Technical University of Košice
Faculty of Economics

Central European Conference in Finance and Economics (CEFE2017)

September 20 – 21, 2017
Herľany, Slovak Republic

Beáta Gavurová – Michal Šoltés

2017

Suggested citation:
AUTHOR, A. Title of the paper. In: Central European Conference in Finance and Economics (CEFE2017), Technical University of Košice, 2017, pp. xx-xx. ISBN

Editors: Beáta GAVUROVÁ
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Published by: Technical University of Košice, 1st Edition (2017)
Number of pages: 906
Number of copies: 300

Grant support and project funding:

Improving Capacities for Enhancing Territorial Attractiveness of the Danube Region (ATTRACTIVE DANUBE)
Utilizing Innovation Potential of Urban Ecosystems (URBAN INNO)

All published papers have been reviewed before publishing. The Conference Proceedings have not been amended or proofread. Editors are not responsible for the language used in the papers.

ISBN 978-80-553-2906-2

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Nigeria Economic Crisis 2015: The root causes, repercussions, and remedies

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Abstract

This paper studies the current economic crisis/meltdown in Nigeria as a brainchild of systematic institutional failure, hyper-corruption and mismanagement, orchestrated by the former governmental regime. The paper finds surmountable factors that lead to the recession and the untold hardship it is having on the Nigerian populace. This paper embraces all possibilities from far and wide that could proffer some significance solutions which could bail Nigeria out of this economic quagmire.

Keywords: Economic Crisis, Economic meltdown, Corruption, Mismanagement, Economic diversification, Poverty.

JEL Classification: E24, E61, E65, G01, G28, N17

1 Introduction

Nigeria is one of the Sub Saharan Africa's largest economies and relies heavily on oil as its main source of foreign exchange earnings and government revenues. As for the population, it is the most populous country in Africa (World Bank, 2017), following the 2008-09 global financial crisis, the banking sector was effectively recapitalized and regulation enhanced. Since then, Nigeria's economic growth has been driven by growth in agriculture, telecommunications, and services. Economic diversification and strong growth have not translated into a significant decline in poverty levels; nonetheless, over 62 % of Nigerians, i.e. 193.3 million people still live in extreme poverty (Anger, 2010; Worldometers, 2017; World Bank, 2017).

Prior to Nigeria economic meltdown in 2015, Nigeria was the largest economy in Africa and the 26th largest in the world with a GDP of $510 billion (World Bank, 2017). Only 14 % of GDP is from the Oil sector, with retail and wholesale trade being the biggest drivers of GDP growth. Potential to achieve 7.1 % annual GDP growth could make Nigeria a top-20 economy in 2030, with GDP of more than $1.6 trillion (Nigeria Stock Exchange, 2014).

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2 Economic crisis in Nigeria

The current economic crisis in Nigeria started in 2015 shortly after the Buhari led administration stepped into the corridors of power. The president cried out publicly that he inherited an empty treasury from his predecessor (The Guardian, 2015).

Table 1 Nigeria Economy: overview from 2011-2017

Year	2011	2012	2013	2014	2015	2016	2017
Population*	164	168	173	174	179	184	193
GDP**	411.74	460.95	514.96	568.49	481.06	405.08	413.70
Real GDP growth	6.30	5.50	5.10	6.30	2.70	-1.70	0.80
Unemployment	6.00	10.60	10.00	7.80	9.00	12.10	14.20
Inflation rate (%)	10.28	11.98	7.95	7.97	9.55	18.54	16.05
Public Debt	41,549.44	48,496.23	54,544.31	56,759.22	55,576.28	47,662.69	52,884.91
Exchange Rate (NGN/USD)	158.76	157.58	158.79	171.10	197.74	306.00	305.10
GDP (in ppp)	856.62	909.73	974.29	1,054.31	1,093.92	1,091.23	1,125.24
GDP p.c.	2,583.00	2,798.00	3,042.00	3,268.00	2,763.00	2,211.00	2,192.00
Foreign Reserves	36.26	47.55	46.25	37.53	31.33	25.84	30.50
Crude Price	94.73	92.20	95.79	105.00	26.40	41.20	51.13
Annual Budget	3.57	3.94	4.98	4.64	4.49	6.10	7.44

NB: * in millions, ** in milliards, United States dollar is represented by USD and Nigerian currency (Naira) is represented by NGN in the table
Source: Amadeo (2017), World Bank (2017)

Economic crisis is a situation in which the economy of a country experiences a sudden downturn brought on by a financial crisis or other factors. An economy facing an economic crisis will most likely experience a falling GDP, a drying up of liquidity and rising/falling prices due to inflation/deflation.

Edwin G. Dolan (2013) defined economic recession as a decline in GDP for two or more consecutive quarters. GDP is the market value of all goods and services produced within a country in a given period of time (usually one year). Economic recession comes with some forces such as inflation, reduction in per capita income, unemployment crowned with poverty (Noko, 2016). An economic crisis is the overall slump in the economy that has an influence on the entire economic activities.

Many theories have been developed regarding the underlying causes of crises. Although, fundamental factors – macroeconomic imbalances, internal or external shocks — are often observed, many questions remain about the exact causes of crises (Claessens & Kose, 2013). Financial crises sometimes appear to be driven by "irrational" factors, including sudden runs on banks; contagion and spillovers among financial markets; limits to arbitrage during times of stress; the emergence of asset busts, credit crunches, and fire sales; and other aspects of financial turmoil. Indeed, the idea of "animal spirits" (as a source of financial market movements) has long occupied a significant space in the literature attempting to explain crises (Keynes, 1930; Minsky, 1975; Kindleberger, 1978).

The following factors contributed to an economic crisis in Nigeria (Olatunji & Weihang, 2017):

(1) Unexpected decline of values of stocks and securities
(2) Frauds – mismanagement of funds at a huge scale
(3) Asset liability mismatch of financial institutions
(4) Lack of transparency, accountability, and opaque monetary policy, etc.
(5) Crashed on the price of crude oil.

An economic crisis has a severe impact on the general public. Increasing unemployment rate impacts the living conditions of the people, whereas the downturn of the performance of financial institutes has a severe impact on the performance of the entire economy. While financial crisis is any of a broad variety of situations in which some financial assets suddenly lose a large part of their nominal value. In the 19th and early 20th centuries, many financial crises were associated with banking panics, and many recessions coincided with these panics.

Financial crisis is a disturbance to financial markets, associated typically with falling asset prices and insolvency amongst debtors and intermediaries, which ramifies through the financial system, disrupting the market's capacity to allocate capital."– (Eichengreen & Portes, 1987). Financial crisis mainly occurs due to drop of values of the financial assets; thus, it influences the financial and investment markets in an economy. A severe financial crisis always leads to economic crisis.

It has been estimated that every two years the world is suffering from one form of financial or economic crisis. For instance, since the 2015 economic crisis in Venezuela, about 105 people died as a result of the crisis, and more than three third of the grocery shops, pharmaceutical shops to mention just a few are closed down because of lack of products. In the case of Nigeria, the inflation rate has hit 16.05 % and unemployment rate is nearly 14.2 % as for July 2017. Many workers where sacked because the companies could hardly pay their employees' salaries and wages. During last century, Nigeria has suffered from series of economic crises, but Nigeria's economy suffered its first annual contraction in 25 years as growth in Africa's top oil producer shrank for the fourth consecutive quarter of 2016. The West Africa nation fell into a technical recession in the first half of 2016, as its finances were hits by low oil prices and declining crude output following militant attacks on pipelines in the Niger delta region (Flick, 2017).

2.1 Theoretical Background and literature review

The history of economic crises dated back to the first century, the financial panic of 33 AD, caused by mass issuance of unsecured loans by main Roman banking houses.

The Crisis of the third century was a period of approximately 50 years in the third century AD, during which the Roman Empire nearly collapsed in the face of civil war, foreign invasion, plague, and economic depression. The third Century Economic Crisis caused by the policy failure of Severus Alexander to devalue the currency to enable him pay his troops. Sometimes known as "the Anarchy," it resulted in a collapse of Roman governmental authority. While the Roman Empire survived the Crisis of the Third century and recovered, it emerged from the crisis fundamentally changed. Thus, the Crisis of the Third Century was one of the major turning points in Roman history (Galbraith, 1990).

In general, the World has hardly stays without one form of Economic crisis. Therefore, many mechanisms are in place against all forms of Financial and Economic crises, which most times proof futile to prevent it from happening (Kose & Prasad, 2010).

US Congress created the Federal Reserve System in 1913 to tame the business cycle once- and for all. Optimists believed central banking would moderate booms, soften busts, and place the economy on a steady trajectory of economic growth. A century later, in the wake of the worst recession in fifty years, and his line-up of noted economists chronicle the critical role the Federal Reserve played in creating a vast speculative bubble in housing during the 2000s and plunging the world economy into a Great Recession (Beckworth 2012).

The financial integration in the World played a significant role leading to financial crises, the 2007-2008 financial crisis got spreads globally in stages and countries-by countries, it started in December 2007 in the United States being the epicenter of World financial hub and spread to countries in Europe, Asia and Africa in 2008. The delayed from reaching other countries on time is attributed to their level of business interconnectivities with U.S, the higher the volume of business cooperation, the faster it gets to such countries (Pyun & Jiyoun An, 2016). We can distinguish between several types of financial crises, e.g.: Currency crises occur when a fixed exchange rate regime collapses or a currency goes into a free fall, like the case of Nigeria in 2016, when naira currency pegged at #189/$1 was not feasible and the Central Bank of Nigeria has to introduce flexible exchange rates to ease the availability of dollars in the markets.

A *currency crisis* involves a speculative attack on the currency resulting in a devaluation (or sharp depreciation), or forcing the authorities to defend the currency by expending large amount of international reserves, or sharply raising interest rates, or imposing capital controls (Reinhart & Rogoff, 2009; Shin, 2009).

A foreign debt crisis takes place when a country cannot (or does not want to) service its foreign debt. It can take the form of a sovereign or private (or both) debt crisis. The case of PIIGS countries (Portugal, Italy, Ireland, Greece, and Spain) in 2010-2013 respectively.

A domestic public debt crisis takes place when a country does not honour its domestic fiscal obligations in real terms, either by defaulting explicitly, by inflating or otherwise debasing its currency, or by employing some (other) forms of financial repression.

Banking crises include bank runs, which affect single banks; banking panics, which affect many banks; and systemic banking crises, in which a country experiences a large number of defaults and financial institutions and corporations face great difficulties repaying contracts.

Banking crises are quite common, but perhaps the least understood type of crises. Banks are inherently fragile, making them subject to runs by depositors. Moreover, problems of individual banks can quickly spread to the whole banking system (Shelton, 2009). While public safety nets, including deposit insurance – can limit this risk, public support comes with distortions that can actually increase the likelihood of a crisis. Institutional weaknesses can also elevate the risk of a crisis. For example, banks heavily depend on the information, legal and judicial environments to make prudent investment decisions and collect on their loans. With institutional weaknesses, risks

can be higher. While banking crises have occurred over centuries and exhibited some common patterns, their timing remains empirically hard to pin down.

2.2 Methods and Data collections

For empirical part of this paper, data are used to show the gravity of the negative effects of the economic crisis on Nigerians and how it affects all facets of the economy. Tables and graphs are used for better explanations and enhancement of the research.

Nigeria's housing market remains depressed, undermined by a combination of problems – economic recession, high interest rates, high inflation, rising unemployment, as well as worsening insurgencies. Demand has fallen sharply. House prices are also declining, especially in real terms.

Table 2 Statistical data on the effects of the crisis on Nigeria and Nigerians

Year	2011	2012	2013	2014	2015	2016	2017
House prices (%)	- 4.2	-4.3	-6.1	-9.2	-18.0	-28.4	-22.2
Energy (Per Kwh)	N7	N10	N10	N10	N10	N11.08	N11.08
Rent	N1,200	N1,300	N1,350	N1,900	N2,100	N2,400	N2,700
Tuitions	N6,000	N6,800	N7,500	N8,300	N10,000	N10,900	N12,500
Transport	N2,000	N2,100	N3,000	N3,200	N3,700	N4,200	N5,900
Medicine	N8,400	N8,950	N10,300	N10,850	N11,500	N12,600	N14,000
Clothing	N40.00	N4.10	N4.50	N5.20	N6.30	N7.80	N8.80
Wages (%)	4.00	6.20	8.00	10.00	9.00	7.00	7.10

N.B.: N – Nigerian currency Naira
Source: World Bank (2017); Kolesnikov (2017)

In Nigeria, house prices fell by 28.4 % during 2016, after an annual decline of 18 % in 2015 and y-o-y decline of 9.2 % in 2014, 6.1 % in 2013, 4.3 % in 2012, and 4.2 % in 2011. When adjusted for inflation, house prices in Nigeria actually dropped a dramatic 18.2 % during 2016. The cost of energy keep increasing despite the economic downturn, for instance it increased from N10 in 2015 to N11.08 in 2016 and 2017 respectively. There was a high increase from 2011 to 2015 from N7 to N10 due to the privatisation policy implemented by the administration of Olusegun Obasanjo with the hope of boosting the sector (Chijoke, 2016).

The wage increment continues from 2011 to 2014 when the economy was pretty much in good shape, but started declining from 2015-2017 when the economy started experiencing crisis. Despite the fact that wages keep declining during the recession, the cost of tuitions keep increasing at an alarming rate, which made so many children to drop out of colleges and universities because their parents were not able to afford the bills. The same thing is applicable to rent and medicine, their prices keep on increasing unabated most especially during the crisis.

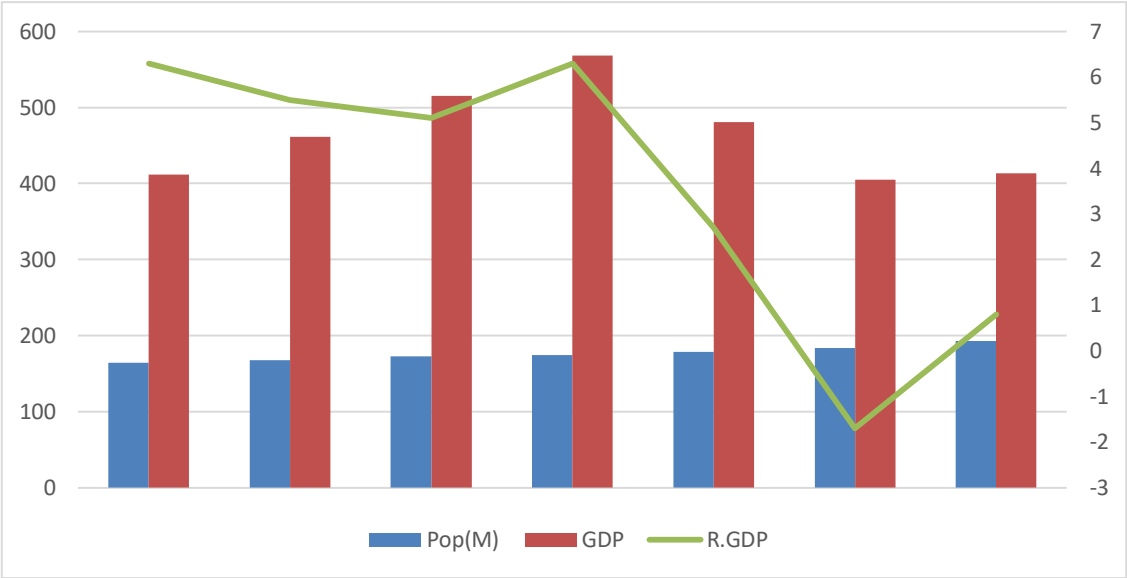

Figure 1 Population, GDP, and Real GDP growth rate in Nigeria, 2011 - 2017
N.B: population is in millions, GDP is in milliards, R.GDP is growth rate of real GDP represented on the right axis
Source: National Bureau of Statistics (2017)

The population growth was at a moderate level, but it has a sever effects on the populace considering the GDP growth rate. While the population growth increased on yearly basis during the year under investigation, the GDP growth increased steadily from 2011 to 2014, and started declining as a result of crash on the price of crude oil, and this shows crystal clear the level of Nigerian government dependence on crude oil. Real GDP growth rate was at its best in 2011 and 2014 respectively and slumped to the all-time low in 2016 (-1.7), when the country fell into recession. It picked up in 2017Q2 when the Government policy focusing on boosting none oil sectors formerly abandoned became the hallmark of the economy.

The following chart shows the lowest unemployment level was in 2011and the highest was in 2017Q2. Unemployment rate increased drastically from 2015Q4 to 2017Q1 due to recessional effects. The inflation rate increased steadily from 2014 and hit the highest level in 2016. The economy started looking positive because of an increase in the price of crude oil at the international market and a truce brokered by the federal government with the Niger Delta militant groups who are agitating for resource control. The economy experienced stable and lowest inflation rate between 2013-2014 at 7.95 and 7.97 respectively.

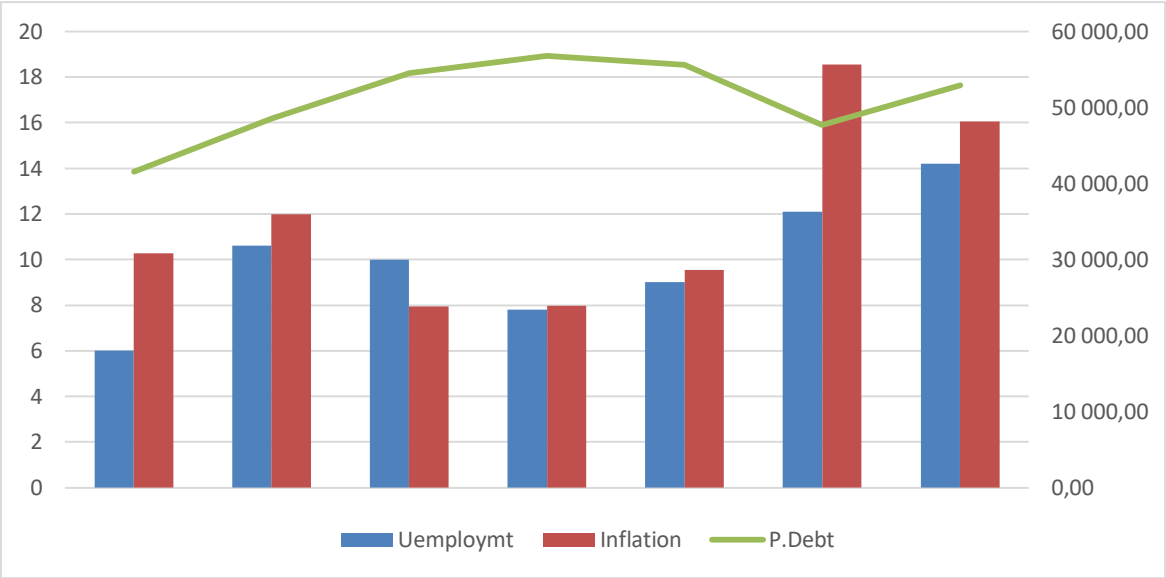

Figure 2 Unemployment, inflation rate, and public debt from in Nigeria, 2011-2017
N.B: unemployment and inflation is in % measured on the left axis, public debt is captured in the right axis
Source: Central Bank of Nigeria

Public debt is the government debt (also known as public debt, national debt and sovereign debt) is the debt owed by a central government. (In federal states, "government debt" may also refer to the debt of a state or provincial, municipal or local government.) Government usually borrow by issuing securities, government bonds and bills. The Public debt is calculated as the percentage of the GDP. The debt ratio to GDP in the year under investigation are: 2011= 10.1 %, 2012= 10.5 %, 2013= 10.6 %, 2014 =10 %, 2015= 11.5 %, 2016=11.7 % and 2017 Q1 =12.8 % respectively.

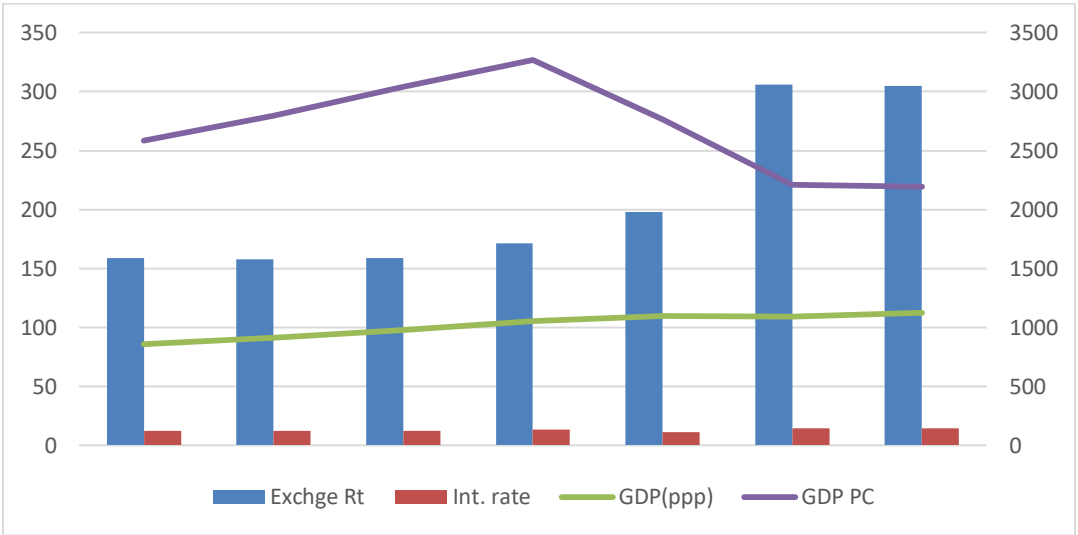

Figure 3 Exchange Rate, Interest Rate, GDP (ppp), and GDP Per Capita in Nigeria, 2011-2017
Source: Nigeria National Bureau of Statistics (2017)

The GDP (PPP) experienced a creeping increments during the period under investigation, while the interest rate was at its lowest in 2015 (11 %) it got increased in 2016-2017 to 14 %, which has a negative effects on growth, resulting from the cost of borrowing.

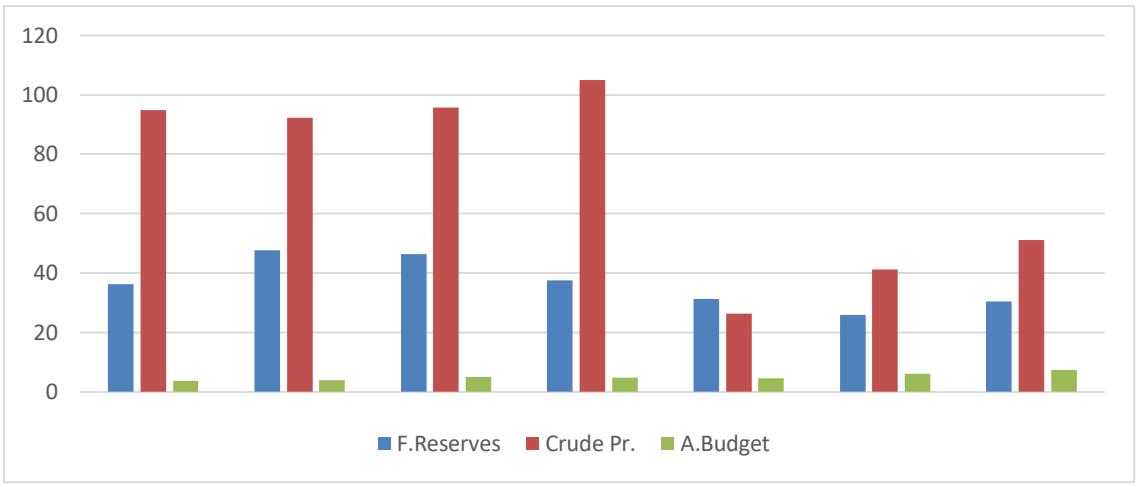

Figure 4 Foreign Reserves, Crude Prices and Annual Budget in Nigeria, 2011 - 2017
Source: Central bank of Nigeria (2017)

There was an increase in foreign reserves from 2011-2012 and a short decline in 2013; the reserves started declining exponentially from 2014-2016, and a short increase in 2017. The price of crude was above $90 per barrels between 2011-2014 and fell below $53 since 2015-2017. During the period under investigation, there was a yearly increase of the annual budget between 2011-2013 and a decline in 2014- 2015. There was an increase of $1.34billion in 2017 annual budget from the previous year.

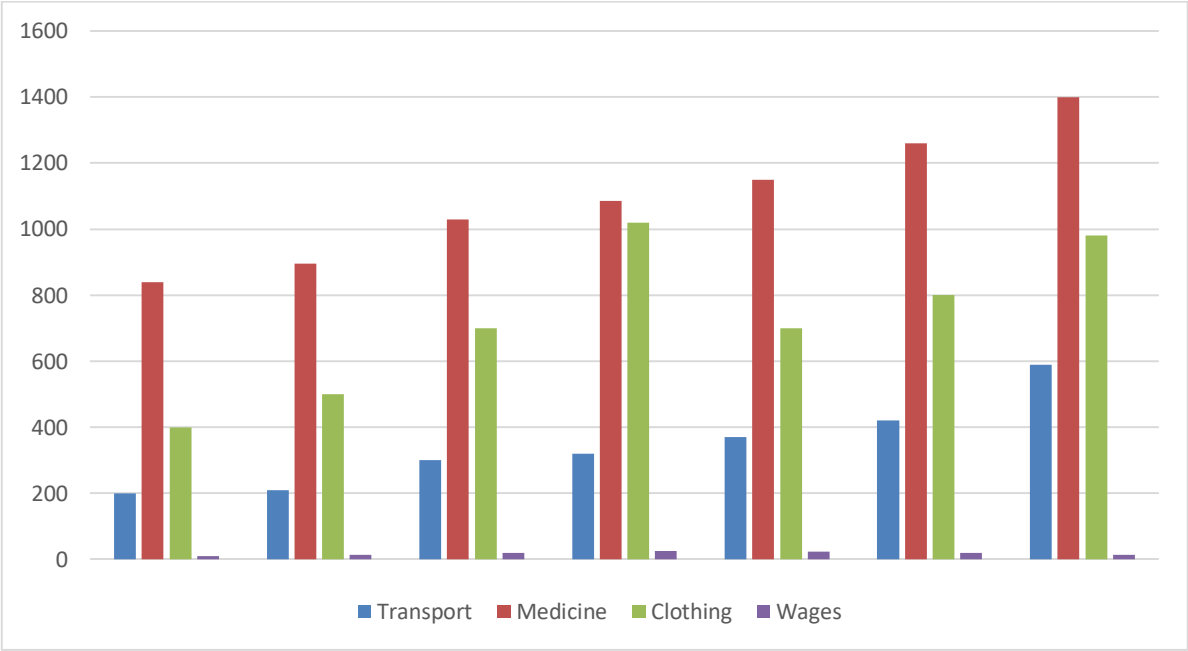

Figure 5 Transportation, Medicine, Clothing and Wages in Nigeria, 2011-2017
Source: Compiled by the author based on the information obtained from National Bureau of Statistics (2017)

The cost of transportation during the period under investigation increased on yearly basis, it went up very high in 2017Q1 and Q2. The medical cost increased exponentially during the period of recession from 1,220 to 1,400 per ordination. The price of clothing was moderate in 2011-2012 and went up very high in 2014. The price went down sharply in 2015 when the recession was

looming and went up during the period of recession. Wages remained very low during the time of recession despite high inflation, it was high in 2014 when the price of crude oil was about 102 USD per barrel.

3 Conclusion

The paper shed more light on the major factors that threw Nigeria into economic quagmire in 2015, despite overtaking South Africa in 2014 as the largest economy in the continent. Nigeria government was engulfed with institutional corruption, mismanagement of public funds, lack of commitment, transparency and accountability, good policy formation, but poor implementation. (Obadan, 2001). Average Nigerians living below the poverty line has increased since it fell into recession. The poverty threshold, poverty limit or poverty line is the minimum level of income deemed adequate in a particular country. At present the percentage of the global population living under extreme poverty is likely to fall below 10% according to the World Bank projections released in 2015. Official statistics report that 70 % of populace live below the poverty line in Nigeria, and this can be attributed to the increasing population, high unemployment rates, income inequality, political instability, corruption etc. The study suggests the following elements could be of vital importance that can possibly help improve Nigeria economy: Full implementation of government policies and programs towards economic diversifications should be among the topmost priorities to avoid "Dutch disease effects in the near future". The government should be more pro-active in preventing and fighting corruptions, this could be done through joint efforts with the international organizations such as CIA, FBI, IMF World Bank and many more anti money laundering agencies all over the globe. The government should focus more on developing her infrastructural base by proving basic social amenities. The 14 % interest rate should be reviewed and reduce to encourage growth. An effective and efficient tax system should be put in place to curb tax evasion. The country should work toward a longer term commitment for benchmark oil prices, as opposed to the current yearly debates and bargaining that surround budget preparation. However, it is widely known that it is an uphill task to come out of economic recession within a short time, the only panacea is the sincerity on the part of government by putting in place some mechanisms that will augment implementation of her policies and programs.

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Analysis of tax competition parameters in the EU countries using clustering methods

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Abstract

Major changes in the tax systems of the EU countries have resulted in the globalization and digitization of the economy, which has substantially increased the geographical mobility of the tax base. These changes resulted in a competitive environment between tax systems. The submitted paper examines in terms of tax competition through cluster analysis methods focusing on identifying and grouping countries into clusters based on predetermined similarities, namely: nominal and effective rates of income tax, gross domestic product, employment rates, inflation rates, total tax burden and total tax revenue. The resulting groups of these multidimensional objects with characteristic properties are compared and subjected to economic verification in order to identify an economically significant categorization based on a combination of several input variables. The analysis has confirmed that tax competition exists between the new and old Member States, while new member states are more competitive than the old ones.

Keywords: Tax burden, Tax revenues, Cluster analysis, Categorization of countries.

JEL Classification: H20, H21, H25

1 Introduction

When assessing tax competition and corporate taxation at European Union level, it must be emphasized, despite the existence of free trade and the common currency, there are 28 different tax systems with different levels of corporate taxation. The fiscal policies of these systems in individual countries are designed to solve current economic and social problems and to stimulate economic and monetary policy growth. Tax policies are currently at the crossroads, either remain a national issue, or it will be necessary to increase cooperation and coordination at EU and international level to solve specific issues and challenges. For the purpose to unify the fiscal policies of these countries, the European Union has set itself the path of harmonization. At present, there are factors that can slow down or even stop the harmonization of tax systems. These are approximations of

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tax systems, which reflect the direction of tax cooperation, which is ultimately not achieved harmonization of tax systems, but their approach.

Despite the fact that tax cooperation is beneficial, recognized and can highly contribute to problem solving, there are opponents of the system who support tax competition Salin (1998), Tiebout (1956). Proponents of tax competition trust in positive impact on increasing of the public finance and tax collection efficiency. As reported Kubátová (2014), some authors see it as a positive barrier for expansion of the public sector and limitation of private sector development. The second group of experts, as for example, Wilson (1999), Stiglitz and Rosengard (2015) or Griffith and Klemm (2004) consider it harmful. They point to the fact that in the public finance market fails, thereby jeopardize tax revenues, and cannot ensure the efficient allocation of fiscal resources. The main problem is the ability of taxpayers to pay taxes in low-tax countries and at the same time to use high-quality public services in a country with a high tax burden. Higher tax burden in individual countries may not always discourage investors from making profitable investments. A country that has a higher tax burden can easily attract investors to a healthy macroeconomic environment, well-built infrastructure and high-quality public services. On the other hand, the low tax burden may not always be a guaranty of return on investment (Haufler & Stähler, 2013; Tóth & Mura, 2014).

In Europe, the problem of tax competition has been evident since the early 1960s. In several countries in this period it began to decline in nominal tax rates, resulting in a negative impact on fiscal externalities, which were based on an independent competition of mobile tax bases. It is necessary to emphasize that since the mid-1980s, statutory corporate tax rates have been substantially reduced in all countries. This phenomenon persists until today, and their downward trend is permanently visible especially when using an effective average tax rate, which results in the widening of the tax base that has occurred in many countries. Larger countries can maintain a relatively high effective tax rates. This finding is based on asymmetric tax competition (Wilson, 1991) and "a new trade theory" (Baldwin & Krugman, 2004). The theory of asymmetric tax competition has elaborated differences in capital elasticity between large and small countries, where higher tax rates are more balanced. The new trade theory says that countries with a large domestic market can maintain higher tax rates. On the theoretical level, live discussions about profit of society, welfare and optimal taxation Lucas (1991), Cooley and Hansen (1992), Mendoza and Tesar (1994) as well as the consequences of the economic cycle, economic growth and growth of taxes Greenwood and Huffman (1991), Easterly and Rebelo (1993), which depend on the characteristics of tax policies in individual countries. Measuring tax rates in terms of macroeconomic models has proven to be very demanding because marginal corporate tax rates are based on a large amount of macroeconomic information on the country, its tax system, tax policy, tax incentives, concessions and exemptions as well as investment projects in certain sectors (Buiter, 1981; Aschauer & Greenwood, 1985). Economic development of countries is an important criterion for segmentation, which is expressed as GDP or GDP per capita, and is the subject of interest of several researches such as (Castro & Camarillo, 2014; Pessino & Fenochietto, 2010). These authors in the economic analysis devoted examining of dependence between GDP and tax revenues. In their works, they pointed out that growth in profits out of which the corporate tax paid, mainly positively influences GDP growth. Equally important factors are indicators of employment and unemployment, which Urbancová and Hudáková (2015) a Tosun (2006) tested as explanatory variables that potentially affect tax revenues. Osterloh and Heinemann (2013) in their research came to the conclusion that in addition to macroeconomic determinants that support of a minimum corporate tax at Member State level, decisive are other socio-economic and geographical factors,

which included their political affiliation, individual characteristics and educational level as well as national interests.

2 Objective, material and methods

The aim of the paper was to review and confirm tax competition between new and old Member States with regard to pre-defined segmentation criteria using hierarchical and non-hierarchical clustering methods. The selection of indicators was made on the basis of the theoretical knowledge of Barro (1979), Devereux, Griffith and Klemm (2002), Clausing (2011), which examined the relationships and the impact of macroeconomic factors on the corporate tax area and the retroactivity of tax on factors in the future. The authors in their work investigated by multidimensional scaling similarities / differences (distances) between examined objects and relationship and impact of selected economic indicators affecting the tax area. The data from Eurostat and KPMG were used to monitor the impact of macroeconomic determinants on the categorization of member countries:

- *nominal (statutory) corporate tax rate (NTR)* in %,
- *effective corporate tax rate* (EATR) in %,
- *gross domestic product* in mil. €,
- *employment rate:* the indicator represents the share of people aged 15 to 64,
- *inflation rate:* measured on the basis of a harmonized index of consumer prices,
- *total tax burden:* expresses the ratio of income from all types of taxes and social contributions in the form of taxes to GDP in %
- *total tax revenues:* express total tax revenue from direct and indirect taxes at current prices in mil. €.

Categorization was performed by several methodological approaches to the study of the data, based on the concept of Euclidean metric (Halkida et al., 2001). In accordance with the stated intent was within the methodology used cluster analysis of hierarchical and non-hierarchical clustering methods. From hierarchical method was chosen Ward linkage analysis (in practice most often used). From non-hierarchical methods was used fuzzy c-means, which is specific to other methods and makes it possible to reveal so-called classification indefinite objects using the kmeans and fanny functions (Ferreira & Hitchcock, 2009; Chartier et al., 2012). Analyzes were performed in the statistical language R using psych, GPArotation, nFactors, cluster and NbClust, and the comparison periods were 2004 and 2015.

Since the indicators gained diametrically different values, in the first step of the analysis we transformed the data by transformation into z-score. Each item was subjected to standardization / normalization by subtracting the mean value and dividing it by the standard deviation, resulting in a zero average and a standard deviation unit. Subsequently, we have visualized and evaluated the data and their signs of clustering in terms of the mutual distribution of countries.

3 Clustering analysis in the context of the tax competitiveness of EU countries

3.1 Ward's method

This is by economists Mojena (1977) the most used and very favorite hierarchical method, which authors consider to be the most effective. Ward's method produces compact clumps of the same multiplicity, method determines the relative distance between clusters using approach analysis of

variance. The clusters are designed to minimize the intraglued sum of squares of object deviations from the cluster center. Using the estimated NbClust function and the cutree command in the R program, we determined the optimal number of clusters that we then plotted in the form of a dendrogram. As we compare 2004 and 2015, it was necessary to determine for each period a number of clusters (Figure 1 and Figure 2). The number of clusters for both years was set at 4.

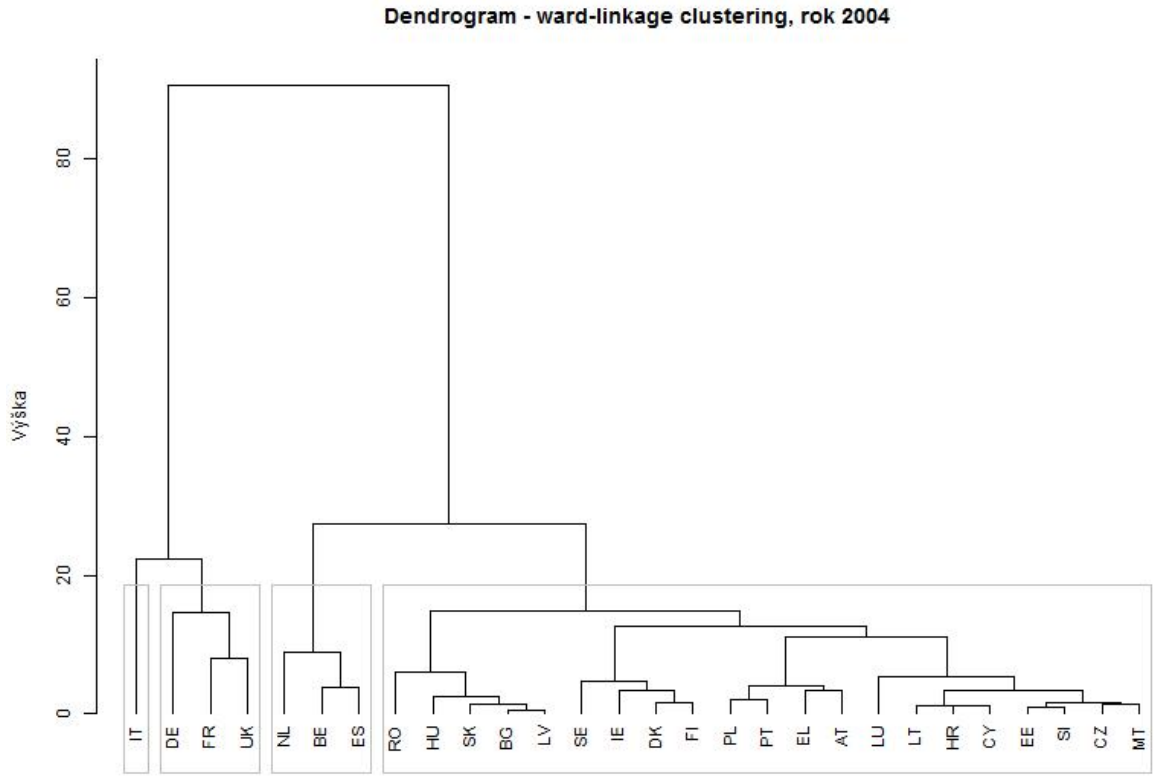

Figure 1 Dendrogram: Ward Method (2004)
Source: Own processing

In 2004, the countries were divided into clusters and their multitude and structure varied. The first cluster consisted only of Italy, as an isolated country. The second cluster was made up of countries: Germany, France and the United Kingdom. The third cluster was made up of the Netherlands, Belgium and Spain. The first three clusters form countries that rank among the old member states. Values of monitored indicators are partly the same, and the height of the statutory rate, which is a crucial indicator in corporate taxation constitutes, the difference between the countries in this case is only 1 %. The fourth cluster is the most numerous. It consists of 21 countries, namely Romania, Hungary, Slovak Republic, Bulgaria, Latvia, Sweden, Ireland, Denmark, Finland, Poland, Portugal, Greece, Austria, Luxembourg, Lithuania, Croatia, Cyprus, Estonia, Slovenia, Czech Republic and Malta. Despite the fact that this cluster is made up of a mix of old and new member states, we can conclude that the old Member States in this cluster are clustered in the second and third branch and the new member states will clump in the first and fourth branches (Figure 1). This proximity and clustering of new and old Member States in specific clusters shows that within member countries exist the differences in corporate taxation.

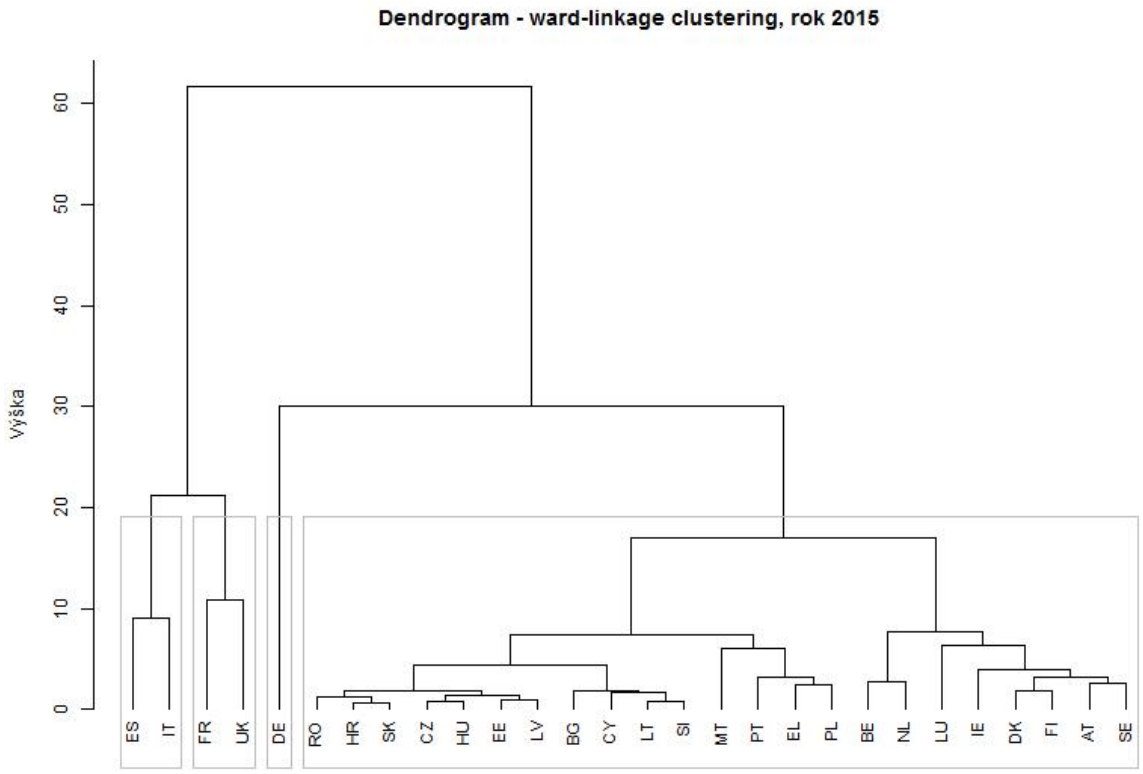

Figure 2 Dendrogram: Ward Method (2015)
Source: Own processing

In 2015, the number and structure of country clustering has changed. The first three clusters were formed as in 2004 by old Member States and the fourth, most numerous (23), was made up of a mix of old and new member states. First cluster consisted of: Spain and Italy (which was in separate cluster in 2004). Second cluster was made up of 2 countries: France and United Kingdom. Third cluster consisted only of Germany. The last fourth cluster consisted of: Romania, Hungary, Slovakia, Bulgaria, Latvia, Sweden, Ireland, Denmark, Finland, Poland, Belgium, Netherlands, Portugal, Greece, Austria, Luxembourg, Lithuania, Croatia, Cyprus, Estonia, Czech Republic and Malta. As in 2004, in fourth cluster we can see mutual grouping of new Member States, which are grouped in the first and second branch of the cluster (change occurred only in branches of the cluster). On the contrary, the old member states expressed their mutual proximity in the third and fourth branch of the cluster. The reason for mutual proximity and division in the fourth cluster is mainly expressed in the similarity of values of the monitored indicators. The difference between values of indicators of old and new Member States is orderly ten times in this cluster. The new member countries in corporate taxation are more competitive, mainly due to lower statutory rates (from 10 % to 22 %) and the effective rate (from 11.33 % to 24.2 %) as reported by several authors Kubátová et al. (2009), Burak (2012). The results of cluster analysis with this method have a satisfactory conclusion, since none of the clusters overlap and have a common intersection.

3.2 The method of undetermined clustering: the fuzzy c-means

Second monitored method was non-hierarchical fuzzy c-means method that differs substantially from other methods and is particularly useful in detecting various types of fraud in practice. This method uses probabilistic calculations and allows countries (objects) belong simultaneously to multiple clusters, each with a certain probability or indeterminate. Placed countries was assigned a

percentages of probability. Indeterminate countries represented countries whose share in individual clusters is approximately equal (total 100 %). The relevance of certain countries was more than 50 %. On the basis of that each country were assigned probability values. The analysis was visually displayed in the form of multidimensional scaling that create clusters based on the highest probability to each of the countries in clusters (Figure 3 and 4). Color blending rate represents the percentage of particular object belonging to individual clusters.

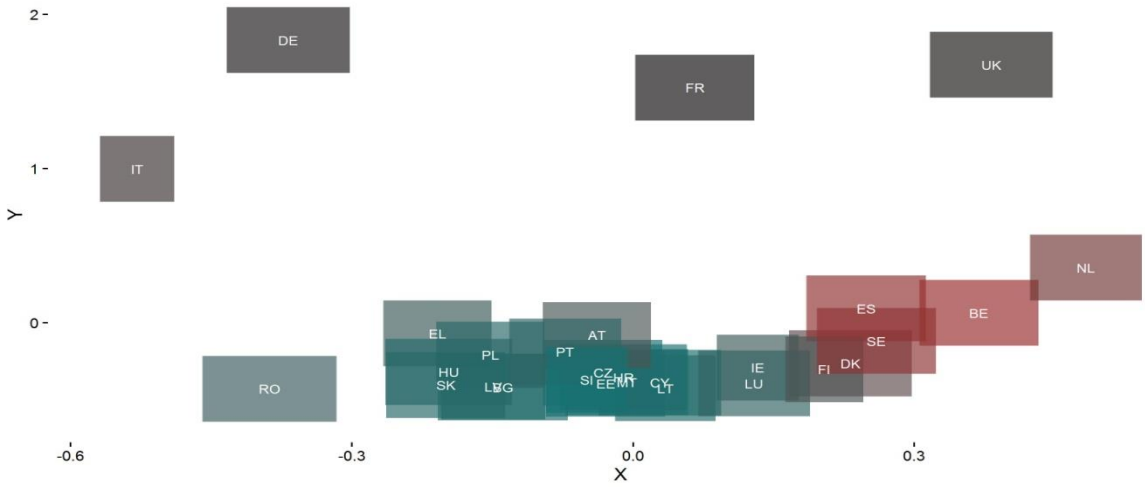

Figure 3 Fuzzy c-means (2004)
Source: Own processing

Table 1 categorizes countries for 2004 and 2015. Average membership of a cluster in 2004 was 66.35 %. Above this average were France (83.44 %), United Kingdom (72.33 %) and Germany (69.22 %). The monitored countries had a strong degree of belonging to the fourth cluster. Although other countries including: Italy, Romania and Netherlands visually operate as separate objects, countries did not show a strong affiliation to any cluster, we can even say that they are indefinite countries: Italy (23.47 %, 19.42 %; 19.42 % and 37.69 %), Romania (22.84 %, 35.69%, 35.69 % and 5.78 %) and the Netherlands (43.90 %, 21.34 %, 21.34 % And 13.42 %).

Compared with the Ward method, Germany, France and United Kingdom were part of the second cluster. Below the average were Belgium (59.96 %), Spain (57.16 %) and Sweden (56.01 %). Their rate of membership was strong at first cluster, which is confirmed by the Ward's method analysis, except for Sweden, which was part of the fourth cluster.

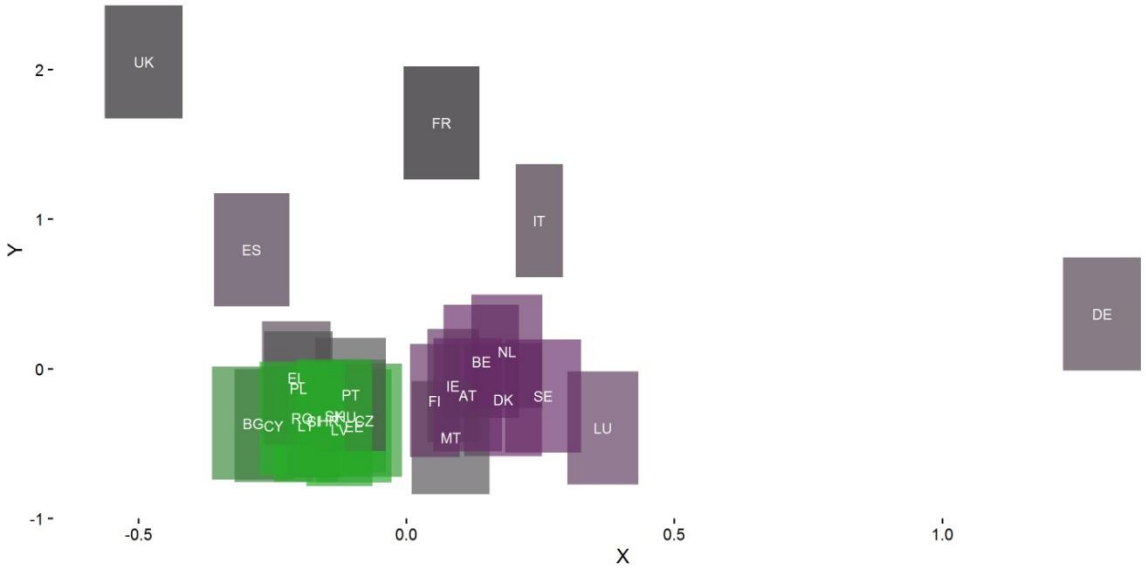

Figure 4 Fuzzy c-means (year 2015)
Source: Own processing

For classifications in 2015, the average was 67.58 %. France showed above-average values with 81.66 % rate of belonging to the fourth cluster and Croatia (74.14 %) with Romania (69.33 %) to the second cluster. In comparison with Ward method, Croatia and Romania are part of the fourth cluster. France was included in the second cluster only at Ward's method Table 1 evaluated as separate objects Germany, Italy, Spain and United Kingdom, which are not showed a strong membership to any cluster, even we can state that they are indefinite countries: Italy (23.47 %, 19.42 %, 19 42 % and 37.69 %), Germany (28.21 %, 22.74 %, 28.21 % and 20.83 %), Spain (25.06 %, 18.89 %, 25.06 % and 30 %, 99 %) and United Kingdom (11.61 %, 10.05 %, 11.61 % and 66.73 %). Below average values reported Latvia (67.50 %), Slovakia (65.8 %), Estonia (65.79 %), Hungary (65.51 %), Lithuania (63.6 %), Slovenia (63.27 %) and Czech Republic (60.02 %). All reported countries have rate of belonging to second cluster below average, while they are inserted into the fourth cluster by Ward's method. UK had some 66.73 % belonging to the fourth cluster, with Ward's method it is part of the second cluster.

Table 1 Categorization of EU Member States by the fuzzy c-means method (2004 and 2015)

Country	2004				2015			
	C1	C2	C3	C4	C1	C2	C3	C4
BE	**59.96 %**	17.23 %	17.23 %	5.57 %	39.40 %	16.23 %	39.40 %	4.97 %
BG	12.81 %	42.44 %	42.44 %	2.30 %	22.02 %	52.50 %	22.02 %	3.46 %
CZ	9.90 %	44.29 %	44.29 %	1.52 %	19.02 %	**60.02 %**	19.02 %	1.93 %
DK	37.03 %	29.74 %	29.74 %	3.50 %	40.29 %	16.26 %	40.29 %	3.16 %
DE	11.30 %	9.74 %	9.74 %	**69.22 %**	**28.21 %**	**22.74 %**	**28.21 %**	**20.83 %**
EE	9.79 %	44.32 %	44.32 %	1.56 %	16.21 %	**65.79 %**	16.21 %	1.80 %
IE	25.38 %	35.88 %	35.88 %	2.85 %	37.86 %	20.50 %	37.86 %	3.78 %
EL	24.47 %	35.15 %	35.15 %	5.22 %	33.82 %	27.83 %	33.82 %	4.52 %
ES	**57.16 %**	18.67 %	18.67 %	5.51 %	**25.06 %**	**18.89 %**	**25.06 %**	**30.99 %**
FR	6.33 %	5.11 %	5.11 %	**83.44 %**	6.49 %	5.35 %	6.49 %	**81.66 %**
HR	10.34 %	44.01 %	44.01 %	1.65 %	12.22 %	**74.17 %**	12.22 %	1.40 %
IT	**23.47 %**	**19.42 %**	**19.42 %**	**37.69 %**	**22.53 %**	**17.19 %**	**22.53 %**	**37.75 %**
CY	11.84 %	43.15 %	43.15 %	1.87 %	23.87 %	48.96 %	23.87 %	3.30 %

LV	13.01 %	42.31 %	42.31 %	2.37 %	17.14 %	**63.60 %**	17.14 %	2.13 %
LT	13.71 %	42.00 %	42.00 %	2.29 %	15.29 %	**67.50 %**	15.29 %	1.92 %
LU	20.17 %	38.40 %	38.40 %	3.03 %	35.82 %	22.32 %	35.82 %	6.05 %
HU	14.80 %	41.23 %	41.23 %	2.74 %	16.39 %	**65.51 %**	16.39 %	1.72 %
MT	12.39 %	42.82 %	42.82 %	1.96 %	32.14 %	31.32 %	32.14 %	4.41 %
NL	**43.90 %**	**21.34 %**	**21.34 %**	**13.42 %**	38.20 %	17.17 %	38.20 %	6.43 %
AT	29.34 %	33.33 %	33.33 %	4.00 %	40.50 %	16.30 %	40.50 %	2.70 %
PL	16.47 %	40.27 %	40.27 %	2.99 %	31.74 %	32.70 %	31.74 %	3.83 %
PT	17.85 %	39.73 %	39.73 %	2.68 %	32.63 %	31.65 %	32.63 %	3.10 %
RO	**22.84 %**	**35.69 %**	**35.69 %**	**5.78 %**	14.43 %	**69.33 %**	14.43 %	1.80 %
SI	9.00 %	44.80 %	44.80 %	1.40 %	17.38 %	**63.27 %**	17.38 %	1.96 %
SK	15.30 %	40.88 %	40.88 %	2.94 %	16.23 %	**65.84 %**	16.23 %	1.71 %
FI	30.65 %	33.02 %	33.02 %	3.31 %	38.94 %	19.57 %	38.94 %	2.56 %
SE	**56.01 %**	20.19 %	20.19 %	3.60 %	39.52 %	17.09 %	39.52 %	3.88 %
UK	10.46 %	8.60 %	8.60 %	**72.33 %**	**11.61 %**	**10.05 %**	**11.61 %**	**66.73 %**

Source: Own processing

Among the indefinite countries with the same rate of membership in all four clusters in 2004 were Italy (23.47 %, 19.42 %, 19.42 % and 37.69 %) and Netherlands (43.90 %, 21.4 %, 21.34 % and 13.42 %). In previous methods, Netherlands was part of first and second cluster and Italy of the first, second and third cluster. Other objects are considerably different by distance of clustering. In 2015, Italy (22.53 %, 17.19 %, 22.53 % and 37.75 %), Germany (28.21 %, 22.74 %, 28.21 % and 20, 83 %) and Spain (25.06 %, 18.89 %, 25.06 % and 30.99 %) are marked as indefinite countries.

Clearly, the old Member States showed a strong affiliation evenly to all clusters. In the previous method, Germany was part of the second, third and fourth cluster. Italy, the first, second and third cluster, and Spain first and third cluster. Italy is the only country within the EU, which belonged to the indefinites countries in both monitored periods, so is not showing strong affiliation to any cluster and still in Figure 3 and 4 operates as a separate object. Despite the fact that this method causes a difference in creating clusters, we consider the results comparable to Ward method, even if there is a movement between clusters of countries, however the structure of individual clusters was preserved.

3.3 Comparison of results of selected factors by cluster analysis

The basic difference between hierarchical and nonhierarchical clustering methods is the fact that non-hierarchical methods do not create a tree structure clustering objects. Results of the methods used in the analysis were very satisfactory and structure of the countries in the clusters is different for the reference years. Variations occurred in the classification in the cluster, but also in numbers of countries in the cluster. Clearly, the member countries reflect corporate taxation and split into two groups within clustering on the basis of input variables. The first group consisted of old member states with year of entry (1958-1995) and the second group consisted of the new Member States with the year of entry (2004-2013) to EU.

Table 2 Breakdown of EU countries by clustering methods (2004 and 2015)

2004				
Methods of clustering	cluster I	cluster II	cluster III	cluster IV
Ward method	IT	DE,FR,UK	NL,BE,ES	RO,HU,SK,BG, LV,PL,PT,EL, AT,LT,HR,CY, MT,CZ,EE,SI, LU, IE, DK, FI
Fuzzy c-means method	BE,ES,SE	-	-	DE,FR
2015				
	cluster I	cluster II	cluster III	cluster IV
Ward method	ES,IT	FR,UK	DE	RO,HU,SK,BG, LV,PL,PT,EL, AT,LT,HR,CY, MT,CZ,EE,SI, LU, IE, DK, FI
Fuzzy c-means method	-	CZ,EE,LT,LV, HU,RO,SI,SK,UK	-	FR,UK

Source: Own processing

In 2004, the first cluster consisted of Italy by Ward's method and this country was considered indefinite by the method of fuzzy c-means. The first cluster had the highest tax burden (37.1). Second highest tax burden had the second cluster, Germany, France and United Kingdom figured together in the other methods too. Third cluster was formed by the Netherlands, Belgium and Spain, which achieved a high tax burden and GDP growth was strengthened to 2.9 %. The last fourth cluster was characterized by the lowest tax burden of 24.07 % and increased GDP growth was among the most competitive for investors. This was composed of a mix of old and new member countries, but the new Member States had decisive numbers.

In 2015, the structure and numbers were just the same as in the year 2004 in all four clusters. First cluster was represented by Spain and Italy. Second cluster consisted of France and United Kingdom. The inflation rate together with the third cluster was at the same level of 0.1 %. Third cluster was assigned to Germany. First and third cluster comprised of only countries that rank among the old member states. The last fourth cluster was a mix of old and new member states where the lowest tax burden and deflation was at 0.1%. The countries in the fourth cluster are characterized by a low degree of convergence in corporate taxation as the nominal rate ranges from 10 % to 25 %, which is much lower than in the previous clusters.

In conclusion, on the basis of macroeconomic indicators we can state that layout countries in clusters were unambiguous for 2004. As Clausing (2007) says, low tax rates and overall tax burden make it more attractive for business and investment, thereby to form a competitive advantage for companies in those countries. According to Teather (2005) functioning tax competition between countries is based on very simple basic principles. Countries are trying to use it to promote economic activity in the country and thereby stimulate economic growth. Existence of tax competition brings two main effects on tax systems of individual countries. If countries can compete with each other in tax terms, the first consequence will be the reduction in tax rates as countries attract foreign capital from other countries. The second effect is that other countries will be forced to reform their tax systems and seek to reduce tax rates to get the capital back. These effects according to our analysis ensure the highest competitiveness, which have the countries of

this cluster. In our case, the most advantageous and the most competitive environment, which may be provided to investors was found in the cluster, which consisted of a mix of old and new member states, but a critical numbers had a new Member States.

The analysis showed that, despite the continuing integration within the EU and efforts to harmonize tax systems, there are still significant differences between selected countries. The differences are particularly significant in the level of nominal and effective taxation of corporations, which aggregates diversity in the economic development of countries and their fiscal management. The analysis also highlighted significant differences between old and new member countries. In terms of taxation of corporations this is divergent towards the countries in clusters 1, 2 and 3. In these clusters can be found establishing and older countries (with date of entry from 1957 to 2003). The level of effective corporate taxation between these two groups is within the range of 3.8 % -10.5 %. While countries of clusters 1, 2 and 3 can be considered as the least attractive tax, countries in cluster 4 are for taxpayers in terms of tax competition more interesting. These countries create space for growth in social security costs (Kubátová & Říhová, 2009; Arnold, 2011; Remeur, 2015; Hakalová et al., 2014; Geciková et al., 2014). By Nerudová (2008) tax competition should contribute to the fact that government of each country has accessed responsible for making tax policy and that the business environment had a lower tax burden and that tax policy is a tool to create conditions for overall economic growth of the country. Tax competition was suspensory for old member states after the EU enlargement in 2004 because the accession countries offered lower corporate taxation. This is in agreement with Teather (2005), who noticed that the low rate in newcomer countries started reducing tax rates in other countries. Kovács (2005) states that harmful tax competition is trying to transfer tax payers operating abroad and at the same time the country protects domestic investors and the whole tax base by mechanism called "ring fencing". This type of competition leads to overall reduction in tax revenue and disruption of tax structures, especially at tax immobile labor, which has a negative impact on employment in the country. Široký (2012) states that the competition in taxes offers positive signal to countries to increase efficiency in the use of public resources, which ultimately will also help the stimulation and growth of the overall economy of the country.

4 Conclusion

The fact that there is a tax competitiveness between new and old member states, was proved by hierarchical Ward method and non-hierarchical method of fuzzy c-means clustering. Mentioned methods were comparing years 2004 and 2015 and we have divided all member states of the EU-28 based on selected factors equally (for both periods) into four clusters. This economic categorization of countries has been grouped on the basis of selected macroeconomic determinants which demonstrated that the member countries in terms of tax burden and the other macroeconomic factors are divided into new and old Member States, the analysis revealed differences in the taxation of corporations in the European area. The results of individual studies, but also our analysis confirmed that tax competition is not systematic, but is merely the result of incorrect harmonization proposals and different tax systems in different countries. Future assumes that space to implement new harmonization measures is large and it is up to individual countries how these measures will be adopted.

Acknowledgements

This paper was supported by the Scientific Grant Agency of the Ministry of Education of the SR, within the VEGA project no. 1/0311/17 valuation of intangible assets and their reporting methods.

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Predictable Abilities of Composite Leading Indicators of European Countries

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Abstract

The paper is focused on analysis of predictable abilities of composite leading indicator (CLI) of OECD in case of chosen European countries in period 1994-2016. The reason of this research is that predictable abilities of composite leading indicator were in 2012 changed under the influence of changes reference series from index of industrial production (IIP) on gross domestic product (GDP) which represent business cycle. For verification of these predictable abilities of CLI were used methods as seasonally adjusted time series, Hodrick-Prescott filter and cross correlation between CLI and cyclical components of time series IIP and GDP. On the results of cross correlation, we can define three groups of countries. First group represent countries where GDP can be used as reference series, second group represent countries where IIP is better to use and third group of countries where both indicators can be used as reference series represent business cycle. On this research we can recommend which reference series is better for construction of OECD composite leading indicator.

Keywords: Composite leading indicator, Index of industrial production, GDP, Business cycle, Cross correlation.

JEL Classification: E32

1 Introduction

The new wave of interest in the economic cycle, mainly in possibilities of its prediction, came with the World Financial Crisis in 2007 which hit mostly the developed world countries. Many economists started to study not only the causes of this crisis, but also the possibilities of its prediction through the different econometric models (Sinicakova et al., 2017). There are indicators in the economic practice which are able on a certain level provide a short-term prediction of the development of the economic cycles and accordingly warn to the possible negative development of the economy (Tkáčová, 2012). The composite leading indicator is one of these indicators. The composite indicator is created by the aggregation of individual indicators into one complex index which is measurable. Its main characteristic is the ability to describe a selected economic area in more detail than individual indicators by themself (OECD, 2012). The composite indicator of cyclical development of economy, which consists of partial indicators of the economic cycle, belongs to one of the most used composite indicators. This complex indicator reflects the economy development and its cyclical behaviour better than individual indicators by themselves. The selection of cyclical indicators creating the composite indicator is not random, but it depends

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on their economic significance, their explanatory value, their predictive ability and so on (OECD, 2012). Creating of the composite indicator of cyclical development of economy is a relatively difficult process and it requires a precisely specified sequence of individual steps (Nardo & Saisana, 2005). To be able to create this indicator, it is necessary to identify the leading cyclical indicators, whose main task is to predict the turning points in the economic activity and at the same time provide the information on probable rate and amplitude of fluctuations in the reference data row at any phase of the economic cycle. These indicators are considered to be the most important out of the entire group of cyclical indicators, due to their predictive ability (Mestre, 2007). The first leading indicator was developed by the American economist Moore from the Economic Cycle Research Institute. Later in 1960, this indicator was refined into the form of index of leading economic indicators (LEI) (Economic Cycle Research Institute, 2012). Presently, there are more opinions on the composition of the composite indicators of cyclic development of economy (Gavurova et al., 2016). The OECD is of the opinion that the economies are different and therefor the composition of the composite indicators varies depending on the country. On the other hand, the Eurostat states that the economic cycles can be traced through the composite indicators with the same composition.

The methodology of the OECD arises from the growth cycle and the time series can be split into random, trend, seasonal and cyclical components. The OECD used the modified method phase-average trend (PAT) of the American National Bureau of Economic Research (NBER), for the trend prediction until 2008. This method is relatively mathematically and statistically difficult (Boschan & Ebanks, 1978). To simplify its description, the calculation of the trend is based on summing the moving averages of the time series (Nilsson & Gyomai, 2007). The OECD decided to replace the PAT method by Hodrick-Prescott (HP) filter, starting from December 2008. The main reason for this change was that the HP filter was able to eliminate the trend component in one operation and at the same time smooth the time series (Schilcht, 2005). Before the HP filter was used, it was necessary to add the Months for cyclical dominance method to the PAT method, which smoothed the series by using the moving averages (OECD, 2008). The main advantage of the HP filter was its modesty on input data (Bezděk, Dybczak, & Krejdl, 2003). Beneš and N´Diaye (2004) considered the HP filter to be the simplest variant of the modern filtration techniques. The HP filter can be relatively easily applied to any time series (Hodrick & Prescott, 1997). Besides this, it is necessary to input only an entry parameter λ, which optimizes the smoothing of the trend (Fabiany & Mestre, 2000). The HP filter's disadvantage is the fact that its results are devious at the beginning and at the end of time series. It is called a problem of „end-points" (Trimbur, 2006). The time series are supplemented with the predictions to mitigate this problem (Zimková & Barochovský, 2007). The OECD uses the monthly data for the calculation of the composite leading indicator, and starting from March 2012 as the reference range are used monthly data of GDP. Before this date OECD used index of industrial production as reference series for calculation CLI. The OECD is the only institution, which uses parameters of external economy, such as foreign trade, mainly the development of export and the exchange rates. In its approach, it combines both soft and hard data. The individual indicators have the equal weights. The reason for this is the fact that the application of different weights could lead to the minimization of the impact of those indicators, which do not show the required concurrence with other indicators. A reduced reliability of the composite indicators could be the consequence, as some of the indicators have a greater explanatory ability in one cycle and other indicators in other cycles (Gyoma & Guidetti, 2012). Based on the Nilsson's studies (Nilsson & Gyomai, 2007), the indicators used by the OECD have a greater explanatory ability than the indicators used by the European Union.

Table 1 Leading cyclical indicators in CLI OECD of European Countries used most frequently

Leading cyclical indicators (component of CLI OECD)	Countries
Production (manufacturing): tendency (% balance)	Belgium, Czech Republic, Denmark, Norway, Poland, Switzerland, Slovenia, Finland
Production: future tendency (% balance)	United Kingdom, Portugal, Netherlands, Italy, Hungary, Greece, France
Consumer confidence indicator (% balance)	Belgium, Czech Republic, Denmark, Finland, France, Italy, United kingdom
Share prices index	Netherlands, Czech Republic, Estonia, Finland, Hungary, Portugal, Slovakia, Spain, France, Ireland, Norway, Sweden, Switzerland, United kingdom, Ireland, Norway
Manufacturing - Export order books: level sa (% balance)	Estonia, France, Germany, Portugal
Order books: level (manufacturing) (% balance)	Italy, Netherlands, Portugal, Slovenia, Sweden,
CPI All items (2010=100) inverted	Finland, Italy, Norway, Slovenia, France, Czech republic
Finished goods stocks (manufacturing) (% balance) inverted	Finland, Germany, Netherlands, Sweden, Switzerland, United Kingdom

Source: Elaborated by authors

2 Predictable Abilities of Composite Leading Indicators OECD

2.1 Goal of the research and methodology

The aim of the report is to verify the prediction ability change of OECD composite leading indicator, in selected European countries, which arose after the change of reference series from IIP to GDP. It is important to realize cross correlation of cyclical components of GDP and IIP with CLI OECD in selected countries and to compare the gained results consequently. The monthly data of IIP, GDP, and CLI, which are available from OECD databases within the period June 1994 – June 2016, will be the source of data. The time series adjustment was accomplished to acquire cyclical components of IIP and GDP. The adjustment included three steps. First step is *seasonal adjustment of time series (seasonal indices)* – seasonal indices enable us to adjust the time series and gain a cyclical component from original data. We apply smoothed seasonal adjustment method which uses seasonal indices. Second step is *trend elimination (Hodrick-Prescott filter)* – one of the reasons to choose the HP filter is that it eliminates the trend component in one operation and it smooths the whole time series in the same step (Schlicht, 2005). It is rather easy to apply HP filter to any time series. It only remains an input parameter λ to enter. The λ parameter optimalises the trend smoothing (Fabiani & Mestre, 2000). Following values are recommended by literature: $\lambda = 100$ for annual data time series, $\lambda = 1600$ for quarterly time series, and $\lambda = 14\,400$ for monthly periodicity time series (Ladiray et al., 2003). HP filter was applied because it is able to eliminate the trend component and to smooth whole time series in one operation (Schlicht, 2005). When cyclical component of GDP and IIP is gathered it is important to realize the *cross correlation* using Pearson correlation coefficient. Seven months shifts backwards are realised and we bargain for the highest value, which was reached in advance. The minimum value of cross correlation can be considered as a leading element when it reaches the level 0.7.

2.2 Results achieved and their comparison

Table 2 illustrates the relation between the index of industrial production and GDP in particular European countries which was investigated on the basis of cross correlation among their cyclical components.

Table 2 Results of cyclical components cross correlation between the IIP and GDP (June 1994 – June 2016)

Countries	t-5	t-4	t-3	t-2	t-1	t	t+1	t+2	t+3	t+4
Austria	0.592	0.664	0.726	0.770	**0.794**	**0.797**	0.782	0.746	0.693	0.630
Belgium	0.485	0.544	0.586	0.611	**0.611**	**0.595**	0.561	0.511	0.451	0.375
Czech Republic	0.348	0.393	0.441	0.482	0.518	0.545	0.556	**0.565**	**0.564**	0.550
Denmark	0.445	0.472	0.492	0.504	**0.508**	**0.500**	0.479	0.441	0.394	0.340
Finland	0.494	0.569	0.634	0.690	0.729	**0.747**	**0.748**	0.726	0.684	0.627
France	0.505	0.580	0.642	0.692	0.725	**0.740**	**0.738**	0.716	0.675	0.622
Germany	0.578	0.659	0.730	0.786	0.823	**0.838**	**0.834**	0.806	0.759	0.695
Greece	**0.122**	**0.124**	0.117	0.115	0.111	0.106	0.089	0.093	0.070	0.056
Hungary	0.316	0.395	0.477	0.543	0.599	0.633	**0.649**	**0.651**	0.628	0.600
Ireland	0.152	0.167	0.187	0.207	0.222	**0.232**	**0.230**	0.220	0.198	0.167
Italy	0.544	0.638	0.719	0.783	0.828	**0.848**	**0.846**	0.819	0.767	0.697
Luxemburg	0.250	0.308	0.361	0.409	0.443	**0.463**	**0.471**	0.459	0.434	0.397
Netherlands	0.161	0.211	0.265	0.315	0.356	0.388	**0.404**	**0.408**	0.397	0.376
Norway	0.124	0.149	0.183	0.220	**0.251**	**0.266**	0.248	0.212	0.169	0.120
Poland	0.302	0.365	0.423	0.471	0.507	**0.525**	**0.537**	0.525	0.505	0.477
Portugal	0.133	0.172	0.207	0.245	0.275	0.303	**0.312**	**0.307**	0.289	0.266
Slovak Republic	0.220	0.292	0.362	0.426	0.482	0.528	**0.559**	**0.575**	0.571	0.548
Spain	0.230	0.302	0.373	0.435	0.490	0.537	0.573	0.597	**0.611**	**0.607**
Sweden	0.621	0.688	0.743	0.783	**0.804**	**0.803**	0.783	0.746	0.689	0.617
United Kingdom	0.465	0.533	0.587	0.629	0.654	**0.664**	**0.656**	0.633	0.599	0.552

Source: Own calculation by authors

As stated in Table 2 the index of industrial production develops simultaneously with GDP in Austria, Finland, France, Germany, Italy, and Sweden where values of cross correlation in time *t* reach levels above 0.7. On the contrary, there is no statistically significant relation between GDP and IIP in Greece, Ireland, Norway, Netherlands and Portugal. In Belgium, for example, IIP behaves as a leading indicator; by contrast, it acts as a lagging indicator in Hungary, Slovenia or Spain. For that reason, it is necessary to consider in which situations it is appropriate to use either GDP, or the index of industrial production as the reference series.

On the basis of Table 2 it was found out that GDP and IIP cannot be used as the reference series as they do not show concurrence. In March 2012 OECD changed the reference series (from the index of industrial production to GDP) for CLI calculation; however, OECD did not modify the structure of CLI for particular countries. It means that, in some countries, CLI prediction ability change to the new reference series (representing the economic cycle) can occur.

Table 3 and Table 4 were created just after the cyclical components had been achieved and the cross correlation of seven months shifts backwards had been realised. On their basis, it is possible to analyse prediction abilities of CLI OECD against two different reference series. Table 3 contains results of cross correlations between GDP and IIP within the time period June 1994 – June 2016. IIP was considered as reference series by March 2012; however, we were verifying its prediction abilities within the entire reference period.

Table 3 Results of the cross correlation between IIP and CLI OECD (June 1994 – June 2016)

Countries	t-7	t-6	t-5	t-4	t-3	t-2	t-1	t
Austria	0.731	0.759	**0.772**	0.768	0.740	0.690	0.622	0.534
Belgium	0.547	0.584	0.615	**0.633**	0.630	0.608	0.547	0.473
Czech Republic	0.602	0.634	0.661	0.678	**0.683**	0.673	0.646	0.600
Denmark	0.546	**0.561**	0.547	0.519	0.471	0.403	0.334	0.258
Finland	**0.566**	0.543	0.501	0.446	0.377	0.290	0.195	0.087
France	0.601	0.642	0.674	0.693	**0.696**	0.681	0.647	0.592
Germany	0.711	0.755	0.784	**0.792**	0.776	0.733	0.660	0.561
Greece	0.253	0.260	**0.267**	0.260	0.244	0.228	0.200	0.156
Hungary	0.520	0.571	0.615	0.647	**0.661**	0.658	0.633	0.584
Ireland	0.230	0.235	**0.236**	0.229	0.220	0.203	0.188	0.171
Italy	0.581	0.662	0.732	0.788	0.823	**0.834**	0.820	0.780
Netherlands	0.308	0.388	0.456	0.512	0.552	**0.568**	0.562	0.533
Norway	0.087	**0.089**	0.089	0.086	0.083	0.071	0.060	0.045
Poland	**0.484**	0.475	0.454	0.423	0.387	0.345	0.294	0.234
Portugal	0.282	0.315	0.346	0.372	0.395	**0.405**	0.401	0.379
Slovak Republic	-0.080	-0.014	0.059	0.141	0.221	0.303	0.379	**0.441**
Spain	0.486	0.515	0.548	0.570	**0.584**	0.584	0.570	0.545
Sweden	0.635	0.677	0.709	**0.726**	0.725	0.706	0.667	0.617
United Kingdom	0.704	0.737	**0.750**	0.736	0.700	0.640	0.556	0.455

Source: Own calculation by authors

As listed in Table 3, only six countries achieved the level of cross correlation above 0.7, hence, CLI OECD was able to predict accurately the economic cycle development, which represented the index of industrial production. In some countries, CLI OECD cannot be considered as a leading indicator because the value of cross correlation is above 0.4. It is the case of Finland, Greece, Ireland, and Norway. For those countries either the structure of CLI OECD or the reference series of CLI is not appropriate enough.

As already mentioned, in 2012 the reference series was changed without any modification in CLI structure. Consequently, prediction abilities of CLI OECD will be verified considering the reference series which is currently based on time series of GDP estimates with monthly periodicity.

Table 4 Results of cross correlation between GDP and CLI OECD

Countries	t-7	t-6	t-5	t-4	t-3	t-2	t-1	t
Austria	0.723	**0.731**	0.729	0.714	0.686	0.643	0.584	0.510
Belgium	0.695	0.746	0.785	0.809	**0.816**	0.803	0.769	0.714
Czech Republic	0.850	**0.860**	0.857	0.842	0.813	0.770	0.714	0.646
Denmark	0.799	**0.811**	0.810	0.797	0.769	0.728	0.675	0.610
Estonia	0.785	**0.793**	0.790	0.775	0.749	0.712	0.664	0.605
Finland	**0.564**	0.512	0.447	0.371	0.284	0.189	0.087	-0.019
France	0.830	0.855	0.869	**0.871**	0.860	0.835	0.795	0.742
Germany	0.661	**0.673**	0.670	0.651	0.614	0.560	0.487	0.399
Greece	0.801	0.828	0.847	**0.857**	0.857	0.847	0.828	0.802
Hungary	0.486	0.502	**0.510**	0.506	0.488	0.457	0.411	0.353
Ireland	0.787	0.818	0.842	0.859	0.869	**0.870**	0.863	0.846
Italy	0.717	0.767	0.803	**0.824**	0.828	0.813	0.779	0.727
Netherlands	0.697	0.707	**0.708**	0.697	0.673	0.635	0.584	0.519

Norway	0.684	0.696	**0.699**	0.693	0.677	0.651	0.615	0.570
Poland	**0.389**	0.332	0.269	0.201	0.127	0.050	-0.030	-0.111
Portugal	0.687	0.715	0.734	**0.743**	0.740	0.726	0.699	0.660
Slovak Republic	0.659	0.701	0.740	0.771	0.793	**0.802**	0.799	0.781
Spain	**0.856**	0.842	0.819	0.788	0.750	0.704	0.653	0.596
Sweden	0.790	0.831	0.859	**0.873**	0.872	0.855	0.822	0.773
United Kingdom	**0.577**	0.571	0.551	0.517	0.470	0.409	0.336	0.253

Source: Own calculation by authors

Table 4 indicates that CLI has leading behaviour according to GDP in case of most European countries observed. CLI OECD is able to predict the economy cycle development the best in Sweden where value of cross correlation achieved the level 0.873 in four months advance. On the contrary, in Poland no leading ability of CLI was noted at GDP reference series. It is possible to claim that CLI OECD can be considered as an appropriate tool to predict the economic cycle for most of the countries observed, if GDP is selected as the reference series. However, it is not optimal solution for all countries. Consequently, Table 5 is presented and it contains comparison of CLI OECD prediction abilities at different reference series.

Table 5 Comparison of CLI OECD prediction abilities at two different reference series

Countries	**IIP and CLI**		**GDP and CLI**	
	Cross correlation	**time**	**Cross correlation**	**time**
Austria	**0.772**	**t-5**	**0.731**	**t-6**
Belgium	0.633	t-4	**0.816**	**t-3**
Czech Republic	0.683	t-3	**0.860**	**t-6**
Denmark	0.561	t-6	**0.811**	**t-6**
Finland	0.566	t-7	0.564	t-7
France	0.696	t-3	**0.871**	**t-4**
Germany	**0.792**	**t-4**	0.673	t-6
Greece	0.267	t-5	**0.857**	**t-4**
Hungary	**0.661**	**t-3**	0.510	t-5
Ireland	0.236	t-5	**0.870**	**t-2**
Italy	**0.834**	**t-2**	**0.824**	**t-4**
Netherlands	0.568	t-2	**0.708**	t-5
Norway	0.089	t-5	**0.699**	**t-5**
Poland	0.484	t-7	0.389	t-7
Portugal	0.405	t-2	**0.743**	**t-4**
Slovak Republic	0.441	t	**0.802**	**t-2**
Spain	0.584	t-3	**0.856**	**t-7**
Sweden	**0.726**	**t-4**	**0.873**	**t-4**
United Kingdom	**0.750**	**t-5**	0.577	t-7

Source: Own calculation by authors

There are some countries in which CLI OECD is convenient in both reference series. Those countries are Austria, Italy (Figure 1), and Sweden where levels of cross correlation in both cases were above 0.7. Better results of prediction abilities at IIP reference series were recorded only in Germany, Hungary, and United Kingdom. Considerable improvement of prediction abilities at GDP was achieved in Greece (from 0.267 to 0.857), Ireland (0.236 to 0.870), and Portugal (from 0.405 to 0.743). In those countries it is not appropriate to consider IIP as reference series at CLI OECD creation. In case of Finland and Poland (Figure 2), both reference series achieved low values of cross correlation. Thus it is important to change current structure of CLI OECD.

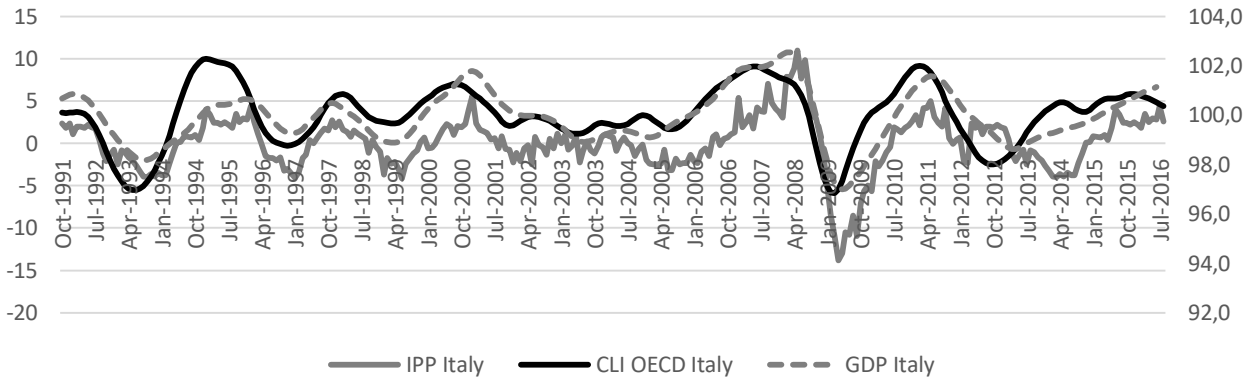

Figure 1 CLI OECD and cyclical components of IPP and GDP for Italy
Source: Developed by the authors

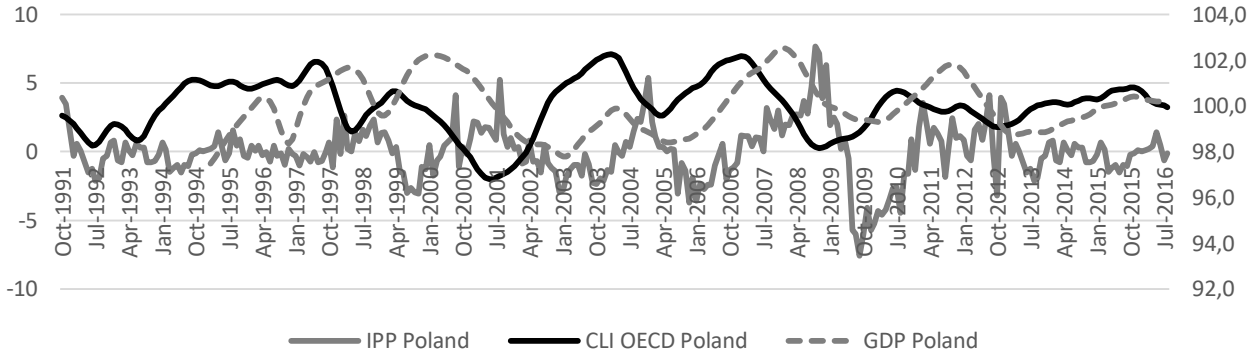

Figure 2 CLI OECD and cyclical components of IPP and GDP for Poland
Source: Developed by the authors

3 Conclusion

GDP, IIP, or composite coincident indicators are markers which are currently used to observe economic cycle of a country. They serve as reference series to create leading composite indicator which is partially able to predict the economy cycle development. OECD monitors and predicts the economic cycles on a long-term basis and it creates CLI for many countries. In 2012, the reference series was changed in order to enhance the prediction ability of CLI OECD whose structure was not changed in particular countries. That was the reason why the present paper is focused on verification the situation. The aim of the report was to validate the change of prediction abilities of OECD composite leading indicator, in selected European countries, which arose just after the change of reference series from IIP to GDP. Cyclical components of GDP and IIP were chosen by application of seasonal index and HP filter and they were consequently exposed to the cross correlation with CLI OECD. Based upon our analysis, it was found out that most of countries achieved better prediction abilities of CLI OECD after their conversion to new GDP reference series. The situation mentioned above occurred in Belgium, The Czech Republic, Denmark, Finland, The Slovak Republic, and many other countries. Only Germany, Hungary and The United Kingdom achieved better prediction abilities by IIP. Austria, Italy, and Sweden reached satisfactory results by both reference series because of high correlation between GDP and IIP in time *t*. In general, CLI OECD is an appropriate tool to predict economic cycles in selected European countries and the change of reference series from IIP to GDP can be considered as positive. In

some circumstances CLI OECD achieved better prediction abilities. Nevertheless, it is important to remark that the index of industrial production can be considered as more appropriate reference series for the economies which are oriented more in industry, because in case of GDP, there are only some estimates (of particular indicator) which are gained by the process of decomposition of quarterly data.

Acknowledgements

This paper was supported by the Scientific Grant Agency of the Ministry of Education, Science, Research and Sport of the Slovak Republic and the Slovak Academy of Sciences under the grant No. VEGA 1/0559/16.

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Shifting Powers – Shifting Gears: Value Creation based on the Digital Impact of the Value Chain in the Train Industry

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Abstract

The actual value proposition of the key players in the global train industry will continue to change drastically due to market trends such as global urbanization as well as digital disruption. Alongside the shift of power to the consumer of rail transport solutions, system suppliers, OEMs (Original Equipment Manufacturers) and operators face the challenge of profit erosions and market consolidation. Contrasting the traditional market environment of the last century, the dynamics of digitalization driven by fast pace, IT capabilities and serviceability will disrupt and reshape the industry value chain in the future. Therefore, the objectives of this paper are to (1) analyse the market dynamics of digitalization with a focus on the train industry; (2) assess the threat of digitalization with regards to its business model innovation and its disruptive potential; and (3) contrast the traditional industry value chain to a digital value chain in the train industry, while exploring value creation opportunities by assessing the digital impact via primary value chain activity.

Keywords: Digitalization, Digital Disruption, Train Industry, Digital Value Chain, Digital Value Creation.

JEL Classification: F23, L22, L92, O32

1 Introduction

Global mobility markets are moving at a larger scale and a faster pace than ever before. With Elon Musk, the icon of business disruption from the Silicon Valley, fostering visionary speed mobility projects and digital players like Uber redefining market and game rules, these dynamics should have an impact of a strong "wake up call" for today's managers.

As digital players constantly outperform traditional established incumbents (Bughin & Catlin, 2017), the call for action in the digital era more important than ever before. Due to the turmoil of digitalization, the pressure on the top management to prepare global organizations accordingly has increased significantly. Capital investors as well as IT high potentials are in the position to cherry pick where to invest their respective resources. Diminishing industry boundaries in the global transportation sector, digital characteristics like the shift from B2C (Business to Consumer), mass markets affecting industrialized traditional industries, today's top management has to "reinvent the wheel" at a fast pace with smart IT investment decisions on digital innovation.

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The following analysis aims to provide insights into the digital impact in one of the most traditional industries – the train market – by exemplifying how macro-economic digital market drivers can be turned into micro-economic opportunities of value creation along the value chain.

The objectives of the paper are to (1) analyse the market dynamics of digitalization with a focus on the train industry; (2) assess the threat of digitalization with regards to its business model innovation and its disruptive potential; and (3) contrast the traditional industry value chain to a digital value chain in the train industry, while exploring value creation opportunities by assessing the digital impact via primary value chain activity.

The structure of the analysis proceeds as follows: section 2 will start with a general overview of the phenomenon of digitalization and its impact on trends and drivers. Section 3.1 describes the driving forces and dynamic positions of the key players within the train market: from the suppliers, to the train OEMs, operators and passengers. Meanwhile, digitalization trends from similar mobility industries such as aerospace and the automotive sector are referred to.

Subsequently, the scope and pace in terms of disruptive potential for the train industry will be briefly discussed in section 3.2 before the shifts from the traditional value chain to the digital value chain are further discussed in section 3.3. The focus will lie on the digital potential for incumbents to optimize their own value chain by primary value activity with regards to the overall value creation potential for incumbent train OEMs to sustain a strong market position in the future. As a consequence, a brief glimpse of "food for thought" for the management is outlined within the conclusion in section 4.

2 Definitions and literature review

2.1 Digitalization

In academic literature, the definition of digitalization is based on either the perspective of technical transformation from analogue to digital technology taken in bits and bytes sourcing in IT. A synonymous term applied to the technical transformation is the term of digitization (Shapiro & Varian, 1999).

The wider perspective of digitalization refers to the implications stemming from the technical transformation into business and society (Picot, Hopf, & Sedlmeir, 2017). From a business perspective, the core questions of digitalization to be answered by the top management evolve with regards to shifting power to mass markets due to network effects and viable business models.

Due to the rise of the topic in the last few years, academic literature has developed a first theoretical perspective on the broad topic of digitalization while the business economy approaches the digital era with its own definitions and application models. Hereby, globally leading strategy consultancies like McKinsey, Boston Consulting Group and Roland Berger play a vital role to shape the common terminology and understanding in the business world by formulating white papers and strategic dossiers and advising their global clients accordingly. As a consequence, the strategic pioneers in the business have to be taken into consideration based on their influential factor.

According to a key study demanded by Germany's influential BDI (Bundesverband der deutschen Industrie), the strategic consulting company Roland Berger refers to digitalization as "[…] the connectivity of all economic areas and adaptation of the players to the new facts of the digital economy." (Bloching et al., 2015) The market leader of strategy consulting, Mc Kinsey, defines digitalization as a technology-rooted phenomenon which impacts a company value proposition, business model or – from a financial perspective – its potential to sustain and create value (Hausmann, 2015).

2.2 Business and digital transformation

Literature interprets different categories of business transformation alongside two basic dimensions (see Figure 1): at first, the nature of change (incremental versus disruptive) and second, the scope of change (realigning versus fundamental) (Messner, 2017):

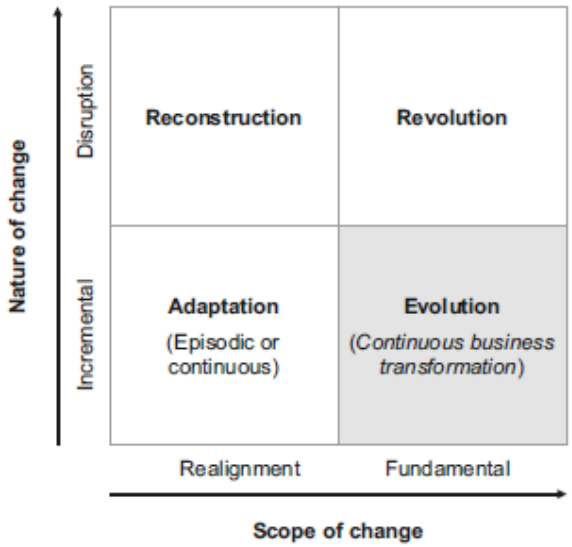

Figure 1 Types of business transformation
Source: Messner (2017, p.9)

Based on the far reaching impact of digitalization across industries, the scope of change can be described as fundamental while its nature varies by industry. Changing dynamics in traditional markets such as the train industry can be interpreted as disruptive, leading to a market revolution with a turnaround under time pressure initiated by the top management.

In fact, fundamental business transformation is rather likely for global players in the train industry to evolve rather incrementally over time – analogous to the 3rd wave with "evolutionary, limited impact over time" (Bloching et al., 2015). Exemplifying incremental business transformation can be the decision-making process on micro-economic level – such as the decision to have competencies in-sourced or outsourced.

In terms of digitalization, the application of a new IT core technology of the virtual reality innovation "digital twin modelling" in the train business is rather associated as an optimization opportunity within the product development process. As such, investment decisions to favour

digital technology are enablers to lower costs and risks to optimize profitability levels than pure revolutionary technology investments (Stewart, Schatz, & Khare, 2017).

Furthermore, experts refer to both terms of digital transformation and digitalization in a similar way. They describe how companies enable IT innovation to digitize their business and thereby reshaping their business models, products and services (Châlons & Dufft, 2016).

In Germany, the term of digital transformation has been widely associated with IT-related innovation and cost-efficient automation of production processes – referred to usually as Industry 4.0. However, the digital transformation does not only drive the agenda of the CIOs (Chief Information Officers) but is more encompassing on the CEO's agenda to digital strategy and digital business models, hence even though originating in IT, the holistic paradigm of digital transformation is commonly agreed on in academia and business.

Up to this point, no common definition of digitalization or digital transformation exists yet, thus the question has to be raised to the academic world to scope and define clear boundaries to ensure a common understanding across industries in the digital domain.

2.3 Digital disruption

In general, disruption happens when a smaller company is able to successfully challenge the incumbents business by capturing financial value on lower price levels, moves up market and threatens incumbents. (Christensen, Raynour, & McDonald, 2015.) Building on this classic definition from the academic innovation icon C. M. Christensen, digital disruption happens if incumbents are not capable of meeting digitalization demand and new players with a high level of IT core competence enter at lower price levels stemming from digitalization.

Strategists classify different waves of digitalization (Bloching et al., 2015) to conclude the extent of the scale to which digitalization in an industry has more characteristics of a disruption as defined by Christensen. Typical characteristics of disrupted markets are e.g. low barriers to enter the corresponding market (Porter, 1980), low switching costs, a fierce price competition coupled with an immense mass market potential for possible network effects to unfold. One famously cited example of a digital disruptive entrant reshaping the global taxi markets is Uber.

Overall, the overarching commonality of value creation remains valid independent of academic or business literature: digitalization is the key enabler for value creation as it transforms markets and its players. From a financial standpoint, the EVA (Economic Value Added) model (Young & O'Byrne, 2000) as the basic concept for value creation is not correlated to waves of digitalization or varying forms of digital transformation. However, industry specific assumptions serving as the base for any EVA modelling urgently need to be challenged as digitalization impacts many industry standards.

3 Industry analysis on digitalization

3.1 Digital drivers and dynamics impacting the train industry

„Digital transformation brings together excess supply and demand, simply […] and at low cost." (Bongaerts, Kwiatkowski, & Koenig, 2017)

This quote summarizes possible implications of digitalization impacting both - supply and demand across industries. To grasp the complexity of digitalization, hardware and software industries merge and traditional industry barriers such as those driving the passenger mobility market begin to melt between automotive, train and airline businesses. The dynamics of digital transformation, e.g., directly affect OEMs in all three mobility industries (Bongards, Kitkowski, & Koenig, 2017; Kessler & Buck, 2017).

This hypothesis quoted above has been proven to be true for the car industry with the raise of car sharing concepts and disruptive models such as the example of Uber. It has also been validated by successful low cost carrier airlines such as Ryanair or Easyjet focusing on the optimization of excess supply and demand. The influencing factor of digital transformation has also started to influence the train market for the last years: Nowadays, train OEMs are required to create value by enabling train operators to fill excess supply with fully seated trains by satisfying the demand of mobile services in a simple and low cost manner – e.g. realized via mobile ticketing.

The following subsections will investigate the digital drivers impacting the train industry in further detail starting with the demand side and its market shift from B2B (business to business) to B2C, continuing with the supply side and its potential of digital innovation by enabling new technologies; while finalizing the analysis with the digital phenomenon of the network affect in digitalized markets as a game changer for both supply and demand.

3.1.1 Demand shift: from product- to service-centred

The megatrends of urbanization and globalization have led national governments as well as global mobility players to find new mobility solutions in the global mobility industry. This shift to mobility as a service proofs to be an ongoing challenge for the industry with a history of more than 150 years focusing on train vehicles. Historically, train innovation and investments were based on technological advancements of train vehicles such as the performance of high speed trains, as market demand evolved around trains as products.

With the power shift from B2B - OEM to train operators - to B2C– OEM via train operators to passengers, train OEMs face the challenge to create value for the B2C customers – which are passengers requesting flexible mobility services rather than a simple train ride (Hausmann, 2015).

Passengers commuting between London – Paris, for example, demand a mobile service irrespective of the means of transport – in a transparent, easy and affordable way, e.g. via mobile app services. In other words: the B2C markets of commuting passengers have become “digital” years ago – a scenario called seamless mobility (Hannon et al., 2016).

The attempts of train OEMs and train operators to meet the B2C service oriented demand are shown in the case of mobile ticketing: For a digital technology to be able to be a disruptive game changer in the market, it has to add value with its characteristics of affordability, ease of use, new benefits and an established ecosystem. The passenger’s willingness to pay for a convenient mobile service (Bongaerts, Kiatkowski & Koenig, 2017) including the described characteristics opens a space for value capture, which has not been realized by the train operators but train OEMs such as Siemens acquiring HaCon in 2017 (Trost, 2017) to complete its service offering for train operators.

With train operators focusing on serviceability in the asset-intensive train industry, train OEMs have vast opportunities to apply digital IT technologies – the challenge they face is to reinvent their value proposition in slow-paced market environments.

As mentioned before, possible business model innovations from the aerospace industry could have inspired the train industry: as Rolls Royce offers additional services for its aerospace turbine engines (Johnston, 2017), the value potential of a 100 % rate of serviceability can be achieved faster by the application of digital IT.

3.1.2 Supply shift: innovation potential by digital IT

Clearly, the digital opportunities in the train industry are tremendous – and yet, market players have not pursued to monetize those opportunities.

Even though one can only speculate about a variety of reasons, a historic view of the traditional train industry helps to comprehend why the nature of radical change has not yet reshaped the market from the incumbent side: technological innovation in the global markets has centred on the claim to improve the performance of the train vehicle (Kortschak, 2017). Certainly, the engineer's dream to increase performance to the maximum in the mobility industry is another vivid example of Elon Musk's speed competition, the "Hyperloop" (May, 2013) The relevance of high performance in terms of speed has dominated the global train markets in a way that is still valid today. For example, French politicians have accused Alstom of having sold off the French prestige train TGV "to the Germans" with reference to the ongoing Siemens and Alstom merger. (Féraud Troude, 2017)

Train operators like Deutsche Bahn favour to rely on train OEMs with the financial backbone and technological core competences. While officially being privatized, the innovation power of the train operator Deutsche Bahn lags behind significantly due to the monopolistic situation discontinued two decades ago (Kortschak, 2017). Hence the innovation power – caused by the traditional nature of the train industry as well as a lack of willingness to IT investments – is limited.

As a consequence, the innovative potential of digitalization is dedicated to the train OEMs and has been realized in several mobility innovations such as autonomous driving and predictive maintenance. Both innovation examples are currently driving innovation in the train industry and only showcase the potential of applying digital IT solutions at strong growth rates: autonomous driving systems built up of 800 km in 2015 and expert's prognosis forecasts almost a tripling of 2200 km by 2025 (Hein & Ott, 2016).

Regarding the innovation of predictive and preventive maintenance, IT data analysis enables train operators and manufacturers to shift from repair to predictive and preventive care implying lower costs and risks in operations and therefore enabling a higher level of serviceability for the train operator while lowering the cost base of both actors significantly.

Similar to the train industry, the aerospace industry identifies attractive growth opportunities with digital IT core technologies such as the Digital Twin concept, AR (Augmented Reality) and IoT (Internet of Things) applied to innovation in order to sustain and create value (Armandon, 2017)

3.1.3 Game changers: network effects and digital platforms

Network effects in the digital economy can be observed across industries with the most successful players having established digital platforms to combine multiple market participants on the supply and demand side. Originating from B2C markets, companies like Facebook or Airbnb base their business model on offering a digital platform and thereby creating a nearly monopolistic market position with great value creation potential. Both digital champions indicate the phenomenon network effects have: the more market participants join the relevant platform, the stronger the value added for all other market participants. Hence, scale and pace play a vital role as the established platform and thus build a new entry barrier to the relevant markets.

The main characteristic of the network effect is that the first market player who successfully establishes a platform will dominate and get 80 % of the market share – a radical "all or nothing" approach (Engelhardt, Wangler, & Wischmann, 2017). Established industrialized global players face a high risk of failing investments if they "bet" on unsuccessful platform concepts or give the opportunity to potential new entrants. As they are forced to participate in the digital race, many have already established venture capital departments to take advantage of the digital opportunities while managing risks tied to the shareholder value.

The mobility industry shows a mixed picture when analysing the degree of maturity regarding digital platforms - and especially the train industry encounters various hurdles. Digital network effects require key market players to aggressively pursue upfront investment with digital IT such as big data into digital platform solutions: in order to be able to scale at a fast pace to capture and create value, one has to overcome numerous hurdles: first, the infrastructure networks of train operators are geographically limited and the typical "island solutions" of multiple physical infrastructure networks require all involved stakeholders to define a common platform overarching physical infrastructure networks. Thus, second, the alignment of stakeholders with economic and political agendas adds to the overall complexity of building an industry-relevant platform. Third, the lack of standardized rules and regulations for safety such as the TSI norm indicates the bureaucracy and inertia which needs to be solved to drive digital platform solutions.

Nevertheless, the opportunities behind the digitalization of the industry offer to the financial train OEMs with the adequate financial strength are unique: by serving a dense network of train operators, they are the players in the industry with the best prerequisites to build digital platforms.

In terms of new revenue streams, train OEMS can utilize the digital platform solutions to lock in their existing and acquire new customers as they offer an attractive added value for every train operator. This scenario allows the train OEMs to monetize the upfront IT investments and gain market share in the digital market segments while creating new entry barriers for competitors or potential new entrants.

The question the future holds for the train industry can be summarized in multiple scenarios: will incumbents like train OEMs – in an "evolutionary" scenario –transform their industry inside-out by overcoming the challenges and aggressively investing in the digitalization opportunities by enabling IT technologies the markets require and enriching their digital portfolio with e.g. digital platforms?

Or – in a "revolutionary" scenario - will long investment cycles, the current focus on market consolidation hold back incumbents and leave space for new digital players to enter outside-in and disrupt one of the most industrialized markets successfully?

3.2 The digital disruptive potential: "revolution" versus "evolution"

In order to assess the likelihood of disruption in the train industry, probability factors to both scenarios "evolutionary" versus "revolutionary" have to be applied founded on further analysis:

The variety of the debate is also evitable by the variety of strategic thinking from the leading global consultancies. While some publications focus on a strong sense of urgency for incumbents to act upon digitalization trends immediately by drawing a picture of disruptive threat across industries (Bughin & Catlin, 2017), other strategists see limited disruption potential due to industry-specific hurdles – as described in section 4.1.3 - in the train industry.

For example, the extent to which digital IT will reshape the industrialized market, has been categorized by Roland Berger as being an "evolutionary, rather small impact" allocated to the 3rd wave for the airline industry (Bloching et al., 2015). Due to the similarities with small series production in the airline and train businesses as well as their revenue models built along 10+ years of investment cycles, the pace and scaling potential of digitalization does not impact as significantly as it has in the mobility markets of airlines or cars.

And yet, the top management of the global train OEMs including the dominant Chinese CRRC player should not ignore the upcoming opportunities at the digital horizon – it might not necessarily be a new player to enter but a strong competitor to partner with a digital IT player in order to shake up the industry.

Sceptics argue that hardware driven markets will not be dominated by software competences of digitalization. Others object about how the growth of acquisitions of train OEMs such as Siemens into niche start-ups like HaCon for mobile ticketing services or investments in the digital platform "Railigent" to leverage Internet of things and big data technology can be explained. The answer will be given by the monetary value captured of the respective incumbent based on a financially viable business case.

It should not be underestimated that the power of digital IT innovation as a new source of value creation in the highly commoditized train industry with vast overcapacities provides a perspective of new profit pools at attractive growth rates and turns out to be a strong asset on the train OEMs balance sheet in times of mergers and acquisitions.

Global players are better equipped to survive the ongoing consolidation phase with strong technology hardware and software competences and a digitalized value chain to service new business models. Hence digitalization will be the decisive factor to attract capital investment for the future, smart IT investments while compiling the story of value creation for shareholders.
Despite the fact that the train industry might not encounter the pace of digitalization at which other industries are transformed due to disruption; today's investments in digital innovation are the foundation for tomorrow's value capture and industry survival.

3.3 The digital impact on the value chain in the train industry

The core of a company's value proposition is how it can create and sustain its value (Porter, 1980). Without a doubt, it was considered a quantum leap in terms of strategic analysis when Porter first introduced the classic sequential value chain with validity across industries: all primary value activities directly add value which a company in the era of industrialization adds to a market. The sequence of the primary value activities inbound logistics, operation, outbound logistics, marketing and sales, and service is building on each other while the secondary value activities support the primary ones in a fundamental way: firm infrastructure, human resource management, technology development and procurement (see Figure 2).

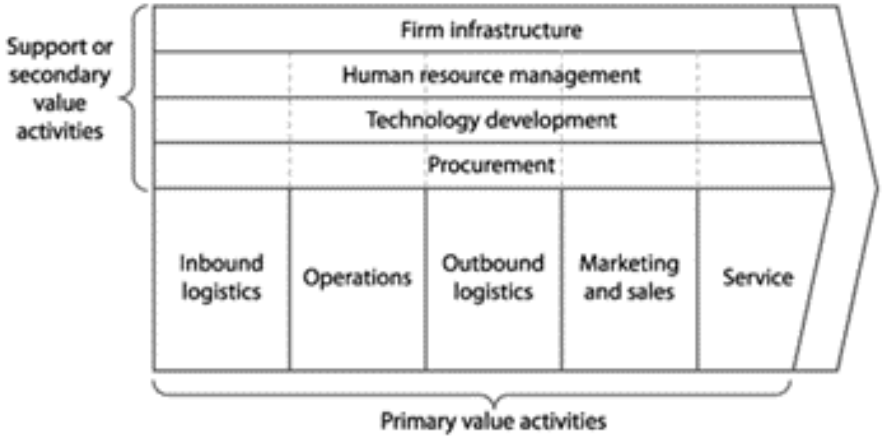

Figure 2 The generic value chain
Source: Porter (2001, p. 52)

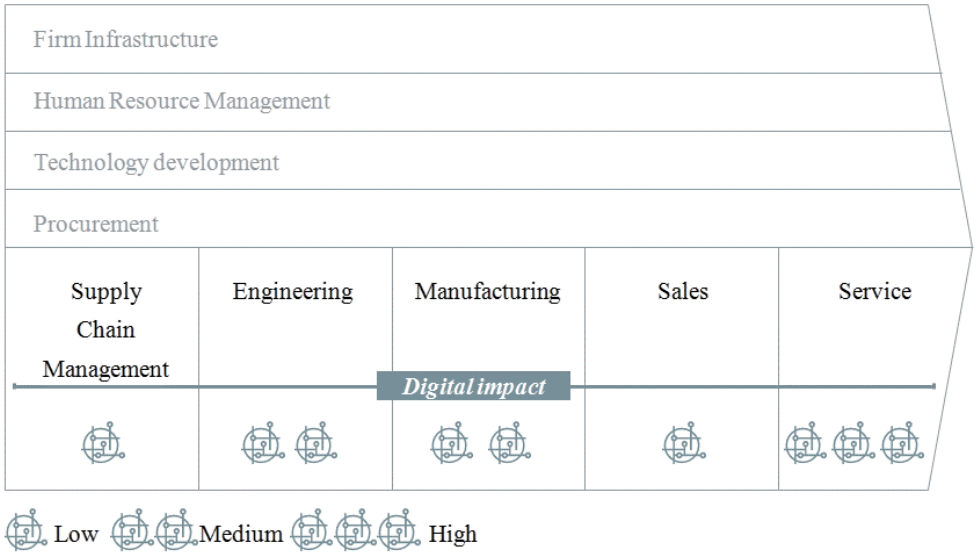

Figure 3 Traditional value chain (train OEM)
Source: Own elaboration

In the value chain analysis tailored to the train industry, the focus is set on the primary value activities which are slightly adapted to better represent the structure of a train OEM in the traditional market: supply chain management, engineering, manufacturing, sales and service – as

functionally organized (see Figure 3). Due to the limited scope of the analysis, the secondary value activities are not analyzed in detail, but rather outlined indirectly to with main reference to the technology development.

In order to set up the digital value chain for a train OEM in a next step, the digital impact on each value chain element of a train OEM's on a micro-economic level is carefully assessed in the following subsections. The objective of the impact rating from * (low) to *** (high) is a simplified summary to conclude where the most promising investment opportunities - in terms of the firm's value creation potential - are to be found without necessarily "re-inventing the wheel" – meaning building on the existing value sources of a train OEM today.

3.3.1 Value chain activity: supply chain management

Strategic partnerships matter as the dependency on the system integrator suppliers is crucial: ~65% of today's cost position are from suppliers (Hein & Ott, 2016), hence the value created in the traditional train business lies with the system suppliers realising double-digit profit margin levels – while OEMs bear the risks of larger infrastructure projects with single-digit margin levels.

With suppliers capturing 50% of the value created in the market (Hein & Ott, 2016), their urgency to develop IT competences is limited. There are little incentives for suppliers to invest in high risk IT innovations by digital core technologies. Consequently, global OEMs with a strong financial background spearhead digital innovation. They are required to build up IT competence internally or externally as they are neither in the position to expect those competences from their suppliers nor able to ignore the push for digital innovation up the value chain from the passengers.

Within the supply chain management, the digitalization of e.g. shared supplier platforms for optimized logistics will incrementally enhance efficiency and cooperation with top-tier suppliers and OEMs and first efforts of train operators have been initiated in Germany (Weiser, Gomes, & Marquardt, 2017). Nevertheless, those efforts have been pursued for the last decade with shared ERP (enterprise resource planning) systems such as SAP and can be hardly classified as a digital innovation.

In order to maintain their power position in times of consolidation, top suppliers have consolidated like the market leading integrating suppliers Wabtech and Faively S.A. (streetinsider.com, 2017). One might assume that system integrators like Wabtech Faively are now required to deliver hardware such as door systems including embedded software to be compatible with the IT platform embedded within the vehicle. As OEMs ask the system integrator suppliers to become digital, only the top suppliers with sufficient IT competences will have the capital to invest in IT solutions based on the variety of digital core technologies. However, the powerful position of system integrators as well as the required capital to finance IT investments are holding back the top-tier suppliers from digitalizing at the pace the OEMs require. Pressured by the power of the suppliers, OEMs are forced to build up the IT competence rather in-house or partner with potentially new IT suppliers.

A brief overview on the build up of IT competences with the dominant players such as the Chinese CRRC Corporation Limited, Siemens and Alstom indicates that those competences are developed in-house with R&D investments in core technology departments in order to position especially Western players as digitalized incumbents. Hence, new strategic partnerships of OEMs with global

IT players to serve the upcoming service business are no the preferred choice of the top management as of today.

Summarizing the status quo as well as the future outlook, it can be stated that the impact of digital core technologies on the value chain activity SCM is limited (*) mainly due to clear power dominance of suppliers.

3.3.2 Value chain activity: engineering

Today, customer requirements for trains demand a high level of customization associated with the popular "lot size one" as every train project has a unique set of technological, infrastructure, safety laws and standards like TSI (Technical specifications for interoperability); especially accounting for trains in the European rail industry. The continuous demand for mass customization in combination with a fierce price competition pushes train OEMs like Siemens to focus on large projects such as Thameslink in the UK producing more than 1.000 vehicles (Waugh, 2016) in order to realize scaling and learning curve effects on the cost side to sustain profit levels.

At this stage, the digitization in engineering exemplified by the concept of virtual reality for engineering simulations such as the "digital twin" indicates the optimization potential. In this case, a digital model of a train is optimized in a virtual test environment, optimized with digital algorithms and transferred back to its physical twin. This interchangeability between virtual and physical models allows for a new level of technological and economic optimization while lowering development lead times and failure risks.

One might argue digital solutions like virtual modelling are just technological experiments. The economic underlying assumption, however, proves the innovative element to become reality across industries: the financially viable model of creating value by substituting labour resources and production facilities to future digital factories.

In addition, joint engineering developments with suppliers and train operators applying lean, agile project management concepts intend to further reduce development cycles and risks for all parties involved.

Overall, the significant digital potential a train OEM can monetize by substituting manual high labor engineering by digital innovative technologies can be assessed as medium (**) on the depicted scale due to its positive impact on the cost competitiveness for train OEMs.

3.3.3 Value chain activity: manufacturing

Looking beyond the train industry, the era of digitalization has already superseded the era of industrialization in numerous mass markets (B2C) – such as the German Industry 4.0 initiative of Adidas' "speed factory". The company's investment in the "digitalized value chain" with innovative IT technologies substituting Asian factories known for lowest labour cost levels (Gaugler, 2017). As a consequence, the level of automation based on digital technologies can be labelled as a game changer for mass market industries.

In the train industry, the commoditization with vast overcapacities indicates why the traditional hardware sales do no longer necessarily create sufficient company value in B2B markets: the

industrialization like train manufacturing has continued in BRIC countries like China: Siemens sold manufacturing patents of its "Velaro" train platform to China's dominant market leader CRRC. Since then, CRRC has aggressively pursued train manufacturing leading to overcapacities and accelerating the latest consolidation market dynamics (Revolvy, 2017).

Two factors have forced OEMs to rethink their classic manufacturing approach from its original Latin sense: "manus" and "facere" being "handmade" to substitute the manufacturing with automated, digital concepts like robotics and artificial intelligence comparable to B2C markets: first, the reduction of development lead times as an essential part of large infrastructure train projects and second, the European engineer labour pricing levels. Therefore, the digital IT manufacturing of Western players competes with the market leader CRRC with a lower degree of digitalization and automation in low cost countries.

Even though complexity levels of train production differ vastly between Adidas' sports shoes and the product life cycles times of 18 months for sneakers contrasting train cycles of several years, the pace of digitalization varies across industries. In both market dynamics, the top management has to strategically decide whether to lead in digitalization with a pioneering approach versus a fast following one and position its investments into the most promising digital IT innovations accordingly. As the application of innovative IT has a significant influence on the cost position, the digital impact can be assessed as medium (**) in terms of potential value sustainability and creation.

3.3.4 Value chain activity: sales

There are frequent arguments why the B2B market will not be that strongly affected by digitalization. While applying digital IT software innovation to increase efficiency levels between existing market participants, characteristics of a B2B market like the train markets will remain as economic, political individual stakeholders as decision makers will not change overnight.

Yet, the shift from product-oriented long investment life cycles into mobility services will have a high level of integrated hardware and software portfolio offering. Traditionally, OEMs sold trains to the train operators only. In the last years, additional services and maintenance have been added to the OEMs portfolio to meet the demand of serviceability in the mobile industry with small revenues at profitable margins.

Train OEMs integrate the train sales in the project infrastructure business with the value chain activity service for train operators: concepts regarding preventive and predictive maintenance as well as the data analysis of the train operators' customers – the train passengers are on the forefront of digital service platforms such as the Siemens Mobility Service "Railigent".

As the value chain activity sales in an isolated view – with the value chain activity service – hardly benefits from the application of digital IT innovation, the impact level should be assessed as low (*).

3.3.5 Value chain activity: service

The shift to customer-centred activities offers vast opportunities for new business models in the service value chain activity service to emerge: the industrialization phenomenon has been followed

by a digital era with an enhanced service offering for the train operators to service the needs of their customer – their passengers. Coupling the digital impact in the traditional B2B hardware industry with the digital driver of network effects, the concept of digital platforms as key asset in the value chain emerges.

Digital value chain activities unfold their value potential as they are more integrated intra- and inter the value chain with functional departments and niche players contributing complementary skills. Market participants contribute and derive value from platforms along the value chain: from suppliers, to OEMs and train operators. Those similar characteristics of hardware and software integration are widely recognized from IT giant Apple offering the iPhone hardware including its digital iOS (iphone operating system) platform to develop application services for iphone customers.

In the example of the train business, various types of platforms evolve along the value chain creating a whole ecosystem of physical and digital platforms in the market: first, an IT platform on each vehicle connecting hardware and software vertically as well as horizontally can be the core portfolio elements of the train OEM. Second, a train fleet including its maintenance centre near Dortmund can be understood as a platform connecting train vehicles as the latest project of the German "Rhein Ruhr Express" project indicates (Schramke, 2017). Third, service-oriented digital platforms for train operators to analyse their customers while keeping monitoring maintenance offer transparency with digital big data analysis, which directly translates into optimizing the value position of the train operators.

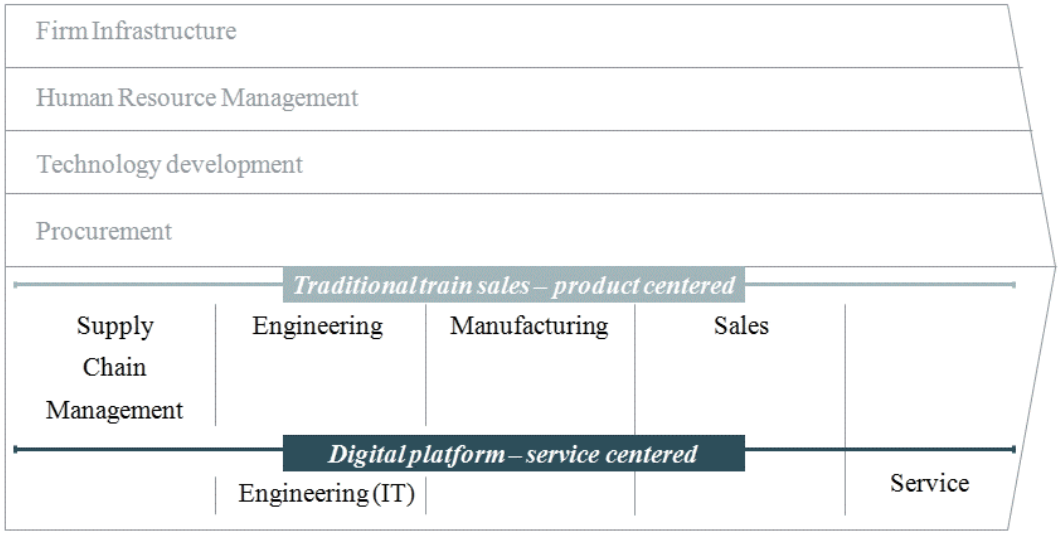

Figure 4 Traditional and digital value chain (Train OEM)
Source: Own elaboration

Figure 4 illustrates to which extent the platform concepts present the value add turning the sequential value chain into a value network enriched by two streams instead of one sequence.

In the setting of the industry value chain, a digital platform can be defined as connecting „two or more players in the market groups where as both groups benefit from the size of the respective one

while not being able to act efficiently as without a digital platform. A setup digital platform market is also understood as multiple-sided market." (Engelhardt, Wangler, & Wischmann, 2017)

In summary, the digital platform based on the network effect combining hard- and software offerings represents an attractive approach for players to sustain their competitive advantage while growing their service offerings by creating value for their customers. As the digital IT innovation potential reaches beyond the sole aspect of increasing efficiency by new business modelling, the digital impact of services at attractive growth rates and profitability levels has a strong digital impact (***).

4 Conclusion

It can be stated that digitalization is more than just a "buzz word": despite the fact that the business and academic world have not yet defined a common terminology, the variety of interpretation on digitalization is symptomatic for its dimension and complexity.

Approaching the topic of digitalization by the industry and value chain analysis for the train industry, main drivers impacting supply and demand have been analyzed - from the product- to the service-centred digital market shift to the digital innovation power to the train OEMs on the supply side: several game changers like network effects and platform business models show clearly that the digitalization dynamics have two main ingredients: also traditional markets change at fast pace and the success of digital investments can be described as digital as well – according to the digits 0 and 1: either investments in digitalization fail or they are so successful that "the winner takes it all".

The value chain analysis also reveals two phases, how digitalization impacts the actual traditional markets: within each value chain activity, digitalization offers cost optimization opportunities on varying amplitudes of impact. Overall, the true value creation opportunity demanding a transformation of a traditional industrialized value chain will be realized in a second phase with new service business models capturing value and enriching today's value's propositions for train OEMs.

The implications for the top management of industrialized global players – in case of the train industry the shift to hardware and highly integrated software is immense and can be summarized for the top management as follows:

I Do not ignore the disruptive potential of digitalization, it will impact every industry
II Action is more valuable than the reaction to proactively reshape markets: fast pace and smart investment decisions are essential
III In order to succeed disruption outside-in your markets, incumbents have to reinvent their business inside-out
IV Success is digital as well: the winner takes it all, with market shares ~80%
V The true potential for sustainable value creation is not limited to optimizing traditional value chains on cost efficiency but acting holistically: service- instead of product-driven

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Indicators of Health Care Quality in Children's Hospital

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Abstract

The paper studies and describes the important factors related to quality of health care services provided at children's hospitals, especially in current environment, characterized by increase of health care expenses and reported decrease of heath care quality as a result of its increased costs. In order to identify important factors influencing quality of health care provided, the Children's Faculty Hospital in Kosice, Slovakia was analyzed and compared to two globally renowned hospitals. The topic was approached from different aspects. A "snapshot" of the current situation in health care quality at the Children's Faculty Hospital in Kosice was created by combination of relevant data from hospital administration, interviews with the hospital's representatives, questionnaires answered by parents of hospitalized children and with information from Seattle Children's Hospital, Seattle, USA and Great Ormond Street Children's Hospital NHS Trust in London, UK, as well as from generally accessible sources. Based on performed research, three main important factors were identified: adequate financing, operational efficiency focused on quality of provided services and involvement of parents in treatment process during their stay in the hospital. As a result, the highest quality of pediatric inpatient health care can be achieved only by a proper combination of the identified factors.

Keywords: Pediatric health care quality, Factors of health care quality, Hospital's funding structure.

JEL Classification: H41**,** H51, I11, I14, P46

1 Introduction

The quality of provided health care is in general perceived as highly dependent on funding and therefore in many cases there is a very limited interest to improve the quality and invest the time in health care quality management. However, daily practice shows that there are also other factors impacting the quality of health care, which in a certain extent, do not rely on available financial sources. In order to investigate what are the crucial factors of the health care quality, we have conducted a research in three children's hospitals – one situated in Slovakia, the second in the United States of America and the third one in the United Kingdom.

The aim of this paper is to describe and compare the funding system and the quality of provided health care in three children's hospital from three different countries and analyze the factors

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impacting the identified quality of their health care. First, we study the Children's Faculty Hospital in Košice, Slovakia, with the focus on its health care quality, as a result of measurable as well as non-measurable and subjective quality indicators. Then we compare it to other two children's hospitals, well known for their top quality performance: Seattle Children's Hospital in Seattle, US and Great Ormond Street Hospital for Children, NHS Trust in London, UK.

As the result of this study, we will explain what is the impact of three main stated factors of health care quality, as identified in the three studied children's hospitals, what are the differences in funding of pediatric hospitals and how does this influence the quality of the care and the hospital's profitability (in selected countries).

2 Pediatric Health Care Quality and Its Main Indicators

Pediatric health care is characterized by features which distinguish it from the adult health care. It involves wide spectrum of different patients with different needs, ranging from immature newborns weighting about 500 grams, to adolescents. Every segment of patients, regarding the age and the specific medical conditions, requires specialized care.

To deliver a high quality pediatric health care, managers face challenges regarding efficiency of the operations, as well as the challenge of reducing risks that may arise due to these operations. The areas are interconnected; the reduction of, or inefficient use of resources will lead to an increased risk concerning diagnostic and therapeutic procedures and hence a decrease in the health care quality (Levy et al, 2008; Schreyogg, 2006; Villagra, 2004).

2.1 Health Care Quality and its Management

The highest quality of pediatric health care can be achieved by the combination of wide scale of factors, starting with public interest, represented by governmental subventions in a combination with a non-profit mission, which would guarantee that all the gains will be further reinvested in order to increase the quality of the health care provided, instead of dividend repayments. Dedicated directorial board should ensure that relevant offices and committees related to the health care quality monitoring and its improvement, operate accordingly. Bottom-up activities should be encouraged and supported. A transparent communication regarding the health quality is essential not only within hospital, but also when the data is reported to external institutions. Parents' representatives should be incorporated into relevant hospital structures, in order to communicate feedback on the quality of care and to provide the suggestions regarding the further improvements.

The costs of health care are increasing also due to the medical progress. To use the resources efficiently, those deciding on the policy in health care must focus, according to Lee (2010), on three aspects, which are a) Performance and results, b) Value which represents positive outcomes occurring in the most efficient way, and c) Teamwork which is a cornerstone for the performance improvements.

In order to provide patients with a high standard of health care quality, Nembhard (2010) identified a primary cause of decreased quality of health care in the US: implementation failure and inconsistent or improper use of innovations. The decreasing quality of health care can be illustrated in figures; there are nearly 100,000 preventable deaths in the US each year and millions of

Americans experience non-fatal, yet serious adverse effects, such as hospital-acquired infections, wrong limb amputations and other medical errors. (Leape 1997 in Nembhard, 2010).

A single individual cannot deliver the best care, even though the individual performance of each team member is important. According to Beaudin (2008), transparency is the most important factor in the quality improvement. The author suggests the main aspects of effective measurement reporting system: to select a small number of evidence-based system-level measures. Further, to report the results quarterly to all managers, senior leadership and the board as a result of monthly reports that are the key indicators to assess the system-level measures in areas targeted for improvement. Weekly reports of failures are important for system priorities. They help to keep high the energy and passion for change as well as making it possible to learn what fixes can be made in a real time. Daily reporting of failures at the unit manager level helps to promote situational awareness.

As a first step we provide the general information on each of the studied hospital, to understand possible similarities and differences in functioning, their general hospital management and also their quality of the health care provided. To identify the most crucial factors of the pediatric health care quality, we have studied the health care quality at the Children's Faculty Hospital in Kosice, Slovakia (further referred to as CHFH) and compared it to two globally renowned hospitals - Seattle Children's Hospital, Seattle, USA and Great Ormond Street Children's Hospital NHS Trust in London, UK (further referred to as GOSH), with the intention to set the crucial factors impacting the quality of pediatric health care.

2.2 General Characteristics of Studied Children's Hospitals

2.2.1 The Children's Faculty Hospital (CHFH) in Košice, Slovakia

The first Children's Hospital was established in Kosice in 1924 with 50 beds at that time. The children's morbidity and mortality were high. Due to the increased needs for pediatric beds, new departments were opened and The Children's Faculty Hospital as such was established in 1966. Currently it runs 3 clinics, 8 departments and 55 specialized out-patient offices.

The hospital belongs to the public sector and is financed by the government; it is affiliated to the University of P.J. Šafárik, offering undergraduate and postgraduate education for doctors and nurses. The market environment of the hospital can be characterized as a loose framework, as some of the departments serve the region of Eastern Slovakia with a population of more than 1 million. Therefore, some departments, such as for example the Neonatology Intensive Care Unit, admit patients from the entire area. Departments of Pediatrics are also available in county hospitals; the most severe cases are however referred to the Children's Faculty Hospitals, to be treated by specialists in particular areas of pediatrics, e.g. nephrology, cardiology, etc.

Discussing the health care quality and its monitoring, currently the EN ISO 9001:2008 standard is in practice; it covers administration and assures that all documents are in the relevant format. Two committees meet regularly and report to the directorial board. The Nosocomial Infection committee reports on the occurrence of hospital acquired infections. The Efficient Pharmacotherapy Committee assesses the reasonable use of medication in terms of efficiency, from a financial point of view, as well as any adverse effects of drugs.

2.2.2 The Seattle Children's Hospital (SCHH), USA

Seattle Children's Hospital was founded in 1907 and serves as a pediatric and adolescent referral center for the largest area of the country, for the US states of Washington, Alaska, Montana and Idaho. The institution is also a primary teaching center as well as a clinical and research center for the Department of Pediatrics at the University of Washington School of Medicine. The hospital works in a partnership with the Seattle Children's Research Institute and the Seattle Children's Hospital Foundation. According to the US News & World Report, Seattle Children's Hospital is among the best US hospitals.

Seattle Children's Hospital operates on a non-profit basis, in the public sector. It currently runs more than 100 inpatient departments, outpatients' clinics and programs with 250 beds. (Seattle Children's Hospital, 1995-2011).

The health care quality is one of the most important factors and therefore a great portion of attention is focused on the health care quality at every level, from nursing staff in wards, through managers, up to the directorial board. The current state of sophisticated quality monitoring is a result of long-standing efforts made by the office of Continuous Performance Improvement (CPI), with the implementation of the Toyota system.

The hospital also offers holistic treatments, including animal assisted therapy, the possibility of telemedicine, e.g. consultation between patients in remote areas and hospital specialists. Seattle Children's Hospital is an important part of the community; it organizes various educational events covering the most frequent health care and health protection issues.

2.2.3 The Great Ormond Street Hospital for Children NHS Trust (GOSH) in London, UK

The Great Ormond Street Hospital for Children in London, UK was founded in 1852 by a doctor Charles West, who realized the different needs of children as patients. His aim was to establish a hospital dedicated to treat the children and improve the health for poor of London of 19th century, when infant mortality was around 50%, due to the malnutrition and infections. Since then, there were many innovative treatments introduced. It has a status of NHS Trust since 1972 and provides a tertiary service within NHS; that means that it accepts referrals from the entire UK and from abroad. Currently, the hospital runs more than 50 pediatric specialties, the widest range of any hospital in Europe.

The hospital cooperates with the University College London (UCL) Institute of Child Health and is the only UK's Specialist Biomedical Research Center in pediatrics, as well as with UCL Partners, an organization with Academic Health Science Centre status.

To match the current needs of the patients and thrive in hypercompetitive environment, maintaining its long-standing reputation, GOSH has introduced the Transformation program in 2007, with the three clear aims: zero harm, no waits and no waste. The program is focused on the quality of health care provided, with a specific target to decrease the risk of morbidity, decrease waiting times to reasonable limits and improve the use of resources. (Great Ormond Street Hospital for Children NHS Trust, 2010)

2.3 Measurement of Health Care Quality

We conducted a research of the health care quality provided to the patients of Children's Faculty Hospital in Kosice and investigated the possibilities of the health care quality improvements, bearing in mind the current circumstances. To obtain the answer to this question, it was necessary to collect and understand the important data and aspects which influence the health care quality; in terms of measurable outcomes and indicators, as collected by the institutions dealing with health care quality monitoring, but also in terms of non-measurable data, such as the perception of the quality of health care by health care consumers. We applied both the quantitative and the qualitative analyses, starting with the SWOT analysis for CHFH, in order to gain a deeper insight into the problems of the departments of the hospital, as well as their apparent and hidden potential for future planning.

All three hospitals were interviewed through a structured questions list, consisting of four sections. The first section covered the characteristics of the hospital in terms of its size, presence of the university, the financial sector and the market in which the hospital operates. The second section has focused on the health care quality measurement and monitoring. The most important economic aspects were covered in the third section. Finally, the fourth section dealt with the aspects specific for the children's hospital, the involvement of parents and also the special therapies available at the studied hospitals. For the purpose of evaluating the perceived health care quality by parents, a self-administered questionnaire was used. The questionnaire consists of two sections. The first section covers the professional and psychological aspects and the second section covers the technical issues, such as facilities, food and accommodation. The facts and figures on the financing, investments and the health care quality criteria of the studied hospitals were obtained from the directorial board of the Children's Faculty Hospital.

2.4 Health Care Quality Monitoring

The structure of health care quality monitoring was found to be approximately the same in all three hospitals. It differed however in its intensity. The staff of the ward monitors the quality on a daily basis and reports any problems, e.g. wrong medication administration, hospital acquired infections, adverse effects of medication, but also the problems which occur during a daily operation, any shortages of material, etc. These activities are supervised in all three hospitals by nursing leaders. At Seattle Children's Hospital and GOSH, it is the policy to watch over the quality and at the same time to keep the activities as efficient as possible. Whereas at Seattle Children's Hospital there are no monetary compensations for any improvements, GOSH states that part of their income is based on the quality measures. Currently at CHFH, a great emphasis is put on the quality monitoring and it is the intention of the directorial board to incentivize the quality improvement.

The health care quality measures are reported to committees working in all three hospitals. All the hospitals have committees dealing with the hospital - acquired infections, as this particular measure is a very important factor among the health care quality indicators. These data are reported to the directorial board and are also a subject of reporting to external institutions assessing the health care quality, such as the health insurance companies in Slovakia, The Joint Commission, The National Quality Forum, The Centre for Medicare Services in US and The Department of Health and Health Protection Agency in UK.

The actions of directorial and executive boards facilitate the quality monitoring and improvement process. At GOSH, for example, these are the executive patient safety walk rounds. At Seattle Children's Hospital, it is the office of Continuous Performance Improvement, staff of which oversees the quality indicators and works on the identified short comings. At CHFH, these are the regular meetings of directorial board with the heads of the departments. According to the opinions from all three hospitals, individuals are essential in maintaining the health care quality. The more motivated are members of the staff, the better results can be expected.

2.5 Identified factors and levels of Health Care Quality

When talking about the increasing costs of health care, there is an evidence that it should have impact on the quality of care provided. For the leaders in the field, it is a matter of survival to thrive despite the rise of the expenses and therefore numerous activities have been introduced not only to run the hospitals with a balanced budget, but also, what is not less important, to communicate to the public that despite the costs, the quality remains the same or is even improving. It was clearly declared by the GOSH executives: Zero harm, no waits and no waste. The Seattle Children's hospital also reports on maintaining the quality due to the measures introduced as a result of increased costs: these are some restructurings; a leaving retiring staff members are not replaced. At the same time, GOSH reports on 7.7 % increase due to the new staff members.

The involvement of parents in monitoring the health care quality is apparent at both GOSH and the Seattle Children's Hospital, where parent's feedback is organized through forums and committees. At CHFH, parents are less involved and the feedback is limited to questionnaire survey or individual expression of parent's opinion. This difference might be caused by the fact that CHFH does not operate in such competitive environment like both other hospitals. There is also an important role of traditions: the parents are simply not used to be involved in the health care, which might be a result of the manner in which the health care system has been organized in Slovakia.

As a result of the conducted research, we have identified three major indicators of the health care quality provided in children's hospital:

1. adequate financing,
2. operational efficiency,
3. involvement of parents in treatment process during their stay in the hospital.

All of the three main factors of the pediatric health care quality were analyzed in more details in each of the three studied children's hospitals.

2.5.1 Adequate Financing

To investigate the quality of the health care provided by hospitals, it is necessary to take into account the economic aspect and assess the provided health care in the light of the current health care system of each particular country. The health care financing differs in different countries diametrically. This fact is reflected also in the quality of pediatric health care, in all its aspects, from the accessibility of primary health care to the availability of up to date procedures and medical treatment.

Studied children's hospitals in three selected countries show the same aspects of funding, as well as the deep differences. In all three countries, the main part of finances comes from government through different institutions.

In Slovakia, the government pays regular payments for all the children to the health care insurance companies, which reimburse payments to the hospitals. The actual payment is based on the agreement between particular hospital and particular health care insurance company; the payment is made for a completed hospital episode of the particular department. The disadvantage of this system is the fact that it does not fully reflect the expenses related to the treatment and from a long term perspective, this system of payments has led to negative financial results of many hospital, especially the ones treating the most severe cases. In the current health care system the payments for the treated patients are based on Diagnosis Related Groups (DRG) (Kovac, 2011).

In US, the government pays for patients, who do not have private insurance or do not pay directly for the treatment; it is done through the Medicaid and Children's Health Insurance Program Reauthorization Act (CHIPRA). Reimbursement for the treatment of a particular patient is based on the All Patient Refined Diagnosis Related Groups (APR-DRG), which is adjusted for pediatric patients; another adjustment is made for the urban/rural areas and reflects also a salary level in particular region. Teaching centers receive supplement for increased expenses related to the training of doctors and nurses. (Centers for Medicare and Medicaid Services, 2011)

In UK, the majority of financial resources come from the National Health Service (NHS), from the government. The reimbursement for treated patient is based on the system of Payments by Results, which assigns a relevant price to the particular diagnosis and its severity; the prices are adjusted according to the area/region of the country. There is a direct impact on payments, reflecting the achieved quality of performance (NHS, 2009).

To summarize, in all three studied hospitals, it is the government, who provides the majority of subventions for the hospitals and who reimburses the treatment of children.

Besides this part of the budget, there are various options how to gain another resources, which are further dedicated to the development of the hospital. The main significant contribution comes from charity and private donations directly to the hospital. Both studied hospital operating in the hypercompetitive environment, Seattle Children's Hospital and GOSH are aware of that fact; their PR reflects their interests and they are both able to collect the substantial resources used for the improvement of facilities and technology. However, due to their national and international importance it is easier for them to attract sponsors than it is to CHFH. CHFH operates in a less competitive environment and the range of possible sponsors is narrowed; however, there are some well-established programs (Pediatric Oncology, Neonatology) which benefit from the donations from all around the country.

Among other used sources are research grants and education subventions, which receive all three studied hospitals, as all three of them are affiliated to the universities and thus represent the research and teaching centers. These resources are used mostly for technology and equipment related to laboratory and clinical research.

The last part of financial resources comes from direct payments for rented premises to the customers (pharmacy, shops, etc.), payment for accommodation of parents, and other payments.

2.5.2 Operational efficiency focused on quality of provided services and reduction of necessary waste

This aspect has been seen clearly especially in two hospitals working in the hypercompetitive environment, GOSH and the Seattle Children's Hospital, where it is necessary to maintain, even to improve the quality despite the increasing costs of operations and thus keep the competitive advantage. The directorial boards of all three hospitals do realize how important this factor is and therefore they initialize and monitor the activities leading towards the quality and efficiency improvements. In both GOSH and the Seattle Children's Hospital, there is a long tradition of declared continuous improvement; it is the Continuous Performance Improvement at the Seattle Children's Hospital and "Zero harm, no waits and no waste" at GOSH. CHFH is in the process of finding its way in both quality and efficiency improvements. The first step is to communicate this intention to all the staff members to get their support; the second step is to communicate these changes to the public.

2.5.3 Involvements of parents in the treatment process during their stay in the hospital

One of the children's hospital unique features is its relationship to the parents. For parents, treatment of their children is usually the greatest priority and therefore it is important for them to be the part of the treatment process, either in the hospital, or in the community. Cooperation with the parents brings the benefits in many areas. The main area is a direct feedback on the quality of health care and how the patients and their families perceive it. It is important to respect the view of parents, as they represent the connection between the child and the medical staff. The involvement of parents in the treatment process improves the healing abilities of the child and helps with the daily activities.

The comments and suggestions of parents which were incorporated in various areas have helped to improve the design of facilities, the information material and the introduction of new staff members into the hospital environment. The directorial board of CHFH realizes its potential for improvements in cooperation with parents and currently prepares the concept of this cooperation. At the Seattle Children's Hospital and GOSH, parents are involved through a well-established inner structure of committees and programs. It cannot be omitted that parents represent also an important connection line to sponsorships, charitable community events, etc., which increases the competitive advantage of the hospital.

3 Conclusion

The case study of the Children's Faculty Hospital in Kosice, Slovakia has brought an interesting insight into the specific conditions and problems of pediatric hospital. Analyzed hospital was compared to the Seattle Children's Hospital in Seattle, US and the Great Ormond Street Hospital NHS Trust in London, UK, in order to find and point out the important aspects related to the quality of provided services as well as profitability. It was difficult to compare the hospitals of different ranks, operating in different market conditions, with different budgets. Despite these differences, there were identified the important factors that share profitable pediatric hospitals in hypercompetitive environment.

In the light of current changes within the health care system in Slovakia, in its financing and transformation from the subvention-based government institutions into the government corporations (which are 100% government-owned) and the change of payment system into the Diagnosis Related Groups based payments, it would be interesting to study what changes had the greatest impact on the health care quality, as reported to external institutions, but also as perceived by patients and families themselves. The paper represents a snapshot of the current situation which is about to change. The environment is becoming more and more competitive also for CHFH and therefore, it is not only the efficiency of its operations, but also a strong position in the market that could lead into the profitable future. The further research will be necessary to assess the impact of the ongoing changes on the pediatric health care quality, its efficiency and profitability.

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Innovative activity of the enterprises in the service sector in Poland

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Abstract

Under current conditions, the services and innovation sectors constitute the driving forces of modern economies. Due to the growing role of the service sector in economic growth, innovation is particularly important in this branch. The following article aims to present the development of innovation activity in the service sector in Poland, in 2018-2015. The first section of the study contains a review of the literature on the service sector and its innovativeness, while the second part analyzes and evaluates selected indicators characterizing innovative activity of the examined companies. The time horizon adopted in the analysis and evaluation of innovative activity of service companies in Poland was the period between 2008 and 2015.

Keywords: Service sector, Innovative activity, Poland, Secondary data, Indicator analysis.

JEL Classification: L80, O30

1 Introduction

Service enterprises play an important role in Poland's socio-economic development. According to statistical data, there were 3164,000 active companies in Poland in 2014 (76,8 % of all enterprises), employing more than 5401,000 people (62,7 % of all people employed in enterprises). Innovation is the primary factor and the main determinant of the development of service companies, and it proves crucial in the process of adapting the companies to the conditions and challenges of today's global economy. Running an innovative business is a necessity, a prerequisite for improving the competitiveness of a service enterprise.

The growing significance of services and innovation in the economic growth of modern economies is now an important area of economic research (Kolluru & Mukhopadhaya, 2017; Darus, Yunus, & Rahman, 2017; Manjón, Mompó, & Redoli, 2016; Mura, & Sleziak, 2015). Despite the service innovation theory, studies in this area have been, thus far, very limited. The following article aims to present the development of innovation activity in the service sector in Poland, in 2018-2015. It should be noted, however, that the limited framework allowed for the presentation of only selected aspects of the problem under investigation. Secondary sources of information were used as well. Based on GUS data collected using the methodology proposed by the Oslo Manual, the innovation activity of service companies was analyzed and evaluated using different indicators. The first

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section of the study contains a review of the literature on the service sector and its innovativeness, while the second part analyzes and evaluates selected indicators characterizing innovative activity of the examined companies. The time horizon adopted in the analysis and evaluation of innovative activity of service companies in Poland was the period between 2008 and 2015[4].

2 Services - concept, types, significance

The literature contains numerous definitions of what a service is. It is a separately occurring activity with no outcome, which provides the buyer with certain benefits that are not necessarily related to the sale of products or other services (Stanton, 1981). According to Nowosielska (1994, p. 8), „services are all service works, regardless of their place in the classification of national economy, both those falling within the production sectors (agriculture, forestry, industry and construction) as well as works performed in service departments (i.e. those that are non-agricultural, non-industrial, etc.)". Services are activities or sets of activities of a more or less intangible nature, which normally – although not necessarily – occur when a customer gets in touch with a service provider, and/or physical resources, and/or enterprise systems that provide a solution to the customer's problem. Analysis of the definitions presented in the literature makes it possible to point out that the most characteristic features of the services emphasized in the literature are their intangibility, simultaneity of production and consumption, customer's needs and the fact that they cannot be stored (De Jong et al., 2003; Merkevicius et al., 2015; Benda-Prokeinová et al., 2017) (Table 1).

Table 1 Product and service

Product characteristics	**Service characteristics**
Tangible	Intangible
Homogeneous (always the same)	Heterogeneous (different each time)
Separateness of production and consumption	Production linked with consumption
Item	Activity
Customers do not normally take part in the production process	Customers take part in the production process
Storage capability	No storage capability
Dominance of technology	Dominance of people
Easy standardization	Difficult standardization

Source: Own study based on De Jong et al. (2003)

Many companies these days carry out both production (manufacturing) and service activities, and the process of producing tangible goods is inseparable from the provision of services. Among the services, we distinguish:

1. traditional services, classified as belonging to the third sector of the economy (trade, transportation and communication, accommodation and catering services, services to the public, service provided by private entities such as beauty or hairdressing services),
2. advanced services, classified as belonging to the fourth sector of the economy, addressed primarily to enterprises (banking, insurance, counseling, advertising and others); it should be noted their importance has been on the increase in the modern economy,
3. services to the public (provided mainly by public institutions), classified as belonging to the fifth sector of the economy – health care, education, research, public administration, justice, police and military; these services have been partially privatized.

[4]This period is due to the availability of GUS (Poland's Central Statistical Office) data.

In the process of socio-economic development, Flejterski et al. (2005) distinguish four stages of service sector development: (1) primary stage, with the dominance of services not requiring high qualifications; (2) growth stage, characterized by the development of services requiring certain qualifications; (3) industry service and consumption growth, and (4) development of high-tech services.

3 Service sector innovation

The increase in the importance of services[5] in the modern economy and the role of innovation in socio-economic development indicate the need to know the innovative processes taking place in the area of services (Kłosiewicz-Górecka, 2016). The service sector has, until recently, been regarded as not eligible for innovation and technical progress, and innovation theory would refersolely to manufacturing (Carlborg, Kindström, & Kowalkowski, 2014; Witellet al., 2017). The importance of services in innovative processes has been reduced to the role of a passive recipient of technological innovation obtained from the manufacturing sector (Niedzielski, 2008, p. 224). Such concept was presented, among others, by R. Barras, who emphasized the dependence of innovation in services on the innovations introduced by manufacturing and production companies that initiate the innovation process in service enterprises. The paradigm of industrial innovation, with services as consumers of innovation and a passive element in the innovation system, would persist (Niedzielski, 2008, p. 224).The perception of service innovation began to evolve only in the 1990s, when two major changes in the way of thinking about innovation occurred. First, it emerged that service innovation played a very important role in the innovation process, thus affecting the perception of service providers as recipients of innovations produced by others. Second, opportunities for innovative activities in areas other than technology were noticed, which increased the importance of improvements introduced by service providers (Niedzielski, 2008, p. 225). Most researchers currently agree that the service sector increasingly benefits not only from scientific and technical achievements, but that it also participates in their development. This is due to the growing role of the service sector in the economy and the shift in the perception of innovation toward „softer" areas of technology, such as marketing or organization and management. Increasing the importance of services in shaping innovation does not, however, mean shifting innovation only towards „soft" areas of activity. Economic research and practice demonstrate that service innovation also heavily rely on modern technologies, and that these areas are closely interdependent (Niedzielski & Rychlik, 2007, p. 177-178).

Innovation as a process of generating and absorbing innovation in services can be considered in several ways. Hertog (as cited in Skórska, 2012, p. 198-199; Osiadacz, 2012, p. 38-39) distinguishes four aspects of service innovation, including the following:

1. a new service concept that involves coming up with new approaches to the problem, providing new types of services,
2. a new level of cooperation with the customer, consisting in creating innovative solutions in cooperation with the customer, with his or her active participation,

[5]The service sector encompasses both industries that are highly absorbent of innovation and „resistant" to it. Telecommunication, financial, insurance, postal and information services occupy one spectrum, while the other covers sectors related to transportation, storage and personal services. This heterogeneity of service activity stirs many controversies surrounding innovation.

3. a new system for providing services, related to the level of cooperation with the customer, refers to the internal conditioning of the organization, enabling employees to perform their tasks appropriately,
4. application of novel technologies, including ICT.

The multidimensional model of Hertog (as cited in Dominiak, 2011, p. 438) emphasizes interactions between the process of service production and its provision, both fulfilled in close cooperation with the customer. The nature of services and the network of interrelations make for the fact that innovation have to do less with the changes in the final product than with the individual stages of the fulfillment of the service, often taking on an organizational nature.

In the literature, service innovations are defined as (Skórska, 2016, p. 154-155):
1. attempts to gain competitive advantage by noticing or discovering new and better ways to compete on the market and their implementation,
2. successfully completed implementation of new ideas or concepts,
3. new services or fundamental changes in the existing services, processes of their production or provision methods,
4. ideas, actions or tasks that are new to the organization and its environment,
5. development of service products that are new from the perspective of the seller,
6. a new or substantially altered service, customer interaction, service provision system or technology that individually or collectively lead to new or renewed service functions; implemented changes require new human, technological or organizational skills.

Service innovation also been defined in the third edition of the Oslo Manual (OECD, 2005), according to which in introduces companies to a new or significantly improved solution for their product (goods or service), process, marketing, organization or external relationship. They are „the result of a process of change or a process concerning the product itself, characterized by a high degree of intangibility, the need for contact between the service provider and the customer, the integration of external factors in heterogeneous relationships, stemming from the high personal output of human factors" (OECD, 2005).

Various typologies of service innovation can be found in the literature (Troilo, De Luca, Guenzi2017). One of the most common is the classification of service innovation in terms of the scope of innovation. According to this criterion, service innovation can be divided into (Gallouj & Weinstein, 1997, p. 538):
1. radical – including complex changes in service activities,
2. smaller-scale innovations (also known as secondary, incremental).

Additionally, innovation in service activities can be further divided based on innovation initiators (as cited in Niedzielski, 2008, p. 245-246):
1. supplier-dominated innovation, often seen as the dominant type of service innovation. Relies on the application of new products resulting from innovation in industrial production, in the process of providing services. Such innovations will be characterized not only by technological improvements, but also by the organizational changes required by them to adapt the company's activities to such innovations – e.g. staff training, etc.,
2. innovation within services – technological or non-technological innovations often implemented in the company for strategic reasons,

3. client-led innovation – these innovations are the response to clearly defined needs of the customer of service companies,
4. innovation through services – where service companies influence the innovation process of another company-client. This kind of innovation refers mainly to B2B (business-to-business) services. A service company provides the knowledge, skills and resources that support the innovation process that takes place mostly in the client-company,
5. paradigmatic innovation – complex innovations, involving both suppliers, customers and service companies themselves.

Classification of service innovations based on innovation initiators is important in terms of exploring possible sources of service innovation. Service innovations are considered not only from the perspective of new services, but also as a novel way of providing services that cover customer contact, distribution channel and/or new form of service activity organization – including changes in management and marketing. At the same time, it is assumed that these changes will meet the requirements of „novelty" and will bring measurable socio-economic benefits (Dominiak, 2011, p. 439).

Innovation in the service sector is perceived through the prism of service functions and understood as service provider innovations and innovations in manufacturing support services. Table 2 presents the main features of industrial and service innovation.

Table 2 Comparison of industrial and service innovation

Industrial innovation	**Service innovation**
Making new or improved products	Developing new or improved services
Introducing new or improved production technology	Use new or improved service provision methods
Applying a new sales and purchase strategy	Applying a new way of interaction with customers and suppliers
Launching a new product sales market	Launchinga new service provision market
Using new raw materials or semi-finished products	Using new tools or materials
Introducing changes in the organization of production	Introducing changes in the organization of the service provision process

Source: Niedzielski (2008, p. 232)

It follows from the above that innovative activities in the industrial sector have their counterparts in service innovation. What is more, production companies often innovate in their service functions in order to diversify their products. Despite the similarities of innovation in the industrial and service sectors, there are also significant differences between the two, concerning mainly the duration of the innovation process and its complexity. The industrial sector most often absorbs new technical concepts through one-off implementation of new technologies in the manufacturing process. The change introduced in the service sector, meanwhile, normally does not end with the introduction of a new technology, but rather continues in the form of constant transformations, enhancements and adaptation to the needs voiced by the customers (Węgrzyn, 2012, p. 614).

4 The service sector in Poland

Services are one of the three main sectors of the national economy (along with agriculture and industry). The current level of development of the service sector in Poland is primarily a consequence of the political and economic conditions that have prevailed in the country in recent decades. The state's contribution to GVA and GDP has been steadily increasing – from around 50% of GDP in 1990 to approximately 63.8 % today. Poland is slowly approaching the structure observed in highly developed countries where the average share of services is around 70 %.

Service companies employ as many as 58 % of all Polish employees, which means that every second employee works in services. In 2014, GVA in the service sector at current exchange rate was PLN 979.9 billion (an increase of approximately 3.4 % compared with the previous year), of which approximately 77% was generated in market services, and around 23% – in non-market services (resulting from state functions in the area of health and social security, education and culture, as well as defense and public security). In fixed prices, GVA for market services amounted to 4.4 % (i.e. up by 0.2 percentage points compared with the previous year), and 0.1 % for non-market services (i.e. down by more than 3.5 percentage points compared with the previous year).

In the sectoral structure of the economy at the end of 2014, there were about 76.8 % of service companies registered in the Polish REGON system (up by approx. 0.5 % compared with the previous year). The private sector, which accounts for as much as 96.2 % of the total, dominates the following sections: trade; repairs of motor vehicles (over 1 million enterprises); professional, scientific and technical activity (385,100 enterprises); transportation and storage (252,500 enterprises). Services are provided by micro-enterprises employing up to 9 people (about 96 % of all companies), whereas organizations employing between 10 and 49 people account for about 3.1 % of the total. The larger companies (i.e. 50 employees and more), meanwhile, account for only 0.1 %. The share of micro-enterprises is higher in both market services (over 97 %) and non-market services (over 88%) (Ministerstwo Gospodarki, 2015).

5 Analysis and evaluation of the innovative activity of the service sector in Poland

The group of enterprises under analysis are service companies[6] of the relevant departments of PKD 2007 (Polish Classification of Activities)[7], where the number of employees is 10-49 (small

[6]The study covered entities employing 10 and more people and the type of activity classified according to *PKD 2007* to the following sections and departments:

- Wholesale trade, except of motor vehicles and motorcycles (division 46) from section Wholesale and retail trade, repair of motor vehicles and motorcycles.
- Transportation and storage.
- Information and communication.
- Financial and insurance activities.
- Architectural and engineering activities; technical testing and analysis (division 71), Scientific research and development (division 72), Advertising and market research (division 73) form section Professional, scientific and technical activities.

[7]*PKD 2007* – Polish Classification of Activities. It is methodologically, conceptually, scope-wise and code-wise coherent and comparable with the NACE Rev.2 introduced by Regulation (EC) No 1893/2006 of the European Parliament and of the Council of 20 December 2006 establishing the statistical classification of economic activities NACE Revision 2 and amending Council Regulation (EEC) No 3037/90 as well as certain EC Regulations on specific statistical domains (OJ L 393, 30.12.2006).

enterprises), 50-249 (medium-sized enterprises) and 250 or more (large enterprises). The study covered the period of the last 8 years, i.e. 2008-2015[8]. In order to evaluate the innovative activity of the service companies in question, the following indicators were analyzed:

1. growth rate of innovation expenditure (previous year = 100),
2. percentage of enterprises that have incurred expenditure on innovation (%),
3. percentage of innovative enterprises (%),
4. percentage of enterprises that have introduced new or significantly improved products (%),
5. percentage of enterprises that have introduced products new or significantly improved from the perspective of the market (%),
6. percentage of enterprises that have introduced new or significantly improved processes (%),
7. percentage of enterprises that have incurred expenditure innovation (%),
8. percentage of companies that have cooperated in innovation activities (%).

The choice of the above-indicators was determined primarily by their significance from the standpoint of the innovative activity of the enterprises and the range of available statistical data.

One of the key indicators used to evaluate innovation is the expenditure incurred with relation to innovation. Business expenditures for this purpose are diversified according to the type of innovative activity. In 2008-2015, the rate of change in the volume of expenditure incurred by service companies for innovative activity was characterized by a significant amplitude of fluctuations. For example, in 2009 – compared to the previous year – these expenditures decreased by more than 22 %, only to increase by over 30 % in 2010 and continue to grow in 2011, although at a smaller rate (Table 3). As a consequence of the fact that this indicator is characterized by a considerable amplitude of fluctuations and does not show any clear tendency, it is difficult to evaluate the innovative activity of Polish service enterprises on that basis.

Also in 2008-2015, expenditure on innovations among Polish service companies amounted to PLN 11.7 billion per year, of which the outlays of enterprises employing more than 49 people (constituting 16.7 % of the total number of the sample) amounted to 93.0 %. In the reviewed period, the concentration of innovation expenditure in services was particularly evident in enterprises with over 499 employees (67.8 % among the 1.1 %) (Table 3).

Again in 2008-2015, service companies were the largest contributor to fixed capital, although these expenditures were steadily decreasing over the period under review (in 2008 they accounted for 74.5 % of total innovation spending, and 38.5 % in 2015). This demonstrates the initiation of innovation by technology and suppliers, and to a lesser extent the market itself. In 2008-2011, a significant part of the expenditure was spent on the purchase of software, whereas in 2012-2015 large sums would be invested in research and development (Table 3). In these cases, the main source of innovation is the implementation of modern information and communication technologies, and human resources. These are mostly innovations based on the innovation model relying on technological advancement (O'Sullivan, Dooley, 2009, p. 47-51), and is the result of increasing competition and the development of ICT on the one hand, and the increasing needs and demands of individual and institutional customers in terms of availability, forms or service time on the other hand.

[8]The latest figures published by GUS (Poland's Central Statistical Office) refer to 2015.

Table 3 Expenditures on innovation activity in enterprises in the service sector by type of innovation activity

Years	Total	Of which					
		R&D	acquisition of external knowledge	acquisition of software	capital expenditures on fixed assets	staff training connected with innovation activity	marketing for new and significantly improved products
2008	10 664 837	647 006	210 730	1 165 200	7 948 124	67 473	287 691
2009	8 260 053	754 684	612 188	1 236 861	4 803 061	65 453	498 714
2010	10 790 284	1 354 134	816 173	1 761 235	5 921 562	82 591	486 676
2011	10 979 090	1 498 477	0	1 534 224	6 015 881	0	485 882
2012	15 145 405	6 068 288	0	1 407 261	5 119 806	0	954 620
2013	11 980 872	2 749 624	456 170	2 456 303	5 085 079	75 855	465 195
2014	12 995 246	2 947 306	216 038	1 328 090	5 617 333	59 997	2 328 782
2015	12 640 880	4 129 793	324 564	1 357 962	4 864 846	144 033	984 961
(previous year = 100)							
2009	77.5	116.6	290.5	106.2	60.4	97.0	173.4
2010	130.6	179.4	133.3	142.4	123.3	126.2	97.6
2011	101.7	110.7	0.0	87.1	101.6	0.0	99.8
2012	137.9	405.0	-	91.7	85.1	-	196.5
2013	79.1	45.3	-	174.5	99.3	-	48.7
2014	108.5	107.2	47.4	54.1	110.5	79.1	500.6
2015	97.3	140.1	150.2	102.2	86.6	240.1	42.3
(%)							
2008	100.0	6.1	2.0	10.9	74.5	0.6	2.7
2009	100.0	9.1	7.4	15.0	58.1	0.8	6.0
2010	100.0	12.5	7.6	16.3	54.9	0.8	4.5
2011	100.0	13.6	0.0	14.0	54.8	0.0	4.4
2012	100.0	40.1	0.0	9.3	33.8	0.0	6.3
2013	100.0	23.0	3.8	20.5	42.4	0.6	3.9
2014	100.0	22.7	1.7	10.2	43.2	0.5	17.9
2015	100.0	32.7	2.6	10.7	38.5	1.1	7.8

Source: Own study based on GUS data

The percentage of companies spending on innovation decreased systematically in the analyzed period. In 2008,these enterprises accounted for more than 13% of the total, but in 2011 they were only 9.6%, and 7.5% in 2015. This data proves that in the period 2008-2015 the innovative activity of Polish service companies decreased (Figure 1).

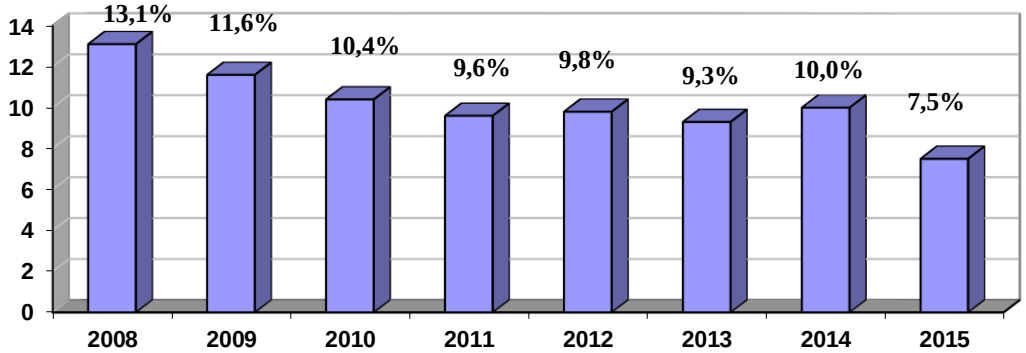

Figure 1 Service enterprises which incurred expenditures on innovation activities (%)
Source: Own study based on GUS data

Another indicator is the percentage of innovative companies. According to GUS[9], an innovative enterprise is one that has introduced at least one innovation during the period under review, or implemented at least one discontinued or neglected (i.e. unsuccessful), or not completed (i.e. one that is still in progress), innovation project during that period.

The analysis of the innovative activity of service companies in the years 2008-2015 indicates a clear tendency of a decrease in the participation of innovative entities. In the analyzed period, there was a marked decrease in the share of innovative service companies from 16.1% in 2006 to 9.8% in 2015 (down by 6.3 percentage points). In all the years under review, service companies most often introduced new or significantly improved processes. It should be noted, however, that in the analyzed period the percentage of enterprises introducing such innovations was systematically decreasing. While in 2008 these companies constituted 12.8% of the total, but in 2015 that number went down to 7.4%. A significant drop in this indicator was also observed for other types of innovative activity (Table 4).

Table 4 Share of service enterprises which introduced innovations in total enterprises in the years 2008-2015 (%)

Years	Innovation active enterprises	Enterprises which introduced innovations		
		New or significantly improved products	New or significantly improved products for the market	New or significantly improved processes
	%			
2008	16.1	10.7	6.5	12.8
2009	13.9	8.00	4.4	10.7
2010	12.8	7.9	4.3	10.0
2011	11.6	6.3	3.3	9.0
2012	12.4	7.0	3.4	9.1
2013	11.4	5.8	2.8	8.5
2014	11.4	6.8	3.9	8.4
2015	9.8	4.8	2.3	7.4

Source: Own study based on GUS data

The last indicator under review concerns the percentage of enterprises that have cooperated in the field of innovation. According to GUS, cooperation in the area of innovative activity means active participation in joint innovation projects with other companies or non-profit institutions. Such cooperation may be prospective and long-term, and it needs not immediately involve direct and measurable economic benefits for the participating partners. Ordinary external contracting, without active participation in the implementation of such projects, should not be regarded as cooperation in the field of innovation.In the analyzed period, the percentage of service companies that conducted such cooperation decreased significantly. While in 2008 they were 6.7%, in 2011 the percentage dropped to 3.5% and down to 2.6% in 2015 (Table 5).

[9]GUS – Główny Urząd Statystyczny (Poland's Central Statistical Office).

Table 5 Share of service enterprises which participated in innovation activities co-operation in total enterprises in the years 2013-2015 by number of persons employed

Years	Enterprises in the service sector			
	Total	by number of persons employed		
		10-49 persons	50-249 persons	250 persons and more
2008	6.7	4.7	12.2	34.5
2009	4.1	2.5	8.2	23.4
2010	4.4	2.9	8.1	26.5
2011	3.5	2.5	5.5	24.7
2012	3.8	1.8	9.4	27.9
2013	2.9	2.1	5.1	22.1
2014	3.0	1.8	6.7	21.3
2015	2.6	1.6	5.4	19.1

Source: Own study based on GUS data

The share of companies that have cooperated in the area of innovative activity was significantly different in the analyzed period depending on the size of the enterprise. In 2008-2015, the largest share of these entities was among companies with 250 and more employees, followed by those employing 50-249 people.It should be noted that in all the groupsboth small, medium-sized and large– this indicator systematically decreased and reached the lowest level for the entire period in 2015 (Table 5).

The results of the research indicate that the innovative activity of Polish service companies is closely correlated with their size and industry[10]. The largest activity is characterized by large entities operating in the insurance and reinsurance sector, as well as those dealing with research and development, i.e. those employing qualified personnel and conducting activities where the development of information and communication technologies facilitates the absorption of knowledge and reinforces the innovation potential. In these specific sectors, competition is intensified and customers become involved in the processes of creating and implementing innovations, which in turn determines their market success.

6 Conclusions

The growing role of services is reflected, among others, in the development of scientific research studies and their practical application. Particular attention is paid to services that require specialized knowledge, among them: IT, design and engineering, consulting, and research and development (R&D). The increase in the share of these services in the economies of the EU countries is linked with the transformation of these countries into innovative, knowledge-based economies (Poznańska, 2009).

The analysis and evaluation of the selected indicators characterizing the innovative activity of service companies in Poland in the years 2008-2015 indicates that during that period significantly decreased:

1. the percentage of enterprises that have incurred expenditure on innovation,
2. the percentage of innovative enterprises,
3. the percentage of enterprises that have cooperated in innovation activities.

[10] This is also the result of research conducted in other countries (Jose Silva et al., 2011; Mina, Bascavusoglu-Moreau, & Hughes, 2014).

The results of the research demonstrate the innovation activity of the service sector in Poland decreased in the analyzed period. Similar conclusions are also drawn from other studies conducted in Poland and abroad (Czubała, 2015). Additionally, many studies and analyses point to the low innovativeness of the Polish economy in general[11], which is largely due to the low innovation activity in the Polish service sector. This is also the result of research studies conducted in other countries.

Under current conditions, the services and innovation sectors constitute the driving forces of modern economies. Due to the growing role of the service sector in economic growth, innovation is particularly important in this branch. The decline in the innovation activity of service companies observed in recent years in Poland requires undertaking a number of measures aimed at increasing their innovativeness. The following is therefore recommended:

1. greater involvement of enterprises in knowledge acquisition,
2. increased use of modern means of communication; supporting the development of the e-commerce and e-services market by increasing the expenditure on technical infrastructure and dissemination of e-administration,
3. introduction of facilities for small service companies to access various types of digital tools to support their businesses,
4. improvement of information channels as a basis for expanding knowledge by small and medium-sized enterprises,
5. greater involvement of governments and public administrations at various levels in simplifying procedures,
6. fostering conditions for the intensive development of outsourcing and offshoring in knowledge-based services.

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[11]According to European Innovation Scoreboard, for example, Poland belongs to the third and second last of the four groups, known as moderate innovators, being located near its bottom border, ranking 25th out of 28 EU countries.

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Cost of senile cataract surgery in 65+ population in the Czech Republic

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Abstract

The objective of this study is to quantify direct costs related to different types of implanted intraocular lenses from the perspective of public health insurance and from the patient´s perspective. The calculations were carried out based on three scenarios. The first scenario describes the real current situation, when the health insurance company reimburses the performances related to the senile cataract treatment including a monofocal artificial intraocular lens (IOL), and the patient pays for all the materials in the case he/she requires a multifocal or toric IOL. The second scenario analyses the situation, when there was the category of so-called "nadstandard" (better care than the standard one) in the Czech healthcare system. In this case, the health insurance company reimburses the performances related to the senile cataract treatment including the sum equivalent to the price of a monofocal IOL as the cheapest option. The patient pays the price difference between the implanted toric or multifocal lens and an equivalent monofocal lens. The third scenario describes the situation corresponding to the judicial interpretation of the Constitutional Court of the Czech Republic, when the health insurance company reimburses only the performances related to the senile cataract treatment including a monofocal IOL, and if a patient requires a multifocal or toric IOL, he/she pays for the whole operation including the materials himself/herself. The study covered a cohort of 200 patients with senile cataract in the age of 65 and over. Data were collected from four cataract surgery performing clinics in 2014. Patients´ costs were obtained through a patient questionnaire asking the direct (out-of-pocket) expenses associated with the cataract surgery. Direct costs of the senile cataract surgery from the perspective of public health insurance were CZK 24,900 (about EUR 907) per person (one eye). Patient´s direct costs were lower for monofocal lenses than for multifocal ones. Patients' costs for an IOL and the related treatment reached up to CZK 35,000 (about EUR 1,275), out of pocket expenses after the treatment averaged out at CZK 4,450 (about EUR 162). The most cost-effective option from the patients´ perspective is the monofocal IOL, however, the patients would spend a higher sum of money for the eyeglasses after the operation. Nevertheless, it is still less than the material costs in the case of a multifocal IOL, which, moreover, is not suitable for all patients. Thus, the monofocal IOL appears to be the best option from the point of view of cost effectiveness both from the perspective of public health insurance and from the patient´s perspective.

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Keywords: Senile cataract, Costs, Elderly patients, Expert judgement, Czech Republic.

JEL Classification: I13, I18

1 Introduction

Written evidence about cataract incidence and its treatment has existed already for 3750 years, since the Code of Hammurabi (Cholevík, 2014). Also documents about the costs of this intervention are of the same age; the Code explicitly sets the remuneration for a successful cataract removal (opening the eye by a bronze tool and removal of the spot from it), and simultaneously also the sanctions, if the intervention was unsuccessful. The price of an eye was high, and thus the remunerations or penalties for surgeons or barber-surgeons were adequate to that (Cholevík, 2014, p. 9). The remuneration (see the Code of Hammurabi, Laws #215-217) ranged between 2 and 10 shekels based on the patient´s rank in the society. One shekel represented about 8.33 g of silver. Laws #218-219 mention also sanctions for a possible miscarriage of the operation ranging from the damage compensation up to cutting off a hand, again according to the patient´s rank (King, 1915). In the history, cataract treatment was recorded also in Old India, Egypt, ancient Greece and Rome, in the Arab World and also in Europe. The way of the cataract treatment had not changed virtually until the end of the 19th century. Opposite to the current situation, up to 50% of interventions resulted in patient´s loss of eyesight (Schrader, 2004). Worldwide, cataract has the highest prevalence out of all eye diseases causing deterioration of vision or even blindness. Epidemiological studies estimate the number of patients affected by blindness in the world to be 30–45 million cases. Nearly one half of them is caused by cataract (Lafuma & Berdeaux, 2008). Senile cataract is diagnosed to patients in the age over 50.

The cataract surgery belongs to the most frequent medical interventions in the world (Soltes & Gavurova, 2014; Gavurova & Vagasova, 2016). In the Czech Republic, similarly to other OECD countries, it is covered from public funds, and thus it is available for most patients without any particular problems. This operation has a great impact on patient´s quality of life, since more than 80% of information are perceived through sight, and its loss leads to a dreadful decrease in the quality of life. The senile cataract surgery has generally a very good prognosis, and its result usually has a very positive effect on a reincrease in patient´s quality of life. On the other hand, from the global point of view, cataract still represents a significant problem. In the Czech Republic, 7 % of those suffering from cataract are referred to a surgery each year, i.e. about ten thousand of these interventions are carried out annually. Since the surgery is also connected with some out-of-pocket payments of patients in the Czech Republic, it is necessary to pay attention to potential catastrophic expenses for health, or rather to an excessive financial burden imposed on some elderly with low income.

Only a few papers focused on costs related to senile cataract and its complications have been published in the West European discourse. Studies of this kind are more common in developing countries, where senile cataract is the predominant cause of blindness. According to published results, the costs of the surgery itself are constant; individual cases differ only in the cost of the implanted intraocular lens (hereinafter the “IOL“), the costs of complications, and the costs of prescribed spectacles lenses.

Lafuma and Berdeaux (2008) created a Markov model, and used it for an estimation of the life-long expenses incurred after the cataract surgery with a monofocal or multifocal IOL in four European countries. The model distributes patients into particular health states. Each state is assigned a value of benefits depending on life expectancy and quality, and costs. There are two basic states after the surgery: the patient either does not need spectacles at all, or he/she needs them and must purchase them. The second case is followed by care of spectacles, and buying new spectacles after a three-year period. Patients that die are also taken into consideration in each state. The costs of spectacles ranged between EUR 200 and 400 in the particular countries (except France). Patients paid the costs themselves. In France, the costs were partly refunded by the national health service (*Caisse Primaire d'Assurance Maladie*) according to the patient´s age and degree of correction. The costs of an examination in the eye doctor office ranged from EUR 25 in France to EUR 100 in Italy. An optometry examination is not covered with an exception of Spain. Patients pay EUR 40 for an appointment at the optometrist. Lafuma and Berdeaux also evaluated costs of patients´ transport to and from the surgery, which differed in particular countries. Substituting these costs into the Markov chain, the total costs of a cataract surgery implanting a multifocal IOL calculated from the perspective of the whole society ranged between EUR 3,551 and 4,052. In the case a monofocal IOL was implanted, these costs ranged between EUR 2,324 and 2,610. The average number of pairs of eyeglasses prescribed after the senile cataract surgery with implanted multifocal IOL reached 1.34–1.61. The value increased in patients with implanted monofocal IOL to 6.05–7.27. Based on the expenses related to the cataract surgery, implanting a multifocal IOL is considered an alternative to eyeglasses (Lafuma & Berdeaux, 2008).

Laureneau, Lafuma and Berdreaux modelled life-long costs connected with the cataract surgery implementing a toric lens in four European countries. These costs were by EUR 308.2–691.7 lover than in the case of implanting a monofocal lens. With a monofocal lens, 66 % of patients required distance glasses after the operation, while it was only 25 % of patients with a toric lens. The decrease in total costs reached (without discounting) EUR 897 (France), EUR 822.5 (Germany), EUR 895.8 (Italy) and EUR 391.6 (Spain). If a 3 %-discount rate was applied, the costs differences were EUR 691.7, EUR 646.4, EUR 693.9 and EUR 308.2, respectively (Laurendeau, Lafuma, Bedreaux, 2009). The postoperative costs of eyeglasses were modelled and estimated to be in the range between EUR 1,050 (Spain) and EUR 1,250 (Germany). The payment for an ophthalmological appointment was the same as in the previous paper. The savings of patients with a toric lens were due to lower costs for the sight correction. Savings were recorded in all four countries (Laurendeau, Lafuma, & Bedreaux, 2009).

Another study of economic impacts of senile cataract was published by Boureau et al. (2009). Total life-long costs for the Nd:YAG laser capsulotomy and related complications were calculated to be EUR 90.5 in the case of hydrophilic lenses, and EUR 189.5–288.0 in the case of hydrophobic lenses. The costs of the intervention itself was estimated similar for all three types of lenses. Unit costs for the Nd:YAG laser capsulotomy amounted to EUR 98.16 in the first year. Higher costs were connected with postoperative complications like a permanent increase in the intraocular pressure (EUR 277.30 in the first year after the operation, and an identical sum in the next years), visual acuity deterioration (EUR 7,242 annually). Furthermore, the authors evaluated single costs of macular edema (EUR 108.13) and retinal detachment (EUR 3,023.54).

Recently Hahn and Krummenauer (2017) surveyed the results and methods of cost-utility analyses of the cataract surgery. Based on decision–theoretic time trade-off, utilities ranged from 0.148 to

0.8 and quality-adjusted life years (QALYs) ranged from 1.424 to 2.43. Based on psychometric instruments such as EQ-5D, utilities ranged from 0.017 to 0.056 and QALYs ranged from 0.141 to 0.547. Reported costs per QALY were between USD 1,307 and USD 14,302.

The objective of this study is to figure out, based on national and foreign results, direct costs related to the type of the implanted IOL both from the perspective of public health insurance and the patient´s perspective in the Czech Republic.

2 Methods and data

The study covered a cohort of 200 patients with senile cataract at the age of 65+. There were 117 women (58.21 %) and 84 men (41.79 %). The average age was 74.11 (74.12 in women and 72.26 in men). Monofocal lenses were implanted to 72.89 % of patients (293 IOLs). Multifocal IOLs were implanted to 8.46 % patients (34 IOLs). Toric lenses were used in 18.66 % of patients (75 IOLs). The IOL type difference between the eyes (left-right) was minimal. Multifocal IOLs were implanted in the same 17 patients. Monofocal IOLs were used in 147 patients (73.13 %) for the right eye, and in 146 patients (72.64 %) for the left eye. Toric IOLs were implanted more to the left eye (n=38, i.e. 18.91 %), while the number of toric IOL implantations to the right eye amounted to 37 (i.e. 18.41 %). Three possible variants (scenarios) were chosen for the calculation of costs related to the senile cataract surgery. Direct costs were calculated through a panel of experts that provided expert opinions (Ivlev, Vacek, & Kneppo, 2015), taking into account consumption of paid medical services provided to patients. The panel consisted of six experts (four physicians from eye clinics, and two physicians from outpatient departments). The data for this study were collected by a combination of the person-based, ie. the bottom-up approach, and data collection through an expert panel. Data were collected from four clinics performing cataract surgery in the year 2014. Patients´ expenses were obtained through a patient questionnaire asking the direct (out-of-pocket) expenses associated with the cataract.

3 Results

Calculations were done based on scenarios presented in Table 1; they describe three model states: (i) the current situation, (ii) existence of so-called “nadstandard” (better care than the standard one) in the Czech healthcare system, and (iii) situation corresponding to the judicial interpretation of the Constitutional Court of the Czech Republic.

In the time of the study, the remuneration of health services was provided based on performance codes defined by the Decree of the Ministry of Health No. 326/2014 Coll. and by the Decree of the Ministry of Health No. 324/2014 Coll., on the point values, the amount of reimbursement for paid services and regulatory constraints for 2015 (so-called Reimbursement Decree), or based on the package price with a special code. Both reimbursement types are equivalent, they have the same structure of provided performances. Due to the goal of this study, the costs from the perspective of public health insurance were calculated based on an expert panel, i.e. the experts defined the performances that were subsequently priced using the Reimbursement Decree. The costs from patients´ perspective were calculated based on a questionnaire survey realized in four Prague eye clinics among 201 patients, and three expert opinions from these clinics.

Table 1 Scenarios outline

Scenario #1: real current situation	The health insurance company reimburses the performances related to the senile cataract treatment including a monofocal artificial intraocular lens (IOL), and the patient pays for all the materials in the case he/she requires a multifocal or toric IOL.
Scenario #2: existence of so-called "nadstandard" (better care than the standard one)	The health insurance company reimburses the performances related to the senile cataract treatment including the sum equivalent to the price of a monofocal IOL as the cheapest option. The patient pays the price difference between the implanted toric or multifocal lens and an equivalent monofocal lens.
Scenario #3: judicial interpretation of the Constitutional Court	The health insurance company reimburses only the performances related to the senile cataract treatment including a monofocal IOL, and if a patient requires a multifocal or toric IOL, he/she pays for the whole surgery including the materials himself/herself.

Source: Own analysis based on Kruntorádová (2015)

The calculation from the perspective of public health insurance covered the costs connected with the examination before the operation, the cost of the senile cataract surgery itself, the costs of the postoperative care, the costs of postoperative medication, the cost of eyeglass lenses and frames, costs for other medical devices (magnifying glass), and costs of transport into the healthcare facility. Furthermore, costs of complications were calculated, particularly the costs of secondary cataract treated by Nd:YAG laser capsulotomy, temporary increase in intraocular pressure, permanent increase in intraocular pressure, retinal detachment, and cystoid macular edema (for details see Kruntorádová, 2015).

The calculation from the patient´s perspective covered the costs connected with the examination before the operation, the cost of the senile cataract surgery itself, cost of the IOL, costs of the postoperative care (checks the first and the eighth day after the surgery of the first eye, and the first check of the second eye), spectacles, other medical devices (magnifying glass), cleaning agents related to wearing eyeglasses, medical fees (applicable in the year of data collection), hospitalization and related fees, performances that are not reimbursed or only partially reimbursed by the health insurance company, regulatory fees for a prescription (applicable in the year of data collection), co-payments for food complements and freely sold medicines, co-payments for prescription medicines (incl. postoperative medication), other costs, transportation costs and accommodation costs (for details see Kruntorádová, 2015).

4 Discussion

According to Scenario #1, **the health insurance company covers average costs for both eyes** (weighted costs for all types of IOLs) in the sum of CZK 24,431.10. According to Scenario #2, this sum increases to CZK 25,939.00. The difference between these two sums is caused by a guaranteed reimbursement of the price of a monofocal IOL. Average costs of the health insurance company calculated according to Scenario #3 are lower (CZK 19,580.00). (See Tables 2, 3 and 4 for details.)

Table 2 Resulting values of Scenario #1

Costs description	Health insurance company perspective	Patient´s perspective
average costs for senile cataract treatment using MONOFOCAL IOL [CZK]	24,256.90	6,970.80
average costs for senile cataract treatment using MULTIFOCAL IOL [CZK]	24,022.20	56,331.00
average costs for senile cataract treatment using TORIC IOL [CZK]	25,294.00	2,5857.20
weighted costs for senile cataract treatment using monofocal, multifocal or toric IOL (ratio 0.729:0.084:0.187 according to the real number of patients) [CZK]	**24,431.10**	**14,648.90**

Source: Own analysis based on Kruntorádová (2015)

Table 3 Resulting values of Scenario #2

Costs description	Health insurance company perspective	Patient´s perspective
average costs for senile cataract treatment using MONOFOCAL IOL [CZK]	25,764.80	5,462.90
average costs for senile cataract treatment using MULTIFOCAL IOL [CZK]	25,530.10	54,823.10
average costs for senile cataract treatment using TORIC IOL [CZK]	26,801.90	24,399.30
weighted costs for senile cataract treatment using monofocal, multifocal or toric IOL (ratio 0.729:0.084:0.187 according to the real number of patients) [CZK]	**25,939.00**	**13,141.10**

Source: Own analysis based on Kruntorádová (2015)

Table 4 Resulting values of Scenario #3

Costs description	Health insurance company perspective	Patient´s perspective
average costs for senile cataract treatment using MONOFOCAL IOL [CZK]	24,256.90	6,970.80
average costs for senile cataract treatment using MULTIFOCAL IOL [CZK]	6,632.50	73,684.10
average costs for senile cataract treatment using TORIC IOL [CZK]	6,845.80	4,4267.70
weighted costs for senile cataract treatment using monofocal, multifocal or toric IOL (ratio 0.729:0.084:0.187 according to the real number of patients) [CZK]	**19,580.00**	**19,549.40**

Source: Own analysis based on Kruntorádová (2015)

The situation in France, Spain, Italy and Germany corresponds to Scenario #2. An implantation of a monofocal IOL is included in the calculation of DRG, the patients have to pay extra money up to EUR 500 for the material itself (the IOL) in the case of other than a monofocal lens. The costs from

the health insurance company perspective range between EUR 1,050 and EUR 1,250 in four studied European countries, the range of patient´s costs[5] is similar (Lafuma & Berdeaux, 2008).

Average costs for senile cataract treatment with a monofocal IOL (used in 72.89 % cases) amounted to CZK 24,256.90 from the **public health insurance perspective** according to Scenario #1 and Scenario #3 (the costs were identical), and a comparable sum according to Scenario #2 (CZK 25,764.80). The variance was minimal in this category. Within EU, the costs of health insurance companies for a surgery with a monofocal IOL implantation ranged between EUR 2,100 and 2,500, (Lafuma & Berdeaux, 2008).

Average costs for senile cataract treatment with a multifocal IOL (used in 8.46 % cases) are similar under Scenario #1 and Scenario #2 (CZK 24,022.20 and CZK 25,530.10, resp.). The costs of health insurance companies were a little higher in the second case, because the health insurance company covers a value comparable with the basic monofocal IOL. A dramatic decrease in costs can be observed in Scenario #3, when the costs of the insurance company amounted to CZK 6,632.50. The difference was covered by the patient.

A similar situation was in the **toric IOL** (implanted in 18.66 % of cases). According to Scenarios #1&2, the costs of the **public health insurance** for senile cataract treatment were the highest with this IOL (CZK 25,294.00 according to Scenario #1, and CZK 26,801.90 according to Scenario #2). It was caused by costs related to the preoperative care, when the patients are examined on corneal topography. From the perspective of health insurance companies, the costs were significantly lower according to Scenario #3 (CZK 6,845.80). The difference was paid by patients. In the above named European countries, the costs of public health insurance for senile cataract treatment implanting a multifocal or toric IOL are identical as in the case of utilizing a monofocal IOL. It is again the patient, who pays for the costs related to multifocal or toric IOLs (Lafuma & Berdeaux, 2008, Laurendeau, Lafuma, & Bedreaux, 2009).

Weighted costs that the patient pays relative to senile cataract surgery in both eyes amounted to CZK 14,648.90 for all types of IOLs according to Scenario #1. According to Scenario #2, patient´s expenses decreased to CZK 13,141.10 due to higher reimbursement of health insurance companies. According to Scenario #3, the weighted costs for all types of IOLs from the patient´s perspective were the highest (CZK 19,549.40). This was caused by costs related to the multifocal or toric IOLs. If we investigated patient´s expenses for individual types of IOLs, the lowest expenses were connected with the **monofocal IOL** (Scenarios #1 and #3 were identical and amounted to CZK 6,970.80, Scenario #2 amounted to CZK 5,462.90). On the other hand, the highest expenses were connected in all variants with **multifocal IOLs** (Scenario #1 required CZK 56,331.00, Scenario #2 required CZK 54,823.10, and Scenario #3 CZK 73,684.10). Expenses connected with **toric IOLs** were similar in Scenario #1 (CZK 25, 857.20) and Scenario #2 (CZK 24,399.30). According to Scenario #3, patients pay CZK 44,267.70 for senile cataract surgery of both eyes including implanted toric IOLs.

The largest variance in **health insurance company expenses** was found in **eyeglasses.** The insurance companies paid from CZK 254.60 (reading glasses without frames, distant glasses

[5] Nevertheless, conclusions of the studies can be very hardily compared due to different economic situations in these countries and in the Czech Republic, above all different cost of living and salary levels.

without frames) over CZK 569.00 for bifocal or multifocal glasses with frames, up to CZK 817.60 for a pair of reading glasses with frames and a pair of distance glasses with frames. Average weighted expenses for glasses from the payer´s perspective amounted to CZK 324.90. The insurance companies paid a lowest sum in the case of implanting a multifocal IOL, when they paid CZK 113.91. The payer´s expenses for glasses in the case of toric IOLs reached CZK 327.16. Paradoxically, the highest average expenses from the perspective of public health insurance were in monofocal IOLs (CZK 348.62). However, this situation is caused by the fact that this group comprise patients with both reading glasses and distance glasses, and that patients with monofocal IOLs more often purchase bifocal or multifocal glasses. A similar trend exists also in the West-European countries, where the expenses for eyeglasses are several times lower in the case of multifocal IOLs than in the case of Monofocal IOL (Lafuma & Berdeaux, 2008; Cuq et al., 2008, Culin et al., 2012).

The readiness to spend money after the cataract surgery has increased. **Before** the senile cataract operation, p**atients´ expenses connected with purchasing new whole spectacles** ranged from CZK 1,322.80 for reading glasses, over CZK 2,790.30 for a pair of reading glasses and a pair of distance glasses, up to CZK 14,370.00 for multifocal glasses. **After the operation,** whole glasses were prescribed to 50.25 % of patients, lenses for glasses to 35.82 % respondents. Neither glasses nor lenses for glasses were prescribed to 13.93 % of the respondents. These patients either did not need glasses (e.g. after implanting a multifocal IOL), or they wore old eyeglasses that they purchased before the surgery, or they bought cheap ready-made glasses in supermarkets. This fact was supported by responses of the category of patients, who were not prescribed glasses nor lenses for glasses, who, however, were ready to spend in average CZK 856.60 for glasses. After cataract surgery, the patients were ready to spend for new whole (i.e. including frames) reading glasses CZK 2,499.50, and for new whole distance glasses CZK 2,721.50, i.e. nearly a double sum as compared with the situation before the surgery. A similar trend was observed also in patients with bifocal glasses. The group of patients with multifocal glasses could not be analysed, because only one patient from our cohort purchased multifocal glasses.

If we **analyse expenses of patients according to the type of the implanted IOL,** they are the lowest in the case of a multifocal IOL (CZK 1,964.70) followed by patients with monofocal IOLs (CZK 2,263.80). Patients had the highest expenses for glasses in the case of implanted toric IOL, amounting to CZK 3,405.20. The weighted (over all IOLs) expenses of patients connected with purchasing glasses were CZK 2,452.10. This trend was proved also abroad. In France, patients paid for glasses after the surgery implanting monofocal IOLs EUR 2,766 (Germany: EUR 2,009, Italy: EUR 1,772, Spain: EUR 1,501); in the case of implanting a multifocal IOL, the patients spent EUR 615 (Germany: EUR 447; Italy: EUR 394, Spain: EUR 334). In France and Italy, implantation of a toric IOL led to a decrease in patients´ expenses; however, such tendency did not prove in our study. In the European context, there was higher patients´ spending for glasses lenses than for glasses frames. The only exception appeared in Spain, where the patients paid more attention to the esthetical issues and spent more money for the frames (Lafuma & Berdeaux, 2008; Cuq, Lafuma, Jeanbat, & Berdeaux, 2008; Lafuma, Laurendau, Lamerain & Berdeaux, 2009; Laurendeau, Lafuma, & Bedreaux, 2009).

5 Conclusion

Direct costs of senile cataract surgery from the perspective of public health insurance are CZK 24,900 (about EUR 907)[6] per person. Patient´s direct (out-of-pocket) costs are lower for monofocal lenses than for multifocal ones. Patients' costs for an IOL and the related treatment reach up to CZK 35,000 (about EUR 1,275), out-of-pocket expenses after the treatment average out at CZK 4,450 (about EUR 162). From patients´ perspective, the most effective variant is implanting the monofocal IOL; on the other hand, such patients spend more money for glasses after the operation. However, these are still lower than the costs of materials in the case of implanting a multifocal IOL, which, moreover, is not suitable for all patients. Thus, the monofocal IOL appears to be the best option from the point of view of cost effectiveness both from the perspective of public health insurance and from the patient´s perspective.

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Leadership style and management training of head physicians as healthcare quality factors: A study from a Czech hospital

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Abstract

There has been an emphasis on quality increase, as well as economic efficiency increase within the health services area. This has led to high demands being put on management of healthcare establishments. Leadership is an important factor of the quality of healthcare. Through the applied leadership style, the manager can influence the satisfaction of his subordinate employees and thus the quality. This study describes basic knowledge about the transformational leadership theory. It focuses on this topic in the healthcare management setting. The purpose of this study is to explore the leadership style displayed by head physicians working at one of the profit- oriented hospitals in the Czech Republic. We want to find out which leadership style is predominant by head physicians in a selected Czech hospital. This target group is unique in this research area because mainly nurses are explored. We also focus on the mapping and identification of head physicians´ education and training connected with the managerial position and human resource management. The data was collected through the Bass Multifactor Leadership Questionnaire (MLQ) and our own questionnaire detecting management training. The obtained data was analyzed by standard statistical methods. Our results show that in the selected hospital the transformational leadership style prevails although the differences were small and almost 80 % of head physicians have no training in managerial skills.

Keywords: Leadership, Leadership styles, Head physicians, Managerial education, Multifactor leadership questionnaire, Healthcare management, Middle hospital, Czech Republic.

JEL Classification: I110

1 Introduction

Compared to other sectors, healthcare management is specific. Healthcare organizations strive not only to achieve the economic goals, but above all the medical goals also. Apart from their professional expertise, it is increasingly more important for healthcare leaders to develop their management competence. It can be observed that the need for their management education is still largely ignored. Continuous education enhances not only qualification, but also enhances the quality of provided healthcare services. As well as education, leadership forms an essential part of every single healthcare manager. In recent times, researchers have been significantly more interested in investigating different leadership styles and their application.

Human resources represent an irreplaceable component in an organization. Without any doubt, human resources can be described as one of the most valuable capitals in any organization (Rad &

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Yarmohammadian, 2006). The work of managers is based on working with people (Shortell & Kaluzny, 2006). The process of performing effectively as a leader rests in the ability to influence others in a way that makes them work with enthusiasm when completing their job tasks (Alves & Canilho, 2010). At the beginning of the path to create a successful organization stand therefore not only outstanding employees but also outstanding leaders (Bennis, 2007).

Healthcare organizations are very complex and dynamic organisms. Performing a manager's role in healthcare might be difficult since many decisions that are made reflect also in individuals' quality of life, as well as society as a whole. Managers are able to ensure that organizational goals are met and quality service delivery achieved through making the right decisions and using their skills. Ensuring the level of care provided should be a continuous process. In this case, quality assessment and measurement are required. It is important to recall that service features attract and satisfy patients, meet their expectations and provide an advantage by distinguishing physicians or organizations from others.

There have been debates in connection with the quality of healthcare, and whether the healthcare system in the Czech Republic can ensure availability to and effectiveness of quality healthcare and whether provided services can achieve set standards. The key factors of the success are nurses and other employees. The lack of nurses is currently one of the major problems within the Czech healthcare system. Although expert data is missing, it is estimated that between 2010 and 2015, more than 1300 healthcare professionals left the system. The number of non-medical professionals represented in the Czech healthcare system is plummeting and this trend continues (MZ ČR, 2016). The causes behind this drop can be found in various areas. Among the reasons are for example, incorrectly set requirements for education, insufficient financial reward and attractiveness of the profession.

According to the fact that the healthcare professionals are absolutely crucial to ensure the quality of services, the mentioned trend represents a threat and it is necessary to find solution. The issue of the quality of healthcare is closely linked to another issue which is an effectively functioning management (Firt-Cozens & Mowbray, 2001; Castle & Decker, 2011). Every manager working in a healthcare establishment needs to be familiar with the current situation in terms of quality. As it has been said by Drucker (2004), it is necessary to adhere to economy, and it is quality improvement that leads to cost reduction which is desirable. On the contrary, poor quality is linked to cost increase. Consequently, the effectively functioning management could positively influence both quality and efficiency and possible it could contribute to solving the problem of fluctuation.

Therefore, it might be valuable for managers to familiarize themselves with the different leadership style theories (Giltinane, 2013). Provided that managers understand the leadership style theories, it could bring a number of benefits. One of them is the ability to determine what style is appropriate for them and what style is applied. It does not matter which style is adopted as any style is not superior to other. Contrariwise, managers need to adjust their leadership style to suit organizational culture and current conditions within their company. The application of different styles enables managers and leaders to become better and possibly the best in their area because they are able to exhaust the maximum out of all benefits each style offers (Tsai, 2011).

Research concerning the investigation of leadership styles in healthcare is predominantly targeted at nurses and the way nurses perform. One of the explanations for this might be the fact that nurses

represent key and at the same time the most extensive field within healthcare (Lorber et al, 2016). Amongst one of the crucial aspects of quality healthcare are the abilities and skills displayed by lead nurses (Havig et al., 2011). However, it is not only nurses who participate in improving the overall level of quality in healthcare. This is why we focused our research on the second largest group of healthcare leader employees – the head physicians working in healthcare establishments. We attempt to determine which leadership style they use, their education in the area of management and ability to oversee human resources.

2 Theoretical review

Leadership is a phenomenon that is at the core of research within social sciences, including psychology, political science, sociology or management. For over a hundred years, leadership has been a subject of scientific research (Antonakis et al., 2004). Leadership is "one of the most observed and least understood phenomena on earth" (Burns, 1978, p 2). Just as there are several concepts of leadership, there are also different definitions of leadership. E.g. Northouse (2016, p. 6) states, that "leadership is a process whereby an individual influences a group of individuals to achieve a common goal."

In our study, we focused on research of leadership style using the transformational theory. It is the most influential theory guiding healthcare leadership research (Wong et al, 2013). In terms of research, this way of perceiving leadership is most prevalent at present. A range of studies e.g. (Sternberg, 2007; Wang & Howell, 2010; Failla & Stichler, 2008) utilizes this specific approach. This theory was formed by Burns (1978) and also Bass (1990) who conceptualized the original theory. A brief description of the individual components can be seen in the following Table 1. The components correspond to the measurement scale used in the MLQ.

Table 1 Multifactor leadership questionnaire scales

Scale	Description
Transformational leadership	
Idealized attributes	Leader creates an idealized form of his personality through a commitment to organization, stability and truthfulness.
Idealized behaviors	Leader supports teams sense of mission and organizational values.
Inspirational motivation	Leader communicates with an attractive vision. Vision serves as an inspiration.
Intellectual stimulation	Leader supports creativity, risks and attempts to convince followers.
Individual consideration	Leader knows his followers well and he is interested in them by listening, fulfilling their needs, respecting the differences between individuals and delegating.
Transactional leadership	
Contingent reward	Leader provides meaningful rewards based upon task completion.
Management-by-exception (active)	Active leader is monitoring and remediating negotiations in advance to avoid serious problems.
Passive/avoidant leadership	
Management-by-exception (passive)	Passive leader act only when significant problems occur.
Laissez-faire	Absence of leadership.

Source: Andrews et al. (2012)

Briefly, transformational leadership is demonstrated by motivating followers through the transformation of own attitudes, confidence and believing in values instead of compelling submission. Transformational leadership serves also as a good predictor of a leader's efficiency (Procházka et al, 2014). On the other hand, transactional leadership is based on exchange process between leader and subordinate when the leader controls and provides them feedback (Aarons, 2006). The last component of this theory is represented by very low participation of leader or absence of leadership.

Healthcare managers face various challenges. Some of these challenges are less complicated and some are more complicated. The high level of staff turnover and staff satisfaction prove to be particularly difficult challenges. Nurses form the largest group within healthcare and it is nurses who are particularly affected by the challenges. As Cohen (2006) said, it is vital for mangers to find out what motivates employees to remain in their positions in order to prevent them from leaving. But it is necessary to say, that not only managers play a vital role in this task. It has been proved in the American environment that excellent results are achieved by hospitals offering good working conditions, atmosphere and opportunities to further develop skills (Runy, 2006).

Long term research manifests the fact that healthcare employees who undertake continuous training not only advance and gain new knowledge but also increase the quality of healthcare services they provide. Continuous professional development of healthcare employees is nowadays generally perceived as commonplace (Průša, 2010). On the other hand, the systematic development of head physicians' and lead nurses' managerial, communication and other interpersonal skills is not adequately accepted as important and is frequently viewed as "something extra".

Empirical investigations have demonstrated that top management leadership can be associated with better quality of care (Anderson et al, 2003; Forbes-Thompson et al, 2007; Rask et al, 2007). Therefore, sufficient attention paid to the development of managerial competences of healthcare staff should become a fundamental necessity and requirement for the whole society. Our pilot study wants to open the theme of leadership style and managerial education in this context and tries answer these research questions:
RQ1: Which leadership style of head physicians dominates in the selected hospital?
RQ2: Is there connection between leadership style and other factors – gender, department size, departures from department, fluctuation?
RQ3: Have the head physicians some managerial education?

3 Data and Methods

For answer the research questions a hospital in the Czech Republic was selected. The chosen hospital is profit-oriented in the legal form of joint-stock company owned by the regional government. It is medium-sized (300-499 beds) and provides both inpatient and outpatient care.

This study is based on a quantitative research design. To identify the leadership style (RQ1), the Multifactor Leadership Questionnaire (MLQ) developed by Bass and Avolio (2004) was used. The MLQ form, version 5x-Short, was administered in May 2017. The questionnaire was distributed during a head physicians meeting where the purpose of the study was explained and the instructions for completing were given. The research sample was composed of 16 head physicians from different departments of the hospital. Two respondents were excluded because of incomplete

questionnaires and the final sample consisted of 10 men and 4 women. For answer the second research question the secondary data from the internal sources of the hospital was used. Finally, we created our own questionnaire about managerial education collected at the same time as MLQ (RQ3).

Data from MLQ was analyzed by descriptive statistics (mean). Linkages between leadership style and other factors were examined by correlation analysis and t-test. To evaluate the open questions of questionnaire about managerial education content analysis was used.

4 Results and Discussion

Firstly, we hypothesized what leadership styles were being predominantly applied in the selected hospital. The MLQ assessment showed that passive avoidant was the smallest in this particular hospital and transactional leadership style prevailed (3.06 out of 4). However, when we look at individual components of leadership styles, the highest value reached the individual consideration value (3.30 out of 4) which forms a part of transformational leadership style. The differences between these two main styles appear to be minimal in this study (Table 2). When we focused on the leadership styles of individual head physicians, it was established that according to their responses, six could be assigned into the category of transformational style and four into transactional leadership style. But for the remaining four head physicians, it could not be clearly determined which style was adopted.

Table 2 Results of MLQ (mean), gender differences (mean, rank of leadership styles)

	Mean	**Mean Female**	**Mean Male**	**Rank Female**	**Rank Male**
Transformational leadership	**2.89**	**2.66**	**2.98**	**X**	**X**
Idealized attributes	2.62	2.75	2.56	4	7
Idealized behaviors	2.82	2.50	2.95	6	4
Inspirational motivation	2.59	2.19	2.75	7	6
Intellectual stimulation	3.11	2.75	3.25	5	3
Individual consideration	3.30	3.13	3.38	1	1
Transactional leadership	**3.06**	**2.88**	**3.14**	**X**	**X**
Contingent reward	2.91	2.94	2.90	2	5
Management-by-exception (active)	3.21	2.81	3.38	3	2
Passive avoidant leadership	**1.14**	**1.06**	**1.18**	**X**	**X**
Management-by-exception (passive)	1.45	1.38	1.48	8	8
Laissez-faire	0.84	0.75	0.88	9	9

Source: Own elaboration

In addition, the study analyses whether the preferred leadership style was related to selected factors. These factors included gender and the size of the department measured by the number of employees, which help better understand the leadership style. Further factors are the number of employees leaving particular departments depending on the size of the department and the employee turnover (fluctuation) calculated as the difference between arrivals and departures from the department to the size of the department. These factors represent connection between leadership style and quality.

The gender-based MLQ results are presented in Table 2. Looking at the values, it can be deduced that the order of the three main leadership styles is the same but some differences can be found within particular sub-groups. It is clear, that individual consideration is at the top of the chart in both sex groups. The passive avoidant has equal preference (rank 8, 9) and consequently scores poorly. To verify that the differences are statistically significant, we applied the pair t-test to compare female and male mean. It appears, that in this group of respondents, gender differences can be considered significant at 5 % significance level (95 % CI - (0.05, 0.47), $p = 0.023$).

The gender differences are also detected in the meta-analysis of 45 studies realized by (Eagly et al., 2003). Based on their results female leaders were identified more as transformational but also incline to contingent reward. On the other hand, male leaders show more signs of management-by-exception (active or passive) and laissez-faire. Similarly, our results suggest that the second most widespread components of leadership style among women is contingent reward and active management-by-exception among men. It is necessary to take in the account the fact that our study involved only a small number of respondents.

In order to examine the relationship between a leadership style and other selected factors, we then utilized a correlation analysis. Its results are shown in Table 3. The most significant relationships were noticeable between the leadership style and the size of the department (the number of medical staff in the department). Although, our data indicates that for the smallest (10-20) and the biggest (over 60) departments transformational and for middle-sized (around 25) departments the transactional leadership style is used, the dependence was not demonstrated in all cases and the sample being examined was not significant enough. Therefore, this relationship could not be generalized.

The next results of our study show no apparent connection between the leadership style and high employee turnover at the department, or more precisely fluctuation. The results suggest that there could be a negative correlation (-0.306) between passive avoidant leadership and fluctuation and on the other hand a positive correlation between intellectual stimulation (0.384) and idealized behaviors (0.295) which are parts of transformational leadership. In spite of this fact, the managerial work is still considered as one of the factors influencing motivation, satisfaction and thus fluctuation. But it is probably not only one factor and therefore the significant influence would show only in concurrence with some or all of them. Identifying the factors and analyzing the linkages could be theme for another research. If we consider the foreign studies, we can claim that a connection has been identified between lower staff turnover associated with the transformational leadership style (Raup, 2008). The transformational leadership style has also been identified as a predictor of staff job satisfaction which positively influences the intent of leave (Larrabee, 2003).

Table 3 Correlation analysis between leadership styles and other variables

	Department size	Departures/ department size	Fluctuation
Transformational leadership	**0.566****	**0.154**	**0.220**
Idealized attributes	0.194	0.224	-0.075
Idealized behaviors	0.584**	0.007	0.295
Inspirational motivation	0.632**	0.073	0.271
Intellectual stimulation	0.571**	-0.081	0.384
Individual consideration	0.306	0.491*	-0.008
Transactional leadership	**0.268****	**-0.240**	**0.262**
Contingent reward	0.146	-0.075	0.176
Management-by-exception (active)	0.316	-0.345	0.272
Passive avoidant leadership	**-0.119**	**-0.259**	**-0.306**
Management-by-exception (passive)	0.059	-0.041	-0.289
Laissez-faire	-0.256	-0.387	-0.219

Remark: *, **, *** indicate statistically significant results at 10%, 5% or 1% sig. level
Source: Own elabororation

In the questionnaire, we also enquired whether the head physicians had completed a training course focused on the development of managerial skills prior to entering the managerial position or during their employment. The results are shown in Table 4. It seems that the vast majority had not received such training, although they could appreciate the potential of training in order to improve communication at the workplace (64.28 %), prevent and resolve conflicts in the workplace (28.57 %) or use interdisciplinary partnership (21.43 %). Exactly these aspects were mentioned by the head physicians in most of the answers.

Table 4 Experience with managerial course (Managerial education)

		During employment	
		Yes	**No**
Before employment	**Yes**	0 (0.00 %)	2 (14.29 %)
	No	1 (7.14 %)	11 (78.57 %)

Source: Own elaboration

5 Conclusion

The quality of healthcare is worldwide and topical theme. The studies show that one of the factor influencing the healthcare quality is leadership. In our study we focused on identifying dominant leadership style of head physicians in a selected Czech hospital. Our results show that transformational leadership style prevails although the differences were small. Next results indicate that there is linkage between leadership style, gender and size of department. On the other hand, the data do not correspond with our expectation that leadership style influence fluctuation and through that also the quality of healthcare. In spite of this fact, we supposed that leadership style is important and especially in healthcare could contribute to eliminate departures of nurses. Considering leadership in this way, we suggest to pay attention to managerial education. As our case study shows, almost 80 % of head physicians have no training in these soft skills although they themselves admit that this training could improve their work.

Acknowledgements

This research was supported by internal grant of the University of Economics Prague [F6/78/2017].

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Business Support and Relationship to Business Based on Education Evaluation – Comparison of Different Approaches of Czech and Slovak Students of Higher Education

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Abstract

At present, there is an evident pressure on the support of learning processes in different types of schools, in vocational education institutions, as well as at universities. The quality of learning processes is also reflected in business dynamics, employment rates, employment patterns, etc. Business education is supported by various European programs as well as institutions that aim to promote skills and competences for a successful career in the global economy. These facts resulted in a research aimed at evaluating education, especially when it comes to supporting entrepreneurship at the Czech and Slovak universities and revealing potential differences between countries, as well as between genders. The query method was used to collect data. For the purposes of analysis, selected statistical methods were applied - descriptive statistics, parameter analysis of variance (ANOVA), nonparametric analysis of variance (Kruskalov-Wallis test) and error bar graphs. The final results highlighted the differences in the quality of higher education perceived by students in the surveyed countries as well as the differences in the tendencies for entrepreneurship between men and women. These facts have been compared with research studies in the discussion framework and a further research platform has been established. At the end of the paper, the main findings are outlined together with some implications from the analysis results for relevant policy makers in both countries.

Keywords: Entrepreneurship, University students, General education support, Potential entrepreneurs.

JEL Classification: L26, A20, I25

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1 Introduction

The business dynamics of countries' economies strongly depend on the quality and structure of the education system. Business knowledge creates a potential for young people to set up their own business, create social enterprises, and bring many job opportunities within existing organizations in the public and private sectors (Halásková & Halásková, 2016; Bem & Michalski, 2015). In addition to knowledge-intensive aspects, the contribution of entrepreneurial education also represents a support of the innovative potential that is important in business activities (Tredevi, 2016; Westhead & Solesvik, 2016; Kondratiuk-Nierodzińska, 2016; Khanagha et al., 2017; Ahmed et al., 2017; Michalski, 2016ab).

Investments in entrepreneurship education are considered to be European investments with the highest return (Pudło & Gavurova, 2012, 2013). The European Commission, through the Entrepreneurship Action Plan 2020 and the Recapitulation Report, highlighted the need to implement entrepreneurship education across all sectors of education, including non-formal learning (European Commission, 2014; Kryk, 2016). Business education has been supported for several decades through the European Education Network of JA Europe and the Citi Foundation in 19 European countries, including the Czech Republic and the Slovak Republic. JA Europe is the largest provider of educational programs for business, employment and financial literacy. In 2016, around 3.5 million students in 40 countries across Europe completed their business and job support programs. These training programs are designed for young people from primary to tertiary education, and their main objective is to promote the development of skills and competences for successful careers in the conditions of the global economy (Bartošovičová, 2017).

These consistent facts highlight the macroeconomic importance of the issue and the long-term interest of the European institutions in its solution. The significance has led to examining the issue of entrepreneurial education in the conditions of selected Czech and Slovak universities and revealing the fundamental differences in the analyzed facts between countries (Becerra-Alonso et al., 2016). The main objective of the contribution is to evaluate education aimed at supporting entrepreneurship and entrepreneurship in the Czech and Slovak university environments, revealing differences between countries and among the respondents' genders and thus setting up a platform for policy makers.

2 Overview of research studies

Many research studies deal with the study of gender differences in factors affecting the propensity for entrepreneurship (Kot et al. 2016). Significant findings are provided by the study of Goel et al. (2015) that in addition to the identified gender differences, affect the tendency towards entrepreneurship, and also include attitudes of doctoral students. Gender differentiation was also investigated by Shirokova et al. (2016). The aim of their study was to investigate the gap between business venture and the intention-action gap between student entrepreneurs.

They were examined individually (family entrepreneurial background, age, gender) and based on environmental factors (uncertainty of avoidance). Misoska et al. (2016) found students in Macedonia less ready to start a business on their own compared to students from the EU countries. The main obstacles to increase students' readiness to start a business or initiate personal entrepreneurial activity is the lack of the institutional support (educational system, government, family, start-up centers). Dabic et al. (2012) examined the gender differences in the perception of

the needs for entrepreneurial education. The results have shown that female students were less willing to start their own business than male students. Packham et al. (2010) examined the impact of entrepreneurial education on entrepreneurship at the European universities in France, Germany and Poland.

The results have shown that entrepreneurial education has a positive impact on the attitude towards entrepreneurship of French and Polish students. The impact of entrepreneurial education on the attitude towards entrepreneurship was found to be more significant in men. Harris and Gibson (2008) examined the attitude towards entrepreneurship of university students at several universities in the USA. Most of the students had good business attitudes. Male students achieved a higher rate of innovation in business. Students whose families had a business experience also had more developed attitudes towards doing business. Available research studies have a clear emphasis on the impact of the university environment on business and other environmental factors (Andronicеanu, 2017). For instance, the study by Ratmaniish (2016) tracked the impact of the university campus on the attitudes and behavior of students in business. The positive impact of the university campus on attitudes and behavior of students in business has been demonstrated. These findings are consistent with the study by Zollo et al. (2017), which confirms the strong impact of the university environment on students' tendencies towards entrepreneurship. On the other hand, these findings contradict the results of the Sesena (2013) research, which states that the university environment has no significant impact on the student's relationship to business. Wider dimensions in examining student inclination towards entrepreneurship are evident in Farhangmehr et al. (2016) and Okręglicka et al. (2017) who provide insight into proper understanding of the main drivers of entrepreneurial motivation among university students. The authors investigated whether entrepreneurship competencies like behavior traits and skills or entrepreneurship education increase motivation to do business.

The study declares the fact that business competencies are predictors of business motivation, not knowledge. Business education according to the results of this study does not increase the motivation of university students to become entrepreneurs. It means that in order to increase entrepreneurial motivation, the development of entrepreneurial, psychological and social skills of students should be promoted within the educational process by focusing especially on the emotional dimension and the development of critical thinking. A set of demographic, social, and personal disposition factors to assess the propensity for entrepreneurship was also explored by Chaudhary (2017). The results of the study also highlighted the impact of family background and school on forecasting the trend towards entrepreneurship. The study also called for public policy representatives and the education system in India, which is largely preparing students for work in the public and private sectors rather than business. A study on Polish students readiness to start a micro firm (Staniewski & Szopiński, 2015) show their entrepreneurial attitudes depend on gender and academic degree differences. Academic programs and gender are important in Polish students´ readiness to start a business nevertheless, students exhibit a strong interest for start-ups and entrepreneurial activities. The presented research studies are very heterogeneous in their process as well as in the content line. Unambiguous unification of research findings from available studies is not possible. This is due to their research focus, determined by the separate research objectives of specific research teams. Their research benefit can be seen in the process as well as in the dissemination line. In the process line, many findings allow to set up the research platform. In the dissemination line, there is an opportunity to actively confront the results obtained from other

research environments and also to capture the implicit causal relationships that are important for subsequent research.

3 Data and Methodology

The basic platform for meeting the stated goals of a contribution was the realization of research in the conditions of Czech and Slovak universities.

Research was conducted in September 2016 – January 2017. 409 students from 14 universities in the Czech Republic and 568 students from 8 universities in Slovakia were surveyed. The Czech students were from the following universities: Technical University of Liberec, Newton College in Brno – University of Applied Business, University of Economics Prague, Masaryk University in Brno, Sting Academy in Brno, College of Entrepreneurship and Law in Prague, Palacký University Olomouc and the Mendel University Brno. Students from Slovakia were studying at the following universities: University of Economics in Bratislava, Alexander Dubček University in Trenčín, University of Žilina, University of Prešov, Matej Bel University in Banská Bystrica, Technical University of Zvolen, Technical University of Košice, Pan-European University in Bratislava. Universities were approached on the basis of willingness to participate in research. The research focused on students of the 3rd year of bachelor study and higher grades (master's degree, engineering studies), who are supposed to be thinking about their future. A total of 408 college students, 156 men (38.2 %) and 252 women (61.8 %) participated in the survey. There were 568 students from the Slovak universities, 216 men (38.0 %) and 352 women (62.0 %)). The data were collected by means of a questionnaire. The questionnaire contained a total of 40 business queries that students had to rate by agreeing to the classical five-level Likert scale:
1 - I strongly disagree,
2 - I do not agree,
3 - I do not agree or disagree;
4 - I agree,
5 - I definitely agree.

The focus was put on those that correspond to the objectives of the contribution from the numerous questions of the research questionnaire. Four statements related to education and entrepreneurship education were analyzed. The first two statements were related to the quality of higher education in general:
(X1) *– I evaluate the university education in my country as of high quality,*
(X2) *- I appreciate the quality education system at my faculty (university).*
The second two statements focused on the quality of business-related education:
(X3) *- The knowledge I gain at my faculty (university) will help me in doing business,*
(X4) *- The knowledge gained by students in my country will help them start doing business.*
From the point of view of business interest, the following four statements were formed:
(Y1) *- I am very interested in business,*
(Y2) *- I am convinced that I will be doing business after my graduation,*
(Y3) *- I will start my business within three years.*
(Y4) *- I am currently doing business.*
The following selected statistical methods were used: - descriptive statistics, parameter analysis of variance (ANOVA), nonparametric variance analysis (Kruskalov-Wallis test) and error bar graphs

to meet the goal of the paper. All spreadsheets and charts were processed in the IBM SPSS 19 statistical software.

4 Results and Discussion

The first stage of the analysis focused on exploring the differences between male and female students in the quality of education in general, the quality of education to promote entrepreneurship and exploring the differences between businesses. Basic statistical characteristics (arithmetic mean, median and standard deviation) of the level of agreement with eight statements by gender are presented in Tab 1. In the views of quality in higher education and higher education to promote entrepreneurship, the difference between the Czech male and female students lies only in assessing the quality of study at the Czech universities in general (Higher education in my country is of good quality - X1). The Czech male students more critically evaluate the level and quality of higher education compared to the Czech female students (average 3.38 vs. 3.59; $p < 0.05$). In terms of evaluating the quality of education at their own faculty (X2), the quality of education towards business at their own faculty (X3) and the quality of education for entrepreneurship globally (X4), no differences between the Czech male and female students were presented. In the group of the Slovak university students, there were no differences between male and female students, or in the opinion on the quality of education. A different situation was found when assessing the relationship to business. The differences between male and female students in relation to entrepreneurship are very significant (ANOVA, $p < 0.001$) in the Czech Republic as well as in Slovakia. For both countries, male students are significantly more interested in doing business than female students (Y1, average 3.74 vs. 3.02, or 3.68 vs. 3.39). Similarly, it is also true of starting a post- secondary business (Y2, average 3.21 vs. 2.50, or 3.25 vs. 2.86 and Y3, average 3.07 vs. 2.46, or 3.01 vs. 2.70) as well as ongoing business (Y4, average 2.54 vs. 1.96, or 2.44 vs. 2.06).

Table 1 Statistical characteristics of education for entrepreneurship and business in relation to the Czech and Slovak students by gender

State	Gender	Man (n = 156)			Woman (n = 252)		
	Variable	M	Mdn	s	M	Mdn	s
CZ	**X61***	3.38	4	0.940	3.59	4	0.868
	X62	3.54	4	0.966	3.68	4	0.877
	X63	3.65	4	0.928	3.56	4	0.919
	X64	3.43	4	0.771	3.39	4	0.856
	Y1***	3.74	4	1.053	3.02	3	1.134
	Y2***	3.21	3	1.106	2.50	2	1.054
	Y3***	3.07	3	1.153	2.46	2	0.979
	Y4***	2.54	2	1.317	1.96	2	0.987
State	Gender	Man (n = 216)			Woman (n = 352)		
SK	Variable	M	Mdn	s	M	Mdn	s
	X61	3.10	3	1.036	3.19	4	1.089
	X62	3.49	4	1.061	3.51	4	0.984
	X63	3.46	4	1.025	3.53	4	1.001
	X64	3.29	4	0.956	3.30	4	0.991
	Y1***	3.68	4	1.067	3.39	4	1.043

	Y2* **	3.25	3	1.154	2.86	3	1.037
	Y3* **	3.01	3	1.110	2.70	3	0.975
	Y4* **	2.44	2	1.215	2.06	2	1.020

Notes: M – arithmetic mean; Mdn – median; s – standard deviation; * $p < 0.05$; *** $p < 0.001$
Source: Authors, own processing

The next step represented an investigation of the differences between countries in the analyzed gender statements. The interest was primarily in whether male and female students in the Czech Republic have a different opinion on the quality of education in the general framework of the quality of entrepreneurship education, and on the attitude towards entrepreneurship of male and female students in Slovakia. In terms of the quality of education in the general framework and quality of entrepreneurship education, the results are similar for both male students and female students. The only significant difference between Czech and Slovak students is the assessment of the X6 - Higher Education in my country as a good one; Average 3.38 vs. 3.10; $p = 0.005$). This shows that Czech students have a significantly better appreciation of the quality of higher education than Slovak students. In the other three statements of the quality evaluation of higher education, there were no significant differences between Czech and Slovak students. Similarly, it is also true for female students - a significant difference was found only for the quality evaluation of higher education in the general framework (X1, average 3.59 vs. 3.19). The Czech female students also assess the quality of higher education significantly higher compared to the Slovak students. In the other three statements of the evaluation of the quality of education, there were no differences between the Czech and Slovak female students. Figure 1 shows a graphical presentation of the results in the error bar graph, which contains 95% confidence intervals for the arithmetic average of the degree of acceptance in the quality assurance studies, while the five-level Likert scale was applied: 1 - I strongly disagree, 2 - I do not agree, 3 - I do not agree or disagree; 4 - I agree, 5 - I definitely agree

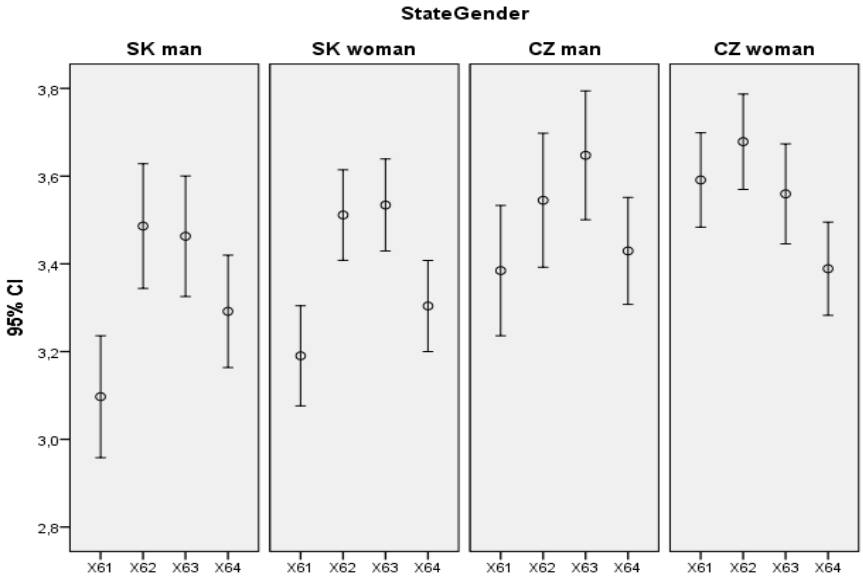

Figure 1 Confidence intervals for (X1), (X2), (X3) (X4) by country and gender
Source: Own processing

Interestingly, in terms of entrepreneurship, results are significantly different between male and female students in the analyzed countries. The Czech college students compared to the Slovak

students have significantly less interest in the business sector (average 3.02 vs. 3.39; $p < 0.001$) and a lower commitment to start doing business (average 2.50 vs. 2.86; 2.46 vs. 2.70, $p < 0.001$). When examining the question of current business, there was no significant difference between the Czech and Slovak female students ($p = 0.209$). This means that the Czech and Slovak female students are doing the same. In male college students in the four areas, the difference between countries was not significant ($p > 0.5$). Figure 2 shows the differences between male and female students, as well as between countries (the Czech and the Slovak Republics) in the field of business interest. The findings related to gender differentiation also correspond with the results of the research studies by Goel et al. (2015), as well as Dabic et al. (2012), Packham et al. (2010) and others who say that female students were less interested in doing business than male students. This may also be related to the higher innovation rate found in men as well as to family business experiences, as reported by the Harris and Gibson study (2008). The research findings should then be examined in several causal relationships and revealed in further causal trajectories. In the context of formulating the conclusions from the research, it is necessary to draw attention to the work of teachers, which is implicit in the questionnaire - in the form of a quality evaluation of higher education. Teachers have a great impact on the success of students. They require the permanent application of innovative teaching methods, as well as adapting to the individual needs of students, encouraging students' creativity, their inventions, etc. Emphasis is also put on empirical learning and project work. These aspects may be observed in the results of a research study by Shirokova et al. (2016) which examine the disparities between business intention and action-gap between student entrepreneurs as well as differences between male and female student entrepreneurship. The European Commission calls for the support of the teaching profession and calls on the member states as well as the experts themselves to engage in reforms that may provide better education through more effective teaching and more effective teacher education as the success of each reform begins with teachers. The quality of higher education is very closely related not only to the work of the teacher, but also to the school environment, in this case to the university. This environment promotes creativity and willingness to take risks, gains many experiences, innovative and inventive potential, etc

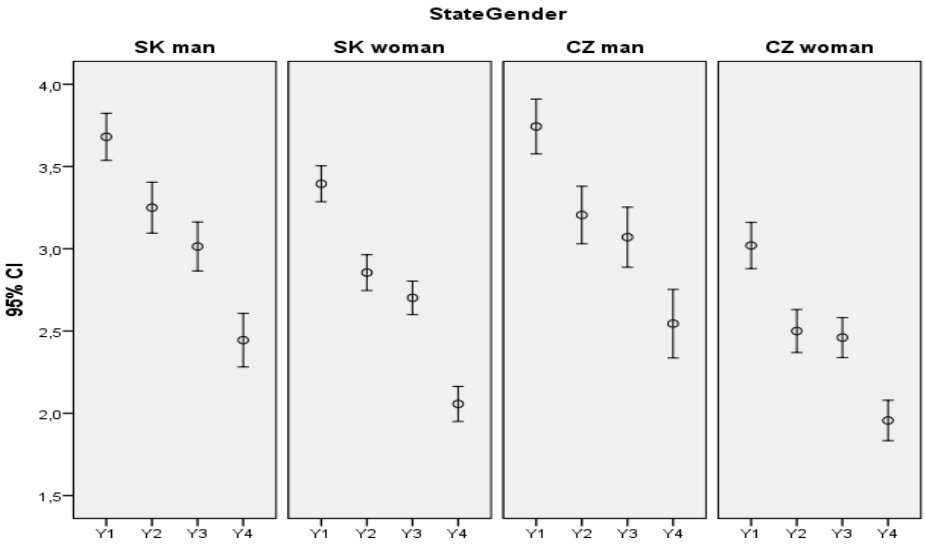

Figure 2 Confidence intervals (Y1), (Y2), (Y3) (Y4) by country and gender
Source: Own processing

The positive impact of the unprivileged environment on students' attitudes and behaviors in business is also demonstrated by the results of studies by Ratmaniish (2016) and by Zollo et al. (2017). On the other hand, these findings run counter to the results of Sesena (2013), which states that the university environment has no significant influence on the student's relationship to business. As reported by Chaudhara (2017) and Farhangmehr et al. (2016), the factors influencing students' tendency towards entrepreneurship are not only knowledge-based (university education), but also complex demographic, social and personal disposition factors, as well as entrepreneurial competencies (considered as predictors of entrepreneurial motivation). These facts are planned to be examined in the follow-up research.

5 Conclusion

Each country has its own value system, culture, and a set of government policies that may greatly influence the future business potential. Favorable social attitudes to business in the country may positively motivate individuals to start a business. Significant entrepreneurial potential in the society consists of young people and school leavers, who have the largest influence on family environment, various social and economic impacts, as well as environmental factors. The learning process is influenced by different social and economic characteristics. This creates a platform for active exploration of preferential dependencies among the factors, as well as significant motivators to help identify many explicit and implicit barriers to individual business development, within the whole society. The above facts led to an idea of realizing the research aimed at studying attitudes of the Czech and Slovak university students towards education aimed at supporting entrepreneurship and examining attitudes towards the relationship with entrepreneurship. The theoretical platform for solving the research was the analysis of current research studies. From their comprehensive assessment, their macroeconomic and microeconomic significance is obvious.

The causality of the factors under investigation allowed the capture of the basic trajectories that are essential for conceiving current as well as future research. Implications of these studies have become increasingly important since the time of the economic crisis when it was necessary to implement a number of procedural changes in education and other policies.

As may be seen from the results of the analysis, the general quality of higher education assessed by the Czech male and female students compared to the assessment by the Slovak male and female students was evaluated better when comparing countries. When examining differences in gender responses, it may be concluded that in both countries compared, female-college students show less interest in entrepreneurship, they want less entrepreneurship after graduation, and they are also doing less at a time than male-college students. This may also be related to the role of a woman within the family, the upbringing of offspring, etc. Female students at Czech universities show less interest in entrepreneurship than female students at Slovak universities, but they actually do the same. There are no significant differences between male students at Czech and Slovak universities. These findings represent an important platform for national and regional policy makers in the field of education, especially in the development of training programs, programs to support the development of small and medium-sized enterprises, etc. Last but not least, they are important sources of information in various evaluation programs and in setting up international support activities by international institutions in the field of entrepreneurial education and economic development of the countries.

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Managerial thinking and management of tourism business

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Abstract

*Tourism is an important factor in the development of the Slovak economy. The basic elements of the system are the companies. These form an important part of the structure of the state economy. Tourism businesses have their own specifics. Most of them belong to the category of small and medium business where the family business prevails. It is these business groups that the European Commission considers to be the winners of economic innovation and jobs. The principles of family businesses and their size are causing them problems. Therefore they also expect assistance from public development actors. The aim of the paper was to determine the nature of tourism businesses in the Nitra region of Slovakia, their specifics and the expected assistance needed for their development***.***

Keywords: Business, Family Business, People, Specifics in Managerial Thinking, Help, Event.

JEL Classification: H80, J82

1 Introduction

Business and entrepreneurship are a basic prerequisite for the existence and development of a market economy. According to the valid legislation on the territory of the Slovak Republic, namely the Commercial Code (Act No. 513/1991 Coll. 4), under the enterprise is meant "*a set of tangible as well as personal and intangible components of business*". Businesses have a significant impact on the economic and social situation of the region, they are a crucial source of employment they affect the rate of unemployment, the number of jobs, the rights and other property values that belong to the entrepreneur and serve to operate the enterprise or because of their nature. The level of regional revenues, the level of public budget revenues (municipal budget, VÚC), the regional GDP, meet the diverse needs of the population and the stability of the region (Výrostová, 2010). Defining the concept of a business is addressed by several authors of scientific publications. For example, Table 1.

Table 1 Business definitions

Authors	Business Definitions
Kučerová & Šmardová (2016)	is an economic, manufacturing, technical, social and organizational system
Hunziker (2014)	an economic unit whose objective is the result of the economy
Orieška (2011)	a basic production unit that recruits and purchases additional factories to produce and sell tangible goods and services

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Jakubíková (2009)	a productive social system that is an economic and technical unit and a social community
Šíbl (2002)	an economically and legally separate business unit with the intention of doing business and economically realizing
Gúčik (2001)	service enterprises that produce tourism goods (non-material and material services) designed to meet the needs of tourists
Kaspar (1995)	an economic unit which, through the permanent combination of suitable means of production (labor, capital, land), aims to provide travel and personal tourism services on economic principles
Marková et al. (2005)	a planned economic unit that manufactures goods in kind or provides services
Gozora (1996)	a form of entrepreneurial activity in which the purposeful reconciliation of material, financial and human resources is realized in a single production and organizational unit with a turnover value and an objective to produce value for the needs of the market and for its own satisfaction
Kudláč (1998)	an organizational unit that produces products or provides services to subscribers

Source: Hunziker (2014), Orieška (2010), Jakubíková (2009), Kaspar (1995), Marková et al. (2005), Gozora (1996), Kudláč (1998), Turba (2016), Kučerová & Šmardová (2016)

According to the terminology vocabulary in the area of Structural Funds, small and medium-sized enterprises are defined as: "entities carrying out an economic activity irrespective of their legal form. These entities include, in particular, self-employed and family-run businesses carrying out craft or other business activities and publicly owned companies or associations which regularly carry out economic activity. "Since 2005, the breakdown of enterprises by size and other criteria listed in Table 2 is applied in the European Union.

Table 2 Boundary values of businesses

Businesses category	**Number of workers; annual work unit (RPJ)**	**Annual turnover**	↔ or	**Sumatotal annual balance sheet total**
Medium businesses	< 250	≤ EUR 50 million		≤ EUR 43 million
Small businesses	< 50	≤ EUR 10 million		≤ EUR 10 million
Microbusinesses	< 10	≤ EUR 2 milion		≤ EUR 2 milion

Source: European Commission Recommendation 2003/361 /, graphic processing by the author

The basic prerequisite for the existence of businesses is their legal personality, which represents their ability to commit themselves and act on their behalf. Formal proof of legal personality is the trade authorization and registration in the trade or trade register. The current legislative options for legal forms of enterprise are shown in Table 3.

Table 3 Legal forms of enterprises and their characteristics

Attribute	Legal form of businesses			
	Trade	**Limited Liability Company**	**public company**	**Society**
Legislation	Trade Act (455/1991 Coll.)	Business Code (513/1991 Coll.)	Business Code (513/1991 Coll.)	Business Code (513/1991 Coll.)
Business	self-employes	trading company	capital company	cooperative
Minimum capital	not determined	5,000 Eur	-	-
Minimum partner contribution	free deposit of the owner	750 Eur	not determined	according to the adopted statutes
Number of partners	the entrepreneur himself	1 - 50	minimum 2 people	2 legal entities or min.
Business management	self-employed	general meetings / directors	all partners or on the basis of an agreement	Board of Directors (short-term) member meeting (highest authority)
Property guarantee	all property	the company all the assets, the partners up to the amount of their deposits	society and companions of all property	the cooperative of all property, members up to the amount of paid deposits
Profit distribution	remains to the entrepreneur	the same work for partners, or under the social contract	equal work or under the social contract	according to the amount of member deposits
The method of raising the capital	the personal contribution of the entrepreneur	raising deposits, joining a partner	raising deposits, picking up a commander	raising deposits, joining a partner
Form of accounting	simple accounting / voluntary double-entry bookkeeping	double-entry bookkeeping	double-entry bookkeeping	double-entry bookkeeping
Reserve fund	is not constituted by law	when composing min. 5% of base. Immania consequently annually min. 5% of net profit, max. however, up to 10% shouted. equity	indivisible fund 10% of the registered capital, 10% of the net profit up to 50% of the registered capital	is not constituted by law

Source: Act no. 513/1991 Coll., 2016, processed by author

Since 01.01.2017 there has been an increase in the number of businesses. The amendment to the Commercial Code refers to the Simple Company for Shares. It is a company whose registered capital is allocated to a certain number of shares with a certain nominal value. The company is responsible for breaching its obligations with all of its assets. The shareholder is not liable for the company's liabilities. The business name of the company must include the designation "single company for shares" or "abbreviation" j. with. a. ".

In the second half of the 20th century, the attention of economists has been concentrated on economic subjects, and those whose contribution to the national economy is on the rise tend to be small and medium businesses perceived as phenomena of market economy development

(Maráková, 2005). Some authors focus on small and medium-sized enterprises more complex, in more detail Table 4.

Table 4 Characteristics of small and medium businesses

Characteristics of small and medium businesses
• apply a specific entrepreneurial culture and philosophy • occupy predominantly local and regional markets • are sensitive to seasonal fluctuations in demand • they are not capable of marketing themselves enough and efficiently • ensuring the operation of the enterprise by cumulative staffing • typically require specific procedures for the selection, deployment and training of employees • require a specific work motivation system • have a lack of primary resources for new technologies • have the character of family businesses, based on the personal work of the owner and family members, prefer a typical patriarchal style of management • planning is usually the nature of a business plan • the basis of the company's structure is the organizational order
The strengths of small businesses
• an overview of your business • operational management • using the business capabilities • faster ability to adapt to market changes • better conditions for business culture and management • a better social environment • better conditions for motivation-oriented management styles • better interconnection of work motivation and self-realization of the personality of employees and their creativity • in terms of market needs, they are more flexible, responding more quickly to the needs of visitors • are dynamic and innovative

Source: Gúčik et al. (2010), Kučerová & Šmardová (2016) and processed by author

Tourism businesses and their relations are essential elements of the tourism system. They have certain manners in terms of management. Small businesses in this sector often have the character of family businesses based on the personal work of the owner and family members (Gúčik et al., 2010). Family businesses and family businesses are generally associated with Tagiuri and Davis with three basic concepts: family, business, and property that are mutually intertwined. Later, the authors of Astrachan and Shake specified the definition of family business and took into account a number of criteria: the percentage of the family in the company's assets, strategic control, the involvement of several generations, and the intention to stay in the family. The latest definition of family business was formulated by the European Commission, which states that the business is family-friendly if:

• the majority of the decision-making power is the natural person who founded, acquired, or had siblings, parents, children or directly descendants

• majority rights may be direct or indirect

• At least one family member or a relative is involved in company management (Kučerová, & Šmardová, 2016).

5 Material and methods

The aim of the paper was to identify the nature of tourism enterprises in the Nitra region of Slovakia, their specifics and the expected assistance needed for their development. Primary research was extensive, divided into 6 research assumptions. Exploratory and descriptive research, observation research, and interrogation research have been applied. The contribution contains partial results of this research related to its issues. The basic sample of the survey was 339 municipalities in the Nitra region. Of which 46 municipalities stated that their accommodation facilities are located in their territory. The research was carried out in 8 districts: Komárno, Levice, Nitra, Nové Zámky, Šaľa, Topoľčany, Zlaté Moravce. 20 villages: Patince, Hokovce, Hronovce, Žemberovce, Jelenec, Polen, Kozov, Cabaj-Čápor, Maňa, Podhájska, Radava, Diakovce, Močenok, Tešedikovo, Jacovce, Krusovce, Podhradie, Prasice, Machlince, Skýcov, Topoľčianky and 63 accommodation facilities. This number was divided into two categories of bed capacity of the company up to 10 and from 11 to 40 beds. Secondary and primary sources were used in the post. The primary sources were data from the questionnaire addressed to the owners of tourism enterprises as well as the results of their personal interviews.

Figure 1 Definition of field research area
Source: Processed by author

6 Results

Human capital plays a crucial role in tourism businesses. It is an important and indispensable tool of potential. Relatively favorable employment situation in the tourism sector is characteristic of the city of Poprad, which is the center of Slovak tourism and industry and Stará Ľubovňa with a large number of self-employed people (Hudáková, 2015). People become one of the major elements of an expanded marketing mix of services and have a significant impact on quality and ultimately on the prosperity of the business. Gecíková and Papcunová (2014) mentions that the development of strategic management is not random, but it is a result of the previous development and adaptation of the management entities of local self-governments to conditions for the development of the

country. The results of primary research conducted in low-capacity accommodation establishments are shown in Table 5.

Table 5 Structure of employees in rural accommodation establishments in%

Business size	Family members	Other employees
Number of beds in the business by 10	86.67 %	13.33 %
Number of beds in the business from 11 to 40	39.86 %	60.14 %

Source: Own research and processed by author

Businesses with lower capacity beds are employed to a greater extent by family members. They are so-called. family businesses. Research has confirmed that a small number of staff requires a high accumulation of functions specifically for managers. Owners often use their personal approach to managing so- coaching. Due to their size, they feel this activity as burdensome. Apart from the mentioned management of a tourism enterprise, which has the character of a family, it has several specificities. One is the inner atmosphere and business philosophy. Family businesses are mostly characterized by personal relationships between entrepreneurs and employees. The business owner is essentially responsible for everything. These businesses are unable to provide sufficient marketing, have specific procedures for staff selection, deployment and training, do not have enough funding for new technologies, and have a high share of live work. Their weaknesses also include the social aspect: transferring family issues, resolving conflicts in an emotional and low-profile manner, etc. Other barriers to development and the causes of bankruptcy of these businesses are dealt with by several authors, whose opinion is complemented by the findings and results of the primary research of the author, see Table 6 below.

Table 6 Weaknesses and threats to small businesses in tourism

Barriers to the development of small businesses	
Internal environment of the business •limited ability to overcome structural barriers - lack of management and technical skills • insufficient motivation • lack of capital, more complex access to capital • fear of risk • a lower level of knowledge and information, on Legislative Conditions, Safety (OSH, PO CO) • lower management level • less efficiency in the use of information technology • limited awareness of opportunities to expand markets abroad • llack of information on possible economic or non-economic support	*Outdoor business environment* • market failures due to the environment in which they operate and compete for stark market participants • limited funding opportunities for research, innovation • access to funding for the unavailability of financial resources • tax barriers • legislative barriers • information and institutional barriers • educational barriers • public opinion • security (crime) • lower competitiveness
Causes of bankruptcy of small businesses	
• business begins with too little equity and caution when using it • market demand is poorly respected and does not match the product offer • underestimating the time needed to market	

- getting credit is not associated with the idea of its return and repayment
- the effort to build a large business and to make large small capital businesses
- it is not being invested in upgrading, it does not incur unforeseen costs and no reserves are created
- large business risks are being introduced, the impact of the external environment on business (economic, social, legislative, technological, environmental), competition, etc.
- rural tourism businesses perceive as an activity that provides them with supplementary income, so they do not pay enough attention to this activity
- this is mostly done by people whose subject-matter is agriculture, they are mostly "multifunctional farmers"

Source: Tourism Management (Gúčik et al., 2010), Entrepreneurship in Tourism (Kučerová & Šmardová, 2016) and processed by author from the results of primary research

The key problem of family businesses is also the rotation of generations of entrepreneurs (Gúčik et al., 2010). The titles of their size create additional problems, so naturally they expect help in their activities.

In order to obtain information on the expected assistance of operators - owners of tourism enterprises from the higher territorial unit and the municipality, the following research was also carried out as follows: As to the question of the assistance expected from operators - owners of rural accommodation facilities from the Office of the Nitra Region, both size groups of enterprises that it is promotional and financial aid. The results are shown in Figure 6.

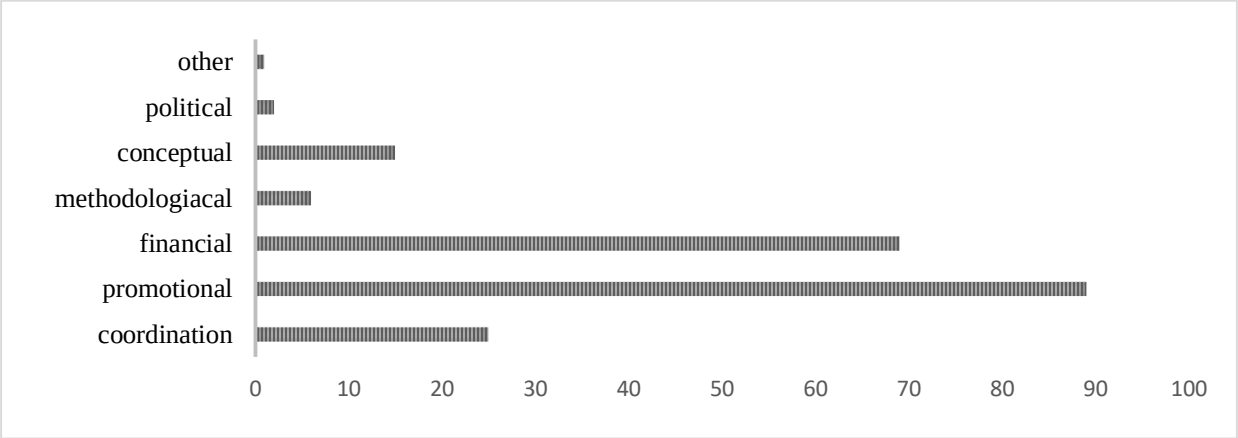

Figure 2 Forms of assistance expected by owners of tourism enterprises in the Nitra region from the higher territorial unit

Source: Own research and processed by author

When asked what kind of assistance they expect from the municipality, the two groups of rural accommodation facilities - businesses, improving the availability of their facilities, adjusting the public spaces, modifying the small architecture. A closer specification of the expected help is shown in Figure 7.

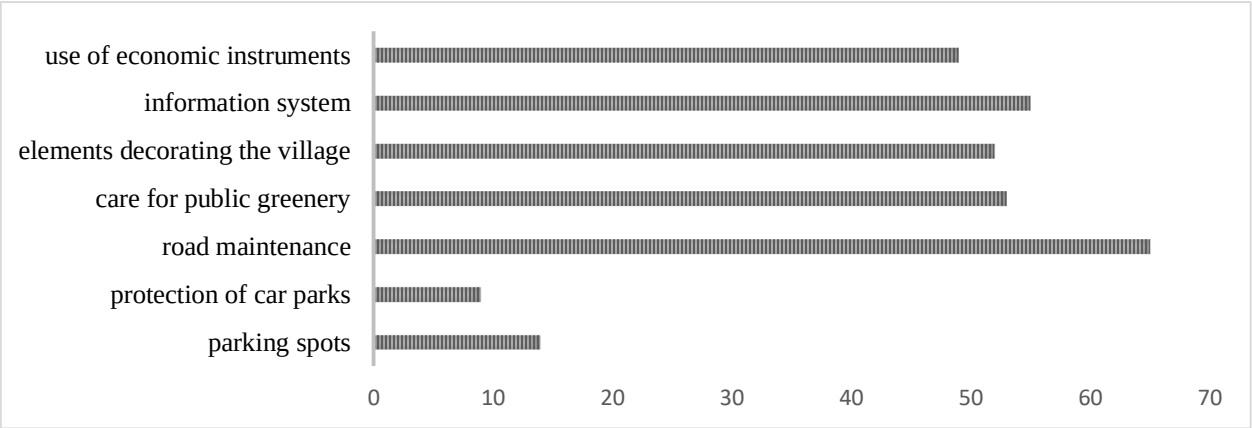

Figure 3 Forms of assistance expected by owners of tourism enterprises in the Nitra region from the municipality

Source: Own research and processed by author

7 Conclusion

Medium, small and micro businesses represent a natural incubator for the development of business culture. The specificity of the management of these businesses, especially in tourism, is significant. Practice and professional public are therefore looking for solutions to known and existing barriers to their development. Also from our primary research, the partial results of which are presented in this paper, the following recommendations have emerged, suitable for their further development. Recommendation:

- increasing the cooperation of enterprises in formal form, creating various interest associations - A union of chefs and waiters to exchange knowledge and experience or informal form
- engaging in closer co-operation with the community, region, in order to create a complex product and achieve a synergic effect
- education of locals and understanding of the importance of the tourism industry, which in the place of their localization influence the quality of life of the local population
- increasing the interest in redistributing income generated by tourism businesses at their location (accommodation fees), care and maintenance of infrastructure
- organizing joint events with developers at the location of the tourism industry
- participate in event creation, which will ultimately increase the image of the destination and interest of visitors to tourism.
- rural tourism plans should be part of the Rural Development Plans
- the national or regional authority - actor, should ensure organized and targeted rural tourism (Kipper & Ozdemir, 2012). Otherwise, the natural landscape may be disturbed in rural settlements
- discuss the perspectives of virtual communities in the rural tourism sector from the perspective of marketing and dizajn (Wang, Yu, & Fesanmaier, 2002)

Acknowledgements

The outputs were part of the dissertation work of the author titled: Increasing the effectiveness of marketing approaches to the development of rural tourism in the Nitra region as well as the VEGA grant project [nr. 1/0440/08] Quality assessment of rural tourism facilities.

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Comparing of the Characteristics of Successful Clusters in the World

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Abstract

The main purpose of the article is to successfully analyze, and appreciate workmanlike conditions of Europe and US, and to sequentially identify characteristics which are essential to their success. Analyzed clusters are selected based on their success and attributes, which were assigned by various institutions dealing with cluster performance rating, clusters in general, special publications, studies and authors. This provides the prediction, that the work analyzes the best and the highest quality clusters reaching "world norm". Based on this analyses, the work focuses on proposing complex system recommending for effectively identifying key characteristics of cluster "world norm" in terms of Europe and the United States of America.

Keywords: Cluster, cluster efficiency, Methods evaluating successful clusters, Cluster budget, Cluster finance, Cluster composition.

JEL Classification: O31, O38, R58

1 Introduction

Currently, cluster theme is getting to the front of interest, and is the most discussed topic. In this age, the world is more globalized, and the competiveness in economic actors is becoming a rival. In addition, in today's world clusters are becoming more important to private companies, research and government institutions, universities, and regions where clusters are established. Clusters can also provide a positive effect onto individual group of people of a region. All of the above facts show support to focus more on cluster.

This article focuses on success and efficiency of clusters. The article also analyzes the most successful clusters, and clusters that are high level quality from Europe and USA. Both Europe and USA have some similar characteristics, but also show some differences that can affect its efficiency. Analysis in this article focus on the differences between successful clusters in Europe and USA.

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2 Theoretical background

Clusters are not a new concept, but something we already knew in the past. The topic of clusters, cluster initiatives and cluster policies has become a subject of great interest to the professional public, mainly as a result of the publication of Michael Porter's book, (1990) "The Competitive Advantage of the Nations". Since then, research studies dealing with clusters, their funding and various other aspects have been growing in numbers. Clusters have gradually received even more attention from practitioners and policy-makers. As noted by Martin et al. (2011), industrial clusters are especially popular among policy-makers; during the last three decades, national and local governments have attempted to foster their development.

For the development of the economy, innovation is essential, to increasingly applied approach based on innovation. Systems of innovation include the institutions that disseminate innovation, businesses, and infrastructure. From this point of view, clusters are a part of the system of innovation (Skokan, 2004). Clusters can develop in different sectors of the industry. Such examples are areas in electrical engineering or the shoe industry. Clusters can emerge in agriculture if it followed the assumption that the companies in the cluster, use innovative technology and offer unique products and services. Clusters may occur in large but also in small economies and at different levels of geographic units. Clusters can also be defined as a group of businesses and non-profit entities, which determines its competitiveness. The basic feature of clusters is the existence of mutual relations between entities within cluster and their relative location. Cluster connection will benefit all of its participants and the region in which the cluster is located (Letková, 2012).

Clusters represent a network, a grouping of enterprises, which are localized in one area, that operate in certain industrial sectors. If the cluster works efficiently and correctly, and it reaches through its competitive advantages, the benefits for its participants (Potomová, 2011). Clusters affect positively on the level of innovation and competitiveness and to the overall growth and business development in the long term (European Commission, 2003). Today, clusters are considered to be an important instrument for promoting industrial development, innovation, competitiveness and growth (Andersson, 2004). Clusters contribute to the creation of new jobs and have an impact on the development of the economy, to the improvement of the prosperity of the region, to increase the influx of foreign direct investment (Sabadka, 2013). Clusters are established on factors such as natural resources or geographical advantages (OECD, 1999). We can define clusters as a concentration of interconnected firms and organizations, which are regarded as important engines for economic growth and the creation of prosperity (Laur, 2012). A cluster can contain a small or a large number of companies, which can have different size and form. The clusters differ in the number of participants and the degree of organization. The clusters may operate on a local, national or even international levels (Möhring, 2005).

The core of the success of each cluster is the systematic search for partnerships and opportunities to work together in making a multi-advantageous agreements (Schiele, 2008). Clusters are generally seen as a tool for economic development and the modernization of the competitiveness of the national industry (Varga, 2013). Another definition talks about clusters as organizational forms of partnership, cooperation, mutual relationships and relations in the economy (Nenova, 2007).

In the global economy, the presence of clusters becomes more and more important and requested. Clusters are beginning interesting to actors and policy-makers. Clusters help to improve the effectiveness of the instruments of economic policy and at the same time also increase the economic benefits from existence of clusters (Ketels, 2008).

Cluster concept is closely linked to the concept of cluster policy, respectively cluster policies. Cluster policies represent political commitment, which consists of a set of policy interventions of the government, whose main goal is to support the existing clusters and also facilitate the emergence of new clusters. Cluster policy can be understood as a political framework that creates the dynamics for clusters and cluster initiatives, based on an approach "bottom-up". The main goal of cluster policies is to create a favourable business environment for innovation business, which can promote new businesses. This supports the development of new industrial value chains, and also the emergence of new industries. The purpose of cluster policies is to strengthen the regional economy and thereby also of the whole national economy (European commission, 2016).

2.1 Cluster Performance

Since clusters can bring many positive benefits and can be a significant element in the development of the entire society, we need to distinguish those clusters, which are the best and the most successful, and which have the potential to meet these assumptions. For this purpose several methods were arranged for the evaluation of the success of the cluster.

The success of cluster depends not only on individual enterprises, but an important role plays also in the surrounding environment in which they operate. A key role of the business is environment and competition. The competition takes place at the same time in different spaces and between different actors. The success or failure of clusters is dependent on the strategy that must be addressed to the participants of the cluster. Defined strategy must take into account a wide range of initiatives that have the potential to deliver a quick and adequate results. Essential in the formation of the strategy is to involve the most important representatives of the region as the company, the administrative institutions, universities, and intermediary organizations. Successful clusters are characterized by the essential characteristics that predispose to successful functioning and achievement of desired results. Main characteristics of successful clusters include the human dimension and the quality of interpersonal relationships in cluster, the collective efficiency, which is based on the diversity of members of the cluster, vertical linkages, cooperation, and the result for these relations is the creation of close working relationships (Skokan, 2004).

2.2 Methods of Evaluation of Successful Clusters

Currently we know several models and procedures that are designed to evaluate the performance of the cluster. These models were developed by different institutions and organizations from Europe and from USA, that are dedicated to the evaluation of clusters and cluster such as.

There are several models, melodies, and procedures that are being developed to assess the performance of clusters. These models have been developed by various institutions and organizations from Europe and United States, which are dedicated to clusters and clusters such as.

Cluster Performance Model
This model was introduced in the Green Paper on Cluster Initiatives. The role of this model is to better understand what factors have a significant impact on the overall performance of the cluster. This model contains four components, such as performance, environment, goals and processes (The European Secretariat for Cluster Analysis, 2012).

Assessment methodology by ESCA and CNG
This methodology was developed by ESCA (The European Secretariat for Cluster Analysis), and emphasizes cluster management as an important factor that should be taken into account when evaluating clusters and cluster initiatives. A benchmarking methodology has been introduced for cluster organizations since 2007. Benchmarking includes 36 indicators to analyze cluster and cluster management (Gamp, et al., 2011).

Evaluation by the European Cluster Excellence Initiative (ECEI)
This methodology includes a label called Quality Cluster Label, which is recognized throughout Europe and focuses on measuring cluster quality (Gamp, et al., 2011). This assessment evaluates a total of the 31 indicators, such as cluster structure, cluster cooperation or cluster awards (2015).

Method Cluster Linked over Europe (CLOE)
CLOE proposes benchmarking indicators to evaluate cluster initiatives. These indicators should be set for cluster initiatives. The assessment methodology is based on a regular check of quality indicators and a review of cluster initiative (Sabadka, 2013).

OECD Rating – The cluster scoreboard
This methodology mainly presents business outcome. In evaluating, eighty (80) business clusters were involved in key innovation sectors with significant roles in local economic growth. This methodology uses data from the commercial database ORBIS, which collects demographic, economic and financial information at the business level. A great advantage of this methodology is that it allows the presentation of data for cluster functionality for smaller municipalities (Temouri, 2012).

U.S. Cluster Mapping
U. S. Cluster Mapping is an information portal that focuses on summarizing data about clusters in the United States. This database is primarily used by governments, economic agents and businesses to understand the competitive environment and industries (U.S. Cluster Mapping, 2017).

3 Methodics of research

The main goal of the article is to analyze selected high quality and successful clusters in Europe and the US. The article analyzes selected clusters based on selected indicators. The objective is to identify the characteristics that are indicative of the best clusters in Europe and the US and to compare and analyze the differences between quality clusters in Europe and the US.

Hypotheses:
H1: Quality and successful clusters in Europe and in the USA have the same or very similar performance characteristics.

H2: The quality and success of the examined "world class" clusters does not dependent on the total number of cluster members (i.e., there are no differences in quality or overall success between clusters with more members and those with fewer members).

H3: Successful clusters in the USA have a larger share of research institutions in their total number of members than successful clusters in Europe.

For the urge of our analysis, we chose five successful clusters from Europe and the United States, which we analyzed based on selected indicators. All clusters have been chosen based on their successes and ratings from clusters, organizations, and venues, which clusters they operate, government institutions, and different authors. We may mention organizations such as the European Cluster Collaboration Platform, U.S. Cluster Mapping, the European Cluster Excellence Initiative, the German Federal Ministry of Education and Research, the European Commission, the European Cluster Panorama 2014, the European Cluster Observatory and others.

In terms of indicators, we have selected fifteen (15) for different areas of cluster operations. In selecting them, we were inspired by the institutions and publications that use them to evaluate cluster quality. We have used indicators that use institutions such as the OECD, the European Cluster Cooperation Platform 2016, the Center for Strategy and Competitiveness, and the European Cluster Observatory. Subsequently, we have obtained the necessary data for the individual indicators for selected clusters. All the necessary information and data was obtained mainly from the European Cluster Collaboration Platform, U.S. Cluster mapping and cluster websites. We then analyzed selected clusters in terms of these indicators. Consequently, we analyzed comparatively the different characteristics of the analyzed indicators among the successful clusters in Europe and the United States.

4 Analysis of selected clusters

For the urge of our analysis, we have chosen clusters that are among the best in the world and achieve the best results. We chose the best clusters in Europe and the US.

Table 1 Selected clusters in Europe

No.	Cluster	Country	Region	Industry	Founded in
1.	Associação Pool-Net - Portuguese Tooling Network	Portugal	Centro	Aviation and automotive industry, digital technologies	2008
2.	Automotive-bw	Germany	Stuttgart	Automotive industry	2010
3.	BioM Biotech Cluster Development GmbH	Germany	Oberbayern	Pharmaceutical industry, biotechnology	1997
4.	CyberForum e.V.	Germany	Karlsruhe	Information technologies, creative industries	1997
5.	Minalogic	France	Rhône-Alpes	Communication and information technologies, biotechnology	2005

Source: Own processing

Table 1 shows selected world-class clusters from Europe that we chose for our analysis. We selected the Klaster Associação Pool-Net - Portuguese Tooling Network because of the Gold Label from the European Cluster Excellence Initiative (ECEI), which advises it among the best clusters in Europe. Another reason is that this cluster was awarded the European Enterprise Promotion

Awards in 2012. At the same time, this cluster is designated by the European Cluster Observatory as the strongest clusters in Portugal.

We have chosen Cluster Automotive-bw because it is awarded the Cluster Management Excellence Label GOLD. This quality label is a recognized proof of cluster excellence at European level. The area where this cluster is located has been ranked by the European Cluster Observatory, among the best innovative regions not only in Germany but also in Europe.
Cluster BioM Biotech Cluster Development GmbH was chosen for its Gold Label award as well as the Spitzencluster, BMBF award, granted by the German Federal Ministry of Education and Research for its success in research and innovation. This cluster was also included by the European Commission among the best European clusters in the field of health service, through the European Cluster Panorama 2014 study (Ketels, 2014).

We have selected cluster CyberForum e.V. because it is awarded the Gold Label and the Cluster Excellence Award Baden-Wuerttemberg as the best cluster in Germany in the field of information technology. Moreover CyberForum e.V. is also ranked second within the program go-cluster. This certificate is awarded by the Federal Ministry of Economy and Energy and it testifies that this cluster is highly competitive one. The Cluster is also within the best clusters in Europe in the field of digital industry. Cluster was included there by The European Commission in the European Cluster Panorama 2014 document. The European Cluster Observatory also included it among strong clusters in innovative regions in the study „the Strong Clusters in Innovative Regions".

Cluster Minalogic have been taken because it is labeled by the Gold Label as the others. Another reason is fact that the cluster is one of the best clusters in Europe in its area according to European Commission European cluster panorama 2014 and moreover, the area where the cluster is located is evaluated by the European cluster observatory as the best region in France as well as in Europe, in terms of innovation rates (Ketels, 2014).

Table 2 Chosen Clusters in the USA

No.	Cluster	Country	Region	Industry	Founded in
1.	Silicon Valley	USA	San Francisco	Information technologies, biotechnology	1971
2.	Boston Route 128	USA	Boston	Information technologies, telecommunications,	1970
3.	Napa Valley	USA	Napa County	Agro-commodities, tourism	1975
4.	San Diego Biotech Cluster	USA	San Diego	biotechnologies	1978
5.	San Francisco Biotech Cluster – Bay Area	USA	San Francisco	Biotechnologies, information technologies,	1985

Source: Own processing

The Table 2 shows selected world-class clusters from the USA that we have chosen for our analysis. The Cluster Silicon Valley has been chosen because, according to The Origin and Growth of Industry Clusters, it is one of the most impressive industrial clusters in US history (Klepper, 2010). There have been founded many successful businesses like Apple, Google or Facebook. Silicon Valley also represents one of the most dynamic innovation centers in the world. Cluster Silicon Valley has been ranked within the best global clusters in the OECD (The Cluster Scoreboard) study. This cluster has also been rated as the best cluster in the USA in biotechnology (Genetic Engineering and Biotechnology, 2016).

The reason why we have selected Cluster Boston Route 128 is that it is a technologically advanced region in the United States of America. Universities provide there strong scientific research. These are mainly universities such as MIT, Harvard University or Boston University and others (Wonglimpiyarat, 2006). Another reason is that Boston Route 128 is a pioneer in clustering companies in the field of technology and commutation technology (Lampe, 1993). Another factor why we have chosen this cluster is the very dynamic development of this cluster as a result of the match between the scientific community, the industry and the federal government (Lampe, 1992). This cluster was rated among the best world clusters in the OECD (The Cluster Scoreboard) study. Also, in 2016, it was rated by GEN (Genetic Engineering and Biotechnology News) as the best cluster in the US in the field of biotechnology (Genetic Engineering and Biotechnology, 2016).

Cluster Napa Valley was taken because it represents the revived wine industry after the end of prohibition in the USA in 1933 (Pinney, 2005). Another reason is that it is a highly competitive cluster that allows the development of related and supporting institutions as well as infrastructure in this area. Napa Valley is one of the most visited areas within the wine industry. It is estimated that this area is visited by approximately 5 millions of visitors (Cassio, 2010). Cluster Napa Valley received the Great Wine Capitals Award in 2017 as the Best Regional Wine and Tourism Organization (Wine Tourist Award).

We have chosen Cluster San Diego because it is one of the most successful clusters in the USA. This cluster creates more than double number of patents per worker than the national average is. Cluster was awarded by portal GEN (Genetic Engineering and Biotechnology News) in 2016, which ranked him within the best clusters in the USA in the field of biotechnology (Genetic Engineering and Biotechnology, 2016). The Milken Institute, in its America's Biotech and Life Science Clusters study in 2004, has marked the San Diego Biotech Cluster as the Best Cluster in Biotechnology in the United States (Milken Institute, 2004).

The Cluster San Francisco Biotech Cluster - Bay Area has been selected because it represents a key element of the biotech industry in the US as well as in the world. Next important factor in choosing this cluster is that it mergers a number of leading world companies, and moreover this cluster can also be proud because of a number of Nobel Prize-winning personalities. An example may be Dr. Shinya Yamanaka, who won the Nobel Prize in 2012 and the Nobel Prize in Medicine. This cluster was named in 2004 as one of the best clusters in biotechnology in the USA. This label was given to him by the Milken Institute in the America's Biotech and Life Science Clusters. GEN (Genetic Engineering and Biotechnology News) has evaluated this cluster as one of the best clusters in the USA in biotechnology in its Top 10 U.S. study Biopharma Clusters 2016. (Genetic Engineering and Biotechnology, 2016).

Table 3 shows the comparison of the differences between given quality clusters in Europe and in the United States of America. There are being compared all selected indicators that are relevant for determining the criteria needed to identify high-quality and successful clusters. For some indicators, we observe the same or similar characteristics of high-quality clusters in Europe and the USA, while with other indicators, we are observing different characteristics.

Table 3 Comparision of the differencies between the clusters in Europe and in the USA

No.	Indicator	Clusters in Europe	Clusters in the USA
1.	Average number of years of cluster operation	14	41
2.	Number of employees	It depends on number of cluster members	It does not depend on number of cluster members
3.	Legal form	Different legal forms	Non-profi organization
4.	Cluster valuation	Valued for the internal structure	Valued for the results
5.	Membership in the organization	They are members of various organizations	They are members of various organizations
6.	Industry sector	Automotive, biotechnology, information technology	Information technology, biotechnology, agro-commodities, tourism
7.	Average total number of members	370	483
8.	Average share of SMEs in cluster	71 %	78 %
9.	Average share of large companies in cluster	22 %	10 %
10.	Average share of research organizations	7 %	12 %
11.	Cluster strategy	Yes	Yes
12.	Cooperation with another clusters	Yes	Yes
13.	Website / transparency / relevance of the information	All cluster organizations have their web page, it is transparent, information are relevant	Only few clusters have their website, it is relevant, data about cluster organization itself are missing
14.	Average number of patents in cluster per 1 mil. citizens	1 339	2 734
15.	Cluster support	All levels (local governments, ministries, central governments)	Central level (federal government)

Source: Own processing

Research has led to the following findings: Quality clusters in the USA have been operating longer than those in Europe and had begun to form a naturally. The number of employees in quality clusters in Europe is directly proportional to the number of cluster members. This does not apply to clusters in the USA. Clusters in the USA are in the form of non-profit organizations, while Europeans one have different legal forms. Quality clusters in the USA are valued for results while clusters in Europe are valued for the internal structure and operation of the cluster organization. Clusters in both cases are members of a wider cluster association. Quality clusters in the USA as well as in Europe operate mostly in profitable and demanding sectors such as information technology, biotechnology or the automotive industry.

Another finding is that on average, there are more members in the USA clusters than in European ones. In the quality USA clusters, there work on average nearly two times more research

institutions of the total number of members, specifically 12 % in the USA and 7 % in the EU. Both clusters in the EU and in the USA have a formal strategy and also cooperate with other clusters. We have also found that the number of patents per capita is approximately two times higher in American clusters than in European ones. For the USA, it is 2734 and for the EU it is 1339 patents per capita. Clusters in the EU are supported from all government levels while clusters in the USA only from a central level.

5 Discussion

The resulting analysis has led to findings in the field of the quality clusters performance in both areas - Europe and the USA. We have arrived to the summarization of characteristics of quality clusters in Europe and the USA, along with the cluster differences in these two locations. Based on these results, we were then able to reach the necessary information and conclusions to evaluate the hypotheses.

H1: Quality and successful clusters in Europe and in the USA have the same or very similar performance characteristics.

Based on the findings we have obtained from our research, we can say that we do not accepted this hypothesis, as we observe different characteristics between the analyzed quality and respected clusters in Europe and in the United States in most of the analyzed cluster quality indicators. The greatest differences were observed in indicators such as number of years of cluster operation, legal form, cluster valuation, cluster composition, number of cluster patents accepted, cluster support, and R & D expenditure. We can assume that the reasons for these differences are mainly the specifics of the countries where the analyzed clusters operate.

H2: The quality and success of the examined "world class" clusters does not dependent on the total number of cluster members (i.e., there are no differences in quality or overall success between clusters with more members and those with fewer members).

Based on the results of our analysis, we have accepted this hypothesis. The quality and success of the analyzed clusters in Europe and those in the US A do not really depend on the number of members of the given clusters. In the case of clusters in Europe as well as clusters in the USA, we can see that these clusters have a different number of members and moreover they also differ in the composition of these members, yet these clusters are all high quality and respected ones. We can assume that the main reason for the irrelevance of this factor for success (the number of members in cluster), is the fact that in analyzed clusters act and co-operate large and successful companies, high-quality research institutions, and universities which are significantly involved in the management, promotion and operation of the cluster, and thus provide a sufficient basis and background for the successful operation of the cluster.

H3: Successful clusters in the USA have a larger share of research institutions in their total number of members than successful clusters in Europe.

Based on the analysis of cluster members' composition in Europe and the USA, we can accept this hypothesis. Analyzed clusters in the USA have a higher share of research institutions in their total number of members, as it is in case of analyzed clusters in Europe. The higher proportion of these

institutions may be due to the fact that clusters analyzed in the United States as well as the USA generally emphasis R & D, which allows the creation of large number of research institutions. Another reason is the fact that American universities are largely involved in research and development, which are also included in the category of research institutions.

6 Conclusion

Clusters have already a high importance, and will continue to grow in the future, so we need to continue to address this issue from all angles and explore clusters in terms of their performance and overall benefits for institutions, businesses, regions, and for society as a whole. It is necessary to constantly seek new and effective methods of their performance assessment, and thus provide appropriate patterns and inspiration for lower quality clusters so that all elements of successful clusters can be implemented in their own structure and thus improved and achieved at the highest level. In the future, it would be interesting to analyze how the importance of the various factors are crucial to the success of the cluster, i.e. what factors and indicators are coming to the forefront, and which, on the other hand, recede and are less important for cluster success and quality. By comparing European and American clusters it can be seen that there is not only one approach that would guarantee the cluster that will be highly competitive. On the other hand, for emerging and already established clusters, it is necessary for them to take positive characteristics from the European as well as the North American approach and incorporate them into their structure and activities. Only in this way, they will achieve a level of competitiveness that will be beneficial not only for their members, but also for the region or the country where they operate.

Acknowledgements

This work was supported by the project of Ministry of Education of the Slovak Republic: VEGA-1/0454/15 “Redefining regional development - moving towards resilient regions” .

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Impact of agglomerations on business development: Are there chances for multiple gazelles?

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Abstract

In the paper, we take into account the possibilities offered by agglomerations for the development of enterprises with high employment growth dynamics (high-growth enterprises – HGEs), a specific subset of which is called gazelles. We show that agglomerations can provide favorable conditions for their development. The reason is that HGEs (and gazelles) often include those activities that are often present in agglomerations. Agglomerations, in our approach, may not only be large cities, but also smaller or medium-sized locally organized clusters of enterprises that create long-term development space for the realization of specific or heterogeneous products and services with a certain degree of technological, business, marketing or research interdependence. Examples of these specific quasi-urban agglomerations are, e.g., Silicon Valley or Medicon Valley. Supporting the development of such highly innovative agglomerations means space for development of HGEs, more dynamic transfer of knowledge and more efficient mechanisms of commercial use of inventions. The conditions for the emergence and development of HGEs and their cooperative-competitive linkages are formed by agglomeration´s environment that assists in constantly improving ability of HGEs to identify market opportunities and commercially use new ideas, products, services and processes. The transformation of the economy is substantially enhanced by agglomerations that create and develop innovation-supporting assets and attractors. In addition, the effects of changes from interactions among different knowledge bases also contribute to all actors (stakeholders) in the agglomeration. Environmental technologies, internal security, business services, programming, biotechnology, nanotechnology and medicine are becoming examples of existing attractive areas where agglomerations can serve substantially. Agglomerations will have a more favorable position if they have interactions between different platforms and between different knowledge bases.

Keywords: Agglomeration, High-growth enterprises, Development, Innovation, Attractiveness.

JEL Classification: L53, M13, O18, O38, P25, R11

1 Introduction

In the paper, we take into account the possibilities offered by agglomerations for the development of enterprises with high employment growth dynamics (high-growth enterprises – HGEs), a specific subset of which is called gazelles. We show that agglomerations can provide favorable conditions for their development. The reason is that HGEs (and gazelles) often include those activities that are largely present in agglomerations. Agglomerations may not only be large cities, but also locally organized clusters of enterprises that create long-term development space for the realization of specific or heterogeneous products and services with a certain degree of technological, business, marketing or research interdependence. Examples of these specific quasi-urban agglomerations are, e.g., Silicon Valley or Medicon Valley. Medicon Valley is a leading life-

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This work was supported by the research grant VEGA 2/0086/15.

sciences agglomeration in Europe, covering parts of eastern Denmark and southern Sweden. It houses a large number of life-sciences enterprises and research centers located within a relatively small geographical area.

2 Theoretical background

Modern, often smaller, enterprises prefer an individual approach to customers, have flexible staff, use networked structures, and focus on change and innovation. These are some of the characteristics that greatly change not only the business environment, but also business models. The consequence is the growing variety and number of actors. High-growth enterprises are enterprises with an average annual growth in the number of employees of more than 20 % per year, over a three-year period, and with ten or more (10+) employees at the beginning of the observation period. Gazelles form a subset of high-growth enterprises. They are high-growth enterprises that have been employers for a period of up to five years (Eurostat-OECD, 2008). The EU definition is similar but speaks of growth of 10 % per year. Agglomerations in the paper are interpreted as functional sets of socio-economic actors (hereinafter referred to as actors), tangible and intangible infrastructures and institutional framework. They are focused on innovation and dynamic development.

There are changes in development trends leading to challenges to which enterprises must respond quickly and adequately. Emerging newcomers in the economic system mean not only opportunities but also represent threats to the prosperity of established enterprises. New forms of parallel cooperation and competition (competition) create other challenges (for issues of cooperation and competition in a geographical and urban context see (e.g. Mueler & Schurr, 2016; Simandan, 2017; Fitjar & Rodrigues-Pose, 2014). The complexity of the environment means that often isolated events and small incentives lead to far-reaching consequences for the nature of the business environment. Interactions among actors generate uncertainty for future development. Similarly, discussions on the role of proximity suggest ambiguity in terms of generally accepted conclusions. Empirical research confirms that the situation differs in approaches, e.g., between the Euro-American area and the Asian area. For example, the relationship between physical proximity and innovation is not the same in all cultural and geographic areas. It is weaker in China and the Republic of Korea, but more pronounced in Europe and the US (Soon & Storper, 2008).

Delayed asymmetric counterforces (DAC), a term introduced in Simandan (2017), is a good complement to the conceptual considerations of the behavior of actors, which have been elaborated in the concepts of constructed regional advantage (CRA), triple, quadruple and quintuple helix (3H, 4H, 5H), and strategies for smart specialization (RIS3). It can be used to analyze intra-urban competitive dynamics at the micro level - at the level of small groups or individuals that is suppressed by macro-approach in the concept of asymmetric warfare. DAC also introduces delays as a source of uncertainty into the issue of agglomeration delays. It turns out that the agglomerations, as a factor in enhancing physical proximity and the useful facilitator of formal and informal interactions of diverse actors, are contextually specific. New enterprises, especially in emerging progressive sectors, have fewer barriers to entry than before. Modern technologies, new ways of financing (such as crowd-funding) and entrepreneurship (such as the sharing economy) confirm this. Size is not as important as attractiveness and synergy in the location. Agglomerations have good opportunities to combine unique assets and achieve synergy effects. Transport of goods and services becomes easier and talents are highly mobile. Various sectors can operate on the global

market. Consequently, agglomerations must have participation of their actors in global value chains and offer their population good quality connectivity, education and training.

The location of the agglomerations and knowledge capacities and competencies of their actors (e.g., HGEs) enable them to be a potential outsourcing center for the EU and the world. Agglomerations interact in cooperative-competitive fashion with other agglomerations and entities. Their competition over resources and cooperation in production cover not only physical but also intangible items. The actions and counter-actions of actors in and outside the agglomeration cause many challenges. Valdalis and Wilson (2015) show that there are a number of strategies and approaches to how to maintain and develop the competitiveness of the regions. Successful enterprises identify those human, locational, material and knowledge resources that enable them to offer their goods and services globally. Elements of the value chain are intelligently linked and lead to custom-made production. As a result of logistics, efficiency increases and costs are reduced. Agglomeration activity requires HGEs to know what elements already exist in them, what are missing or which are not sufficiently developed. Opportunities are in every area of economic activity. New small and medium-sized enterprises (SMEs) and HGEs create new markets or enter the markets released by major companies characterized as non-core competencies for them. Searching for prospective knowledge, partners and their interconnection is an important component of networking and clustering. Small and medium-sized enterprises are able to compete on the market today because they have some characteristics similar to those of large corporations. Actors located in agglomerations can create new products and services and penetrate different markets using modern infrastructure, progressive business models, sophisticated management and governance tools and sophisticated strategies.

3 Current Challenges in the Context of Expected Changes

Information and communication technologies (ICT) allow HGEs and SMEs working (and collaborating) from anywhere, anytime, anyhow and with anyone. Agglomerations are in the process of developing and deploying a broad connectivity that enables enterprises in them to use digital, mobile, personal and other networks. Learning and adopting these technologies will be important to the future development of HGEs, SMEs and agglomerations themselves. Agglomerations compete globally and the traditional administrative boundaries are becoming increasingly disadvantageous for them. The competition (i.e., competition mixed with cooperation) of all actors within the agglomeration will be even more necessary than it has been so far.

Actors must be aware of the importance of modern technologies for development. However, it is equally important to take care of talents and that is why education and science becomes a priority. Supporting role is played by the technical infrastructure within agglomerations. Global markets, agglomeration environment, modern technologies and innovative forms of business are opportunities for HGEs and SMEs to expand their territorial and production opportunities. Emphasis has to be put on novelty and originality, as they only bring with them the added value and attracts potential global partners. Agglomerations, together with multi-level governments, are usually aware of the importance of strengthening these elements. There is a need to become attractive by attracting talented people, investors, experts, enterprises equipped with modern technologies, and those entities that control or own top-level knowledge, e.g., patents. The global economy is growing and agglomerations must realize the global dimension of business. However, there are also changes in agglomerations that strengthen competitive relationships of HGEs with

other actors. Enterprises should use the co-location effects of agglomerations with their density of critical factors that are deployed in a given location. Transport infrastructure and logistics capabilities make it easier to provide global services by HGEs. Enterprises in agglomerations should use the synergies of their R&D capacities, educated workforce and the presence of top-level global partners. This allows them to create and form unique sets of competitive entities capable of generating progressive knowledge and global products. Agglomerations can be an example of how synergies can help regional development and increase competitiveness.

Global ICT-based information and business connectivity has made it possible for SMEs to be similar to large companies. These changes have increased the importance of intangible assets (knowledge, human and social capital) as opposed to tangible assets (manufacturing machinery and equipment, finance, ICT and transport infrastructure). Flexible and dynamic SMEs are developing business in virtual and physical global space as they have accelerated and expanded their economic processes. Virtual space allows enterprises to collaborate globally with partners in all segments of the value chain. Lower costs of access to the sectors allow for stimulating their expansion. Robotics and new technologies in unusual areas and to a different extent replaces workers in certain disciplines (goods delivery by drones, etc.). Many actors in agglomerations have creative potential and a certain set of knowledge, some of which are specific or even unique. This potential can be used in a context of favorable conditions (density of actors, size of the market, etc.). Moreover, agglomerations provide a number of impulses for development, due to the presence of diverse producers, varied production, efficient distribution and an environment conducive to changes. The cooperative-competitive model in agglomerations is based primarily on inventions and innovations and is less reliant on traditional price competition. Agglomerations show higher growth dynamics (that is attractive for gazelles) than other territorial entities and gain greater effects as a result of higher dynamics and innovation. Dynamically growing, innovative and knowledge-based SMEs, often employing a unique combination of knowledge and skills, have contributed significantly to job growth in recent years. Innovation increasingly reduces the life cycle of products and enterprises. Many enterprises in Slovakia are far from the situation that they have exploited the possibilities outlined above and their potential is therefore rather at a sub-optimal level.

The modern society requires high-quality education, research activities, but also entrepreneurial activity. Numerous university graduates in agglomerations contribute to their dynamics. High share of personal income growth has been derived from technological production in the recent past. Sectors focused on global markets produce higher value products. The vast majority of new jobs in new business areas is or will be created by SMEs. Their success depends not only in which sectors and regions they operate but also how they function. Similar is the case with agglomerations. Those that are active in their functioning will probably be successful. Citizens' welfare, the reduction of inequality and the decline in poverty are important factors for their development. Agglomerations support leaders in scientific research and help inventors and other stakeholders dynamically commercialize their scientific and research results. Slovakia does not create enough talents and entrepreneurs, and those that it has are moving abroad because talents are highly mobile segment of any economy. Not every country, agglomeration or enterprise makes effective use of its potential human capital to effectively address current challenges. Educational systems do not seek to adjust to the pace at which job requirements change. The state should provide sufficient assistance to address the demand for highly skilled jobs rather than to meet the rising demand for low-paid skilled labor. Agglomerations successfully generating experts can be

successful in the long term. Training and education are factors of talent development. The problem of getting experts from abroad has nowadays rather political connotation. European economies need talents (and qualified employees) from abroad to meet the demand of the corporate sector. However, foreign experts require quality work and life conditions. In particular, it is the openness of the society to diversity, the promotion of creativity and otherness, the understanding of other mentalities and modern technical and attractive social infrastructure. Agglomerations that host talents will be able to make better use of these options. Highly skilled workers prefer for their work position those agglomerations that are in cities, and they also prefer housing in safety suburban areas with clean and healthy environment where friendly neighborhoods are and where good transport to work is. They often like active lifestyles. Enterprises in agglomerations not only create links between themselves in a territorially defined territory, but also in a virtual space. In this area, talents can be combined at global level if there are mechanisms that enable them to effectively carry out joint activities. Prerequisites are ICTs and "common language" mental models that ensure:

- Sufficient understanding of the problem;
- Effective communication between individuals and teams;
- Effective division of competences.

Enterprises can maintain success, high wages, attractiveness, and position in the global market only by producing non-standard goods and services produced using unusual practices and technologies. As the pace of change is increasing, agglomerations must shape the environment and create conditions that support the creation and application of original ideas. Universities, science and technology centers and other entities are important for the development of agglomerations. Effective technology transfer is important to ensure that inventions can be commercially exploited. Productivity and prosperity cannot come without new ideas and innovation. Therefore educational and scientific-research system in agglomerations must match them. Actors need to improve the mechanisms by which they create and disseminate knowledge. It requires, e.g., reconsidering the relationship of cooperation between universities and enterprises (especially HGEs). Greater activity of universities can enhance the involvement of universities as a full-fledged partner of HGEs in the development of the agglomeration. While few in numbers, fast growing enterprises contribute disproportionately to employment generation. For example, in 2014 they accounted for around 20% of employment in all enterprises with 10+ employees in Ireland, Israel or the United Kingdom. The rate of HGEs varies considerably across countries and sectors, reflecting the relative specialization or comparative advantages of countries in certain activities. For example, in France and Sweden the rate of HGEs is higher in services than in industry, while in Hungary and Latvia the opposite is true (OECD, 2017). Slovakia, as is shown below (see Figure 1) represents a group of countries with rather high share of employment in HGEs. The share of HGEs measures the number of HGEs as a percentage of the population of enterprises with 10+ employees.

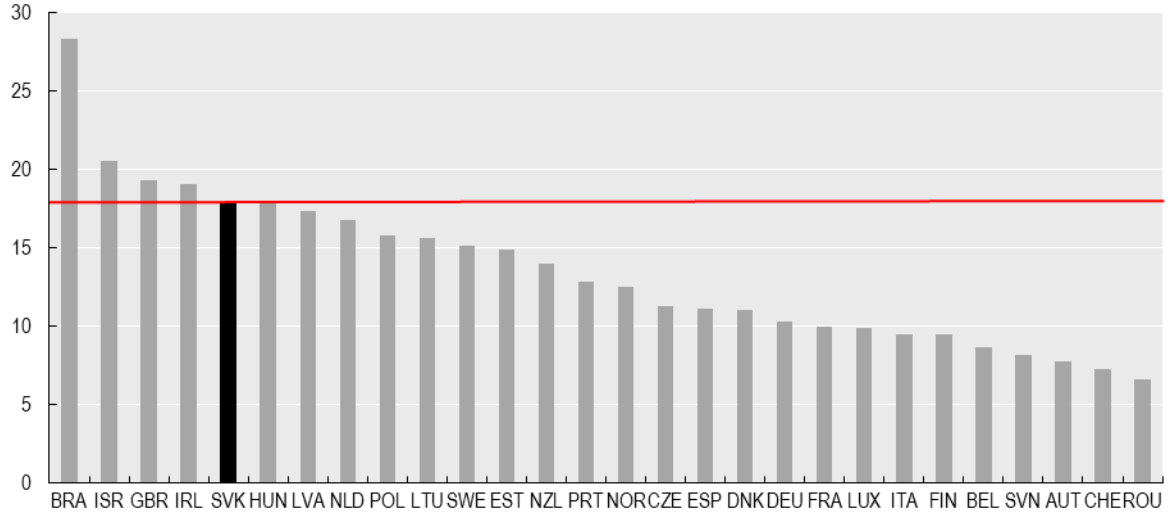

Figure 1 Share of employment in high-growth enterprises -more than 10% employment growth
Note: Percentage of employment in enterprises with 10+ employees, 2014 or latest available year.
Source: OECD data, author.

New enterprises are deciding on location in agglomerations that have high quality living and working conditions. It must therefore be sufficiently attractive and friendly to the diverse groups of people that make up a community of talents from around the world. The abilities of actors are also reflected in how they can identify, develop and present globally (for tourists) and locally (for residents) unique aspects of their locality. Success does not come from a skillful replication of an existing set of factors, but rather by identifying uniqueness and creating own specific attractiveness. Agglomerations facilitate the process of creating unique and new partnerships in a larger impact community. Sometimes they promote the variety and complexity of environment by bringing in new HGEs and mixing them with the embedded actors and facilities, the latter often being modernized through revitalization. Successful revitalization projects are particularly those that use in revitalization the activities of different groups of actors (artists, entrepreneurs, architects, developers, etc.). Talented people often create an attractive environment for other people. Agglomerations have, or are trying to dispose of, all attributes and assets (attractors) to become an attractive place for talents, HGEs, gazelles and their employees. This requires meeting a set of conditions:

• Creating attractive conditions and assets (attractors) for talents and HGEs.
• Using strategies to promote the use of tangible and intangible resources of various kinds.
• Focus on increasing the attractiveness of cultural, technological and other elements.
• Applying policies and measures that protect the traditional and new assets of the agglomeration.
• Implementing an economic development strategy that seeks to attract talents and gazelles.

It is the effort of agglomerations and HGEs to acquire and retain in particular talented young workers and experts. Agglomerations must make effective use of existing own resources to become attractive destinations for talents and HGEs. That requires conditions of different kinds: natural and cultural attractions; favorable climatic conditions; sporting attractiveness, including the organization of major sporting events; educational and scientific research centers; convenient location, good connections to other parts of the world; openness to foreigners, acceptance of diversity in opinions, religion, etc. HGEs may have use these attractors for their functioning.

Figure 2 shows situation regarding average employment in HGEs, for selected highly developed countries, that is calculated by dividing the number of employees in HGEs in the reference period by the number of HGEs in the reference period. Gazelles form a subset of high-growth enterprises. They are high-growth enterprises that have been employers for a period of up to five years. The share of gazelles corresponds to the number of gazelles as a percentage of the population of enterprises with 10+ employees.

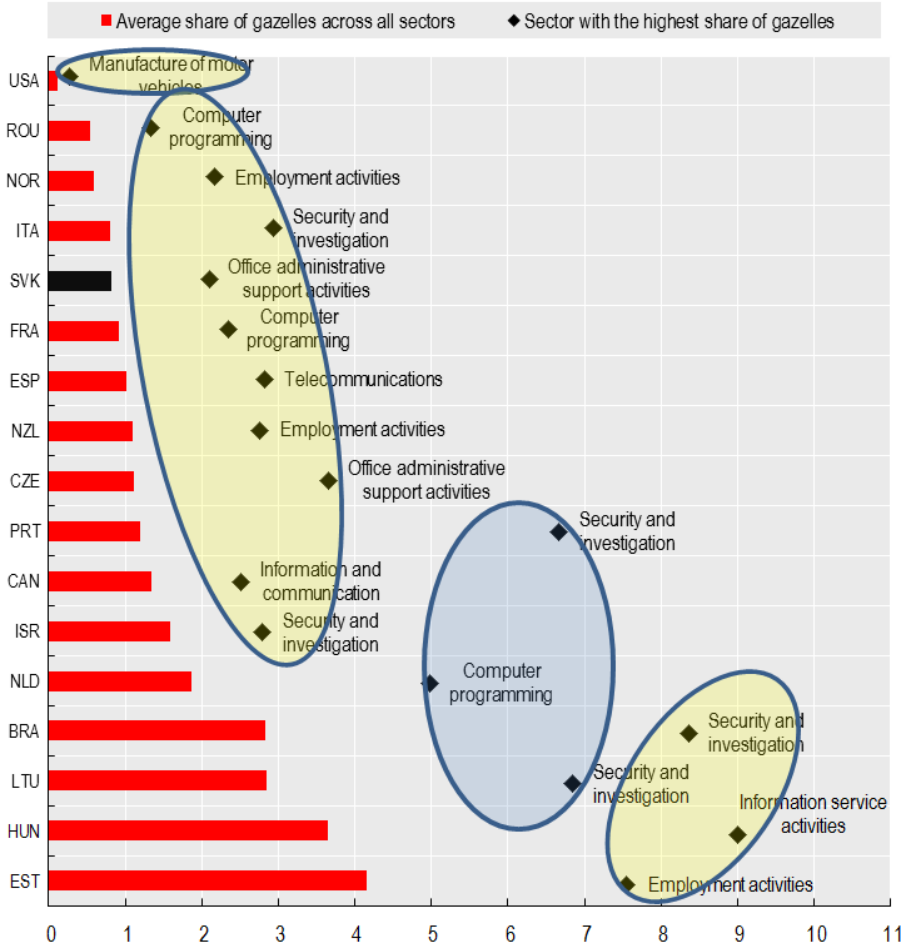

Figure 2 Average share of gazelle-type enterprises in selected countries and sectors with the highest proportion of gazelles

Notes: (1) Data presents the share of gazelles at 2-digit ISIC Rev.4 level. A special case represents CAN, where data present section level.

(2) Sectors where number of gazelles was less than 5 were excluded.

(3) Position of Slovakia is depicted in black, instead of red, color for the indicator of average share of gazelle- type of enterprises.

Source: OECD data, author.

Low-cost production with the help of modern technology allows the start of new enterprises. Combining low cost of production at one location with key technological knowledge in another location is possible often via intermediaries or “linking elements". Logistics and advanced technologies make it possible to strategically connect the various production and service components efficiently to globally operating entities at relatively low initial costs. It is important to maintain a high dynamism in the creation of new enterprises or new partnerships of existing

ones. They remain often small, but some of them reach the parameters of HGEs or even transnational corporations. As regards technological progress results - new radical innovations contribute equally to them as incremental innovations.

The vast majority of radical innovations arise in new SMEs and not in large traditional firms. Expenditure on research and development (R&D) in larger companies is declining, while in smaller enterprises it is rising. It is often SMEs that create – with contribution of talented people - new products or services that are related to different knowledge bases (analytical, synthetic or symbolic). Encouraged and streamlined business activities towards science and research speed up the creation of new inventions. This, in turn, reinforces the development of new disciplines, often technologically challenging. The prosperity of the regions where the successful agglomerations are located reflects the fact that agglomerations are expanding into adjacent areas in an effort to find environmentally acceptable locations for talents and their families. In doing so, they compete to win talents and successful actors of various kinds. To be successful there are some characteristics:

- Educational institutions enrich and modify their traditional curricula and approaches so that their graduates meet the requirements of enterprises.
- Enterprises meet customer requirements by employing experts who are able to operate in e-commerce and e-marketing conditions and can use iCloud, social networks and similar tools.
- Agglomerations and enterprises realize that they can not only use isolated knowledge bases but must combine elements from them in original ways. Therefore, a synthetic knowledge base product (e.g., car production) can be appropriately linked to the product of a symbolic knowledge base (e.g., seat cover design) and that of analytical knowledge bases (e.g., new material for steering wheel).
- Creative and talented people, including artists, are important for the development of attractive and dynamic communities that support creativity and innovation (as suggested by the experience of, e.g., Copenhagen). Such talents are playing an increasingly important role in shaping new jobs and helping enterprises and declining sectors to transform themselves.
- Talents evolve in an environment that has an atmosphere where diversity is recognized and where opportunities for an exchange of ideas and ideas often appear. They are mobile and are attracted to agglomerations where creativity is appreciated.

Talented people sometimes have specific needs and try to apply in specific areas of activity. They like to work with other talented people (allowing agglomerations), often too narrowly or too broadly targeted (the agglomeration helps them find "complementary" or "collaborating" partners), they like variety and diverse society as well as cutting-edge technology. That is why they are looking for areas that enable them to meet their creative, cultural and technological needs. Agglomerations are an ideal venue for the concentration of talented, creative, successful and dynamic personalities, and at the same time helping them to form and develop. They also help them get the necessary professional contacts and job opportunities. Standard production and commodities bring only standard (and often substandard) effects. An environment characterized by increasing rate of change and considerable diversity attracts knowledge and creativity. Agglomerations need to create an environment that encourages the emergence and development of new ideas.

4 Conclusion

Supporting the development of innovative agglomerations means space for expansion of HGEs, more dynamic transfer of knowledge and more efficient mechanisms of commercial use of inventions. The conditions for the emergence and development of HGEs and their cooperative-competitive linkages are thus formed. HGEs are constantly improving their ability to identify market opportunities and commercially use new ideas, products, services and processes. The transformation of the economy is substantially enhanced by agglomerations that create and develop innovation-supporting assets and attractors. The effects of changes from interactions among different knowledge bases contribute to all actors (stakeholders) in the agglomeration. Environmental technologies, internal security, programming, business services, biotechnology, nanotechnology and medicine are becoming examples of existing attractive areas where agglomerations can serve substantially. Agglomerations will have a more favorable position if they have interactions between different platforms and between different knowledge bases.

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The challenges for Digital Society: education and e-leadership

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Abstract

The way in which digital technologies have transformed our everyday lives is before our eyes. These changes pose new challenges in training leaders able to lead the socio-economic changes. We are in the middle of a crossroads of opposing tensions which do not find explanations in univocal interpretations but demand a collective effort to understand the renewed role which university can have in advanced modernity. The essay aims to reflect about issues posed by digital revolution to the human development and the training of leaders able to face this new challenges. The essay provides an overview of the most important directions of variation introduced by digital revolution and, therefore, on possible accompanying paths. Concluding, the essay focuses on the theme of strategic skills to live with consciously in digital space.

Keywords: Digital revolution; Education, Digital culture, Emotional competences.

JEL Classification: I20, I25, I29

1 Introduction

Digital revolution poses new challenges to organizations and their traditional mechanisms of operation, engagement and socialization of knowledge (Nonaka, 1995). This process of general complexity of our society is leading to the emergence of a new socio-economic and organizational model that we are still unable to understand and govern, opening up scenarios of profound inequalities and new social and economic risks. We are in the middle of a turn of opposing tensions which do not find explanations in unequivocal interpretations but demand a collective effort to understand the renewed role which the vast space of education (as education-training-work) can have today in advanced modernity.

The main goals of this paper is to reflect about the transformations introduced by the digital revolution in the world of work. Transformations that ask to the education systems to rethink training goals and methods in the face of strategic skills frameworks that are becoming increasingly complex and undetermined. For this reason, this theoretical paper intends to answer the following questions:

- What are the major challenges of the future?
- How can social and economic development be pursued in the context of changes and uncertainties that characterize our times?

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To answer to these questions the essay offer a literature review[4] through a reasoning aimed at reconstructing the directions of change (§ 1), some perverse effects that can be seen in the ongoing change processes (§ 2) and the challenges to form new Generations of men and women capable of coping with the digital challenge and moving within complex organizational environments (§ 3).

2 The directions of change

It is visually discernable how digital technologies have transformed our daily lives. Such technologies now appear to be physical and cognitive prostheses that give meaning and continuity to our daily action, radically redefining socio-economic times, spaces and balances. On the basis of this epochal change, not yet fully understood in its outcomes and developments, there are many researchers who have attempted to outline the contours of our time that are distinguished by its global and reticular character (Castells, 2001, 2004, 2006, 2009). A development in which the Internet and the impact of digital development have emerged as carriers of the so-called knowledge economy (Foray, 2006) and knowledge society (Lundvall, 2006).

To better understand the complexity that characterizes the digital challenge it may be interesting to investigate the contribution prepared by the World Economic Forum (2016/a: 2016/b) in outlining the four directions of change introduced by the digital society, which leave out some areas of expertise which are increasingly becoming interdisciplinary and multidisciplinary spaces that require people flexibility and resilience.

The first one refers to **the conquest of longevity** made possible by the scientific and technological progress that marked the '900, determining the increase in life expectancy and the quality of life. This phenomenon contributes to the complete redesign of the social system, in terms of the labour market and welfare systems. This imposes a comprehensive and radical rethinking of learning paths (increasingly oriented towards lifelong learning), access and exit mechanisms from the world of work and career paths, increasingly fragmented and discontinuous, with the risk of being trapped in bad jobs or blocked biographies (Capogna, 2011).

These problems demand the overcoming of sectoral and disciplinary solutions to make way for integrated and transdisciplinary approaches, able to look at the complexity of the phenomenon through a multidimensional perspective. This entails time to envisage alternative models of socio-economic development, which are sustainable and inclusive.

A second innovation path is given by the **industrial automation processes** and the impact they produce in the global and social scenario. Impact that can be synthesized in four priority development directions.

a) The use of data, the computing power of machines and connectivity that unfold in big data companies in the Internet of Things and cloud computing.

b) The analytics industry derives from the fact that the Internet creates totally traceable systems, providing a wealth of data that can be of great value both in terms of research and

[4] This reflection is part of a wider research initiated by quantitative recognition from secondary data (Capogna, 2014) and continued by a multidimensional approach based on qualitative (Capogna, 2016) and an explorative quantitative research still in progress (Decode project: DECODE, "DEvelop COmpetences in Digital Era"). The gathering of quantitative data has been realized by an online structured questionnaire filled by 1210 teachers of different level of school. The main goal of Decode Project is to understand the more important trends for analysing the expectations and the perceptions of teachers in the face of digital revolution.

commercial terms, opening a great debate on this and in order to skills to manage this amount of data, both in the debate between privacy, accessibility and transparency.

c) The human-machine interaction that refers to the development of more and more user-friendly interface and, therefore, subtle and pervasive for their ability to intervene in a hidden manner and modify the categories of risk related to work and personal and social development (Capogna, 2014/b).

d) The applications of real-world digital solutions, such as robotics, 3D printing, and artificial intelligence that radically modify the physical world around us and, therefore, our way of interacting with it and among us.

To address these processes of innovation it is necessary to develop new horizons of meaning (sense making), innovative and adaptive thinking, and distributed intelligence for the prospect of sustainable development models that are able to mature a new balance within a world of work which, while destroying jobs, seems blocked by a growing mismatch of skills in key profiles.

While such innovation perspectives let you see new developmental paths, there is no shortage of authors reporting the risk of "easy enthusiasm for big data" (Bonolis, 2016) and all that is connected to it.

This process of general increase in complexity of our society is leading to the emergence of a new socio-economic model that we are not able to understand and govern yet by placing the **polarization of the organizational arrangements that** is the third of these changes.

Modern society coincided with the emergence of new collective and institutional actors such as organizations and nation states, on which the social pact was founded, which was the foundation of our welfare systems for the whole of the twentieth century. But in contemporary, liquid and global society (Bauman, 2000), we are witnessing further evolution. One observes a depletion of the functions of founding and constitutive institutions of modern society (family, labour organizations, schools, national governments, etc.); while emerging new polarized relationship models between more and more super-structured organizations with regard to processes, production and value management (multinationals, supranational economic and political organizations, World Bank, supranational agencies, information and digital giants etc.) and "timeless and aspatial" organizations that have their roots into the network and the changes it introduced in the social system 'atomizing profiles working' into a myriad of experiences, relationships and skills that shatter personal, professional and organizational identity. The perverse and unforeseen consequences of this unstoppable trend is evident in the fact that never before such levels of production and wealth have been reached and, at the same time, never such heights of widespread poverty, inequality and social injustice have been touched. This injustice also affects the education system when the *World Report 2014 on Education for All* (UNESCO, 2014) denounces that a quarter of young people in poor countries cannot read and that one of the dramas of the socio-economic crisis in the world is given by a shortage in the quality of the teacher training.

For all these reasons, reflecting on the quality of the entire education system is central. The key competencies considered to meet this systemic complexity include cross-cultural, networking, diversity management, collaboration capabilities in virtual environments, design, adaptability and resilience to move within complex, fragmented and territorially dispersed and digital organizational systems. Moreover, in 1993 the World Health Organization (WHO) denounced the

need to promote "social and relational skills that allow the students to effectively address the needs of everyday life, relating with confidence to themselves, to others and to the community, "considering the profound value, in terms of economic and social consequences, which lies in the immaterial dimension of the covenant of trust at the heart of communities that have strong social capital (Coleman, 1988; Putnam, 2000).

The whole of these new challenges asks to imagine a different, sustainable, and fair future, envisaging innovation paths that are able to rethink the present and the future of our societies, starting with a new ability to engage the mass-media-digital panel of our times in cultural, social and educational processes; and this is the last directress of the highlighted change. The convergence of these trajectories requires the development of an **ecological approach** capable of raising digital culture in people to move with consciousness and critical thinking in the media world.

This obliges us to deal with new and more complex training goals that can integrate new media literacies (Horton, 2007), media competences (Baacke, 1998), digital literacy (Gilster, 1997), computational thinking and management of cognitive, emotional and relational load, which is essential to move with consciousness and critical spirit as active and co-responsible citizens for the common good, overcoming the anthropocentric perspective that has led the development of modernity. Possible applications of digital evolution open highly innovative scenarios for organizations and rethinking entire work and social processes. But, in the impact of these processes of change we can be glimpsed some perverse effects that we will try to outline below, focusing only on the possible drift towards a certain idea of technology.

2.1 Perverse effects

One of the most important innovations associated with digital society can be summarized in the concept of 'big data'; because, thanks to the traceability of data, it makes a lot of information available reaching far beyond our management and interpretation skills. This opens the way to new and interesting development paths, putting together both the power of computing and modern computer systems and the access to unimaginable data until just a few years ago, leaving ever more complex challenges ahead. Challenges that Doug Laney (2001) has defined through the 3V (volume, velocity and variety) growth model to indicate that data volumes increase as time passes, their generation speed, the variety of data. As with these elements, a further dimension is quickly affirmed, one referring to the legitimacy of such data which often risk being inconsistent.

These elements complicate the processes of extraction, analysis and interpretation and require people and organizations to provide:

- an investment in datasets which can efficiently process the growing amount of data;
- the elaboration of alternative representation models (data merging and integration, Machine Learning, algorithms, etc.) to handle such complexity;
- an increasing focus on the formation of professional figures with high technical-mathematical-statistical skills for the definition, management and understanding of analysis processes.

On this trail, Schönberger and Cukier (2013) point out that the big data present some dark sides, which can be summarized in the fact that, more and more, in complex decision making processes, particularly where the time factor represents a significant variable, the final choice is delegated to

an algorithm. Algorithmic decisions are presented as neutral, objective and reliable, able to support complex decision making processes but they have some perverse effects of great concern. An example of this is the fact that not so often important choices for the economy and everyday life are entrusted to automated procedures and powerful software which, thanks to sophisticated mathematical models, reduce or completely eliminate human intervention, with the intent to make more rapid and reliable complex operations, and reduce related risks. Not counting the organizational contexts where algorithms are automatically updated by machine based on artificial intelligence tools (such as Google's algorithm). But, algorithms are not at all neutral and objective as we are inclined to believe. In fact, they discriminate, as well as the more decision makers that they propose to correct, because they are not able to understand the cultural framework and social variations of the processes. They cannot count on the main intuitive and emotional intelligence of the most powerful of technologies: the human one. Algorithms can make very accurate predictions but they cannot explain their motivations and consequences.

Kevin Slavin (2011) denounces that algorithms model our reality and, when automated, these processes escape control of the most, take a long time and effort before being recaptured and brought to normal in case of system errors or bugs. A significant example in this regard comes from the finance world, where finding the time when buying and selling titles can make the difference between wealth and bankruptcy. The risk lies in the loss of control that may result from system bugs or the complexity of mathematical models (Ausiello & Petreschi, 2011). In the same line, the *International Trade Union Confederation* moves a clear statement in consideration to the "financialization system" that characterizes our era. The term "financialization" indicates the growing financial sector dominance over overall economic activity and, at the same time, the weight that financial markets show in determining the state of the global economy as well as the behaviors of companies that are often more profitable to speculate in finance instead to make investments in productivity and work. This is because interest rate and stock price developments are increasingly influencing the definition of business strategies, leading to what appears to be the predominance of financial assets far beyond the production of goods and services. In reality, the terms "financialisation" is travelling categorically parallel with the term "globalisation" and part of what is generally referred to as the "global economy" a convenient word used for the structural changes of our economy and society and that in substance lead to the distribution of the powers, where in the centre we have the finance and where the people are often out of the game. How we are far from Edgar Morin, and from his man's ethics?

Digital development is also linked to the growing movement of ideas inspired by the open date philosophy that public assets available to institutions or public administrations must guarantee free access to anyone who wants to study them in accordance with the transparency administrative principle that aims at ensuring the widest possible information circulation both inside and outside the administrative system. Transparency and information correctness that should contribute to fueling credibility and web reputations that in the post-modern economy are increasingly associated with the ability to govern access and research systems in the network.

In our society, the conquest of technique and its penetration into every social and organizational space is so strong and pervading that, according to the *Converging Technologies for Improving Human Performance, by* o the National Science Foundation's (2003), in the global scenario, in relation to the modern war "[...] t*he human has become the weak link both from the physiological and the cognitive point of view*".

The perceived risk behind this excessive confidence in technological infrastructure is linked to several orders of reasons that we cannot consider exhaustive of the problem:

a) to the renewal of a certain myth of rationality and confidence in the possibilities offered by the digital instead of the promise of absolute rationality and linear progress desired during the modernity;
b) to the creeping domain of digital holder's power who behind the promise of freedom, equality and sharing, build new platforms and control spaces that contribute to rejuvenating knowledge and educational systems (and not only) in new market opportunities to monetize;
c) to the pulling force of a certain cultural imperialism oriented towards the primacy of technocracy which serves to process and standardize complex processes and systems and to uniformize and homologate to the detriment of specificities and peculiarities;
d) the drift that is seen in the overwhelming affirmation of an economical reading of reality based on the principle of usefulness, productivity and measurability applied to everything, incautiously also to social spaces based on care relations such as education and health care.

But we cannot consider the Einstein's fundamental principle, which states that "not everything that can be counted counts, and not all that counts can be counted."

The reflection on the dangers of such risks and perverse effects that help us understand that in a digital and high technological society the real difference is not (or not only) in mastering specific technical skills but by promoting a digital culture and criticism thinking capable of forming people able of moving into organizational systems where the traditional hierarchy leaves room to reticular relationships; the system turbulence requires a continuous adaptation process (Mintzberg, 1996); the centrality of information, as a fly to innovation, calls on social actors to a paradigmatic change in the way of understanding communication from mere content transmission to an empowerment tool for people and organizations.

In other words, network society requires attention to multiple identity formation, capable of confronting community retreats (family, school, church, neighborhood, work, etc.), the turbulence and complexity of systems and the growing multiculturalism expansion. All these processes leave the subject alone in front of the increasingly dematerialization of organizations (Sennet, 2001) in a framework of relationships with variable configurations whose digital mediation is an inescapable component.

2.2 Educating in digital time

Following these considerations, we see the emergence of four core competencies that we can summarize with Morin, great thinkers of the complexity (2001), to favor educating in digital time:

1. the area of strategic and complex thinking, in other words, dialogic, recursive and hologramic, referring to the ability to contain the whole information, in each single particle of the all;
2. the area of technical-methodological skills that may have different levels and degrees of mastery but which still require transversal and widespread training given the pervasiveness of digital technologies in our lives;

3. the area of expertise associated with the exercise of a planetary identity underpinned by the increasingly strong "globalization" processes, Capable of thinking of local development as community development and not just as economic speculation;
4. and, finally, the area of digital competence, or better digital culture, which are needed to move consciously within a system that shifts between the opportunities of democracy and digital innovation and those of the risk of a new form of technological totalitarianism made possible by an unjustified use of political propaganda by Internet.

In reality, Edgar Morin often says nothing about the word ”Internet” because for him in the application of new technologies it is not the technology that should be *centre stage* but *always the people. Morin knows very well that Internet it is the first communication system really shared.*

In this case, it is difficult to imagine the further progress that the application of artificial intelligence, semantic web, and increased reality will make it possible for the market, creating collaborative environments more and more focused on enhancing of the experiential, contextual and socio-relational dimension, further amplifying the elements of a socialization process that occurs outside traditional educational agencies, leaving young people more and more alone.

This radical change in the places and processes of knowledge building, social and sharing opportunities poses new challenges to the knowledge economy and to the processes of economic and social innovation in network society. The network society implies an extension of the emotional and cognitive experience for the subject. Through the web, each one can connect to the whole world requiring to the subject to mature new forms of awareness for moving within dematerialized relations that solicit differently perceptual systems but not for that are without consequences for the subject. Educational systems are therefore faced with new challenges, not merely the transmission of knowledge but the formation of subjectivity capable of:

- expressing themselves through new forms of relationship and community, of which digital mediation is now an inevitable component;
- understand the reflections of identity construction determined by living the web, overcoming the real-virtual dichotomy, because they are two faces of the same medal whose consequences always and in any case reverberate on the 'here and now' of our everyday life;
- to anticipate the possible future of social and economic organizations immersed in extremely turbulent systems in the face of the extraordinary changes in the act.

Therefore, to the technological development should match integral human development.

3 Discussion and conclusion

Based on what emerged from the literature review, we now try to answer the initial questions. Regarding the first one (major challenges of the future), in our opinion one of the most important issue is the attempt to reduce the complexity delegating the own evaluations and subjective choices to external responsibilities (as in the example of algorithms) which are always reassuring. Such delegation does not require active involvement and participation in the understanding and evaluation process. It relegates the subject to a state of subordination and extradition by himself and social complexity. In this circumstance, action, rather than being guided by personal value-orientation, which everyone has to face, is predefined by the procedure and the salvific algorithm. This free the social actor from the burden of choice, reducing her/him to a passive terminal of a

procedure that does not understand and does not run. We are confronted with a cultural hegemony and the fascination of simple and modeled solutions offered by the techno-economics paradigm, which increasingly assume the appearance of a 'steel cage' rather than an opportunity for progress and social justice. A situation in which the subjectivity interpretative of the social actor and his true chance of being in relation (Heidegger, 1976) is lacking. For this reason, in relation to second issue (how can social and economic development be pursued in the context of changes and uncertainties that characterize our times), we can say, in the hyper-technological and digital society, the challenge to win is to forge people and new leaders capable of sharing the centrality of person and her/his inalienable value. A new humanism is therefore possible, indeed, necessary, promising and expected to form figures capable of moving within reticular relationships where the hierarchy takes on forms of variable configurations and forging leaders capable of seeing digital as a factor of innovation, enabling, possible world connector and change flyer. People capable of envisaging new horizons of meaning through which to redesign and exploit the opportunities offered by digital technologies to contemporary society on an ecological and global scale. To ensure fair, solid and ecological development at global level is the only way to prevent and counter the social and economic disasters that lie ahead of our eyes. Therefore, in the face of high technical and methodological skills to move in digital systems, we need strong social-emotional skills to sustain the cognitive, emotional, and relational loads that glide in real-virtual systems. In this sense, the challenge of contemporary society, in confronting to the digital that has been tried to rebuild, is to forge people enabling them to freely enjoy what is available for full self-realization, exercising, from an ethical and responsible perspective his/her ability to choose according to the common good (capabilities approaches) (Nussbaum, 2000; Sennet, 2007). After all, WHO (1993) calls for promoting *Life Skills Education in School* such as; self-awareness, emotion management, stress management, critical thinking, decision making, creativity, effective communication, problem solving, empathy, and interpersonal relationships which represent the basis of a community based on relationships of confidence, and able to promote social capital.

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Market regime detection using graph theory tools

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Abstract

The aim of the contribution is to combine the dynamic conditional correlation methodology and the minimum spanning tree approach to analyze the internal structure of the DJIA index. The proposed method consists of the following steps. First, using the method of the minimum spanning tree for each period, we calculate the selected graph characteristics, which are then compared using the Mann-Whitney U Test, depending on the market regime. The market regime is calculated based on the logarithmic return of the DJIA index. We want to show that the structure of the market given by the minimum spanning trees of the graph varies depending on the regime in which the market is located. We perform the analysis using graph characteristics that allow quantifying the shape and length of these spanning trees.

Keywords: Market regime detection, Graph theory, Minimum spanning tree, Dynamic Conditional Correlations, Dow Jones Industrial Average.

JEL Classification: G15

1 Introduction

The capital market is the mechanism and set of institutions and transactions that meet the supply and demand for money capital. Many analyses of the capital markets point to a high degree of interconnection between these markets and also to a certain degree of complexity within these markets. In a context of strengthening globalization and the liberalization of economic processes, the individual components of these markets cannot be analyzed separately, but a complex view of the issue is needed. This is the reason why, in the analysis of capital markets, studies analyzing relationships and linkages within these complex systems are making their way to the front. These studies follow the hierarchical arrangement (topology) and the structure of capital markets using a number of modern mathematical methods and procedures.

The aim of this paper is to analyze the internal structure of the Dow Jones Industrial Average index and to compare it over the certain periods, using the minimum spanning tree method and dynamic conditional correlations. The hypothesis is that the structure of the analyzed index, defined by the minimum spanning trees in the period of the big market falls, is statistically significantly different from such a structure, for example during sideways trend market. (The sideways trend describes the horizontal price movement that occurs when the forces of supply and demand are nearly equal. A sideways trend is often regarded as a period of consolidation before the price continues in the direction of the previous move.) Numerous mathematical and statistical methods are described in more detail in the Methodology and Data chapter.

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2 Theoretical Background

Over recent years there has been much focus on how network theory can be used to explain and better understand financial markets. Since the correlation coefficient is the most used dependency measure, the main area is the study of correlation based networks. These networks can be used to reduce the complexity of financial dependencies and to understand and forecast the dynamics of financial markets. We would like to mention some of the papers related to the structure of financial markets and introduce some methodological approaches that are used frequently.

The first publication in this field was written by Professor Rosario Mantegna (Mantegna, 1999), who introduced the method of minimum spanning tree. By constructing this subgraph, the author finds the US stocks are grouped based on their industry sector. This means, that price of the stock includes not only information about the current and past financial situation of the company, but also information about structure and topology, which is the main advantage of used methodology.

Onnela et al. (2003a) introduce a new network type - the dynamic asset graph. In comparison with the previous one, done on the static time period the methodology is similar, but not the analysis. The same authors (Onnela et al, 2003b) analyzed financial markets from the perspective of portfolio creation. They showed the assets with the highest diversification potential are located on the edge of minimum spanning tree.

Bonanno et al. (2004) consider how the returns of market-traded stocks are affected by varying the time horizons used to compute the correlation coefficients. They find the graph structure progressively changes from a complex organization to a simple form as the time horizon decreases. The paper also discusses volatility time series of stock prices and global financial markets.

Another way how to define a structure of the financial market is the use of the planar maximally filtered graph. It is more difficult method regarding the calculation, but by using it, we can get more information about the market structure. This approach was used by Tumminello et al. (2005), Tuminnello et al. (2010) or Kenett et al. (2010).

Other authors dealing with the correlation based networks are for example Mizuno (2005), Naylor (2006) or Miskiewicz (2012). Contributions dealing with the stock market and stock returns are for example AL- Shubiri (2013), Janke et al. (2013) or Chovancová et al. (2016).

3 Methodology and Data

We analyzed daily adjusted close prices of the shares of the Dow Jones Industrial Average (DJIA) for the period from 19th of March 2008 to 14th of November 2016. From these prices, we calculated logarithmic returns for each share according to Formula 1:

$$R_t = \ln \frac{P_t}{P_{t-1}} = \ln P_t - \ln P_{t-1} \qquad (1)$$

where R_t is logarithmic return in time *t* and P_t je adjusted close price in time t.

Table 1 Correlation of DJIA particular components' returns with the return of DJIA

IBM	0.74962	AXP	0.75614	UTX	0.84835
XOM	0.80139	V	0.62833	BA	0.75948
DD	0.80181	JPM	0.74087	CAT	0.77208
CVX	0.80483	TRV	0.73198	HD	0.73885
NKE	0.66800	JNJ	0.74500	MCD	0.68081
GE	0.74688	UNH	0.60149	DIS	0.81513
KO	0.65175	PFE	0.70523	CSCO	0.72247
AAPL	0.59913	MRK	0.63936	VZ	0.69623
PG	0.70709	WMT	0.58463	MSFT	0.70801
GS	0.71319	MMM	0.82275	INTC	0.72888

Source: Own processing using R

The same approach was used to calculate logarithmic returns of the whole analyzed DJIA index. Table 1 shows the overview of analyzed components of the DJIA index and their correlation with the index return. As we can see in Table 1, the highest correlation with the index has the United Technologies Corporation (UTX), almost 0.85. The lowest correlation has the Wal-Mart Stores Inc. (WMT) with a value of 0.59. It is apparent from the table that all the components of DJIA index had a positive correlation with the index during the whole analyzed period. The question is if this correlation is constant or varying over time.

Standard analyses of financial markets´ structure are based on the calculation of correlation matrix of particular shares´ returns. We can calculate it either based on the profitability of the whole analyzed period and the outcome is one big correlation matrix, or we split the analyzed file according to time frames (rolling windows) that are used to calculate correlation matrices. In our analysis, we used the other, more modern approach that reflects shares returns´ volatility over time.

The analysis uses a Dynamic Conditional Correlations method introduced by the authors Engle and Sheppard (Engle & Sheppard, 2001). If we assume the volatility of share returns will change over time, we should also consider a dynamic correlations structure of these returns. These so-called dynamic conditional correlations are estimated using the Generalized Autoregression Conditional Heteroskedasticity Model (GARCH (1, 1)).

Figure 1 shows an example of computed dynamic conditional correlations of the UTX and the WMT with the DJIA index. Average of dynamic conditional correlation (red dotted line) converges to long-term correlation coefficient calculated for the whole period. Blue dotted lines represent the area of average plus minus standard deviation.

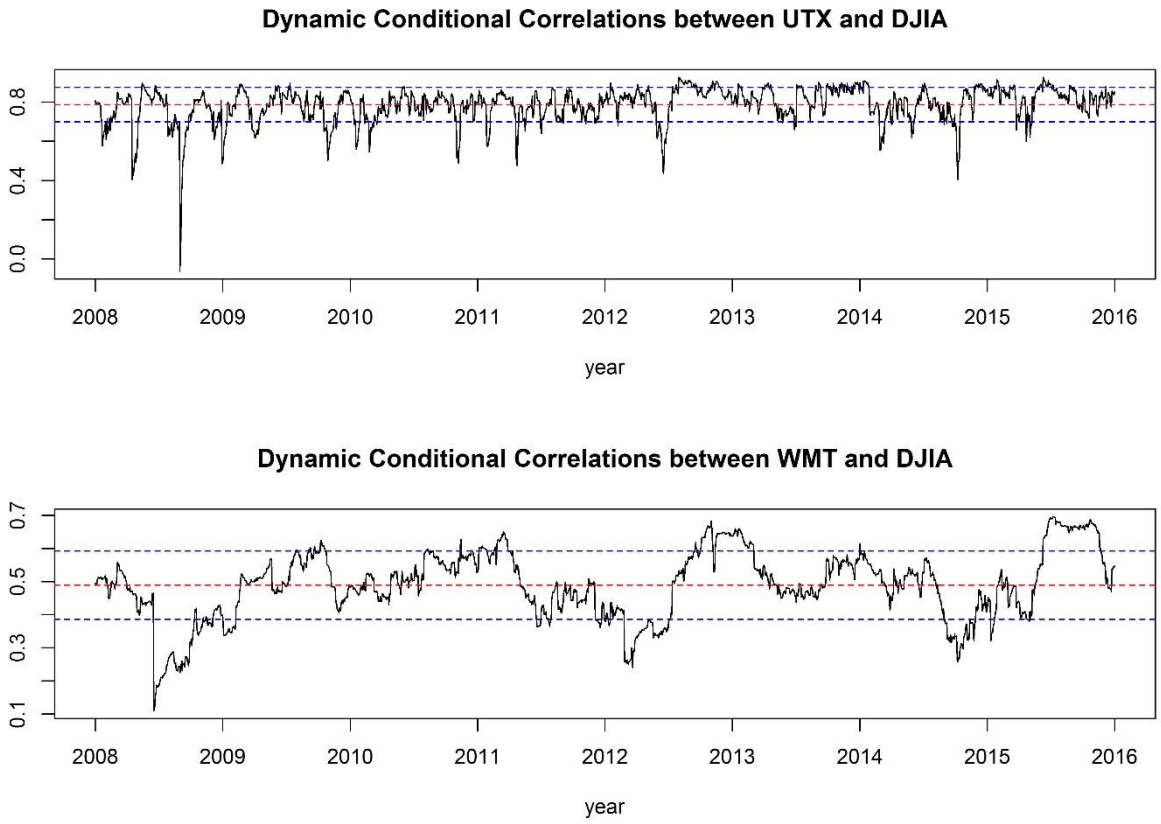


Figure 1 Dynamic conditional correlations between selected assets and DJIA
Source: Own processing using R

This approach was used to calculate the matrix of dynamic conditional correlations for each day of the analyzed period. These correlations fulfill all the attributes of the Pearson correlation coefficient. If we want to bring tools of the graph theory particularly the minimum spanning tree method, first we need to calculate a certain metric that is used to define the distance between particular shares. Regarding the fact the correlation coefficient doesn´t meet the conditions that we demand from distance metric, we have to perform its transformation according to the Formula 2 that represents the Euclidean distance of normed vectors of particular shares´ logarithmic returns.

$$d(i,j) = \sqrt{2 * (1 - \rho_{i,j})} \qquad (2)$$

where $d(i,j)$ is distance of share i from share j and $\rho_{i,j}$ is correlation coefficient between share i and share j.

We calculated square symmetric distance matrix for each day using this method. This matrix serves as a base for the application of the discrete mathematics tools. Using the distance matrix it is possible to clearly define the graph, from which is possible to compute minimum spanning tree that helps us to identify the market structure. The analysis was performed using the statistical programming language *R*. We used a library for the graphs and network analysis *igraph*. For the graph visualization, we used *yEd Graph Editor*.

4 Results and Discussion

We created the minimum spanning trees for each day of the analyzed period and compared them between themselves according to the market regime. The market regime was defined according to the logarithmic return of the DJIA index. We calculated deciles of logarithmic returns, being the first decile representation of the big market fall. Deciles 5 and 6 we consider as the period with almost zero profitability, which can represent the sideways trend market. 10th decile represents the period of the big market growth. According to the Table 2, we can see the minimum logarithmic return of DJIA index for the whole analyzed period was -8.20% and maximum logarithmic return was 10.51%. If a daily logarithmic return of DJIA index is less than -1.21%, the market is in the big fall regime. If a daily logarithmic return of DJIA index is greater than 1.24%, the market is in the big growth regime. Sideways trend market is when the daily logarithmic return is greater than -0.12% and less than 0.22%. Regarding the fact we made this classification according to the deciles of logarithmic returns, big fall and big growth regimes occur in 10% of observations and sideways trend market regime occurs in 20% of observations.

Table 2 Logarithmic return on DJIA index in individual deciles

Decile	Logarithmic return
0.00	-8.20%
0.10	-1.21%
0.20	-0.65%
0.30	-0.30%
0.40	-0.12%
0.50	0.05%
0.60	0.22%
0.70	0.43%
0.80	0.70%
0.90	1.24%
1.00	10.51%

Source: Own processing using R

At the beginning of the analysis, it was necessary to determine what to compare because the spanning tree itself is only a structure that does not have any quantitative characteristics. We have decided to define, compute and compare two selected graph characteristics: length of the tree and the occupation layer, which will be defined in next subchapters. The goal is to determine if these graph characteristics will differ in some way depending on the regime in which the market is located.

4.1 Minimum spanning tree length

The length of the minimum spanning tree in a weighted graph is the sum of the lengths of the tree edges. Since the minimum spanning tree is such a graph structure that allocates the least distant objects as close as possible to each other, we assume that the trees with the smallest distances belong to periods of the big market falls and growths. This is because, during these periods, the correlation between shares is high, which, given the Formula 2, represents a low relative distance between these shares (negative dependency between correlation and distance). This fact can also

be illustrated in Figure 2, where we can see that the shortest distances of the minimum spanning trees reach the deciles 1 and 10 representing the periods of the big market falls and growths. The length of the minimum spanning tree was calculated for each day of the analyzed period from the conditional dynamic correlations of the individual shares of the DJIA index as described above, deciles were calculated from the logarithmic daily return of the entire DJIA index.

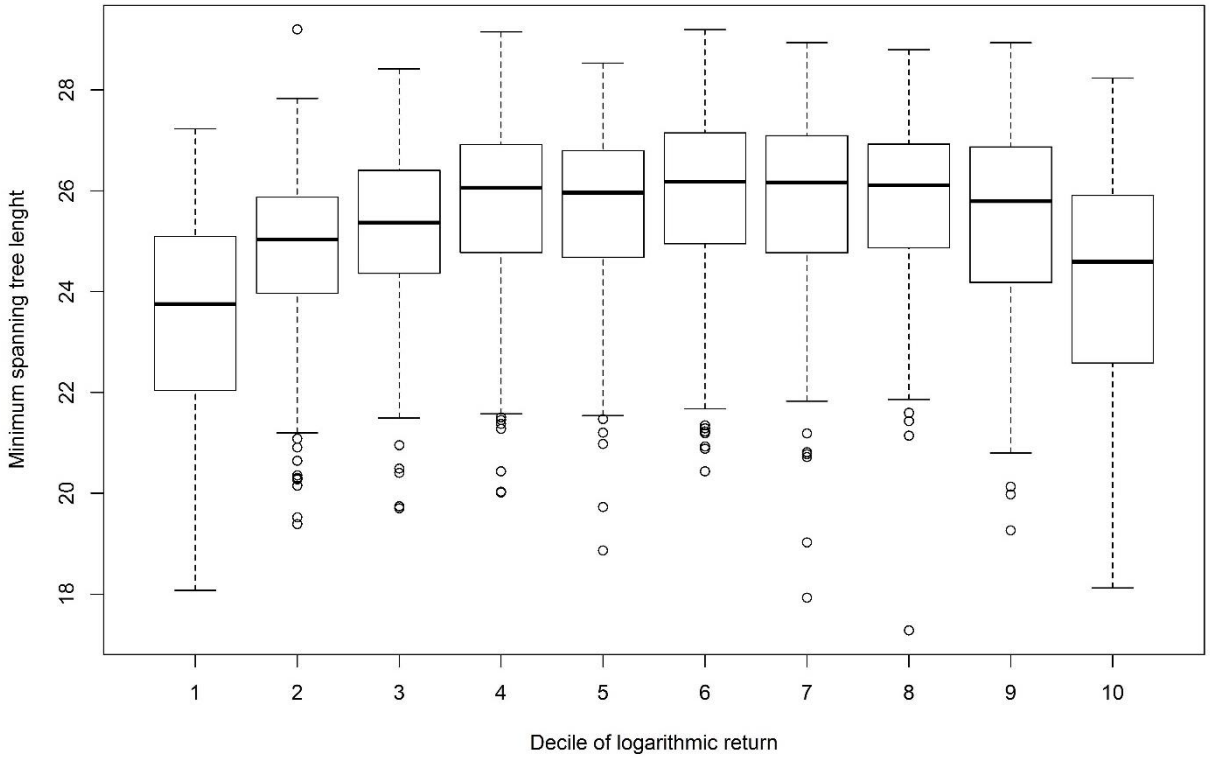


Figure 2 Minimum spanning tree length according to deciles of logarithmic return of DJIA
Source: Own processing using R

From the Figure 2, the concave shape of the curve joining the median of each decile can be seen. We assume that with the big market falls and growths the minimum spanning trees will reach the shortest distances and vice versa, when the market has sideways trend, where the returns of shares are less correlated, the distances between shares in the minimum spanning trees are longer. This means that in the periods of sideways trend market, minimum spanning trees should be longer in comparison with other periods.

We tested samples from individual deciles to see if the mean values of the minimum spanning trees length in each period differ from one another. The first sample consisted of spanning trees that were in periods with a logarithmic return on the DJIA index of less than -1.21% (big market fall regime - decile 1). The complementary sample was represented by all other spanning trees (deciles 2-10). The second sample consisted of spanning trees that were in periods with a logarithmic return on the DJIA index of more than 1.24% (big market growth regime - decile 10). The complementary sample was represented by all other spanning trees (deciles 1-9). The third sample consisted of spanning trees that were in periods with a logarithmic return on DJIA index of more than -0.12% and less than 0.05% (sideways trend market regime - deciles 5 and 6). The complementary sample

was represented by all other spanning trees (deciles 1-4 and 7-10). The same approach was used to test differences between the second graph characteristic: occupation layer.

Using the Shapiro-Wilk test of normality, we found that the samples did not have a normal distribution, so when comparing the mean values we did not use parametric t-tests but the non-parametric independent 2-group Mann-Whitney U Test method.

The hypotheses were chosen as follows:

H0: $\mu_1 = \mu_2$ Mean values of the graph characteristics´ samples are equal, minimum spanning trees in specific market regimes do not differ from others according to the particular graph characteristic.
H1: $\mu_1 <\!/\!> \mu_2$ Mean values of the graph characteristics´ samples are not equal (they are bigger or smaller), minimum spanning trees in specific market regimes differ from others according to the particular graph characteristic.

The test results for the minimum spanning tree length are shown in Table 3, subscript 1 relates to a particular market regime and subscript 2 to the remaining observations.

Table 3 Results of 2-group Mann-Whitney U Test for minimum spanning tree length

Minimum spanning tree length	μ_1	n_1	μ_2	n_2	H_2	p-value
Big market fall regime	23.49994	218	25.39466	1963	$\mu_1 < \mu_2$	< 2.2e-16
Big market growth regime	24.35401	219	25.30030	1962	$\mu_1 < \mu_2$	3.517e-11
Sideways trend market regime	25.71508	437	25.07754	1744	$\mu_1 > \mu_2$	2.919e-10

Source: Own processing using R

It is clear from the Table 3 that in case of the minimum spanning tree length, our assumptions have been fulfilled. During the big market fall and growth regimes, when the correlation between DJIA components is high, the shorter minimum spanning trees are formed on the market. On the other hand, in the sideways trend market regime, the longer minimum spanning trees are formed on the market.

4.2 Occupation layer

We assume that minimum spanning trees in individual market regimes are not distinguished by their length but also by their shape. Therefore, apart from the minimum spanning tree length, we also analyzed another graph characteristic: occupational layer. J.-P. Onnela et al (Onnela et al, 2003b) introduce the term mean occupation layer. Considering our demand, we only need to calculate occupation layer because we always compare spanning trees with the same number of edges. The occupation layer calculation method is as follows. First, we select the vertex with the maximum degree, which layer is equal to zero. The degree of the vertex v of a graph G is the number of graph edges which touch v. All adjacent vertices of the central vertex have a layer equal to one, all their adjacent vertices have a layer equal to two, and so on. The vertex layer, therefore, represents the smallest number of edges through which we can reach it to the central vertex. Occupation layer (l) is calculated as follows:

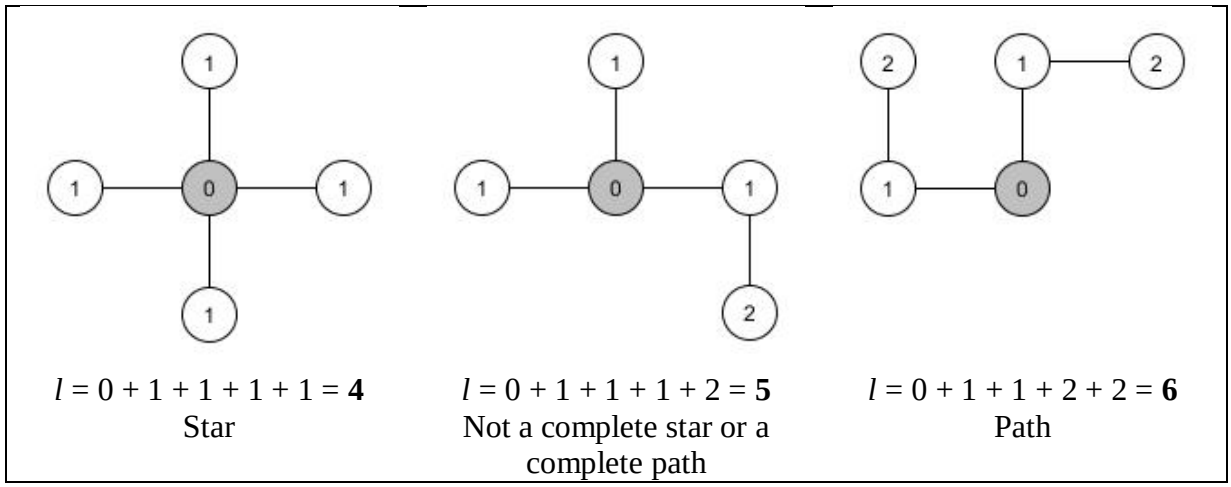
$$l = \sum_{i=1}^{n} level(v_i) \qquad (3)$$

where n is the number of vertices and $level(v_i)$ is layer of the vertex v_i.

If we compare the shape of minimum spanning trees that are composed of a different number of vertices, we recommend using a mean occupation layer ($\bar{l}$) that represents the normalized occupation layer value (divided by the number of edges):

$$\bar{l} = \frac{1}{n-1}\sum_{i=1}^{n} level(v_i) \qquad (4)$$

The reason we consider for identifying the shape of the minimum spanning tree the occupation layer as a suitable graph characteristic is that there are generally two basic shapes of the spanning trees. The first one is the star and the other is the path. The star of *n* vertices is such a connected graph (a connected graph is one in which each pair of vertices forms the endpoints of a path) that has *1* vertex of degree *n-1* and *n-1* vertices of the degree *1*. The path is such a connected graph that has all the vertices of degree *2* with the exception of the initial and final vertices that have the degree *1*. In general, it is assumed that in the period of the big market falls and growths, the minimum spanning trees in the shape of stars are created due to the high correlation of shares. Vice versa, during the sideways trend market regime, the market should generate minimum spanning trees in the shape of a path. In Figure 3, we illustrate the use of occupation layer methodology on the three spanning trees of five vertices. The central vertex with the layer 0 is marked with a gray color. As we can see the more the graph resembles its shape in the star, the lower the value of the occupation layer and on the contrary, in the shape of the path, this characteristic is the highest.



l = 0 + 1 + 1 + 1 + 1 = **4**
Star

l = 0 + 1 + 1 + 1 + 2 = **5**
Not a complete star or a complete path

l = 0 + 1 + 1 + 2 + 2 = **6**
Path

Figure 3 Examples of the occupation layer of the selected spanning trees shapes
Source: Own processing using yEd Graph Editor

Figure 4 gives an example of a graphical interpretation of the analysis results. On the left is the minimum spanning tree whose occupation layer is minimal (51), on the contrary, on the right is the minimum spanning tree whose occupation layer is maximum (188). The minimum spanning tree on the left, with its shape, is uniquely similar to the star. The second one on the right is similar to the path. Therefore, we consider occupation layer very suitable for comparing the shape of individual market structures.

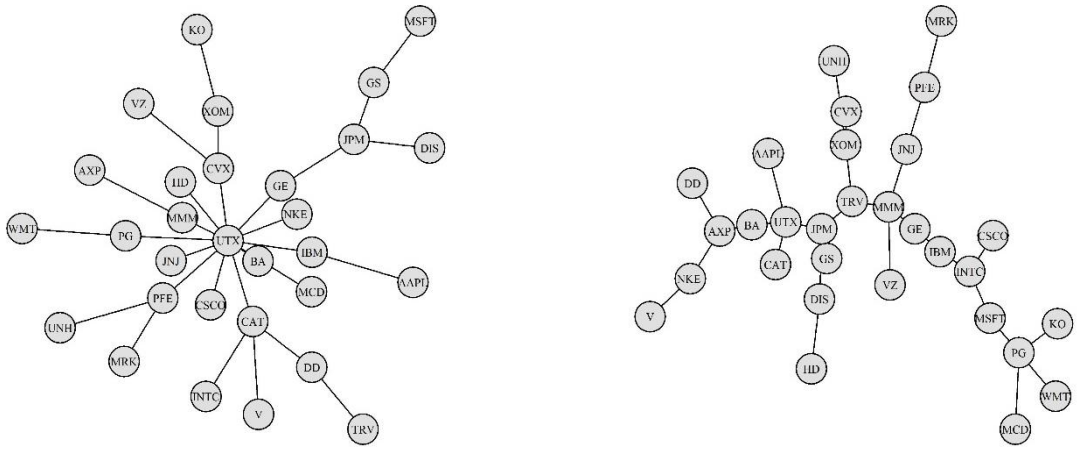


Figure 4 Shape of the selected minimum spanning trees
Source: Own processing using R

The aim is to show that in the periods of the big market falls and growths minimum spanning trees tend to shape the stars and vice versa in the period of sideways trend market regime the path. From the division of the logarithmic return to the ten deciles in Table 2, we get market regimes and this time we compare the occupation layer in the same way as in the previous subchapter.

The test results for the occupation layer are shown in Table 4, subscript 1 relates to a particular market regime and subscript 2 to the remaining observations.

Table 4 Results of 2-group Mann-Whitney U Test for occupation layer

Occupation layer	μ_1	n_1	μ_2	n_2	H_2	p-value
Big market fall regime	82.28935	218	84.77523	1963	$\mu_1 < \mu_2$	0.04706
Big market growth regime	82.22069	219	85.379	1962	$\mu_1 < \mu_2$	0.005071
Sideways trend market regime	81.35698	437	82.83372	1744	$\mu_1 > \mu_2$	0.07447

Source: Own processing using R

As we can see from Table 4, in periods of the big market falls and growths, market structures tend to shape more resembling to star. However, in case of sideways trend market regime, we did not observe a statistically significant difference in occupation layer characteristic.

5 Conclusion

We analyzed the internal structure of the DJIA index in 2008 - 2016. Using dynamic conditional correlations and graph theory tools, we calculated the minimum spanning trees for each day from the analyzed logarithmic returns of the DJIA components, which were then compared on the basis of logarithmic returns of the DJIA index itself. During the comparison, we were particularly interested in the shape and length of these spanning trees. The main findings of our analysis include the shorter lengths of minimum spanning trees in the periods of the big market falls and growths, and these spanning trees are shaped into more reminiscent stars. In the periods of sideways trend market regime, the minimum spanning tree length is higher. However, we did not succeed in proving the assumption of forming longer paths in this period.

Findings of our analysis are mainly related to the Professor Rosario Mantegna (Mantegna, 1999) methodology approach. We also expanded Onela's (Onnela et al, 2003a) methodology of dynamic asset graph by using dynamic conditional correlation approach. The hierarchical topology of assets we analyzed in some specific market regimes. The main benefit of the contribution is that we have not only analyzed the topology but also its dynamics and shape of this topology.

In the future, the analysis could continue with the inclusion of other indexes and their comparisons, for example, using the mean occupation layer. Other graph characteristics may be used, for example, graph diameter, graph radius, the length of the longest path, etc. We also plan to analyze market structures and index profitability using time lags, which allows us to predict market development in the future.

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The significance of ratings in business-to-business procurement

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Abstract

The procurement process is determined not only by the price, but also by additional information for assessing total utility of requested product or service. Current statements of policy makers or global actors calls for higher trust and transparency of company's behavior. Such an information can enrich the decision making to select the best utility. In the paper, we have realized experiment in the form of web based simulation of tenders, where real procurement managers were asked to rank three offers with different variables – price, internal rating, external rating, internal loyalty, market presence, financial health and social responsibility level. On the base of our results, in the case, where the price was not significant factor for the procurement decision, the highest significance was visible in internal rating, what shows, that Slovak companies relies more on their own experiences with specific supplier and only in the case of absence of this information they rely on similar information from the market more than other determinants.

Keywords: Procurement, Suppliers, Ratings, Loyalty, Experiment.

JEL Classification: D23, D81, D90, L2

1 Introduction

In electronic commerce and generally in networked business informatics, trust and security has received significant attention, as it is related to growth in this area of business. The Commission of the European Communities noted that, in order to win consumers as well as businesses over to e-commerce, it is necessary to build trust and confidence. In concrete terms, consumers and businesses must feel confident that their transactions will not be intercepted or modified, that both sellers and buyers own the identity they claim, and that the transaction mechanisms are available, secure and legal. The significance of mutual trust in digital world was claimed in new European strategy of digital single market.

Trust has been proclaimed as a valuable economic asset because it has been described as an important antecedent to effective inter-organisational collaboration. In several studies, trust is considered as the factor which reduces transaction costs and allows for greater flexibility to respond to changing market conditions (Nachira, 2010; Barney & Hansen, 1995; Dore, 1983; Dyer, 1997).

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Together, it leads to superior information sharing routines which improve coordination and joint efforts to minimize inefficiencies (Aoki, 1998; Clark & Fujimoto, 1991; Nishiguchi, 1994), and facilitate investments in transaction or relation-specific assets' which enhance productivity (Asanuma, 1989; Lorenz, 1988; Dyer, 1996). Some studies even claim that national economic efficiency is highly correlated with the existence of a high trust institutional environment (Fukuyama, 1995; North, 1990; Casson, 1991; Hill, 1995). For example, Fukuyama (1995) argues that the economic success of a nation depends on the level of trust inherent in the society.

Several other studies contend that e-commerce cannot fulfil its potential without trust (Jones, Wilikens, Morris, & M. Masera, 2000; Farhoomand & Lovelock, 2001; Raisch, 2001). Lee and Turban (2001) highlight lack of trust as the most commonly cited reason in market surveys why consumers do not shop online. The reason for this is that online sellers are not well known to the consumers, the consumer has no opportunity to physically examine the product before buying, and the consumer cannot protect any sensitive private or financial information that the seller receives. In research on e-commerce, trust is regarded as a mental short-cut to a buying decision, where the buyer is faced with the uncertainties of product quality and vendor reputation together with appropriate fund transfer (Lee & Turban, 2001).

Supply chain management has been recognized as one of the most important business process and management functions for achieving higher business efficiency and competitive advantage. The fact that suppliers play a key role in affecting firms' performance has been well recognized in the literature (Donlon, 1996; Min & Mentzer, 2004; Kannan & Tan, 2006; Li et al., 2006; Koh et al., 2007). According to Ford (2003), the high costs of purchased goods and services typically account for around 70% of the total cost.

One of the most crucial points of effective strategic supply chain management, the procurement function is considered (Talluri & Sarkis 2002). In line with procurement process innovation, advances in information and communication technology (ICT) support companies to achieve substantial economic benefits within business processes. (Devaraj et al., 2007; Doucek et al., 2010; Dorčák & Delina, 2011; Dorčák & Pollák, 2011; Sudzina et al., 2011; Delina & Tkac, 2010; Hill & Scudder, 2002)

Todays, e-procurement applications impact companies by costs reduction, increases of overall profitability, or generally improve procurement practices and economic benefits (Olson & Boyer, 2003). According to Delina and Tkáč (2010), one of the crucial factors how to increase efficiency of cooperation with suppliers and how to increase procurement efficiency is trust building in electronic business environment with special attention on reputation evaluation (Delina, 2009; Delina & Dráb, 2010).

Ratings used in e-procurement processes are evaluating historical experiences with particular supplier and making procurement selection more objective and validate total utility of potential supply instead of considering only the price. The understanding of the role and significance of ratings in procurement decision making is crucial for understanding the value of historical experience, the value of non-price character where this value can be transferred between procurers from commercial sector but also to public procurement sector. This paper studies the significance of different types of ratings in procurement decision making between commercial procurers

through experimental simulation game analyzing behavioral patterns used in current procurement environment.

2 Objective and methodology

The objective of this study is to examine, how different types of reputational management mechanisms can be significant in procurement decision makings and what behavioral patterns exist in procurement decision making between commercial procurers.

This research was realized by experiment through developing web based simulation environment where different procurement situations were simulated and real procurement managers were asked to rank three suppliers with different parameters of their offer according to their preferences. Each offer by suppliers were described by:

- Price with rank from 1 - 5, where 5 was the best price (lowest)
- Internal rating from 1 – 5, where 5 was the best rating assessed within procuring organisation from historical transaction
- External rating from 1 – 5, where 5 was the best rating assessed in the global environment (e.g. market or other business platforms) not by the procuring organisation.
- Internal loyalty from 1 – 5, where 5 is the longest history of business transactions within procuring organisation
- External loyalty from 1 – 5, where 5 is the longest history of business transactions on the global market or external business platforms
- Financial health of supplier organisation from 1 – 5, where 5 is the highest financial credibility
- Social responsibility from 1 – 5, where 5 is the highest level of social responsibility in the supplier organisation

For the purpose of this study, we have selected from our experiment only cases when the price as attribute was not sensitive for the final rank, it means, the price was not significant factor for ranking of three suppliers. Together, we have assessed only internal and external rating and internal and external loyalty to analyse following working questions:

- Is internal rating more important then global rating? It means, procuring company rely more on own knowledge retrieved from their own historical transactions and experiences as on experiences of global market with behaviors of this particular supplier.
- Internal loyalty as long term factor of customer relation is more important then historical presence on the market.

The experiment was conducted with 100 procurement or business managers from Slovak companies, where each of them realized 30 selection of suppliers on average.

3 Research results

For the purpose of working hypothesis analysis, we have selected only cases, where the price was not significant for the decision making. That's why, only cases where the price for the second place was the same or better were selected.

Table 1 Descriptive Statistics

		Minimum	Maximum	Mean	Std. Deviation	Rank diff
Internal_rating1		1	5	3.18	1.397	0.5
External rating1		1	5	3.11	1.394	0.27
Internal loyalty1		2	4	3.27	.730	0.57
External_lojalty1		2	4	3.14	.789	0.29
Financial health1		2	4	3.12	.799	0.27
Satisfaction1		2	4	3.05	.812	0.14
Internal rating2		1	5	2.68	1.416	
External rating2		1	5	2.84	1.413	
Internal_loyalty2		2	4	2.70	.808	
External lojalty2		2	4	2.85	.821	
Financial health2		2	4	2.85	.816	
Satisfaction2		2	4	2.91	.817	
Valid N (listwise)	1366					

Note: own analysis in IBM SPSS Statistics

Through comparing means of suppliers' attributes between winning place against second place, we see that the highest mean is by the internal loyalty and internal rating. The Rank diff represent the highest difference between values between attributes on the first/winning place and second place. It means, the highest difference, the highest significance for the decision. Also this factor shows, that internal loyalty and internal rating were the most important factors for procurement decision making in the case, where price was not the factor for the decision. This result can be explained by strong trust in long term relations and own experiences from historical transactions, where only known business partners are validated and trusted. It means, if the price is not the key, Slovak companies relies on known business partners with higher rating rated by internal procurement manager.

3.1 Decision rules

For the purpose of deeper analysis, we have calculated differences of attributes between first and second rank and second and third one. It provides an information, how big difference in specific attribute can cause movement on one level of rank. On the base of these data, we have used decision tree rules to find causalities and rules describing the significance of particular attribute or set of attributes which can be significant to get to higher ranks. Results are shown in the table 1 below, where Mode: 1 presents the rule for getting on the 1th rank and Mode: 2 for getting on the 2nd rank (from third one). In the case of missing value, it means, that the value was not yet published for the procurement manager.

Table 2 The decision trees rules

```
Change in internal rating in [ "-1" "-2" "-3" "1" ] [ Ave: 1,337, Effect: -0,202 ]
        Change in external rating <= -2 [ Ave: 1,515, Effect: 0,178 ] => 1,515
        Change in external rating > -2 and Change in external rating <= -1 [ Ave: 1,353, Effect: 0,017 ]
                Change in external rating in [ "-1" "-2" "1" "2" "3" "4" ] [ Ave: 1,261, Effect: -0,092 ] => 1,261
                Change in external rating in [ "-3" "-4" ] or Change in external rating IS MISSING [ Ave: 1,441,
Effect: 0,088 ] => 1,441
        Change in external loyalty > -1 [ Ave: 1,3, Effect: -0,036 ]
                Change in social responsibility <= -1 [ Ave: 1,354, Effect: 0,054 ]
                        Change in external loyalty <= 1 [ Ave: 1,311, Effect: -0,043 ] => 1,311
                        Change in external loyalty > 1 [ Ave: 1,42, Effect: 0,066 ] => 1,42
                Change in social responsibility > -1 [ Ave: 1,262, Effect: -0,039 ] => 1,262
Change in internal rating in [ "-4" ] [ Ave: 1,423, Effect: -0,115 ] => 1,423
Change in internal rating in [ "2" "3" "4" ] [ Ave: 1,273, Effect: -0,266 ]
        Change in external loyalty <= -2 [ Ave: 1,4, Effect: 0,127 ] => 1,4
        Change in external loyalty > -2 [ Ave: 1,256, Effect: -0,017 ]
                Change in external rating in [ "-1" "-2" "-4" "1" "2" "3" "4" ] [ Ave: 1,197, Effect: -0,058 ] =>
1,197
                Change in external rating in [ "-3" ] or Change in external rating IS MISSING [ Ave: 1,29,
Effect: 0,034 ] => 1,29
Change in internal rating IS MISSING [ Ave: 1,642, Effect: 0,104 ]
        Change in external rating in [ "-1" "-2" "-3" "-4" "1" ] [ Ave: 1,544, Effect: -0,098 ]
                Change in internal loyalty <= 1 [ Ave: 1,584, Effect: 0,04 ] => 1,584
                Change in internal loyalty > 1 [ Ave: 1,485, Effect: -0,059 ] => 1,485
        Change in external rating in [ "2" "3" "4" ] [ Ave: 1,477, Effect: -0,166 ]
                Change in financial health <= -2 [ Ave: 1,506, Effect: 0,029 ] => 1,506
                Change in financial health > -2 and Change in financial health <= -1 [ Ave: 1,386, Effect: -0,091
] => 1,386
                Change in financial health > -1 [ Ave: 1,514, Effect: 0,038 ]
                        Change in internal loyalty <= 1 [ Ave: 1,552, Effect: 0,038 ] => 1,552
                        Change in internal loyalty > 1 [ Ave: 1,449, Effect: -0,066 ] => 1,449
        Change in external rating IS MISSING [ Ave: 1,701, Effect: 0,058 ]
                Change in internal loyalty <= -1 [ Ave: 1,622, Effect: -0,078 ]
                        Change in financial health <= -1 [ Ave: 1,574, Effect: -0,048 ] => 1,574
                        Change in financial health > -1 [ Ave: 1,651, Effect: 0,029 ] => 1,651
                Change in internal loyalty > -1 [ Ave: 1,726, Effect: 0,025 ]
                        Change in external loyalty <= -1 [ Ave: 1,697, Effect: -0,029 ]
                                Change in financial health <= 1 [ Ave: 1,682, Effect: -0,015 ] => 1,682
                                Change in financial health > 1 [ Ave: 1,748, Effect: 0,051 ] => 1,748
                        Change in external loyalty > -1 [ Ave: 1,746, Effect: 0,02 ] => 1,746
```

Source: Own calculation in SPSS Clementine

The first number in final rule specifies the average value of ranking in continuous variant to predict better the differences between rules and second number presents the support. From the table, it can be seen, that the most important factor is internal rating, where higher differences (higher values) caused a movement to a higher rank. As the synergy factor was identified the length of the market presence, what can be presented, that Slovak companies trust older companies as new ones. In the case, where internal rating was not accessible, the most important factor was the external rating, where procurement managers will rely on experiences of foreign procurement organisation with the behavior of respective supplier.

These results describe more precisely than means from Table 1 behavioral patterns of procurement managers and show the highest importance of own experiences with supplier. On the base of these

results we can confirm first hypothesis, where internal rating is more important then global one. Although the second hypothesis we cannot confirm, as the significance of internal loyalty was not so high and was visible only in specific cases.

4 Conclusion

Trust is the key issue in whole economy according to many actors or statements of policy makers (Davos meetings, etc.). According to several experts mentioned in above, trust can reduce transaction cost and increase efficiency in business relations. Procurement as a process is determined by multicriterial decision making, where in addition to the price as main factor, the most important factors are internal rating and external loyalty and in the case of unknown internal rating, external rating can support the decisions in this field.

This supports direction of the procurement and total utility based decision making, where ratings and loyalty can enrich the information needed to select the best supplier not only from the aspect of price but on the base of total utility of requested delivery.

Acknowledgements

This work was supported by the Sloveak Research and Dedelopment Agency under the contract No. APVV-15-0511.

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Electronic Auctions Analysis: the case of Slovak and Czech Republic

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Abstract

The objective of this article is to analyse and statistically describe the electronic auctions carried out through an electronic auction system provided by Proebiz who provide its serices mostly to Slovak and Czech subjects. Auctions especially electronic also called eAuctions are considered to be a most promising tool to address the efficiency of any procurement processes through their claimed increases of the cost savings for the procurer. The process of procurement in the environment of the electronic business connection usually differs from the traditional one, therefore it has to have its special conditions. The main objective of this article is to analyse whether the application of electronic auctions is continually providing savings to the procurers and how did the procurers behaviour changed during the analysed period.

Keywords: Electronic Auctions, Effectiveness, Real case data.

JEL Classification: H57, P45

1 Introduction

The theory on auctions has its beginning connected auctions with the process of sale, where the seller or representative wants to sell his goods for the best price. The opposite type of auction, where buyer introduces an auction with the purpose to buy a good or service for the lowest price thus saving his costs was named as reverse auction. These auctions became very popular especially in case of procurement / tender (Jap, 2003) where they claim an increase in transparency (Smart & Harrison, 2003). Applications of these types of auctions have been introduced in the public procurement and more often in environment of the private entrepreneurs. With the development of eProcurement, the application of eAuctions has become more frequent. Several specific types of auction schemes have been developed. Private entrepreneurs are not bound to specific regulations and so can introduce and apply also other than classical auction mechanisms (Caniëls & van Raaij, 2009). Often auctions with some degree of transparency or hybrid solutions, or quasi-auction mechanisms or other added features like reputation mechanisms, can be observed in real-life (Delina & Dráb, 2010; Smart & Harrison, 2003).

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The availability of quality empirical data from real executed auctions not only from public sector but also from private companies is for research purposes a critical point. In this paper we have used a dataset provided by an international eAuction provider company PROebiz, that has provided us with a random sample of 5000 auction results starting from year 2008 – mid 2016.

2 Description of data and methodology

Altogether a database of 4255 eAuction records in years 2008-2016 were filtered and used in the analysis. The sample included 2928 records where the procurer was from private sector, 609 records where the procurer is a public body and 718 cases of public procurement as a sealed bid process. Among the analysed variables we have included: date, procurer type, auction type, information regarding the auction transparency setting (ordering visible, lowest prices visible, win/lose information, additional ordering information), recalculated transparency index, numbers of participants, new participants, number of bids, auction rounds, estimated price, final auction price, savings, number of extensions, basic category for goods and services.

For the analysis methods for descriptive statistics were applied. The data was explored using tabular and graphical representation of the data. Simple descriptive models using correlation were used. For filtering and conditioning a pivot table was applied. All the statistical measures were carried out using either SPSS statistics or R studio program.

3 Analysis of actions in SR and CR during the period 2009-2016

3.1 eAuction volume development

Some authors claim that the type and process of procurement depends on the total volume of the auctioned goods and services. Usually more complex processes are applied in case of auctions of greater total value. Electronic auctions at the beginning of their implementation were in many companies and by public subject applied only on a small portion of their total purchases and usually they were applied to not complicated goods and services usually with a low price. Our question was if the companies and public bodies are increasing the application of eAuctions also for larger procurements.

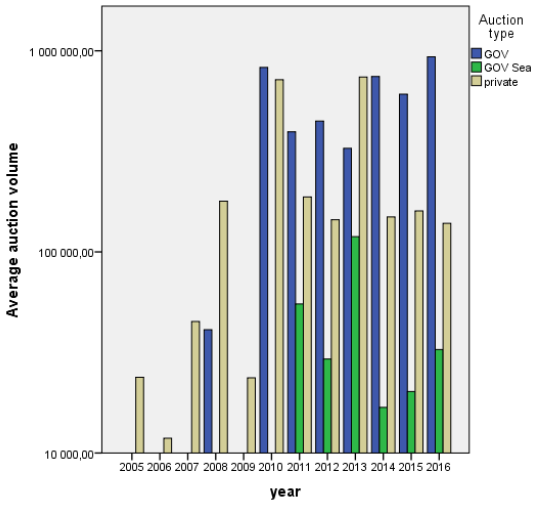

Figure 1 Average auction value per auction type
Source: Authors

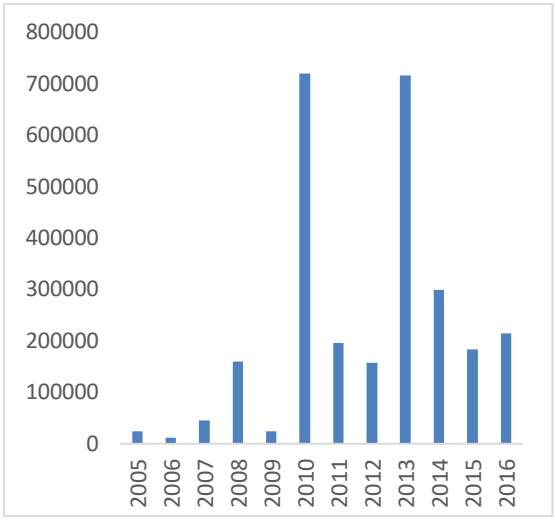

Figure 2 Average value of one auction
Source: Authors

As can be seen from the previous picture a slight increasing trend in the volume development can be observed. The auctions with the greatest values were in the last years issued by public bodies. From the figure can be an overall increasing trend in the average volume per one auction, suggesting that even bigger and more complex procurements are carried out using electronic auctions. Two clear peaks are recorded as outlier values in years 2010 and 2013, due to great construction project projects, that have also pulled the private sector procurement activities. An interesting and positive finding is an uptrend in the volume and frequency of the auctions performed by public bodies through electronic auctions.

3.2 Number of eAuctions´ participants

Analysis showed an increasing trend in the number of procurers and also in the number of participants taking part in the competition during the auctions. A small decrease in 2016 is due to missing data.

Table 1 Number of procurers and auction participants

	year											
	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Number of procurers	8	50	51	28	38	95	294	486	491	1098	1092	524
Number of participants	59	268	327	211	159	446	1266	2737	3327	6617	9329	4574

Source: authors

As can be seen on Figure 3 from year 2009 an increasing average number of eAuction participant is clearly identifiable. The overall competition during the auctions became more intense not only in the case of private procurers but also in the case of public bodies.

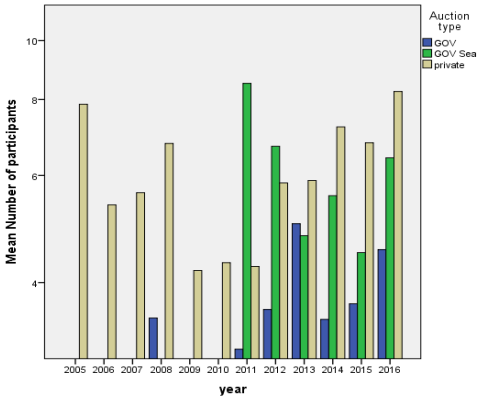

Figure 3 Number of participants
Source: Authors

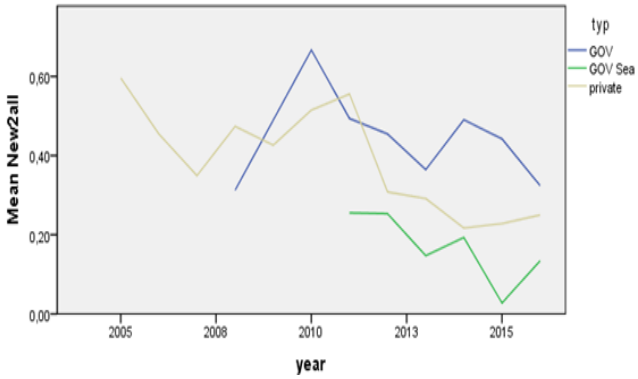

Figure 4 New vs. all participants ratio
Source: Authors

Most of the economic systems dealing with effectivity tend to reach some state of equilibrium. To analyse whether the eAuctions are attracting new participants or if they became a common procurement tool accepted by the majority of procurement process subjects a ratio between new auction participants and all auction participants was created. As recorded in
Figure 4 a very slight down slope of all three ratio curves is present. Judging from the charts can be stated that more and more auction participants are taking part in online eauctions repeatedly. During the last years the ratio has droped to around 20% of new eauction participants. On the other hand, this fact can be in the case of public procurement a sign of system malfunction where always the same participants circulate in public procurement calls or auctions that could suggest fraud behaviour, that will cause a crowding out effect for the new or other participants. This issue should be analysed in more detail.

Electronic auctions can be used in both cases when the issuer is planning to sell a good or service to wider spectrum of potential buyers to assure the highest possible revenue, and in case when the issuer is planning to buy good or service for a reasonable price and specifications to achieve cost savings from the sellers´ competition. To analyse the provided dataset simple charts were created. We have divided the whole dataset to sell auctions and buy auctions. Our sample is mostly populated with auctions intended for buy and by a small fraction of selling auctions. Most of the sell auctions were of NIPPON and ERMMA type. As can be seen in the Figure 5 the absolute majority of sell auctions were issued by private subjects and only a fraction by public bodies.

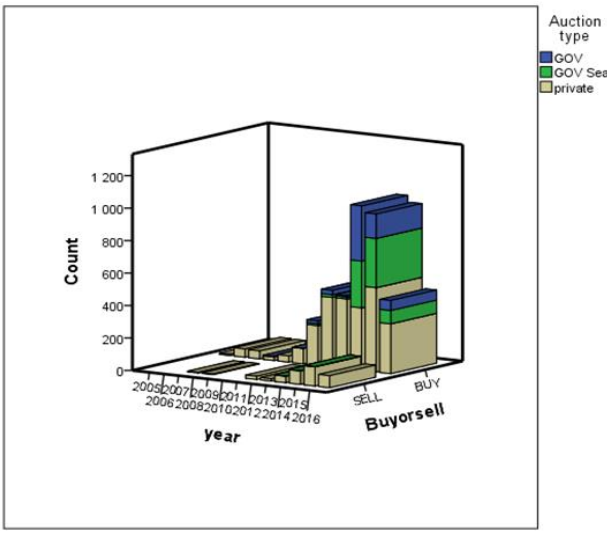

Figure 5 Number of buy/sell auctions according to the issuer type
Source: Authors

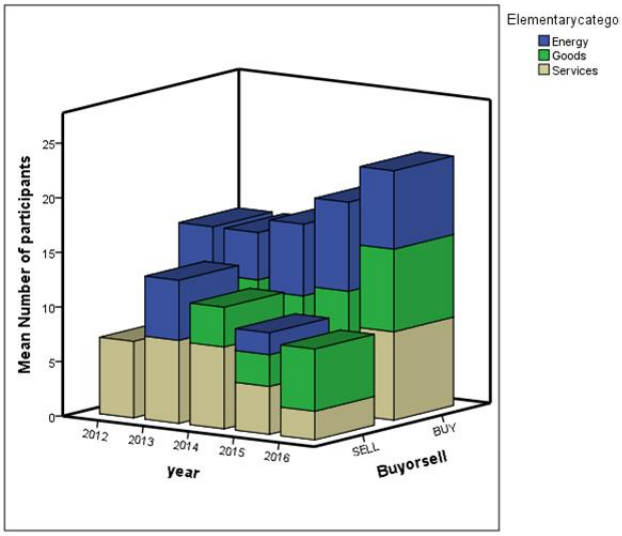

Figure 6 Average number of buy/sell auction participants by the trade subject category
Source: Authors

In the second chart an average number of participants according to auction transaction purpose and the elementary category of the auctioned item. From the Figure 6 can be seen a decrease in sell auction in services and an increased trends in buy auctions.

3.3 eAuctions´ complexity analysis

To assess the complexity of electronic auctions we have analysed the number of rounds in each auction and the number of round that were issued before the auction round and the number of rounds after the auction round. The Auction round is in our analysis considered as the only dynamic round where the participants can adjust or change their offers or bids. Usually there are several other rounds that are issued before the auction one. These rounds serve for participants' identification, control of preliminary conditions requested by the issuer, introduction of first sellers offers or first bids. After the auction round usually no or only few control rounds followed.

From both of the charts the development shows a clear trend towards more complex auction settings in all the analysed auction types. Also the average number of rounds before the first auction round suggest that the procurers suit their auctions to their needs and tend to have more complex and controllable rounds before the actual dynamic auction round.

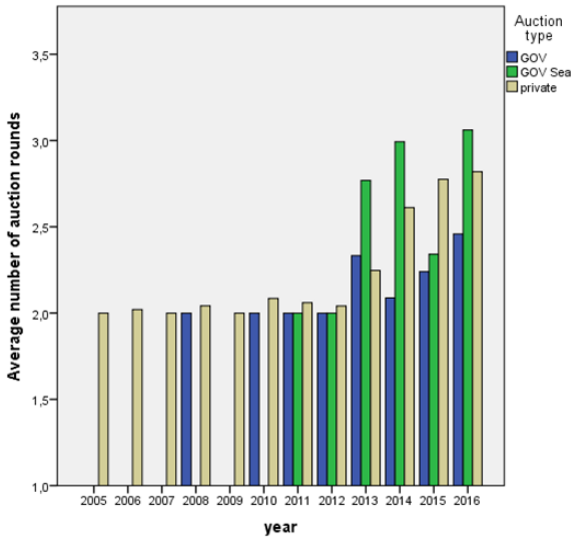

Figure 7 Number of auction rounds
Source: Authors

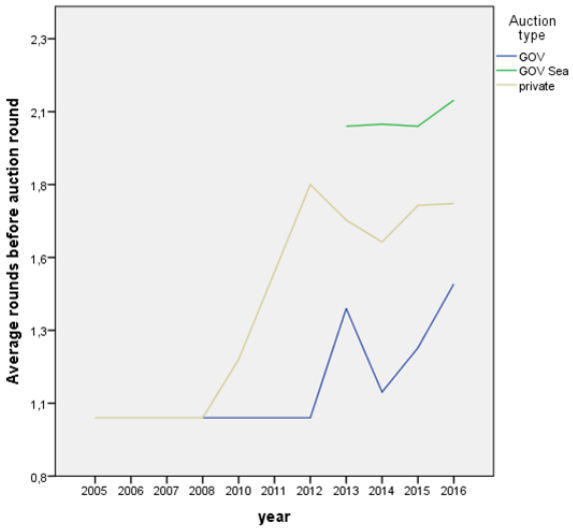

Figure 8 Number of rounds before auction rounds
Source: Authors

3.4 Saving analysis

Savings generated by the auction process depend on several factors. Some of them are easily measurable and their impact do have a strong theoretical background and empirical evidence (Chen, 2007). Many authors (Athey, Levin, & Seira, 2011; Kuśmierczyk, 2015) claim that the tighter the competition between the auction participants the greater the savings or price premium. Competition can arise only when a sufficient number of participants is present, therefore research claims that the increasing number of auction participants can positively affect the size of the achieved saving. Savings are according to authors an abstract term, a value that does not exist. The main issue with savings achieved during an auction is their calculation. In any procurement or in any auction the issuer should have an estimated value that would be acceptable for his trade. If his estimation lacks accuracy the achieved saving from the auction can be significant. In this case the savings just present the issuers ability to do an accurate price estimation. If the final winning price is compared to first offer or first bid during the auction, the savings usually record smaller value. The database in this analysis used as the comparison price as the estimated value of the auction.

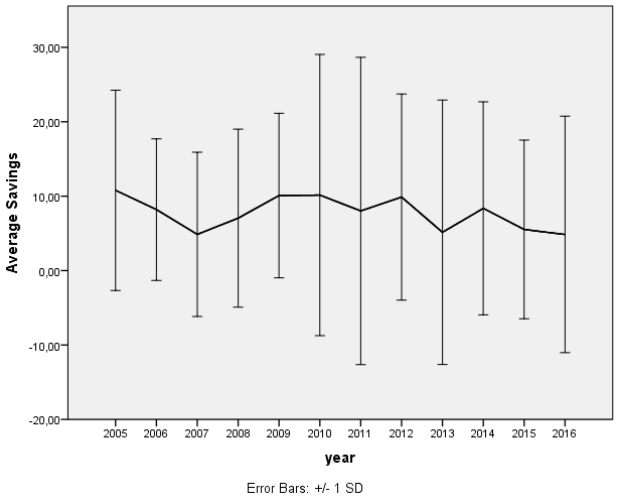

Figure 9 Average savings with SD bars
Source: Authors

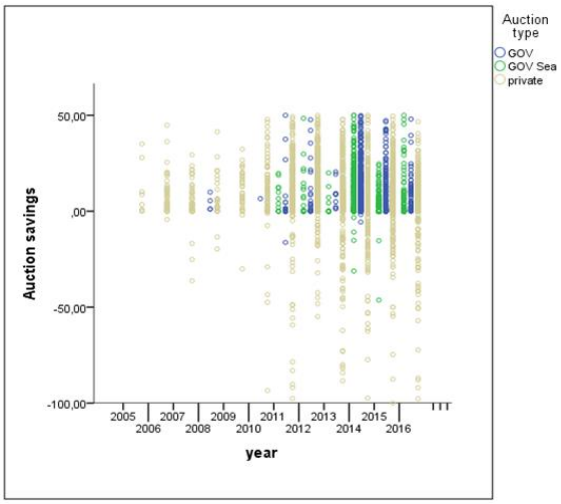

Figure 10 Savings according to auction type
Source: Authors

Therefore, the resulting calculated percentage savings are only as accurate as accurate were the auction issuer´s estimations. Figures 9 and 10 show the development of the average savings achieved in the analysed years. As can be seen on the first chart the average savings have a declining trend and also the standard deviation is slightly becoming narrower. This development is suggesting that the auction issuers are achieving lower savings than in previous years. This can be the result of several factor. On one hand it can be the result that the issuers are continuously improving their estimations of the assumed prices and the average saving is without change, on the other hand, could the auction participants became more skilled in the auction systems and have overcome their transparency issues through some fraud behaviour. The development can be also a result of an equilibrium state where the bids and offers came to a certain level where no more saving can be achieved, and the market, or at least its part, is fully or partially cleared of inefficient subjects, which moved to other less transparent trade processes.

4 Conclusion

Electronic auctions are claimed to be a tool increasing the efficiency of procurement processes so in the private as in the public sector. This article has analysed the electronic auctions carried out using an online platform that is provided by an well established eProcurement solutions provider with the Slovak and Czech market localisation.

The results showed that the electronic auctions, introduced at first as a new tool, became more frequent in their application to a wider field of procured goods. Increase in the volume of the individual auctions declares that electronic auctions are used for greater and more complex procurements. This is partially also the result of legislation changes that are requiring electronic auction in certain public procurement processes. Auction´s issuers are continuously learning how to improve their auctions and so achieve greater benefits and saving. This was confirmed also in the analysis where the results show that the auction´s issuers are tending to use more and more complex auction settings with several rounds to have a full control of the electronic auction advantages. The savings development pointed out that the eAuction environment is slowly reaching an equilibrium, where the authors assume a stagnation of the electronic auction saving generation

capacity, and will become a sort of control mechanism. This issue needs a further evaluation and deeper investigation that will be in authors interest.

Acknowledgements

The paper was published with the support of Agency under MŠ SR within the project VEGA No 1/0807/16: „The Efficiency of Digital Single Market Development determined by the changes in transparency level, information asymmetry and socio-economic characteristics of market subjects“.

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Methodology of Impact Assessment of the Implementation of the Economic and Social Development Program of the Region through the Regional Identity Index

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Abstract

The purpose of the material is to present a new approach of assessing the impacts of regional policy document (Economic and Social Development Program of the Region - ESDPR) through the composite index - the Regional Identity Index (RII). RII is included in the ESDPR as an impact indicator. The difference between output and outcome indicators and impact indicators is that in the case of impact indicators, a longer time span is observed in assessing the benefits of implemented measures. Impact indicators are legally presented as indicators relating to longer-term effects. The key impact of the ESDP is the increase of regional identity among the inhabitants of the region, which should serve as one of the key motivational prerequisites for their higher activation, involvement and participation in endogenous development processes in the region.. In order to evaluate the results of the implementation part of the Economic and Social Development Program of the Region from a certain point of time it is necessary to measure the impact indicators for which the new methodology of creation and evaluation of the composite indicator of the Regional Identity Index (RII) is presented.

Keywords: Regional identity, Regional identity index, Regional indicator, Impact assessment, Population attitudes, Regional awareness.

JEL Classification: O21**,** R58

1 Introduction

The main purpose of this document is to present a new approach to measuring the impacts of a stratigraphic document such as the Economic and Social Development Program of the Self-Governing Region. At present ESDPR is monitored and evaluated once a year. However, at the end of the period under review, this assessment does not aim to improve the conditions in the region but only to monitor the fulfillment of the monitored indicators. In the definition of ESDPR indicators, it is traditionally used to track data that is readily available, and can often only be tracked by the region. Therefore, based on long-term strategic planning and monitoring, it was necessary to create a new approach, a new methodology for assessing the impacts of the ESDPR. The basis of this new approach is the composite index of the regional identity index.

Regional identity is the special kind of phenomenon, which forms throughout historical and territorial socialization. The great ambition of this new approach is to interrelate Anssi Paasi with recent regional economic development and planning discussion and to enhance regional identity as

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a planning tool. RII is included in the ESDPR as an impact indicator. The difference between output and outcome indicators and impact indicators is that in the case of impact indicators, a longer time span is observed in assessing the benefits of implemented measures. Impact indicators are legally presented as indicators relating to longer-term effects. The key impact of the ESDP is the increase of regional identity among the inhabitants of the region, which should serve as one of the key motivational prerequisites for their higher activation, involvement and participation in endogenous development processes in the region (social cohesion, public service), including awareness co-responsibility for the quality of social processes.

2 Regional identity - definition and basic characteristics

Definition of regional identity for RII measurement purposes:

- r**egional identity is a constantly evolving social process aimed at the application of values in social life.**

The concept of identity comes from Latin and means coincident, identic, same. Identity is the attribute of what is identical, i. e. coincident (identical in uniqueness, the same) although they can be perceived or called differently.

In terms of regional identity is mostly understood the relationship to a particular territorial unit within which an entity integrates on the basis of geographic, social, economic or cultural characteristics with the existence of region borders both informal and formal. The region present an area where integration of social awareness takes place, so the social dimension rather than the physical level of the process must be emphasized. An individual can then be identified with the region, for example, on the basis of patriotism, national pride, cultural traditions or common history. Building a regional identity requires a conscious approach. As a rule it builds up from bottom to bottom but it also requires support from above. An indispensable requirement for building a regional identity is the category of confidence that can be created on the basis of repeated positive experiences.

Within the framework of targeted regional identity support it is important to deal with globalization trends that often marginalize the national, economic and racial differences of individual sovereign states. In contrast regionalization seeks to increase the powers of sovereign states (regions, municipalities...) and their dominance over the powers of international communities and institutions (Soltes & Gavurova, 2015). Despite these differences some common features can be found in globalization and regionalization. The aim of both directions is to improve the quality of life of people by enforcing certain value systems. One of the goals of globalization is to create good living conditions in all countries with an emphasis on the democratic political system and respect of human rights. The aim of regionalization should be to increase social cohesion, reduce poverty and inequality and improve the quality of life, social infrastructure and environmental oversight in a defined territory (Soltes & Gavurova, 2016). The aim of both directions is to improve the quality of life of people by enforcing certain value systems. Again this implies that it is rather a social than a material (economic) construct.

Here it must be borne in mind that the current challenges posed by globalization as the main direction of the development of today's advanced society increasingly require the need for human compatriot, understanding, partnership and solidarity. In this context, there is a pressing need to

look for a new regulatory framework, a new political vision that would allow policy makers to include care in their programs and vision as part of the value system (Gavurova et al., 2016). This system would then include not just equality and justice but also values that are closely intertwined with the concept of care, such as attention, responsibility and compassion. Incorporating these values could lead to a different kind of political action than is preferred in today's modern society, based on the principles of individualism. It must be remembered that current care which has previously taken place in the home, is increasingly moving to the outside world, from private to public, to collective and commercial services, in the case of out-of-school day care, care for the sick, old parents and relatives, etc. Especially in the healthcare world this trend is particularly marked towards a significant shift from treatment to care, with an increase in chronic illness, increased life expectancy, longer physical activity and requires new ways of thinking about quality of life (active aging). Recognizing regional identity could make it possible for individuals to become aware of the sense of belonging to the region, which is also reflected in the increased interest in participation in governance and vice versa participation in governance allows the strengthening of regional identity. That is why the role of developing a regional identity is also an irreplaceable role in supporting the development of civil society where people are encouraged to choose themselves from a wide range of activities and formulate their own needs in the process of public debate. The role of policymakers is then active (listening) respond to those needs and requirements that are relevant to institutional practice.

3 Research of regional identity

Regional identity also represents the bond of man to the place where he lives and realizes his everyday needs. It is also a value relationship to the territory, a neutral, positive or negative identification with the social community in a given territory. It provides some information about the way people live, their attitudes, opinions and values. These are reflected in the thoughts and perceptions of man and consequently have some influence on his actions. Strong regional identity can be a tool to achieve greater activation and participation of the population of the region in its development processes. Creating a positive value relationship to the territory should be reflected in the assumption of some responsibility for the place where a person lives.

To explore and measure regional identity is important to define it in terms of factors that can be expected to have an impact on its formation and reinforcement. Important is also the definition of further benefits and impacts that should be achieved through enhanced regional identity (in line with the *ESDPR* objectives). The conditionality of regional identity lies in the analysis of the relationship between social processes in the seat and the space in which the social processes take place.

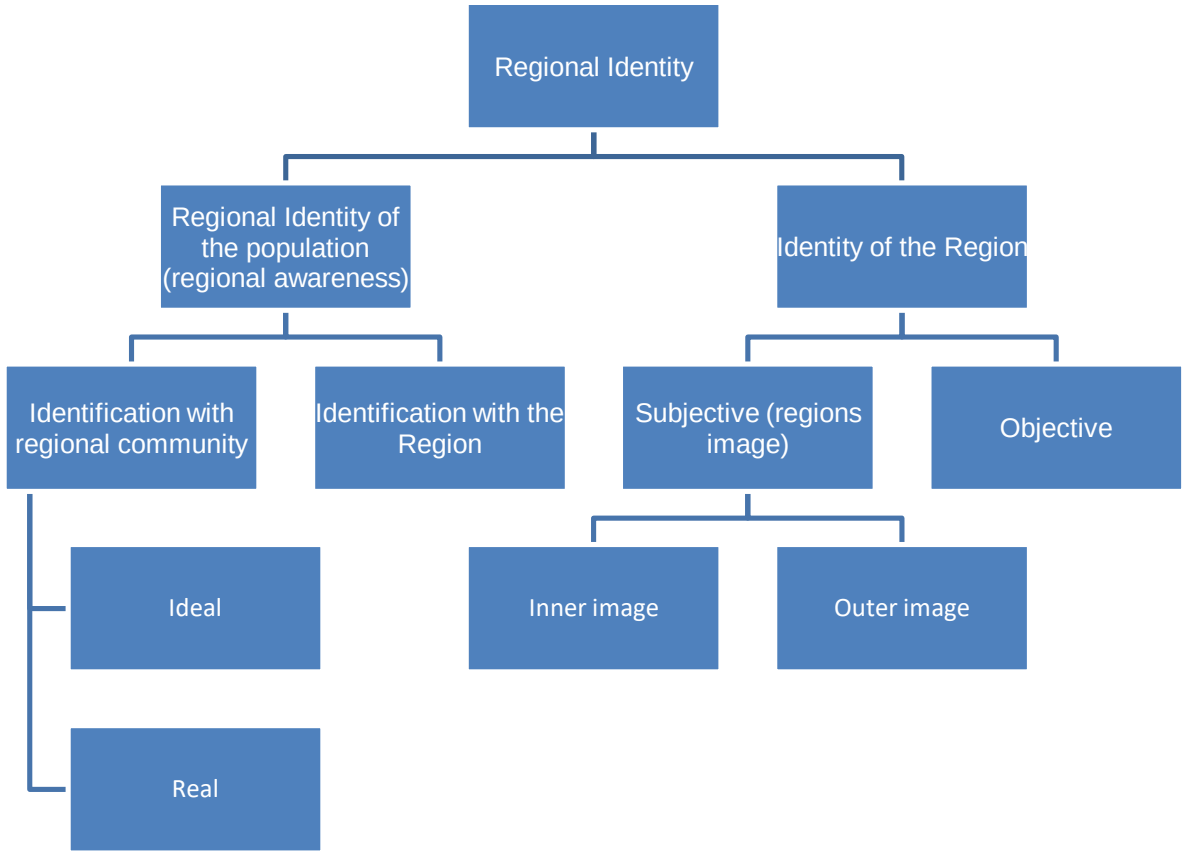

Figure 1 Regional Identity
Source: Paasi, 1986 In Bucher and Kunáková (2010)

For a clearer definition of how to proceed in the exploration of regional identity can be the inspirational concept of Paasi (1986), which perceives regional identity as an identity composed of:

- Regional identity of the individual - relationship of the inhabitants to region, its attitudes, experience, engagement rate in social networks, values such as confidence and responsibility. Identify with regions means the ability of a person to feel cooperative with community, institutions, territory, aware of the differences and uniqueness from other territories, to identify with certain social values, which can determine its subsequent activities in territory.
- Regional collective identity - (regional awareness) - as a summary of attributes of similarity and identity between the inhabitants of the region, sharing common characters and symbols, common cultural reference, goals, ambitions. It is some collective memory and social interactions in territory.
- The identity of the region - as the image of the region, as a certain concept of subjective and objective ideas about given to the region by its inhabitants as well as its image externally.

4 Measuring regional identity

The measurement and research of regional identity can be accessed through multiple approaches but most authors agree that it cannot be evaluated solely on the basis of secondary and quantitative data and the implementation of a certain type of empirical survey is also recommended (Paasi, 1986; Repaská et al, 2015; Bucher & Kunáková, 2010; Chromy & Semian-Kučera, 2014). It is

especially from the fact that it is primarily about the definition of regional identity relationship and value categories. The empirically obtained data should be supplemented by related objectively factual data from economic, social and environmental field. Therefore it is possible to lean towards the combination of quantitative a qualitative surveys.

Simplified it can be said that regional identity also expresses some indispensability, consistency, harmony in behavior of the inhabitants in the territory in question at the same time. A key part of shaping its form is then initiative of individuals, their attitudes, opinions and values, their migration trends, the socio-demographic characteristics of the population, the image of the region, its history, the settlement of the region, its location, the quality of the institutions and public infrastructure (educational, technical, social, information and communication). Summary of these diverse categories and factors can form the core of measurement and assessing the state of regional identity. These indicators represent the basic database which can be used to create a composite indicator.

Based on the above, the impact assessment of the implementation of specific ESDPR objectives in strengthening regional identity will be carried out through:
- quantitative indicators accumulated in of one part of RII,
- results of a qualitative survey cumulated in the second part of RII.

The results of both parts then determine the value of the composite indicator RII for the relevant period.

5 Limits of regional identity measurement

The methodological and interpretation problems and risks in examining regional identity can be ranked:
- identifying factors that enhance regional identity and it is possible to foresee a clear causal link. The *ESDPR* should be conceived on the assumption that the planned activities will take place strengthening regional identity. It is problematic to identify and establish a clear causal link between the measures taken and real benefits for promoting regional identity.
- identifying the benefits that are the result of a stronger regional identity (eg participation rate, social capital level, reduced migration rate, etc.). These impacts can be perceived rather as secondary effects, as it is through a stronger identification with the region that the population should be more actively involved in its development. The measures proposed in the ESDPR are to create the necessary prerequisites and conditions for doing so.
- searching for similarities and finding differences in the region's identity - capturing in and out, managing the image of the region, etc.,
- the fact that regional identity is a complex phenomenon that is affected by many factors and which is changing over time,
- there are other subregions (cultural-historical, natural, etc.) in the territory, it is important to deal with this fact,
- with regard to the conditions and process of creation of the regional level of self-government in the Slovak Republic, current globalization tendencies, it is possible to assume a low level of regional identity (now a basic value), which is also necessary to interpret the results in a wider context.

6 Regional identity index

6.1 Indicators for calculation RII - quantitative detection

Quantitative indicators for the calculation of RII have been established within the three main areas of Economic and Social Development Program of the Region. Within these three areas the following strategic and specific objectives are set out to which indicators for their quantitative measurement were subsequently proposed (Table 1 List of indicators at regional level):

A. Economic area (weight 25 %)
B. Social area (weight 50 %)
C. Environmental area (weight 25 %)

Table 1 List of indicators at regional level

Indicators	Unit of measure	source
ECONOMIC AREA		
employment rate aged 20-64	%	Statistical Office of the Slovak Republic- Selection of Labor Force Survey
rate of registered unemployment	%	Head of Labor, Social Affairs and Family of the Slovak Republic
share of job seekers over 24 months	%	Head of Labor, Social Affairs and Family of the Slovak Republic
number of newly created jobs in the information and communication sectors	number	Statistical Office of the Slovak Republic
number of newly created jobs in professional, scientific and technical sectors technical activities	number	Statistical Office of the Slovak Republic
number of newly created jobs in the Information and Communication and creative and arts activities	number	Statistical Office of the Slovak Republic
number of newly created jobs in the transport and storage sectors	number	Statistical Office of the Slovak Republic
number of newly created jobs in the accommodation and catering sector and travel agency activities	number	Statistical Office of the Slovak Republic
number of newly created jobs in local distribution and processing networks	number	Statistical Office of the Slovak Republic
number of members (workers) of newly created cooperatives	number	KSR
SOCIAL AREA		
average gross monthly nominal wage of employee	EUR	Statistical Office of the Slovak Republic
rate of poverty risk - 60% median	%	Statistical Office of the Slovak Republic
average disposable household income	EUR / month	Statistical Office of the Slovak Republic
number of companies involved in Corporate social responsibility	number	KSR
number of newly created interest groups	number	KSR
share of social service recipients in the region per 1000 inhabitants of the region	%	Ministry of Labor, Social Affairs and Family of the Slovak Republic
mean life expectancy at birth in men (average over the last 3 years)	years	Statistical Office of the Slovak Republic
mean life expectancy at birth in women (average over the last 3 years)	years	Statistical Office of the Slovak Republic

infant mortality	‰	Statistical Office of the Slovak Republic
Educational Index of EAO Workers	index	Statistical Office of the Slovak Republic-Selection of Labor Force Survey
gross migration balance	‰	Statistical Office of the Slovak Republic
The proportion of households living in rent, lease	%	Statistical Office of the Slovak Republic
number of people involved in volunteering	number	KSR
number of visitors to museums, galleries, theaters and libraries	number	Statistical Office of the Slovak Republic
total net cost per 1 visitor (museums, galleries, theaters, libraries)	EUR	National Educational Center
ENVIRONMENTAL AREA		
share of population supplied with water from public water mains	‰	Statistical Office of the Slovak Republic
share of population connected to the public sewerage network	%	Statistical Office of the Slovak Republic
number of places in social facilities per 1000 inhabitants	number	Statistical Office of the Slovak Republic
number of beds in healthcare facilities per 1000 inhabitants	number	National Health Information Center
share of roads I. and II. classes in very good, good and satisfactory condition	%	Slovak Road Administration
density of highways and expressways (including drawers)	km / thous. km^2	Statistical Office of the Slovak Republic
number of sewage treatment plants	number	Statistical Office of the Slovak Republic
volume of treated waste water	thous. m^3	Statistical Office of the Slovak Republic
PM_{10} emission volume	$\mu g.m^{-3}$	Slovak Hydrometeorological Institute
volume of solid emissions	t / km^2	Statistical Office of the Slovak Republic
volume of Sulfur dioxide emissions	t / km^2	Statistical Office of the Slovak Republic
volume of nitrogen oxide emissions	t / km^2	Statistical Office of the Slovak Republic
volume of emissions carbon monoxide	t / km^2	Statistical Office of the Slovak Republic
share of electricity produced from renewable sources from gross electricity consumption (SR data)	%	EUROSTAT
percent of the assessed municipal waste material	%	Statistical Office of the Slovak Republic
percentage of municipal waste collected by composting	%	Statistical Office of the Slovak Republic
the amount of municipal waste recovered	kg / capita.	Statistical Office of the Slovak Republic
separated municipal waste components	t	Statistical Office of the Slovak Republic
share of protected areas	%	State Nature Conservation of the Slovak Republic

number of nights spent in accommodation facilities	number	Statistical Office of the Slovak Republic

Source: Košice Self-Governing Region (2016)

6.2 Indicators for calculation RII - qualitative evaluation

The aim of the questionnaire survey is to get an image of the level of regional identity of the population with an emphasis on their relationship to the region including the related aspects. The sample of respondents should be secured through a random selection with a sample representativeness assessment with an emphasis on territorial distribution, since the identity to the region also takes into account subregions. An acceptable status for the number of completed questionnaires is the provision of min. about 5% of the total population in the region. The questionnaire should be repeated every year to obtain a sufficiently relevant data volume for a comprehensive impact assessment of the implementation of the ESDPR.

From the content point of view the questions in the questionnaire should be designed to provide the survey with information for identification and assessment:
- Population attitudes towards the region, the level of their relationship and their identification with the region,
- Awareness of the region's identity as a set of unique characteristics.

The results of the questionnaire survey form should be complementary part of the measurement and evaluation of regional identity along with the quantitative part of the RII. As mentioned in the introduction it is an indicator of the impact that assess the benefits and impacts of implemented activities and measures in the longer term.

In the first year the survey will create database for the basic year (i.e. zero) which in the coming years enable to implement the comparison of data over time. As there is no available data relevant for establishing the facts from the past, will be piloting the questionnaire survey and from him the results and assist in the planning of the next evaluation process. Wider use can be seen also in the planning of more effective measures in regional policy for the future.

Evaluation questionnaire should be implemented mainly through the tools of descriptive and inductive statistics with using available statistical software. Planned should be also correlation analysis and detection of causal relationship. The choice of particular methods will depend on the size and nature of the sample as well as the fulfillment of other relevant circumstances.

7 Conclusion

Regional identity is a broad concept that can be misunderstood. In the first step it was necessary to define what is understood under RII as a regional identity. In the first step it was necessary to define what is understood under RII as a regional identity. Regional identity is perceived as a social process in a certain community living in a certain space, and this social process, in terms of its sustainability, is indispensable to focus on the service of the public. It means the application of social values, based on the strategic and specific objectives of the ESDPR to the practical life of the community. Therefore rather than a value relationship to territory is RII preferred to understand regional identity as a value relationship to a society living on a given territory. In measuring regional identity it is necessary to took in account all the relationship and value categories possible

to measure empirically. Such empirically acquired data will need to be supplemented by related objective factual data. For this reason the RII composite indicator will be measured by quantitative and qualitative detection. These two RII parts cannot be meaningfully combined into one composite indicator. RII indicator will have its own point value for both the quantitative and qualitative parts. The aim of this work has been to present a new approach of assessing the impacts of regional policy document. The region is an entity that cannot be experienced directly, but is represented in the everyday lives of individuals by symbolic means through political, economic, legal and other institutions and the power relations associated with them.

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Monetary Transmission Effectiveness in the Slovak Republic

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Abstract

The last years reviewed whether the single European monetary policy is able to achieve its main objective and thus create a stable economic environment for overall macroeconomic developments in the euro area and for its individual members. The first results for estimating the crisis impact pointed out that the traditional interest rate channel was the most affected and the transmission slowed down and weakened. Based on these findings and the persistent problems in the EMU, the main objective of this paper is to assess the impact of the monetary policy conducted via interest rates and the impact of the crisis on the development of selected variables in the case of Slovakia. In order to analyse the transmission of monetary policy interest rates to the economy, the VAR method using the recursive Cholesky decomposition is applied. This method is very often used in empirical studies to measure the effectiveness of monetary policy. Based on the results, it can be stated that the impact of monetary policy interest rates was not significant for Slovakia. By observing the crisis impacts, examining reactions and variance decomposition in two different periods, we obtained results that clearly pointed to the mitigation of the monetary shocks impact on the development of the observed variables.

Keywords: Monetary policy, Interest rate, VAR model, Financial crisis, Slovak Republic.

JEL Classification: C32, E43, E52

1 Introduction

The objective of the European monetary policy is to maintain price stability in all member states of the euro area through the single monetary policy. The last years reviewed whether the single European monetary policy is able to achieve its main objective and thus create a stable economic environment for overall macroeconomic developments in the euro area and for its individual members. To analyse the ability of common monetary policy to influence the development of macroeconomic indicators, it is necessary to study monetary policy transmission mechanism. When central banks regulate official interest rates, the transmission process assures transferring these effects to real economic variables and ultimately, to the development of the price level.

In our analysis, we will be focused on interest rates transmission channel and its impact on the product, inflation, and nominal effective exchange rate - NEER. In this paper we will analyse, whether the shock in interest rates (monetary shock) will have a desirable impact on selected macroeconomic indicators. We will estimate models based on the fundamental assumptions of the transmission mechanism of monetary policy. The recent crisis significantly affected the evolution

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of the euro area, therefore we divided our analysis into two periods – the first one covers the period from the first month of 2000 to the last month of 2007. The second period covers also the years of the economic crisis (2000M1-2016M6). We will also be able to follow the shock impact on the observed indicators. This paper is divided into five sections. Following the introduction, the relevant empirical literature is reviewed in Section 2. In Section 3we provide an overview of VAR model that we use to calculate the impulse-response functions and variance decomposition. In Section 4 we discuss main results. Finally, concluding remarks are made in Section 5.

2 Literature Overview

The mechanism through which monetary policy influences economy is sometimes called "black box" (Bernanke & Gertler, 1995). The monetary authorities adjust short-term interest rates that further affect capital costs, fixed investments, real estates and equipment and finally the aggregate demand. The economic theory assumes that in general, the monetary restriction will be followed by the decrease of product and price level, succeeded by the exchange rate appreciation. However, some studies show possible inverse reaction of prices or exchange rates. Unusual behaviour of exchange rate could be caused by the changes of exchange rate arrangements or exchange rate crisis and is referred to as "exchange rate puzzle" (Arnoštová & Hurník, 2005). This atypical reaction appears often also in case of price level ("price puzzle") and was firstly explained by Sims and Eichenbaum, Castelnuovo, Surico (2006). The theory justifies the existence of this problem by misidentification of monetary shocks or insufficient adjustment of interest rates (Balke & Emery, 1994). Rusnák et al. (2013) state that the problem of price puzzle is result of incorrect model specification.

The analyses of monetary transmission mechanism are often based on vector autoregression models. The standard VAR approach assumes that the dynamics of the economy could be explained by the various macroeconomic variables. Even though some authors criticise this method by pointing out its simplification of economic reality, these models are still one of the most widely used in modelling of monetary transmission processes. The impact of monetary restrictions via interest rate shocks was tested for example by Bernanke and Gertler (1995), Ramlogan (2007), Jiménez-Rodríguez, Wieladek, Pascual (2016).

The monetary transmission in CEE countries was analysed in various studies with the focus on the transformation process and the capability of monetary policy to influence the economic development (Brissimis & Skotida 2008; Égert, Crespo-Cuaresma, & Reininger 2007; Arnoštová & Hurník, 2005). The study of Sander, Kleimeier (2004) that analysed 8 CEE countries showed that over the period 1993-2003 the monetary transmission mechanism was accelerated in comparison to euro area countries. However, in general the monetary policy effects tend to be lagged. For example Havránek and Rusnák (2013) state that the average lag length is 29 months.

The recent financial crisis and the events that followed, such as debt crisis, accentuate many problematic EMU issues, especially its asymmetric development. The strong interdependence of countries means that the problems cannot be viewed separately. The issues of symmetries in economic development and the efficiency of own monetary policy are questioned by Siničáková et al. (2014). The impact of financial crisis on monetary shocks (interest rates and exchange rates) on real economic variables (GDP and price level) was analysed with the use of VAR approach for the cases of Czech Republic Borys et al. (2009), Franta et al. (2013) and Poland Lyziak et al. (2011),

Demchuk et al. (2012). Babecká-Kucharčuková et al. (2013) also stress the weakened and slowed monetary transmission in Czech Republic by the global financial crisis.

3 Econometric model

In order to analyse the transmission of the interest rate shocks, we will use the Vector Autoregression approach. Model was identified through the restriction resulting from the recursive Cholesky decomposition of the residuals. The recursive identification scheme reflects the causal relations of endogenous variables. Unrestricted VAR model can be written in the form of the moving average vector of the random components in the following form:

$$KY_t = AY_{t-1} + BX_t + \varepsilon_t \quad (1)$$

where $Y_t = [y_t, p_t, i_t, e_t]$ (2)

is n x 1 vector of six endogenous variables, $y_{r,t}$– industrial production, p_t – domestic price index (CPI), i_t – interbank interest rate e_t- nominal effective exchange rate. A corresponds to n x n polynomial with coefficients representing relationships among endogenous variables on lagged values, K matrix contains all coefficients describing simultaneous relations between variables and B is a matrix describingthe relationship among endogenous and exogenous variables. ε_t is a n x 1 vector of serially uncorrelated errors of the model.

Vector of exogenous variables:

$$X_t = [p_{com}, y_t^F] \quad (3)$$

consists of the following two elements: world commodity price index -p_{com} and industrial production of the EMU $y_t^{F.}$ These variables are included due to the strong economic links between the EMU and the Slovak republic and the impact of commodity prices on the domestic economy. As we consider them exogenous, we assume implicitly that there is no feedback from the Slovak republic to the countries of the EMU. The vector of exogenous variables should also help to solve the price puzzle problem. Involvement of additional variables reflecting the real economy may be beneficial.

Within the used four-component model we assume four exogenous shocks – demand shock $(\varepsilon_{y,t,})$, internal price shock $(\varepsilon_{p,t})$, monetary policy shock $(\varepsilon_{i,t})$and exchange rate shock $(\varepsilon_{e,t})$. By multiplying equation (1) by an inverse matrix C^{-1} we obtained the reduced form of the VAR model (this adjustment is necessary because the model represented by the equation (1) is not directly observable and structural shocks cannot by correctly identified). Thus the VAR model described by the equation (1) can be rewritten to following representation:

$$Y_t = K^{(-1)}AY_{t-1} + K^{(-1)}BX_t + K^{(-1)}\varepsilon_t = DY_{t-1} + e_t \quad (4)$$

where D is a matrix describing the relationship among endogenous variables on lagged values and e_t is a n x 1 vector of serially uncorrelated errors of the model.

Relationship between reduced-form VAR residuals (e_t) and structural shocks (ε_t) can be expressed as follows:

$$K^{-1}C\varepsilon_t = e_t \; alebo \; C\varepsilon_t = Ke_t \quad (5)$$

Based on the Cholesky decomposition of the reduced-form VAR residual matrix the equation (5) can be rewritten as follows:

$$\begin{bmatrix}1 & 0 & 0 & 0\\ 0 & 1 & 0 & 0\\ 0 & 0 & 1 & 0\\ 0 & 0 & 0 & 1\end{bmatrix}\begin{bmatrix}\varepsilon_{y,t}\\ \varepsilon_{p,t}\\ \varepsilon_{i,t}\\ \varepsilon_{e,t}\end{bmatrix}=\begin{bmatrix}1 & 0 & 0 & 0\\ k_{21} & 1 & 0 & 0\\ k_{31} & k_{32} & 1 & 0\\ k_{41} & k_{42} & k_{43} & 1\end{bmatrix}\begin{bmatrix}\varepsilon_{y,t}\\ \varepsilon_{p,t}\\ \varepsilon_{i,t}\\ \varepsilon_{e,t}\end{bmatrix} \quad (6)$$

The relation (6) define matrix *K* as a lower triangular (all elements above the diagonal are zero) and *C* is a unit matrix(i.e., all coefficients of the *C* matrix outside the main diagonal are equal to zero).

Employed VAR model allows to estimate impulse response functions (IRF) of endogenous variables (focusing on interpreting results of product, domestic price indices and the exchange rate) to analysed impact of the monetary policy shock. Ordering of variables reflects implicit assumptions about what is observed at the time of decision-making by the monetary policy authorities, and on the response of individual variables to the monetary policy actions. During decision making the monetary authorities will take into account the current state of the product and inflation. At the same time, the monetary policy actions already assume that their effect on the product and prices is not immediate. Interest rates will respond immediately to demand shocks and price shocks, a situation that can be interpreted as a reactionary role of monetary authorities to shocks in the real economy. As the exchange rate is placed after the interest rate, it is assumed that its reaction is immediate. However, the interest rate does not react immediately to changes in the nominal exchange rate. Ordering of variables (2) is crucial not only for a correct identification of structural shocks but also to reveal a convenient transmission mechanism of the monetary policy shock into the domestic economy. Correct identification of exogenous structural shocks reflecting Cholesky ordering of variables denotes following assumptions:

- product do not contemporaneously respond to the shock from any other endogenous variable of the model;
- domestic price index doesnot contemporaneously respond to monetary policy and exchange rate shocks, while it is contemporaneously affected only by the demand shock;
- interest rate does not contemporaneously respond to the exchange rate shock;
- exchange rate is contemporaneously affected by the shocks from all of the endogenous variables of the model.

After initial period, endogenous variables may interact freely, without any restrictions. Alternatives of the endogenous variables ordering are based on the channels of the monetary policy pass-through after an unexpected interest rate increase. To capture the effects in the demand, we have included a real product, which is expressed through the industrial production index available in monthly data, as opposed to the real output data reported quarterly. Even though quarterly data can be interpolated, we have chosen this approach, like many other authors, such as Creel Levasseur (2005), Kapuscinski (2013). For the price variable we will choose domestic price indices (consumer price index). In order to assess the impact of monetary policy on the real economy, the money market interest rate will be applied similarly as in the works of Arnoštová and Hurník (2005), Borys and Horváth (2008), Kapuscinski (2013), Babecká-Kucharčuková et al. (2013). In these studies, close links between the main monetary policy rate and the money market rates have been pointed out. As the monetary policy rate do not change continuously, the three-month money market rate is being chosen. The variable exchange rate is represented by a nominal effective exchange rate (NEER). Creel Levasseur (2005), Babecká-Kucharčuková et al. (2013) state that

NEER is appropriate for assessing the possible costs of joining the EMU as there are strong trade links.

Before starting the analysis, it was necessary to test selected time series for stationarity as well as to verify the existence of long-run equilibrium. It was also important to test the model for residual autocorrelation, heteroscedasticity and normality. As most of the endogenous variables were not stationary on the values (and had the unit root), it was necessary to test these series for cointegration. The existence of the cointegration between variables was verified by Johansen cointegration test. The results of the cointegration tests by both Trace and Maximum Eigenvalue statistics indicated in almost all cases no cointegration among the endogenous variables of the model. In order to verify the stability of the model we used the AR roots test. The graphs indicated that none of the points exceeds the circle, thus the estimated VAR models were considered stable. To save space the results of tests are not presentedin this paper, however, they are available upon request.

To solve the price puzzle problem, we took 6 lags (6 months) into account when estimating the model, similar to Arnoštová and Hurník (2005), Babecká-Kucharčuková et al. (2013) or Kapuczinski (2013). The lag of 6months was also found to be the most appropriate based on the testing of the information criteria.

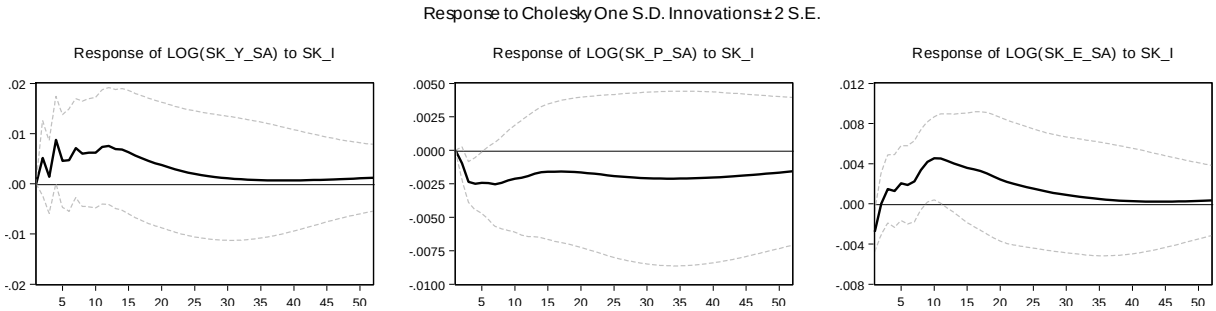
To investigate interest rate pass-through we employed monthly data for period 2000M1-2007M12 (model A) consisting of 96 observations and for period 2000M1-2016M6 (model B) consisting of 198 observations for the following endogenous variables - industrial production, inflation, interbank interest rate, nominal exchange rate and commodity prices. The data for all variables were obtained from the International Financial Statistics (IMF) and Eurostat. All variables, excluding interest rates, are in the form of indices (average 2010 = 100), seasonally adjusted and in the form of logarithms. Employing time series for two different periods (pre-crisis period - model A (2000M1-2007M12) and extended period - model B (2000M1-2016M6)) allows to examine effects of the crisis period on monetary policy pass-through. A comparison of a longer period with a shorter (pre-crisis) period will allow to assess the similarity, respectively the diversity of the interrelationships between the variables.

4 Results of the model for two periods

The effects of monetary shocks (growth of interest rates) on endogenous variables can be observed through IRF functions (impulse-response function).The presented graphs will represent the reaction (percentage changes) of output (Y), price level (P) and nominal effective exchange rate (NEER) to a positivemonetarypolicyshock.All shocks are standardized to 1 % shocks and horizontal axes indicate the months. Responses of variables will be observed during the first 52 months following the shock. In the case of the CEE countries, a maximum response should occur within 18 months of the shock (Havránek & Rusnák, 2013).

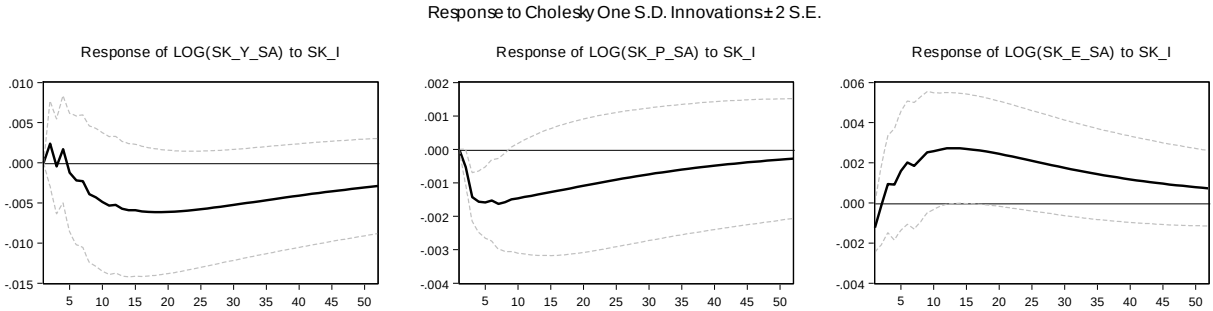
In case of an unexpected monetary-policy tightening (monetary shock in the form of a sudden increase in interest rates), a decline in the product is expected (possibly with a time delay). Figure 1 presents product responses during 2000M1-2007M12 to the monetary shock in Slovakia. Despite the sudden rise in interest rates, the observed response for Slovakia was positive. During this period, the behaviour could be explained by the fact that the growth of Slovak production was

largely determined by factors such as high trade openness and links to other countries, or a large inflow of foreign investment that largely determined Slovak industrial production. Figure 2 enables to compare product responses for an extended period of 2000M1 to 2016M6 and draw conclusions as for the possible impact of the crisis. For a longer period of time, the reaction of the product is negative and a time delay (5 months) can be observed.



Note: Response LOG(Y_SA), LOG(P_SA) a LOG(E_SA) toI.Increase in NEER values over time corresponds to a currency appreciation

Figure 1 IRF SR 2000-2007
Source: Own calculations



Note: Response LOG(Y_SA), LOG(P_SA) a LOG(E_SA) toI.Increase in NEER values over time corresponds to a currency appreciation.

Figure 2 IRF SR 2000-2016
Source: Own calculations

The response of prices to the sudden rise in interest rates should lead to a fall in the price level. Nevertheless, it has already been mentioned that in the case of VARs, the inverse responses (i.e. the rise in the price level in response to the rise in interest rates), referred to as the "price puzzles" are not impossible. Earlier empirical studies have also confirmed it, often in the case of CEE countries. The explanations are various, e.g. the insufficient responses of interest rate to expectations of future inflation. In the case of Slovakia, it can be clearly stated that the price level responded by its decline. In the longer period, the price level response did not change significantly compared to the pre-crisis period.

The exchange rate was the last tested variable of the model. The theory assumes that an increase in the interest rate should be accompanied by an inflow of foreign capital, which will result in an appreciation of the country's exchange rate. The NEER response, as expected, led to the appreciation of the exchange rate and there was no atypical behaviour referred to as the“exchange

rate puzzle". The results could be explainedby the relative stability of the currency both before and after the adoption of the euro.

Based on the estimated model, it is possible to continue the analysis by the variance decomposition for endogenous variables. This allows monitoring the contributions of the changing interbank interest rate to product, price level and nominal effective exchange ratevariability. These figures represent the percentage of the impact of the change in the interbank interest rate on variability of variables. The following table (Table 1) presents the results of the variance decomposition for two monitored periods - 2000M1-2007M12 (marked 2007) and 2000M1-2016M6 (marked 2016).

Table 1 Variance decomposition

	2007	2016	2007	2016	2007	2016
SK	**Y**	**Y**	**P**	**P**	**E**	**E**
1	0,000	0,000	0,000	0,000	8,225	2,040
6	7,506	0,413	15,431	11,224	6,631	2,210
12	12,165	2,214	12,868	10,727	19,416	6,723
18	13,835	4,637	10,021	9,623	20,016	10,285
52	12,702	10,215	15,847	6,950	17,179	14,047
CholeskyOrdering: LOG(SK_Y_SA) LOG(SK_P_SA) SK_I LOG(SK_E_SA)						

Note: Product = y_sa, pricelevel = p_sa, NEER= e_sa
Source: Own calculations

The strongest impact of interest rate shocks on the product in the pre-crisis period is recorded after 18 months. The change in interest rates explained about 14 % of the change in the product. In the wider period, we see the weakening (10 %) and the delay in impact due to the crisis and post-crisis events. In the case of the price level, the responses to the interest rate shock are slightly more pronounced, compared to the product in the pre-crisis period. Price variability can be explained by changes in interest rates to 15 % with a 52-month delay. Price development, as mentioned above, was strongly influenced by reforms such as changes in taxes, regulated prices and other administrative measures over the period 2000-2007. High openness intensified the sensitivity of price changes in imported commodities. All these factors have reduced the ability of monetary policy to influence price development. As for the extended period, the transfer from interest rates to other variables was significantly disturbed. This unfavourable development could be linked to an increased risk premium that could have led to changes in the functioning of the interest rate channel. The impact of interest rates on NEER variability appears to be more significant (20 %), compared to other variables in the pre-crisis period. Longer period covering also the crisis and post-crisis events shows a significant decline and a greater delay in the interest rate impact.

Based on these results, it can be concluded that the impact of monetary policy interest rates was not significant for Slovakia. Observing the impact of the crisis through the investigation of reactions and decomposition in two different periods brought results that clearly pointed out the weakening of the monetary shock influence on the development of monitored variables. The weakening of the impact of monetary policy interest rates can be also attributed to the expansion of monetary instruments by the European Central Bank (quantitative easing). At the same time, this development could be also related to an increased risk premium that could have led to changes in the functioning of the interest rate channel.

Many empirical studies focused on the CEE countries analyse the impact of own monetary policy within country. Franta et al. (2013), also note that due to the crisis, the transfer of impact of this type of shocks into the real economy is weakened. In the Czech Republic, however, the weakening of the monetary shock impact is not observed for price level. In this case, we cannot confirm the same findings, as our results indicate a significant weakening of the monetary shock impact in case of price level over an extended period. However, the difference between the results could have been caused also by the different lengths of the analysed periods(Franta et al. (2013) study - the post-crisis period until 2010, our analysis – the post-crisis until 2016). Arnoštová and Hurník (2005) in their study for Czech Republic observed different price responses to the monetary shock for two different periods. The first period covered the years 1994-2004 that included the change of exchange rate regime. In this case, the prices responded to sudden rise in interest rates by rising. However, the price level response to a sudden interest rate shock changed to a decrease for the period of 1998-2004 when the inflation targeting regime was applied in the Czech Republic. The similar results appear in the case of analysis of Babecká-Kucharčuková et al. (2013) – Czech price level showed an unexpected reaction for the period 1995-2010 but after modifications of the model and including the 6-month delay, this reaction was already in line with the theoretical assumptions. Similarly, this study states that the transmission of monetary policy to the real economy was not significantly affected in the observed period (until 2010). Kapuscinski et al. (2013) analysed Poland for the period 1998-2013 and state that production responded to the monetary shock by dropping but in case of prices, the issue of price puzzle appeared again. They argue that in the case of VAR models, prices tend to fall with considerable delay due to the way of estimating VAR models and not as a consequence of the actual phenomenon. The authors do not note any evidence of an exchange rate response to monetary shocks, although a temporary appreciation could be expected. According to them, this is related to the perceived increase in future risk and the expected deterioration of the economic situation. The issue of price and exchange rate puzzles was recorded also by Creel, Levasseur (2005) in their analyses of these three countries (Czech Republic, Poland and Hungary, period 1993-2004). During the observed period, there was also a very weak reaction of the product to the monetary shock. Our findings for Slovakia (period 2000-2016) show that the initial reaction after the outbreak of shock did not confirm the price puzzle issue.

5 Conclusion

The recent financial crisis and the events that followed prompted discussions on transmission mechanisms, their channels and time delays in monetary policy. Studies focused on the euro area single monetary policy indicate that the impact of monetary policy depends on a number of external factors (economic structure, competitiveness, presence of various shocks, etc.). Therefore, it is still discussed whether the common monetary policy contributed to a worsening of the cyclical disparities of the EMU countries compared to the situation if the shocks were faced by countries with their own monetary policies. Due to the high interdependence of the member economies, one country's problems cannot be seen in isolation, as other countries are also affected by possible negative impacts. The efficiency of country's own monetary policy as a tool for managing the macroeconomic development, or for a mitigating the negative impact of the crisis is therefore questionable. The study results for some CEE countries showed that in the pre-crisis era the transmission process of the monetary policy was faster than in the EMU countries and that there was a high potential for the convergence of monetary policy transmission due to increasing market concentration, and the recovery of the banking system and the participation of foreign banks. Others pointed out that during the transformation period of these countries; the transmission to the

final monetary policy target (inflation target) via exchange rate channel was stronger and more stable compared to the interest rate channel. The first results for estimating the crisis impact pointed out that the traditional interest rate channel was the most affected and the transmission sloweddown and weakened. Based on these findings and the persistent problems in the EMU, the main objective was to assess the impact of the monetary policy conducted via interest rates and the impact of the crisis on the development of selected variables in the case of Slovakia. In order to analyse the transmission of monetary policy interest rates to the real economy, the VAR method using the recursive Cholesky decomposition was applied. This method is very often used in empirical studies to measure the effectiveness of monetary policy. Based on the results, it can be stated that the impact of monetary policy interest rates was not significant for Slovakia. By observing the crisis impacts, examining reactions and variance decomposition in two different periods, we obtained results that clearly pointed to the mitigation of the impact of monetary shocks on the development of the observed variables.

Acknowledgements

This paper was written in connection with scientific project VEGA No.1/0994/15.

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Why is there no initial public offerings in Serbian capital marketsTS?!

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Abstract

The goal of this chapter is to analyze the main reasons for absence of initial public offerings (IPO) in Serbian capital market. More than 20 years after beginning of transition processes still there is no real IPO. Serbian economy faces huge structural problems. Finding solutions for most of them is closely connected with the lack of financial sources. On the other hand we have very bank-centric financial system with expensive and limited supply of loans and other financial resources. In such a situation the right question is why there are still no real IPOs?! In an attempt to search for answers, we have conducted a survey among a number of local business people. The views and opinions reflect the current picture of the situation and indicate the areas of mistrust, ignorance and even resistance to these processes.

Keywords: Initial public offering, Serbian capital market, Belgrade Stock Exchange, Corporate Governance, Equity.

JEL Classification:

1 Introduction

More than twenty years have passed since the beginning of the transition processes in Serbia. Unfortunately, they have not yet been fully finished or completed. Modest economic indicators suggest that attempts to develop a market economy have not given the desired outcomes. The fact is that in economic terms, Serbia is at the very bottom in the list of the European countries, more and more lagging behind not only the most developed, but also less developed neighboring countries (Eric, Redžepagić, & Vukotic-Cotič, 2010). Within the scope of this paper neither we will deal with many challenges of transition, nor the analysis of economic effects of the still incomplete privatization, unclear and vague economic policies and a number of other open issues and significant failures in the Serbian economy. We will try as much as possible, though with certain difficulty, not to treat the issue of the current crisis, which is often used as an excuse and justification for not doing enough. At this point, we will try to analyze why, almost twenty years after the beginning of the development of the capital market in Serbia, there is no true initial public offering (IPO).

The capital market is certainly one of the pillars of the market economy and the most important market for production factors (Eric, 2003, 2010, 2012). As such, it has a particularly important role in the overall economic and financial system. Its main function consists in linking sectors and entities with surplus and deficit of financial resources, which should allow better mobilization of

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capital, efficient allocation, higher levels of investment and faster economic growth. Developed capital market cannot be imagined without the IPO processes. They lead to the emergence of new companies, issuers and the creation of "new blood" in the market.

Unfortunately, since the restoration of the Belgrade Stock Exchange in 1989 (under this name since 1992) there has not been any single IPO. All shares that have been listed and traded (over 1,000) were made in one of the following two ways:

- Either from the process of privatization – which was the case most often
- Or from the process of recapitalization, i.e. additional, seasonal issues of shares of companies whose securities were initially listed on the Belgrade Stock Exchange through the process of privatization.

Until the end of March 2013 not a single limited liability company (Ltd) announced a public offering for issuing of shares, completed issuing of shares and appeared on the stock market. Also, neither state-owned company was sold in that way. The emergence and development of the Serbian capital market has been based exclusively on privatization, which is not a "natural" order of things. The essence of the primary capital market is the issuing of the financial instruments through which their issuers come into possession of long term sources of funding under relatively favorable conditions. If the primary function is not achieved-the question arises if there is any sense in the existence of capital markets. Without capital market there are no other production factor markets without which in turn there is no developed market economy. The whole relation could be simplified as the following: without a developed capital market there are no investments, and without them there is no faster development. Unfortunately, Serbian economy, as well as the economies of some neighboring countries, is school examples of the conclusions drawn above, which is reflected in modest macroeconomic performance.

In an attempt to answer the question why there is still no IPO, we have tried to turn to those which it most depends on - the owners of a number of companies that have the potential for issuing shares. The sample is carefully structured and for the purposes of this study a survey was conducted - based on the interview method. During 2012, we conducted interviews with 56 owners of medium and, for Serbian circumstances, larger size businesses. Not the classical questionnaire was used, but an interview in which all respondents were asked the same questions. Hence, some of the answers were very difficult and almost impossible to quantify, so they would be presented in a descriptive form. Some respondents even insisted that research remain anonymous. Further in this paper many of the conclusions will be based on their attitudes.

The central research issue, as well as the central point of this chapter can be the following: Why there is yet no IPO in the capital market of the Republic of Serbia? In order to get certain answers, we have divided this paper into three major parts. After the introduction, in the second part the significance of the IPO will be discussed for both companies involved in these processes and the whole national economy. In the third part, we will point out what the different categories of stakeholders can expect from the IPO. We will try to shed light on the entire process from different perspectives of potential participants. The fourth part is devoted to the analysis of possible reasons for the absence of these processes in the Republic of Serbia. It is based on the results of research and analysis of practices in both developed and emerging markets. Finally, there is a conclusion and a review of references.

2 Different aspects of Initial Public Offerings (IPO)

An Initial Public Offering is the process of the first primary issue of shares of the company which had not previously been public and had not collected capital in this way. Companies that join the process of IPO are usually registered in the legal form of a limited liability company or a closed joint stock company. Potential candidates for IPO are those business organizations that have achieved a certain level of business maturity and have significant potential for further growth and development. To ensure that this potential is fully used they need stable and long-term sources of funding. Therefore, the company decides to change its legal form to an open joint stock company. After that it can access the process of registration of the issue of shares by the relevant regulatory authority, most often by the Commission for the Securities. Registration itself involves completing extensive documentation (in the form of prospectus), publicly announcing relevant information and data (financial statements, audit reports, business plans, strategies, etc.). When the regulatory authority makes the decision and approves of the prospectus, the company can start implementing the IPO and public offering. After the completion of the whole process, the shares start to be publicly traded on an organized market. In the entire procedure the investment bankers play an important role, by performing a full range of services, starting from the initiation procedure, preparation of dossiers, underwriting, advisory and distribution of shares to the new owners.

IPO can bring a number of benefits to every company, among which the following can be particularly emphasized:

- Almost unlimited potential for acquiring additional capital: In case of taking a loan or issuing of securities of the debt instruments there are always certain restrictions, which are linked to the credit potential of the company. It is not the case in issuing of shares. For example, a company with assets (liabilities) in the balance sheet of EUR 1 million, assuming that there are no liabilities or debts, could get the loan of maximum 400-500,000 euro through credit sources. It is not the case in issuing of shares. The company may issue shares to the amount of several millions euro, regardless of the previous capital. Thus increasing financial strength, there is an increase of the total capacity of debt and solvency of the company. All that creates a basis for easier issuing of new securities in future, including shares.
- IPO involves prior introduction of corporate governance, public disclosure of data and greater transparency in the operation. In that way more efficient work of management can be provided, as well as growth of social responsibility and business ethics.
- IPO is an important stimulus for increasing strength and size of the company. Knowing that financial resources are no longer constraint to growth, managers' activities are focused on seeking and finding new investment opportunities. The management of the company is more encouraged to invest or enter into mergers and acquisitions (M&A) so as to achieve the objectives and growth strategy.
- A number of positive effects on the human resources, especially in terms of attracting and retaining quality managers and employees.
- IPO operations always attract media attention, which can lead to increased credibility and reputation of the company. Promotion of IPO often turns to promotion of the very company, its products and services, which later may have favorable marketing and other strategic implications. A typical example is the IPO of *Google* in 2005 or *Facebook* in 2012. Weeks before the first day of commencement of the sale of shares through the IPO the media were full of news about the companies and their business.

Making decisions on the IPO is a very complex issue. The decision-making process should include consideration of a number of strategic, legal, organizational, financial, and investment aspects. The whole process must be part of the strategic orientation of the company to implement a strategy of growth. Thus, each step has to be carefully prepared for a longer period of time. It is not good that the decisions on the IPO are made outside the strategic planning process in the company. In addition, there has to be a clear vision of the future of the company and readiness of the founder or original owners to accept the necessary changes that the whole process involves. Prior to IPO, companies must analyze several aspects. First of all, the following issues have to be analyzed:

- IPO is an external way of financing through the issue of shares. The first question is whether the company is ready for this kind of financing. It is necessary to have solid and stable business development prosperity, earning potential and quality management, as well as human resources. To be completely accurate - not all companies in all industries are good potential candidates for an IPO.
- As the issuing of shares enables collection of large amounts of funds, a basic question is whether there is an investment, research and development programs that could be financed from these funds?! As a reminder, if there are no investment, research and development, there is no growth or development of the company. Only innovative companies with a clear research and development investment potential can be "right" candidates for the IPO.
- Shares as a source of financing are an alternative to using debt. These include the establishment of no debtor-creditor, but the ownership relationship. Each issue of shares changes the company ownership structure. The real question is whether the founders and current owners are ready for new co-owners and the changes which they bring. In case of reserves, resistance or suspicion towards the new co-owners – it can be a big problem later in the implementation of the process of IPO.
- Legal form of open joint stock company implies the existence of significant costs. Some of them are related to the introduction of corporate governance, the others to the registration procedure with the appropriate regulatory authorities, the fees of investment bankers, brokers, insurance brokers, advisers, auditors, etc. It is important to understand whether the company will have enough benefits from the IPO and whether its effects can cover new, high maintenance costs of a joint stock company. In many countries in transition, not long after privatization and appearance of shares of the majority of privatized companies, the process of delisting occurred on the stock market, i.e. closing of companies, the process totally opposite to IPO.
- Extremely important set of issues is related to the nature of the financial system and the attitude of the state towards the capital market. All owners need to feel protected. "Opening" of the company, which the process of IPO basically involves, is the acceptance of higher standards of governance, respect for the rules and a high level of disclosure and transparency to the public. In the conditions of a developed and safe financial system, market mechanisms imply encourages original owners to offer parts of their company through the IPO, because they may have several benefits out of it. In underdeveloped countries there is resistance due to the high level of uncertainty. Weak institutions and corruption can discourage potential issuers on the principle-"anyone can "*peep into" my business and know what I am doing*!" The issue of increased accountability and safety of all participants are some of the central issues in the IPO process. Unstable financial systems in transition countries are generally not fertile ground for the promotion of these processes.

3 What different kind of stakeholders can expect from IPO?

Certainly the most important categories of stakeholders in the activities of the IPO are interested economic organizations. Generally speaking, if they have business interests and the obvious economic benefits, the IPO should follow. However, among them there are a number of other stakeholders, such as investors, regulators, investment bankers, accountants, auditors, different types of advisors, the general public, etc.

The attitude of the investors towards the IPO is always positive. IPO involves the emergence of new financial instruments in the market, expanding range of investment alternatives, thus creating more opportunities for portfolio diversification. Generally, more quality financial instruments in a given market mean more developed markets. The problem with the capital market in Serbia is its path of development and emergence. As in many other countries of the Central and Eastern European region, it has developed in parallel with the flows of transition. Before 1990, there was not a well-developed basis of investors, neither institutional nor individual, especially in the household sector. Many citizens had the first contact with shares when they started to get them free through the various stages of the privatization process. Serbia in this respect is one of the countries that could be the world leader in the duration of transition. It lasts for 24 years. Several privatization laws have been changed and yet these processes have not been completed. In the beginning, the model of internal privatization was mainly applied in the Republic of Serbia, i.e. free distribution of shares to employees. Later the models have been changed, as well as percentages of free distribution of shares. However, there are a number of people who have never got shares. This injustice should be remedied through the distribution of shares of a few large state-owned enterprises, which has been delayed due to the impact of global crisis. All of the above supports the conclusion that Serbia is not a culture of investment in equity instruments. All this was accompanied by a low level of knowledge on financial markets and instruments in general, which represented an objective barrier to the further development and expansion of markets.

From the perspective of the regulator IPO also implies positive developments. That leads to the emergence of new market participants in the role of issuers and new instruments, which contributes to the expansion and strengthening of the financial markets. For the regulator it is important that all participants comply with the applicable legislation, particularly the one connected with the disclosure standards and transparency. Here it has to be pointed out that the regulator should take account of at least two important moments:

1) **Respecting the rules of "*national market*"** - this means that domestic companies should primarily begin to gather capital on the national capital market. In this way they help their development through the concentration of domestic savings. Only after recognition in the domestic market, the company can turn towards foreign, i.e. international capital market. In Serbia, there were examples of loud announcements made by some businessmen that the shares of their companies would immediately be listed on the world's leading stock exchanges. Unfortunately, it turned out that it was wishful thinking, totally unrealistic and unachievable. World experience shows that the company is the first to be promoted in the domestic market, and only then can try to sell its shares in the international market. In practice, only one company in the region managed to get listed on the major stock exchanges but in a short time. It is the company called Pliva, Zagreb (Croatia) which listed on the London Stock Exchange (LSE). However, it soon delisted, as it could not meet the high listing requirements. We can surely say

that it will take a lot of time that one company from Serbia becomes sufficiently strong and attractive for listing on one of the world's stock exchanges.

2) **"*Concentration rule*"** - particularly in relation to the implementation of the European directive MiFID, where the national regulator can direct the execution of investors' orders in one market segment - the regulated market. Namely, there are many views according to which MiFID with the defined new forms of trading platforms (Multilateral Trading Facility – MTF and Systems Internaliser - SI) bear the risk of market fragmentation (Davies, Dufour, Scott-Quinn, 2006). This danger is particularly pronounced in smaller countries and emerging markets, where the very small volume of domestic savings can be relocated to a larger number of markets.

For the national regulator, the Commission for Securities of the Republic of Serbia, it can surely be said that it could contribute much more to encouraging the IPO process. The Commission took up quite a passive attitude, mainly in response to problems. It is quite a correct role in the developed markets, but it is less than enough on the Serbian market, which is still in the process of formation. We think that the faster responses to problems, maximum timely resolution of claims and cost reduction could help encourage new issuing. Capital market regulator should create conditions so that potential issuers and investors have much more confidence in the domestic market. Here we should mention the major role of the Commission in the promotion and education of the participants on the capital market. An open question is how the Commission for Securities was ready for a pro-active role. It proved to be a highly bureaucratic organization that failed to understand that it exists in a non-active market.

In developed markets, the central role in the process of IPO is performed by the investment bankers. By nature, they are often in charge of finding potential candidate companies, encouraging them and preparing the very process (Morrison, & Wilhelm, 2007; Fleuriet, 2008). That is sometimes worked on for many years with the cooperation of both sides-the companies themselves and the unions of investment bankers. One of the major problems in Serbia and the region, which largely explains why there are not too many IPOs, is that there are no big and well-known investment banks. The volume of business of the entrepreneurs in the Western Balkans is quite small if compared with the world average and cannot generally attract big players. For example, the overall capitalization of the Belgrade Stock Exchange by the beginning of 2013 was slightly over 7 billion Euros, which is the value of an average merger and acquisition transaction in the U.S. or the E.U. Without attractive projects and large transactions there is no interest expressed by big investment banks. On the other hand, local banks were by nature more oriented towards commercial activities rather than investment banking.

In addition to the lack of interest of large investment banks, the fact is that there are no domestic banks specialized in investment banking. Most banks opted for the strategy of focusing to the commercial banking activities, both in retail and corporate sector. Loans are the most common form of financial product that is offered to companies. Due to restrictive monetary and credit policy followed by the central bank, the National Bank of Serbia, for several years in a row, lending conditions that dominated in the sources of financing of the economy have become more favorable. In addition, the public finances of the Republic of Serbia with the outbreak of the global crisis in 2008 were increasingly in trouble, and the government in order to finance its needs issued high-quality (in terms of relatively low risk and attractive returns) financial instruments. Banks used lending surpluses for investments in such Treasury Securities. In that way, there were fewer funds

to grant loans to the economy. Hence, the loans have become rare and expensive commodity, accompanied with a high level of risk. According to many bankers, corporate securities represented riskier instruments and therefore there was a significant dose of resistance to engage in investment banking. Finally, in order to get a more accurate insight, it should be noted that the financial system of Serbia and other countries of the Western Balkans is bank-centric, where in the total value of financial assets the banks dominate with over 90 % of the market share. Hence, a logical explanation for the lack of an IPO can be the following: local banks did not have great interest, nor showed the proper initiative.

IPO always provokes certain media attention and interest of the general public. In many countries it has been confirmed that big IPOs contribute to the promotion and development of national capital markets. In that way, the strength and potential of the national economy is affirmed. It promotes transparency and good corporate governance practices. IPO can bring many advantages to less developed countries, too, such as the following:

- The public offering raises the level of media attention both regarding the company, and the overall market. That contributes to growing reputation and company credibility as well as increasing confidence in the very market.
- The company comes to fresh capital which increases its financial strength, increases debt capacity (related to the possibility of enduring new debt) and total solvency. It helps increasing capitalization of the national stock exchange and encourages new issuers and issuing. The company itself becomes capable of expanding the range of potential alternatives for financing - loans, bonds, convertible instruments, preferred and common stock, which allows greater flexibility in financing. Based on these benefits other companies decide more easily to enter the IPO.
- The emergence of quality stocks through the IPO process allows the retention of savings and capital within the national economy, which is extremely important for stimulating economic growth and development. Stable growth and development are not possible only through the foreign direct investments, but through domestic investments as well.
- Strong national companies are suitable for attracting and retaining quality managers and employees who may be particularly motivated to work successfully through stimulations and reward schemes by involving them in the ownership and bonuses paid in shares.
- The company may become a target for mergers and acquisitions, thus creating new opportunities for growth, and additional welfare to the owners.
- Greater transparency in work-more opportunities to raise standards of corporate governance, more efficient management, increasing social awareness and social responsibility, increasing the general level of business ethics, etc.

4 Possible reasons for the absence of IPOs in Serbia

According to the Agency for Business Registers in Serbia there were 106,683 active companies as of March 31st 2013. In addition, there were about 214.095 registered entrepreneurs, making a total figure of about 320,000 of active business entities. Out of that number only 1,248 companies were registered in the form of a joint stock company (www.apr.rs), where about 1,060 have listed stocks on the domestic market - Belgrade Stock Exchange (BSE). There are several listings on the BSE, including:

- **Prime listing** - which is presented by the best companies whose shares are very actively traded. Unfortunately, it entails only 5 companies as follows: Nikola Tesla Airport (tick symbol AERO), Energoprojekt Holding (ENHL), Petroleum Industry of Serbia - NIS (NIIS) Soja protein – Becej (SJPT) and Tigar tire factory of Pirot (TIGR).
- **Standard listing** - in which there are 3 companies including: Alfa Plam Vranje, Commercial Bank Belgrade and Metalac Gornji Milanovac.
- **Open market** - consisting of 103 shares issued by 99 companies.
- **Multilateral trading platform** - the largest segment of the Serbian capital market in which there are 960 shares issued by 945 companies. This segment is the most numerous, but not too liquid.

Current organization of the Belgrade Stock Exchange is presented on the Figure below:

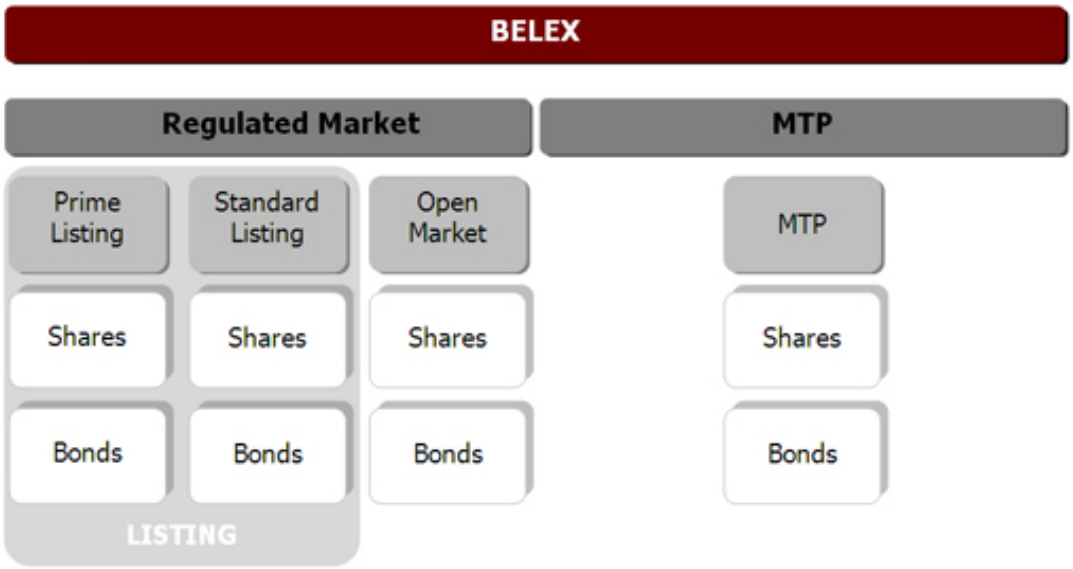

Figure 1 Organization of the Belgrade Stock Exchange
Source: http://www.belex.rs/eng/trzista_i_hartije/organizacija_trzista

If we, however, summarize the data presented it can be concluded that by the end of March 2013 Belgrade Stock Exchange traded 1,071 shares in all listing areas issued by 1,052 joint stock companies. Bearing in mind that the total number of business entities in the Republic of Serbia amounted to 106.683 it means that the share of joint stock companies was 0.986 %. This data itself does not worry much, because the situation is similar in many other markets. However, what must be noted is that none of these companies did appear on the BSE through the process of IPO. As we

have already said, they have found themselves on the Belgrade Stock Exchange through privatization.

The central question of this paper is why there is no IPO in the Republic of Serbia? Based on the presented data, it can be seen that most dominant form is the legal form of the limited liability company where possibilities of raising capital are substantially limited. Therefore, the possibilities for investments, growth and development are limited as well. Such companies are by nature oriented towards banking system and loans as the most dominant source of funding.

On the other hand, according to several surveys, a large number of local businessmen claim that one of the biggest problems is that alternative sources of funding are limited. (Ministry of Economy and Regional Development, RASME, 2007, 2008, 2009, 2010) If we bear in mind the aforementioned restrictive policy which was implemented in Serbia for a number of years by the central bank, where the high level of referential interest rates was uses as one of the mechanisms, it turns out that prices of bank loans towards commercial companies have grown significantly, creating more capital costs. It resulted in a paradox - on the one hand we had very limited and expensive bank loans, and on the other, there were no IPO operation, while business entities were losing external sources of financing.

In seeking an answer why there is no IPO, we tried to contact a number of businessmen who we surveyed. Based on a sample of 56 owners of medium and larger companies, we can say that in general there is a certain amount of caution, restraint, and even fear from the IPO. It cannot be said that that was common to all, but the general impression prevailed. Some of the individual statements could be reflected in the following:

1) IPO involves the opening of the company, greater openness and transparency in work. Many of the respondents had a high level of reserves against these commitments. Specifically, we found that there is a significant dose of resistance, which was particularly pronounced with owners of very successful companies. Some of them have pointed out a bit irrational argument that "*success is not tolerated in Serbia*."
2) IPO involves changes in the management of the company and the introduction of a different management model called corporate governance. The majority of the surveyed business owners still keep being limited in the awareness that they should retain their dominant stake in the ownership of the company. More than 50% of the interviewees stated that they generally do not have anything against selling a portion of the company, but on condition that they hold 51% in the ownership. The question - why – was answered differently but basically in a very simmilar manner – „*to prevent someone else from imposing what I have to do*". Unwillingness to change the management system and the adoption of the corporate governance in our opinion is one of the key oppositions to the IPO.
3) About 60% of the respondents admitted that without an IPO there is no economic progress, but that their companies and businesses simply are not yet at that level. In other words, they do not have enough quality projects that would be able to finance through equity in due course.
4) About 40% of the respondents thought that they do not need IPO then, as it is much simpler and easier to access funds through bank loans or any of the mechanisms of state aid. For them it is more important that the state helps by influencing banks to reduce interest rates, or extend repayment of the loans taken before.
5) In about 20% of cases it was more than obvious that business owners know the basic principles of corporate governance, but they just do not want to turn their companies into open joint stock

companies. This was particularly visible in some situations where the parent companies which were registered as limited liability companies were majority owners of some joint stock companies. In some cases there are indications, but no firm evidence to suggest that a very high turnover was made between legal entites related in such a way through which could a part of profit could be withdrawn from the joint stock companies to the detriment of minority shareholders.

If in addition to these attitudes which clearly result into resistance to the IPO are added those factors which are generally known on a global scale, the absence of true IPOs in Serbia can partly be explained.

As one of the most prominent potential problems that can occur in any IPO is how to determine the initial price of shares in the offer. In recent years on the global scale we have witnessed two classic cases of incorrect pricing. One happened in 2005 and is connected with the issuing of shares by *Google*. On the first day of trading, stock prices went up by 18 %. After a few months, prices were several times higher, bringing remarkable profits for investors. The second is related to the IPO of *Facebook*, where offered prices were significantly overestimated.

The problem of underestimation of prices is not so present in the later so-called seasonal emissions, since the shares are already traded in the secondary market and there are publicly available data. The problem of determining the price in the IPO was dealt with a number of researchers, who, based on extensive empirical studies, come to the conclusion that prices are undervalued in most IPOs (Tinic, 1988). Such underestimation is a direct cost to the company, as there is the possibility of selling the shares at a higher price and therefore the opportunity to raise more capital. Underestimation of share prices in the IPO can be best stated through their subsequent growth, after the completion of the IPO. In such cases, many speculators who get returns above average can have great benefit, too.

On the other hand, the emergence of stock price overestimation also carries great risk to the issuer company. In such a case, the company faces the risk of not selling all shares in the primary emission or at least not in the expected time. That can cause a number of problems to the company, especially if the capital is needed in a relatively short period of time. The highest risk of overestimation of shares in the IPO is related to the decline in prices after the start of trading. A typical example is the IPO of *Facebook* in 2012. Although all shares were sold due to the vast propaganda activity, troubles in terms of fluctuation of prices started in the first few months after the IPO (May 2012). In just a few weeks, prices fell by more than 50 %, which cause unfavorable reactions by the investors and undermined the reputation of the very company and the investment bankers involved in the process.

In recent years, IPOs have gained a certain degree of negative publicity. This was largely contributed by several types of manipulative practices, the three of which will be highlighted here (Madura, 2010; Eric & Djukic, 2012)

a) **Spinning** - the practice in which investment bankers in the role of underwriters allocate a portion of IPO shares in favor of the executive directors of the company issued shares. They do that hopping that, in return, their institutions would be engaged in rendering other services to that particular company in the near future.

b) **Laddering** - occurs when there is a high demand for the shares in the IPO process, and when it is certain that the whole issuing would be successfully sold (*hot* IPO). In that case, the broker-dealer firms may encourage individual investors to place buy orders at prices that are higher than the price offered in the IPO. The aim of such action is to cause upward movements in prices after the IPO. Individual investors accept this hopping that their brokers, in return, would book some of the shares at lower prices in some new "*hot*" IPO operation in the near future.

c) **Excessive commissions** - also happen when there is a high demand for shares from the IPO. Some brokers charge very high fees to customers who want to buy these shares. Investors accept it because they know that they would make up for the higher cost after selling the shares at a higher price, perhaps on the first day of secondary trading. This practice is often associated with mistakes made by the investment bankers when evaluating the initial share price. If the price is set at very low level, the issuing company would be at a loss. The company or individual who registered shares in the IPO in order to sell them immediately after the start of trading in stock market is known as *stag*, and the profit realized in such a way - *stag profit*. This is more a British term, while the American term for stag is *flipper*, because the investor, like in a pinball machine, jumps out of trading the first day after the issuing of shares. Of course, in case of the increase in the market price.

Finally, in providing a more complete picture about the IPO, several potential challenges that companies may be facing should be noted as well. They are related to the following issues:

- **Previously mentioned high costs of maintenance of the joint stock company** – which are associated with legal, accounting, auditing, marketing, stock exchange, consulting and other costs. The amount of these costs is often not small; it can cause reduction of overall profitability, so it should be taken into account in a timely manner.
- **The need for greater transparency and openness in work** - which requires a much higher level of accountability at all levels of management and operations of the company. Our small-scale research showed that it is a major problem for companies in Serbia. Many of the respondents were unable to accept the change from the autocratic style of management to a decentralized, which basically means respecting the principles of corporate governance.
- **Greater exposure to risk** - trading shares on the stock market is related to many kinds of risk starting from the danger of not selling all shares, to the fall in prices, liquidity, business failures, regulatory requirements, etc.

Overestimation and underestimation of shares, as well as the examples of these three problematic practices with IPO, certainly undermine the trust and respect in them. However, these are processes which are unprecedented and which can provide to companies almost unlimited opportunities to raise capital. In order to have a successful IPO, certain steps must be taken, which are associated with adequate planning system. In that sense, it is necessary to make some very important activities, such as creating a quality and professional management team, developing promising businesses with strong market growth potential, preparation of quality financial statements with unqualified auditor's opinion, the legal completion of the company, the establishment of defense mechanisms against the attempts of acquisition, setting and developing high quality system of corporate governance, and so on.

5 Conclusion

The undeniable fact that more than 20 years since the beginning of the transition process and the establishment of the real capital market in Serbia there was not a single IPO has motivated us to try to answer the very simple question under this chapter – why? Without new companies on the stock exchange there are no new financial instruments and the development of domestic capital markets, nor faster economic and social development. Poor macroeconomic performance in the Republic of Serbia has to concern everyone. However, they cannot be considered isolated from the lack of investments. One of the most common reasons of the low level of investment activity is attributed to the lack of funds. And it is at this point that we find one of the many paradoxes of the Serbian economy - on the one hand the financing of economic activities is very difficult, usually made by expensive loans, on the other hand mechanisms of raising capital through IPO operations are not used.

4.1 In this paper we tried to find a reasonable explanation why there are no IPO operations. The fact is that out of 1,060 companies whose shares are listed on the BSE, all were there due to the process of privatization. Unfortunately, none of them is a result of IPO. Without any doubt the most important category of stakeholders in the activities of the IPO are interested business organizations. Generally speaking, if they have financial interests and the obvious economic benefits, the IPO should be made. In trying to find the answer to the question why there are no IPOs in Serbia, we started from interested economic organizations. Using the method of interviewing potential candidates, we came to the following conclusions:

- There is considerable resistance to the process of IPO that is associated with the fear of losing control.
- Unwillingness of the majority owners or founders to change the style of management and to introduce the principles of corporate governance.
- A sort of confidence in the capital market and institutions, which are still in their infancy.
- And the last, but certainly the most important – the lack of quality business initiatives and projects that would in due course be able to be financed through equity capital and that might attract the interest of investment bankers.

As another explanation, it can be pointed out that the state itself does not understand the importance of the capital market and is not ready to sell some state companies in the IPO.

When the lack of business initiatives is connected with insufficient knowledge, mistrust, and fear it is normal that there is resistance to change. That is the reason why there is no IPO. The only question is until when? IPOs are only a reflection of the poor performance of the Serbian economy. It is necessary to somehow get out of this vicious circle. There is no development without investments, there are no investments without good investment projects and affordable sources of financing, and there is neither without quality people. The solutions are to be sought within these coordinates.

Acknowledgements

This paper is a part of research project No. 179015 (*Challenges and prospects of structural changes in Serbia: Strategic directions for economic development and harmonization with EU requirements*) and project No. 47009 (*European integrations and social and economic changes in*

Serbian economy on the way to the EU), financed by the Ministry of Science and Technological Development of the Republic of Serbia.

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The global economy crisis and the co-working solution

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Abstract

The co-working is a style of work that is spreading throughout the world and that involves a shared working environment, often an office and independent activity. In the article we will analyse why the co-working success in global crisis time and what about it in the future.

Keywords: Global economy crisis, Co-working solution, Co-working success.

JEL Classification: F23, G01, G30, F60

1 Introduction

From the beginning of this year Donald Trump has been president and it's been months more since he was elected, but I am not sure he will find solution *to emerge from the economic crisis*. I don't think it's Trump's policies, which seem to be more popular than he is and that he will find new and I think that a lot of the elite hatred for Trump, and for his supporters, stems from just such a sentiment. For decades now, the "educated meritocrats" who ran America: "we are the best in the world"…." USA...USA". Ok but during his time on the presidential trail for example in Tampa Bay, or in other places, presidential candidate Donald Trump will be using a co-working space to base his operations team.

Donald Trump is not the only big name to use co-working, or endorse the benefits of this method of working, maybe it is a news but not in USA, of course, it is an intertwining between politics, economy and marketing. For Trump the use of co-working has been simply a functional, simple, no-strings-attached way to work without the stresses of maintaining an office space. Building relationships within the community was for him and his team imperative when moving the "electoral business" forward[2].

2 What is co-working?

But what is the co-working? Co-working is a style of work that includes a shared working location, often an office and independent activity. Different to a typical office environment, those co-working are usually not employed by the similar organization. In this particular moment where it threatens to be worse and the global defences are much weaker than eight years ago, in fact during the last crash central banks cut interest rates from around 5 percent to zero and bought up trillions

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[2] see Kwiatkowski, A., & Buczynski, B. (2011). *Coworking: Building Community as a Space Catalyst.* Cohere LLC.

of dollars of bonds and loans to stabilise the system with governments spent vast amounts of public money to stop banks going bust and devastating the wider economy, the crisis is very good for co-working. In this connection, I should like to emphasise that today the co-working has assumed the wider significance of real movement of ideas because it is born "the sense of belonging collective"[3]; thus become a key factor the free trade of the experiences, objectives and why not, the dreams, the common daily life feelings.

Co-working is a not only a USA phenomenon, but it is possible to consider a global event, I've seen this *phenomenon* many times in all world, in fact co-working spaces are no longer found just in New York, Paris, Rome and London – in Asia, South America and even some African capitals, these non-territorial, communally used office spaces are springing up everywhere.

We travelled to Russia to take a closer look at three very different co-working spaces, it is an occurrence that can be seen in Moscow and Saint Petersburg, as in other important Russian cities. Politicians and business travellers looking for their customary comforts in the Russian capital are also among the guests.

Promotion of co-working began in Russia recently, in 2013/2014 and over the past years its market has more than doubled. About 2500 new collective offices open around the world annually. The co-working is the keystone of the global economic recovery and innovation. Take stock of the situation, analyzing the spread in Europe, the USA, but also in Russia, in Asia and of course in Italy, also with a look to the new fast developing economies. In 2016 there where about 12.000 in the world co-working enterprises and in the 2017 an increase more than 20%, it is planned to around 14.000 facilities.

[3] Gianelle C., & Panzeri, R. (2013). Nuove esperienze, nuove idee: coworking. Una nuova forma di lavoro che aiuta a scoprirsi imprenditori? *Revue Economia e società regionale*, 228-233.

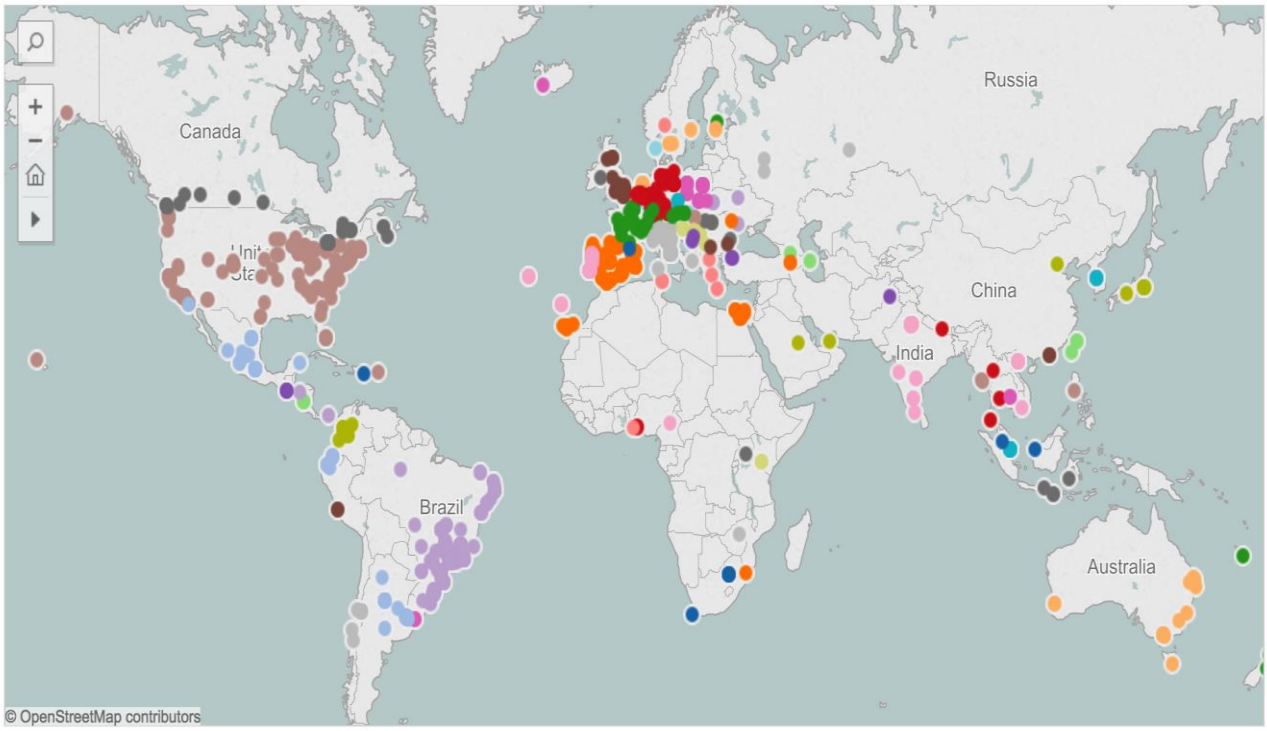

Figure 1 Co-working in the world
Source: Author

3 The success of co-working

Why this success? Because co-working is usually an attractive to work-at-home professionals, independent workers, or people who travel frequently who end up working in relative isolation, but it is also the social gathering of a group of people who are still working individually, but who share values, and who are interested in the synergy that can happen from working with people who value working in the same place together with each other.

Today the co-working is the most important solution to the problem of isolation that many homework, while at the same time approving them escape the distractions of home. In previous years, growth was more active in relative figures (to 20-80%) but this can be explained by the effect of the free niche. The number of members using co-working spaces globally has been steadily increasing year on year and is predicted to reach one million by 2018.

With the new global economy, becomes a winner the ability to attract and retain professionals with diverse talents and skills, who share the desire to learn and enrich their knowledge in an environment that favors the transmission of knowledge and collaborations. From here, the exponential growth of co-working phenomenon. Established by start-ups, businessman and freelancers, a growing number of companies, large and small, are exploring how to incorporate the concept4. Coworking and liquid or flexible space are fast becoming precarious components of wider Corporate Real Estate and portfolio strategy.

[4] Desiderio, G. (2015). Coworking 3.0: il coworking e la startup per l'economia sostenibile (Ebook). StreetLib: Gabriele Desiderio.

The New York co-working community has also been evolving rapidly in places like Regus and Rockefeller Group Business Centre. Regus Group opened the first mini-office centre in Russia in 1998. Furnished spaces with office equipment were offered for rent with flexible conditions. Actual co-working with places for single workers began to appear in 2008.

The first facilities were opened by enthusiastic trying a new format, co-owner of the workstation co-working. The growth demand for such premises was partly caused by the crisis, the economic situation forced renters to optimize the costs and to reduce in the same time the staff and decline leases of classical office in favour of co-working. In Russia, especially since 2014, the number of requests from companies increase approximately up 70% normally refers to Russian co-working spaces as a crisis phenomenon, according the equation: more crisis=more co-working.

The immensity of space characteristic of USA or Russian territory has favored the development of co-working phenomenon on a large scale, while in Europe the concentration in smaller spaces facilitates the connection, communication and exchange of information that lacks a little 'to overseas reality. Another feature of the USA and Russian phenomenon has spread outside of the big cities: whether in Europe large scale of the coworker is located in the big cities, in the USA only 50% is located in the city. In Italy the co-working phenomenon is still in its beginning.

The Italian economy is still suffering from a lot of the crisis and always in my country for a young business initiative it has been considered as an option last respect to employment, even if today the businessman are starting to look these modes as the solution for the exit from the problems of labor market.

In USA the co-working business was starting everywhere, in the bay area, Anca Mosoiu and also in Oakland and in Miami new places have been opening their doors, among them is City-Desk and in many metropolitan areas, with cities such as Seattle, Washington, Portland, Oregon, and Wichita, Kansas, now offering several thriving co-working venues. The New York co-working community has also been evolving rapidly in places like Regus and Rockefeller Group Business Centre.

Since the years 2000 a few studies have shown the number of co-working spaces and available seats have roughly doubled each year. From 1994 to 2015, according to Bureau of Labour statistics, the USA unincorporated self-employment rate fell by more than 25%, a downward trend mirrored in major economies the world. While co-working spaces may seem to be magnets for a certain type of worker, they’re also reflections of bigger structural shifts in employment.

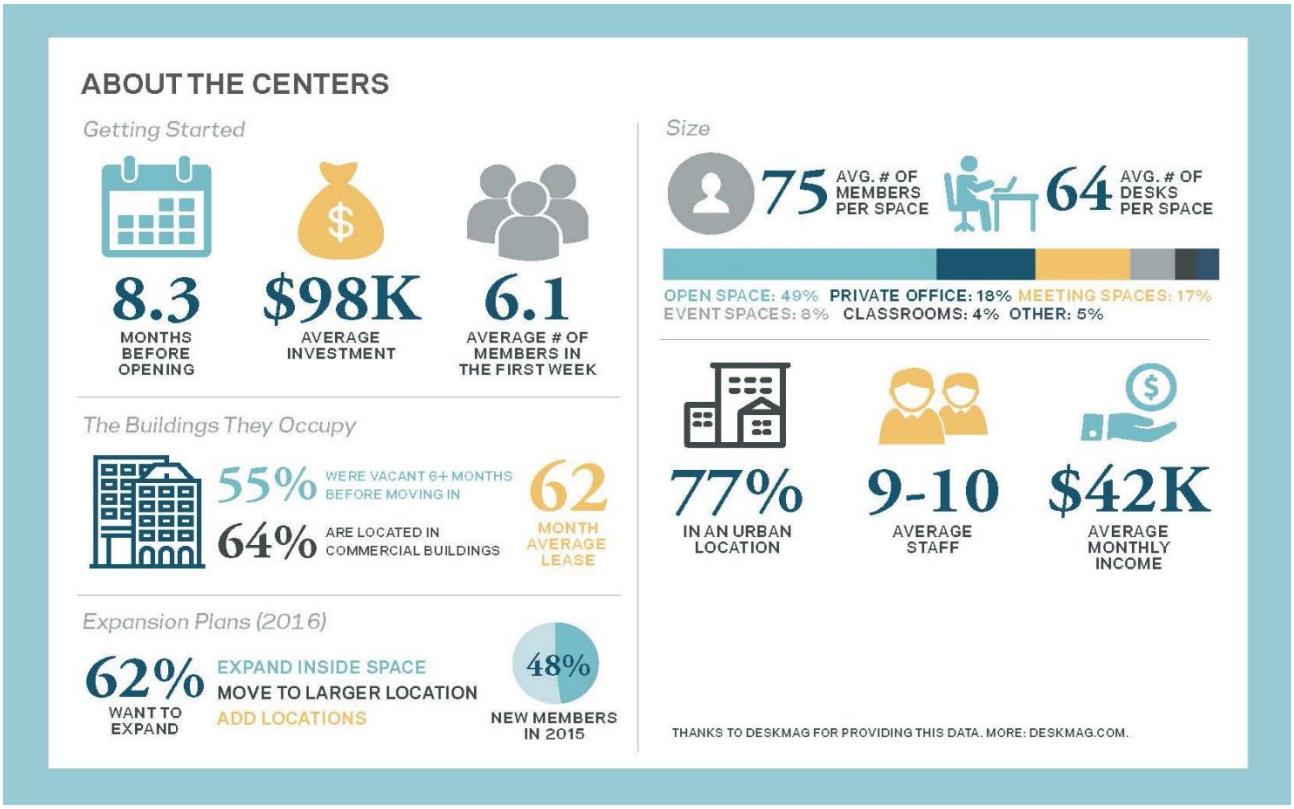

Figure 2 Co-working
Source: Sisson (2016)

Owners of collective offices agree that the crisis has helped. The fast development of the format is due to natural causes by the rational approach to spending money also when the businessman is traveling. A considerable number of medium and small businesses have moved to these offices because it is convenient for companies to use the ready infrastructure, any competition with traditional offices, in fact the co-working rentals are beneficial for small companies and innovations projects that are not interested in long-term contracts.

Compared to other countries, in Italy we have a lack of support schemes and ad hoc incentives, it discourages the self-employment and the opening of co-working spaces. It is almost always the initiatives at a grassroots level, the work of individuals and businesses. Therefore, in Italy the most co-working spaces are missing coworker, lacking the culture of freelancers, businessman and individual risk5. The knowledge that a real opportunity exists to fail several times and that it is always necessary to start it head on. The situation seems now less formed, and the first calls and the first supports to co-working phenomenon, are being born in Italy.

Situation very complex. Today in global time, every day we have news which upsets the world. Though the decision of President Trump to exit the Paris Agreement has been met with disapproval and severe critiques, many have taken the news as a way to play their part, however small and find ways in which to individually or as a company decrease their environmental footprint. It is a small contribution but symbolically important, especially in times like this, it is up to us as individuals

[5] **s**ee Kit Crea Impresa (2013). *Come aprire un centro coworking, incubatore, centro uffici.* Roma: Genesis editore.

to contribute to a larger cause and there are various ways flexible workspace operators can follow the co-working operator as "Bond Collective", whose initiative is for example to reduce their environmental footprint. In fact, co-working spaces possess a huge potential to support environmental sustainability due to their essentially sharing-oriented constitution.

Co-working supports the sharing of space, supplies and other resources, thereby cutting down on basic wastefulness. Many co-working spaces already incorporate ecological friendly performs into their spaces in a variety of ways. Therefore, exist a strong relationship among sustainability and economic capability. In future we can see how is possible to build strong relationships with environmentally friendly businesses that exist independently from "green spaces" (for example companies that have only one paper cutter for all). Co-working fundamentally possesses, sustainable values of sharing in eco way.

4 Conclusion

In conclusion, the co-working segment will develop further. In the next years the company, and not only, plans to open new workstations in all world, in the big city but also in small cities and why not in countryside. There are ready requests of places, more of that are ready booking in a planned co-working space. The companies plan to be in all cities and the facilities will preferably be opened in business centers, in this case a new business will be to prepare the infrastructural component of business center, everywhere, in this case also in Ukraine, Moldova, etc. etc.

We agree with the idea that the global crisis help the growth of co-working but in any case today it is a real phenomenon and it is true the co-working spaces are rapidly increasing day by day. Co-working is helpful for freelancers and entrepreneurs struggling to find a good work space within their budget, it is not a temporary situation but a new global business, used by all also used by President and maybe in the future also by Putin.

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Public Investments from EU Cohesion Policy in Slovakia: A Structural View

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Abstract

The Cohesion Policy has been the main source of public and to great extent private investments in Slovakia in the last decade. This paper examines the investment carried out in the 2007-2013 programming period in Slovakia from a sectoral perspective. We analyse the distribution of Cohesion policy spending in all sector of the Slovak economy using the NACE 2 classification with special focus on the manufacturing sector. The paper examines the share of Cohesion policy spending via the operational programmes on the total gross fixed capital formation in the Slovak economy in the period of 2007 – 2016. Furthermore, the paper examines the share of the individual financial sources i.e. EU funding, state budget co-financing and own resources of final beneficiaries on total Cohesion policy spending in this period.

Keywords: Cohesion Policy, Co-financing, Manufacturing, Slovakia, Sectors.

JEL Classification: E60, E22, F36, O10, O20

1 Introduction

The accession to the EU created new qualitative and quantitative opportunities for financing of the socio-economic development of the Slovak economy. The end of the 2007 – 2013[3] programming period allows us to make a retrospective analytical attempt to examine various dimensions of financing of economic and social activities. The Cohesion Policy is mainly an instrument of regional and national convergence to the EU. However, in this paper, we would like to focus on structural aspects of Cohesion Policy implementation i.e. which sectors and to what extent have benefitted the most in the 2007 – 2013 programming period. The natural heterogeneity of the economy, as well as specific conditions present during the Cohesion policy implementation, create a different level of co-financing distributed between the EU sources, state budget co-financing and own resource of final beneficiaries. In the second part of the paper, we are focusing on the manufacturing sector. Own interest in this specific sector is motivated not only by its relative importance to the Slovak economy (e.g. share of employment, export) but also due to new challenges which are linked to other EU policies (reindustrialisation and challenges of the technological development – Industry 4.0 as well as environmental regulations).

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[3] Although we are referring to this period as 2007-2013, the actual implementation is still not completely finished due to the application of the n+2 rule and other legal provisions. All the data used in the paper from the ITMS database are from 1.1.2017.

In the 2007 – 2013 period, the allocation to Cohesion Policy interventions in Slovakia amounted to EUR 11.7 billion and have been focused on three main objectives: 1. Convergence, 2. Regional Competitiveness and Employment and 3. European Territorial Cooperation. The Cohesion Policy has played a dominant role in the Slovak public investment funding in the previous years. Slovakia had the highest share of EU funding on total public investment (more than 80 %) among EU member states during 2011 – 2013. The investments of Cohesion Policy were allocated to all sectors of the Slovak economy. Therefore, the paper provides a detailed view of the distribution of Cohesion Policy implementation in the structural context. We analyse and compare absolute and relative values of financial implementation during the 2007 – 2013 programming period in SK NACE sectors A – U. Special focus is devoted to the manufacturing sector analysed at the 2nddigit level of the NACE 2 classification.

2 Literature

Assessment of the socio-economic impact of Cohesion Policy interventions in various dimensions is the objective of many studies and research papers. Although there are mostly dominated by econometric approaches, the papers are applying various combinations of methodologies. Jarský et al. (2014) conducted a comparative qualitative analysis of EU funds impacts on forestry in Slovakia and the Czech Republic. Reggi and Scicchitano (2014) evaluated the Structural fund's allocations 2007 – 2013 in the context of regional digital strategies. Streimikiene et al. (2007) assessed the Cohesion Policy spending on the development of sustainable energy in Poland, Lithuania and the Czech Republic. The Structural funds and the concept of lifelong learning in Romania were investigated by Nicolaua (2010), using the research approach of good practice mapping. Panitsides (2014) conducted qualitative research (based on the semi-structured interview) of the Greek education system in the context of the Europe 2020 Strategy. Background and context of integration of the Roma population in and through education, based on the synthesis of secondary sources (economic and policy documents) was examined by Pasca (2014). Mirošník et al. (2014) conducted an analysis of Cohesion Policy from 2007-2013 based on the data of final beneficiaries in combination with socio-demographic and financial data. Novosák et al. (2017) provide empirical evidence on the associations between Structural Funds allocations in the Czech Republic's micro-regions in 2007 – 2013 and intrastate regional disparities by considering three traditional pillars of sustainable development. The empirical analysis of the impact on improvement in accessibility and territorial cohesion from a policy perspective in Poland was the focus of work done by Rosik et al. (2015). Becker et al. (2010) empirically investigated the effects of EU Structural Funds on regional performance. Radvanský (2014) and Frank (2013) published experiences with evaluation in the context of Slovakia. Procedural aspects, political and administrative barriers to Cohesion Policy implementation in Slovakia were analysed by Šipikal (2015).

3 Methodology and data sources

The analysis is based on several data sources, mainly the microdata obtained from the Information and Monitoring System (ITMS). The database contains financial data available at the beginning of 2017. The financial implementation is carried out via operational programmes and three types of financial sources – the EU contribution, the state budget and own resources. The EU contribution represents the financial resources allocated for Cohesion Policy from the EU budget via the Operational Programmes. The state budget provides the necessary co-financing according to the share set up in the relevant strategic documents (e.g. operational programmes, programming manuals). Own resources represent the co-financing of the final beneficiaries representing the public or private sector. First, we aggregate financial microdata from all finished projects or projects in

implementation by the 1.1.2017. Second, we sort all data by the 1st level of NACE classification and 2nd level of NACE classification in case of the manufacturing sector (sorting criterion is NACE code of project recipient). Finally, we compare data sets with sectoral shares of gross fixed capital formation (cumulative value 2077 – 2016). We use this macroaggregate as a proxy variable for the total level of investment in the sector.

4 Cohesion Policy Interventions – A Structural View

At the end of 2016, the total financial implementation of Cohesion Policy reached EUR 15 billion. The EU contribution reached EUR 11.7 billion, the state budget contribution was at EUR 2 billion and the own resources of final beneficiaries reached EUR 1.3 billion. This implies that for each 9 euros spent from the EU budget induced one euro of public or private spending from their own resources. The state budget contributed one euro for each EUR 5.8 of funding provided by the European budget.

4.1 Sectoral Distribution of Cohesion Policy Spending

The sectoral distribution of Cohesion Policy spending by the source of financing shows, that the share of EU contribution varies between individual sectors of the economy (Figure 1). The highest volume of EU funding at EUR 4 billion was provided to the public administration, defence and compulsory social security which represents 34.5 % of total EU funding in the 2007 – 2013 programming period. The second largest volume of EU contribution (EUR 2.5 billion) was spent in the construction sector, which represented approximately 20% of total spending. The third largest beneficiary of the Cohesion Policy support was the education sector. At the end of 2016, the volume of EU contribution reached EUR 886 million, which represented 7.6% of total EU contribution.

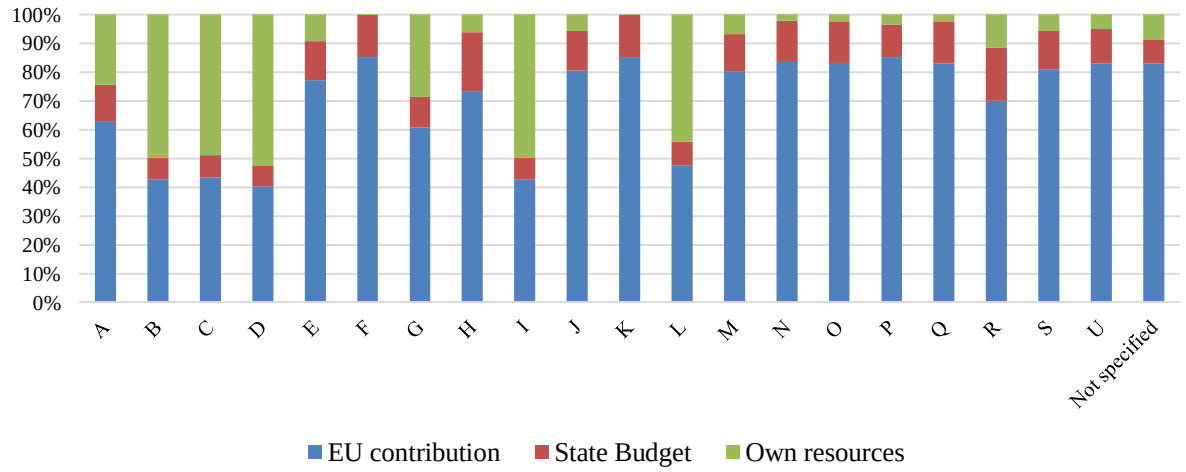

Figure 1 Sectoral distribution of Cohesion Policy spending by the source of financing at the end of 2016 (in %)
Source: ITMS (2017), Own calculations

Note: A-Agriculture, forestry and fishing, B-Mining and quarrying, C-Manufacturing, D-Electricity, gas, steam and air conditioning supply, E-Water supply; sewerage, waste management and remediation activities, F-Construction, G-Wholesale and retail trade; repair of motor vehicles and motorcycles, H- Transportation and storage, I-Accommodation and food service activities, J-Information and communication, K-Financial and insurance activities, L-Real estate activities, M-Professional, scientific and technical activities, N-Administrative and support service activities, O-Public

administration and defence; compulsory social security, P-Education, Q-Human health and social work activities, R-Arts, entertainment and recreation, S-Other service activities, U-Activities of extraterritorial organisations and bodies.

Figure 1 shows the share of Cohesion policy spending (EU contribution, state budget co-financing and own resources of beneficiaries) in selected NACE sectors of the Slovak economy. The inclusion of state budget co-financing and own resources of final beneficiaries changed the ranking of the sectors, which benefited the most from Cohesion Policy interventions. It is especially visible in the manufacturing sector, where the share of own resources is almost at 50 %.

Table 1 Sectoral distribution of Cohesion Policy spending by the source of financing at the end of 2016 (EUR million)

NACE	EU contribution	State budget	Own resources	Total
Agriculture, forestry and fishing	24.63	5.04	9.61	39.28
Mining and quarrying	2.83	0.50	3.31	6.64
Manufacturing	465.97	82.24	525.31	1 073.52
Electricity, gas, steam and air conditioning supply	117.85	20.79	153.75	292.40
Water supply; sewerage, waste management and remediation activities	712.95	124.99	85.04	922.98
Construction	2 509.58	442.77	4.01	2 956.35
Wholesale and retail trade; repair of motor vehicles and motorcycles	14.12	2.49	6.66	23.27
Transportation and storage	677.59	191.84	56.17	925.59
Accommodation and food service activities	115.26	20.34	133.92	269.53
Information and communication	89.69	15.36	6.32	111.37
Financial and insurance activities	328.03	57.89	0.26	386.17
Real estate activities	10.47	1.85	9.73	22.05
Professional, scientific and technical activities	771.68	122.47	66.22	960.37
Administrative and support service activities	308.75	51.92	8.00	368.68
Public administration and defence; compulsory social security	4 037.81	683.24	130.44	4 851.49
Education	886.65	121.94	36.41	1 045.00
Human health and social work activities	297.25	52.21	9.10	358.56
Arts, entertainment and recreation	213.65	55.62	35.33	304.60
Other service activities	76.97	12.58	5.44	94.99
Activities of extraterritorial organisations and bodies	0.86	0.13	0.05	1.03
Not specified	46.27	4.53	5.00	55.80
Total	11 708.86	2 070.73	1 290.08	15 069.67

Source: ITMS (2017), Own calculations

Table 2 Comparison of Gross fixed capital formation and Cohesion Policy spending in Slovak economy

	% share in total		
NACE 2 Classification	Gross fixed capital formation (cumulative 2007 - 2016)	Cohesion Policy spending (cumulative 2007 - 2016)	Coefficient
	(A)	(B)	(B)/(A)
Agriculture, forestry and fishing	2.64	0.26	0.10
Mining and quarrying	0.47	0.04	0.09

Manufacturing	23.50	7.15	0.30
Electricity, gas, steam and air conditioning supply	9.74	1.95	0.20
Water supply; sewerage, waste management and remediation activities	2.90	6.15	2.12
Construction	2.10	19.69	9.36
Wholesale and retail trade; repair of motor vehicles and motorcycles	6.09	0.15	0.03
Transportation and storage	8.55	6.16	0.72
Accommodation and food service activities	0.87	1.80	2.07
Information and communication	4.95	0.74	0.15
Financial and insurance activities	1.49	2.57	1.73
Real estate activities	16.33	0.15	0.01
Professional, scientific and technical activities	1.95	6.40	3.29
Administrative and support service activities	3.70	2.46	0.66
Public administration and defence; compulsory social security	10.02	32.31	3.23
Education	1.56	6.96	4.45
Human health and social work activities	2.05	2.39	1.16
Arts, entertainment and recreation	0.86	2.03	2.35
Other service activities	0.22	0.63	2.94
Activities of extraterritorial organisations and bodies	-	0.01	-

Source: EUROSTAT (2017), ITMS (2017), Own calculations

Table 2 shows the comparison of gross fixed capital formation and Cohesion Policy spending in all sectors of the economy. In 2007 – 2016, the cumulative gross fixed capital formation reached EUR 160 billion, with the manufacturing sector contributing the most with EUR 37.7 billion. The share of the manufacturing sector on represents 23.5 % in total gross capital formation, followed by real estate activities with 16.6 % share.

The localisation coefficient shows the ratio of gross fixed capital formation share in the relevant sector relative to the share of Cohesion Policy support in the sector. The values above 1 show, that the Cohesion Policy support was the most important contributor to overall investments in this sector. This is especially visible in the construction sector (Table 2) where the value of the coefficient is above 9.

Education, professional, scientific and technical activities as well as public administration and defence were also among the sectors where Cohesion Policy was the most important source of investments.

4.2 Cohesion Policy Spending in the Manufacturing Sector

The manufacturing industry is one of the most important sectors of the Slovak economy. Slovakia ranks among the countries with the highest share of manufacturing in the EU (in 2016 the share amounted to 20 % of GDP, the EU average was 14,4%). Given its importance, it is natural that the manufacturing sector was the beneficiary of Cohesion Policy support. The financial implementation was at EUR 1074 million of which the EU contribution was EUR 466 million. The manufacturing sector was among the sectors, where the EU contribution was among the lowest (only 43%). The share of own resources of final beneficiaries in manufacturing reached 48%. The share of manufacturing on the total financial implementation of Cohesion Policy (EU sources, state budget, own resources of beneficiaries) reached only 7%.

The overall investment activity in the Slovak economy in 2007 – 2016 (measured by the gross fixed capital formation) shows that the manufacturing industry was among the most important

sectors (Table 2). The ratio of gross fixed capital formation and cohesion policy implementation (value 0.3) shows, that the financial implementation in this sector was under proportional. Table 3 and Figure 3 show the absolute and the relative distribution of financial implementation in the manufacturing sector. The results of comparison show that:

- The manufacture of fabricated metal products, except machinery and equipment was the most supported sector with EUR 244 million (with a higher share of own resources).
- The Cohesion Policy poorly supported the flagship of the manufacturing sector, the manufacture of motor vehicles, trailers and semi-trailers.
- The manufacture of coke and refined petroleum products had the second lowest support from Cohesion Policy, but the lowest share of own resources from co-financing.

The financial implementation of Cohesion Policy in the manufacturing was influenced by various factors:

- The focus and character of Cohesion Policy related to the needs and expectations of enterprises in the manufacturing sector (e.g. level of private sector support, innovation support, in-house research and development, ecological aspects of production)
- The size of the sector (the Cohesion Policy interventions prefer small and medium-sized enterprises)
- Absorption capacity of final beneficiaries (e.g. research and development absorption of enterprises)
- Priorities set up by the government. The financial implementation for manufacturing was carried out via the OP Competitiveness and Economic Growth (80%) and only partially via other operational programmes. In this context, differences in the sectoral distribution may be caused by the different approach of managing authorities.

Table 3 Distribution of Cohesion Policy spending by the source of financing in manufacturing sector at the end of 2016 (EUR million)

NACE Two-digit	EU	State Budget	Own resources	Total
Manufacture of food products	44.54	8.37	43.68	96.59
Manufacture of beverages	23.90	4.22	28.78	56.89
Manufacture of textiles	2.55	0.45	2.21	5.22
Manufacture of wearing apparel	2.90	0.51	3.20	6.61
Manufacture of leather and related products	5.98	1.06	6.77	13.81
Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	13.15	2.32	12.63	28.10
Manufacture of paper and paper products	16.96	2.99	20.44	40.39
Printing and reproduction of recorded media	21.74	3.84	19.70	45.28
Manufacture of coke and refined petroleum products	2.59	0.44	1.10	4.13
Manufacture of chemicals and chemical products	9.54	1.68	12.19	23.41
Manufacture of basic pharmaceutical products and pharmaceutical preparations	7.49	1.28	6.79	15.56
Manufacture of rubber and plastic products	35.50	6.23	41.32	83.05
Manufacture of other non-metallic mineral products	29.21	4.97	28.90	63.09
Manufacture of basic metals	24.01	4.24	32.02	60.27
Manufacture of fabricated metal products, except machinery and equipment	103.52	18.15	122.15	243.82
Manufacture of computer, electronic and optical products	7.67	1.35	8.12	17.14

Manufacture of electrical equipment	9.38	1.65	8.53	19.56
Manufacture of machinery and equipment	37.93	6.69	45.47	90.08
Manufacture of motor vehicles, trailers and semi-trailers	12.32	2.12	13.83	28.27
Manufacture of other transport equipment	5.86	0.99	3.59	10.44
Manufacture of furniture	35.06	6.19	44.39	85.64
Other manufacturing	12.94	2.28	18.67	33.89
Repair and installation of machinery and equipment	1.24	0.22	0.84	2.29
Total	**465.97**	**82.24**	**525.31**	**1 073.52**

Source: ITMS (2017), Own calculations

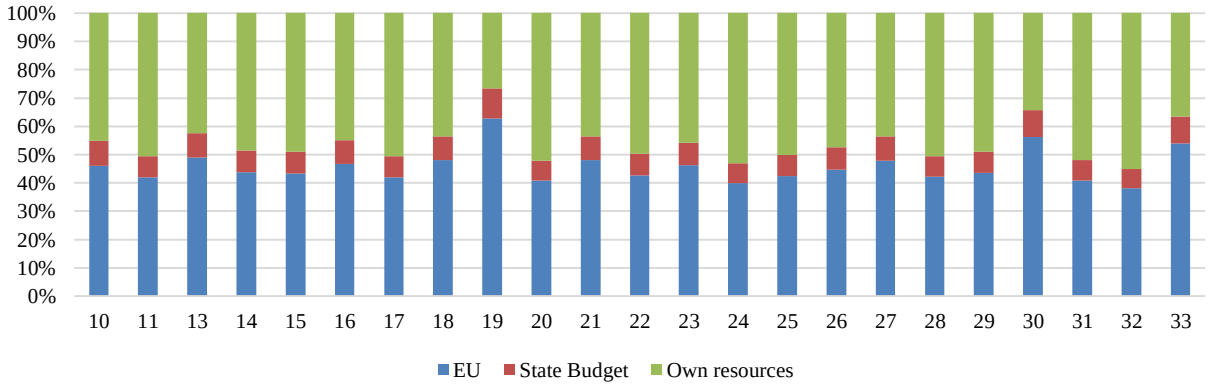

Figure 2 Distribution of Cohesion Policy spending by the source of financing in manufacturing sector at the end of 2016 (in %)

Source: ITMS (2017), Own calculations

Note: 10-Manufacture of food products, 11-Manufacture of beverages, 13-Manufacture of textiles, 14-Manufacture of wearing apparel, 15-Manufacture of leather and related products, 16-Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials, 17-Manufacture of paper and paper products, 18-Printing and reproduction of recorded media, 19-Manufacture of coke and refined petroleum products, 20-Manufacture of chemicals and chemical products, 21-Manufacture of basic pharmaceutical products and pharmaceutical preparations, 22-Manufacture of rubber and plastic products ,23-Manufacture of other non-metallic mineral products, 24-Manufacture of basic metals ,25-Manufacture of fabricated metal products, except machinery and equipment, 26-Manufacture of computer, electronic and optical products,27-Manufacture of electrical equipment, 28-Manufacture of machinery and equipment, 29-Manufacture of motor vehicles, trailers and semi-trailers, 30-Manufacture of other transport equipment, 31-Manufacture of furniture, 32-Other manufacturing, 33-Repair and installation of machinery and equipment, 33-Repair and installation of machinery and equipment.

When comparing the proportions of total investment and financial implementation of Cohesion Policy, we see several disproportions (Table 3). The "winner" among the manufacturing industries is printing and reproduction of recorded media. Given the relatively low overall investments in the period 2007 to 2016, this sector implemented an over-proportional share of Cohesion Policy support. The manufacture of motor vehicles, trailers and semi-trailers was in the context of Cohesion Policy strongly under-invested, the value of the coefficient 0.1 shows a significant disproportionality of gross fixed capital formation and support from the Cohesion Policy. Similarly, there are two other important industries with a very low value near to zero: manufacture of computer, electronic and optical products as well as manufacture of electrical equipment. The manufacture of basic pharmaceutical products and pharmaceutical preparations reached the value of the coefficient 2.7. Although this sector has rather a small share of gross fixed capital formation, the support from Cohesion Policy is positive due to its high-tech nature.

Table 4 Comparison of gross fixed capital formation and Cohesion Policy spending in the manufacturing sector (% of total GFCF)

Manufacturing sector	% share in total		Coefficient
	GFCF (cumulative 2007 – 2016)	Cohesion Policy spending (2007 – 2016)	
	(A)	(B)	(B)/(A)
Manufacture of food products + beverages and tobacco products	7.0	14.3	2.0
Manufacture of textiles + wearing apparel + leather and related products	1.1	2.4	2.2
Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	2.3	2.6	1.1
Manufacture of paper and paper products	2.5	3.8	1.5
Printing and reproduction of recorded media	0.8	4.2	5.4
Manufacture of coke and refined petroleum products	4.3	0.4	0.1
Manufacture of chemicals and chemical products	4.4	2.2	0.5
Manufacture of basic pharmaceutical products and pharmaceutical preparations	0.5	1.4	2.7
Manufacture of rubber and plastic products	8.3	7.7	0.9
Manufacture of other non-metallic mineral products	4.1	5.9	1.4
Manufacture of basic metals	5.9	5.6	1.0
Manufacture of fabricated metal products, except machinery and equipment	8.0	22.7	2.8
Manufacture of computer, electronic and optical products	6.3	1.6	0.3
Manufacture of electrical equipment	5.6	1.8	0.3
Manufacture of machinery and equipment n.e.c.	8.3	8.4	1.0
Manufacture of motor vehicles, trailers and semi-trailers	25.5	2.6	0.1
Manufacture of other transport equipment	0.7	1.0	1.4
Manufacture of furniture + other manufacturing	2.4	11.1	4.7
Repair and installation of machinery and equipment	2.0	0.2	0.1

Source: EUROSTAT (2017), ITMS (2017), Own calculations
GFCF – Gross Fixed Capital Formation

5 Conclusion

In the 2007 – 2013 programming period the Slovak economy benefited from additional investments atEUR 15 billion. Implementation of Cohesion Policy significantly improved and changed financing (mainly in the second half of programming period) in many fields. As we show in our contribution, the cumulative value of financing varies depending on the sector. The comparison of cumulative gross fixed capital formation share of the individual sectors on total gross fixed capital formation relative to Cohesion policy investments showed that investments in some sectors were heavily dependent on the support of Cohesion Policy. These sectors include construction, education, professional and scientific activities as well as public administration and social security.

The manufacturing sector as the main driver of the Slovak economy received relative moderate support from of Cohesion Policy. The share of EU contribution supporting the manufacturing sector has been compared to other sectors rather low. The average share of EU contribution was at 43.4 %. In this context, direct aid to the private business and its range is still a controversial issue in the national economic policy. Although one of the objectives of the Cohesion Policy is also to increase of competitiveness, the authors prefer to focus the Cohesion Policy support mainly for

public goods (e.g. education, efficient public administration, R&D, physical infrastructure, etc.) than direct aid for private enterprises in form of grants. In the previous programming period, the Cohesion Policy supported the manufacturing sector mostly by means of technology transfer, research and development, energy efficiency and environmental protection, and some minor support went to the human capital.

Acknowledgments

This paper was supported by the by the Slovak Scientific Grant Agency (VEGA) [No. 2/0070/15].

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The Importance of an Organizational Infrastructure in a National Substance Prevention System

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Abstract

The use of psychoactive substances is recognized not only as a threat to individuals and society but also represents a significant economic burden to the society. We aimed to (i) introduce prevention and a scientific approach to prevention and (ii) provide arguements that prevention is an important part of socialization process but only if done accordingly. Risk and protective factors that are linked with risk behaviors can be found on the individual level (biological and personal characteristics), micro-level environments (family, school, work etc.) and makro-level environments (community, society etc.). Based on more than 40 years of collecting evidence we know that risk behaviors are preventable. We also know that prevntion is cost-effective. Prevention is a field of expertise that has a real impact in the society if done accordingly. Therefore, prevention professionals and prevention scientists started to form professional groups with the common interest: to improve the field of prevention through: (i) development and implementation of evidence-based interventions and policies, (ii) education and training of the prevention workforce, (iii) establishment of functional infrastructures in prevention, and (iv) countinuous support of prevention research and prevention science as a whole.
Funding sources: This work was supported by the Czech Science Foundation (Grant no. 16-15771S) and Charles University, Prague (PRVOUK-P03/LF1/9).

Keywords: Prevention, Management of prevention, Social costs of addiction.

JEL Classification: I18, I12

1 Introduction

Healthy populations who live in safe and secure environments have a direct impact on human welfare and contribute to raising national income levels (USDS, 2015). Use of psychoactive substances (including tobacco and alcohol - usually illegal for children, the illegal drugs, inhalants, and the nonmedical use of prescription medications is recognized not only as a threat to individuals and society but also represents a significant economic burden to the society.

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The extent of worldwide psychoactive substance use is estimated at 2 billion alcohol users, 1.3 billion smokers and 185 million drug users (WHO, 2017). For example, alcohol alone substantially contributes to the global burden of disease with 4% of total mortality and ~5 % of disability-adjusted life-years (Rehm et al., 2009). Yet, we are not speaking about prevalences and specific problems in various sub-populations (e.g. Petruželka et al., 2017).

Problems linked to substance use have a direct and indirect impact to the healthcare sector (e.g., medical care spending), criminal justice systems, workplaces (including productivity losses), as well as other sectors of the economy. In the the U.S.A. alone, crime-, lost work productivity- and health care-related costs are estimated at more than $740 billion each year (NIDA, 2017).

Substance use is considered a risk behavior. Engagement of a person in any type of risk behavior increases the odds of death, injury, and/or psychosocial harm unrelated to temporal proximity. Risk behaviors are addictive (behaviors) and thus repeated. This means that we talk about a behavior that is both rewarding and reinforcing (EUPC, in preparation). An early recognition of populations/individuals who are at risk of substance use but are not using and/or of those who are already using substances is the key to success that at the very end decreases the incidence and prevalence of drug use. Substance use is one of the largest avoidable risk factors.

The aim of this paper was to (i) introduce prevention and a scientific approach to prevention and (ii) provide arguements that prevention is an important part of socialization process but only if done accordingly.

2 Prevention

In our lifes and life of our children, not all things go as planned. We encounter various types of problematic situations to which we react in certain ways. In prevention we try to minimize the odds of occurence of problematic situations (for example, not being exposed to violence) and also educate people in order to recognize problematic situations early and train them to react the best possible way.

There are different definitions of prevention. According to one of them *`prevention is performed to forestall and/or delay specific health, social and educational problems, and/or to reduce their negative impact on individuals and society`* (Miovský et al., 2012).

While substance abuse is classified as a disease, drug use is considered a behavior - not a disease or a disorder as such (Sloboda, 2014). According to Sloboda (2014), preventive interventions in any environment are part of the socialization process (see Figure 1). Macro-level environments represent economic and socio-political, media and other influences that manifest themselves on the social climate and further form the social environment. The macro-environment environment has a direct impact on the individual and the micro-level environment and a indirect influence (through micro level) on an individual. The micro level represents the family and caregivers, the closest social environment, such as peers, school, interest groups, etc. In Figure 1, there are areas of influence (points of intervention) that can be applied to prevention / socialization. Understanding the role and importance of prevention interventions for society means understanding the influence and significance of the socialization process.

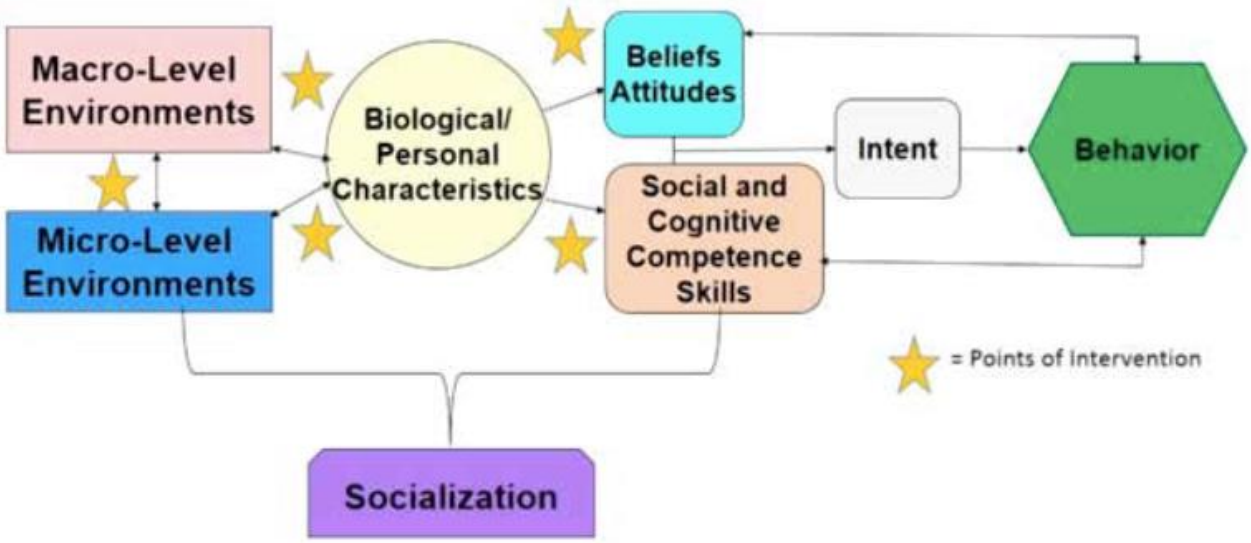

Figure 1 An Interaction of Personal Characteristics and the Micro- and Macro-Level Environment Socialization, and Points of Intervention
Source: Sloboda (2014)

3 Key tools in prevention

There are many factors that affect the quality of the prevention interventions that are beneficial to the society. The quality (effectiveness) of any prevention intervention that is delivered to the target groups depends on many factors. But the key factors are the: interventions (what specific activities are done and with whom), implementers (and their level of knowledge, skills and competence), coordinators and infrastructure (organizational factors), and science and research (how evidence is being bulit).

3.1 Interventions

Effective prevention consists of specific and specialized activities. By this we mean that prevention is based on a long-term work when we pay attention to target group(s) from early developmental stages and follow them in their course of life. We try to detect any problem early and to react – deliver intervention - as soon as possible after the first detection to achieve relief of improvement. As severity builds up over time, the simple rule says: If we start working with the problem early we increase the chances of success.

If we want prevention to perform well we need evidence-based interventions, policies, and practices, where evidence is build through high quality research. Let us begin with a simple question: `What are the interventions and policies delivered to the target groups based on?`: We surely will get different responses from people from practice. And some of them may be very active in the field of prevention for more than 30 years. But where they obtain the feedback on their work? How they actually know their effort is coined with a positive change in the targeted behaviors?

From the resposes, we created the following categories of approaches of how evidence in prevention is created, each represented by a characteristic statement (Gabrhelík, 2016): First approach is based on ideology. The typical response would be: `Our approach works because we believe it.` But any belief does not tell us about the real impact of what we do. Another approach

is based on practice. The typical response would be: `Our approach is popular in practice - children like it, so we think our approach works.` This response would represent such preventive efforts when children are asked for a feedback and how they liked whatever activities right after the end of the prevention program. While this approach is somehow better than the previous one it does not really tell us about how we actually changed the behavior of those targeted. And then there another approach that is based on evidence & research. The typical response would be: `The results are statistically significant and children like the intervention (fidelity), so we assume that the approach is effective.` The evidence-based is the only approach that can inform us about a true change in the behavioral outcomes observed in our target groups.

Prevention is a long-term work with the target group. It consists of a delivery of single interventions that are complementary of each other and the effect builds over time, Immediate improvement is not possible in most cases either. A single intervention is simply not enough to cause profound changes in human behavior. In prevention, we are not telling „not to do“ something“ but rather „what to do instead“ of the unwanted behavior and „how to do it“. Knowing how and when to deliver multiple and complex interventions is the key to success.

3.2 Implementers

If we expect from prevention to have an impact in the society it is obvious that any type of prevention interventions should be delivered by those who know how to do it. To do the right things in the right time with the right tools with the right target group requires a specific knowledge, skills, and compentence. To have appropriate knowledge means that we have all necessary information that are needed to perform well. Skills are needed to apply specific and appropriate knowledge when needed. Competence tells us about the level of knowledge and skills when applied to any situation in real-life practice. Knowledge, skills, and compentence must be orchestrated in such a manner that increases the impact of prevention interventions to a maximum possible. If we want to have specialists in prevention with higl level of knowledge, skills, and competence we must invest in their professionalization.

3.3 Coordinators and infrastructure

To succeed with prevention we must provide (at least) fundamental knowledge to those who coordinate prevention - opinion leaders, decision makers and policy makers - about the most up-to-date, effective, evidence-based prevention interventions that are currently available.

Opinion leaders, decision and policy makers are found at every level of prevention work. They can be prevention coordinators, prevention specialists, prevention workers or policy makers, located at the community, state or country level (EUPC, in preparation). We talk about professionals who are `responsible for the planning, implementation, and monitoring of prevention interventions and/or policies within a defined geographic area. These individuals not only supervise prevention workers who help deliver or monitor prevention interventions, but also serve as the ‘face’ and ‘voice’ of prevention in the society` (EUPC, in preparation, p. 14). But in this respect it is important to clearly distinct between the formal possition (i.e., when someone is appointed to do something irrespective of his/her knowledge, skills and competence in prevention) and the level of education and training (i.e., ideally represented by tens and hundreds of hours of formal accredited education and training and certain level of credentials) before we call someone prevention professional.

The emphasis on formal education and training in prevention and prevention science is on rise worldwide. Prevention professionals and prevention scientists started to form professional groups with the common interest: to improve the field of prevention through education and training of the prevention workforce. In Europe, the European Society for Prevention Research (EUSPR) was founded in 2010. EUSPR `promotes the development of prevention science, and its application to practice so as to promote human health and well-being through high quality research, evidence based interventions, policies and practices` (EUSPR, 2017). Establishment of national prevention societies is being increasingly reported.

Evidence-based prevention interventions and policies and activities within the science of prevention can be only delivered and conducted under specific conditions. By these conditions we mean a strong and functional infrastructure. For this `backbone` prevention infrastructure to function well we need (Gabrhelík, 2016):

- sufficient legislative support (UNODC, 2015) that is stable in time;
- adequate funding (UNODC, 2015) at all levels (co-ordination, implementation, research, etc.)
- active and co-operating institutions (on the levels of co-ordination, implementation, research, common interests, etc.),
- a system of quality control of services and providers,
- ongoing support of implementation efforts and continued pressure on quality improvement (UNODC, 2015),
- support of research and scientific activities that help to build the most up-to-date evidence.

Organizational infrastructure in prevention must be based on adequate planning, clearly formulated goals and based on mid- and long-term prevention strategies. Support from the financially-involved institutions is a prerequisite for the existence and proper functioning of prevention professionals (implementers, coordinators, researchers, etc.) and the wide implementation of prevention interventions into practice. Impact of all prevention interventions and political decisions must be continually evaluated (UNODC, 2015). Activities can be adequately planned for the next period only when based on this feedback (Gabrhelík, 2016). See Figure 2.

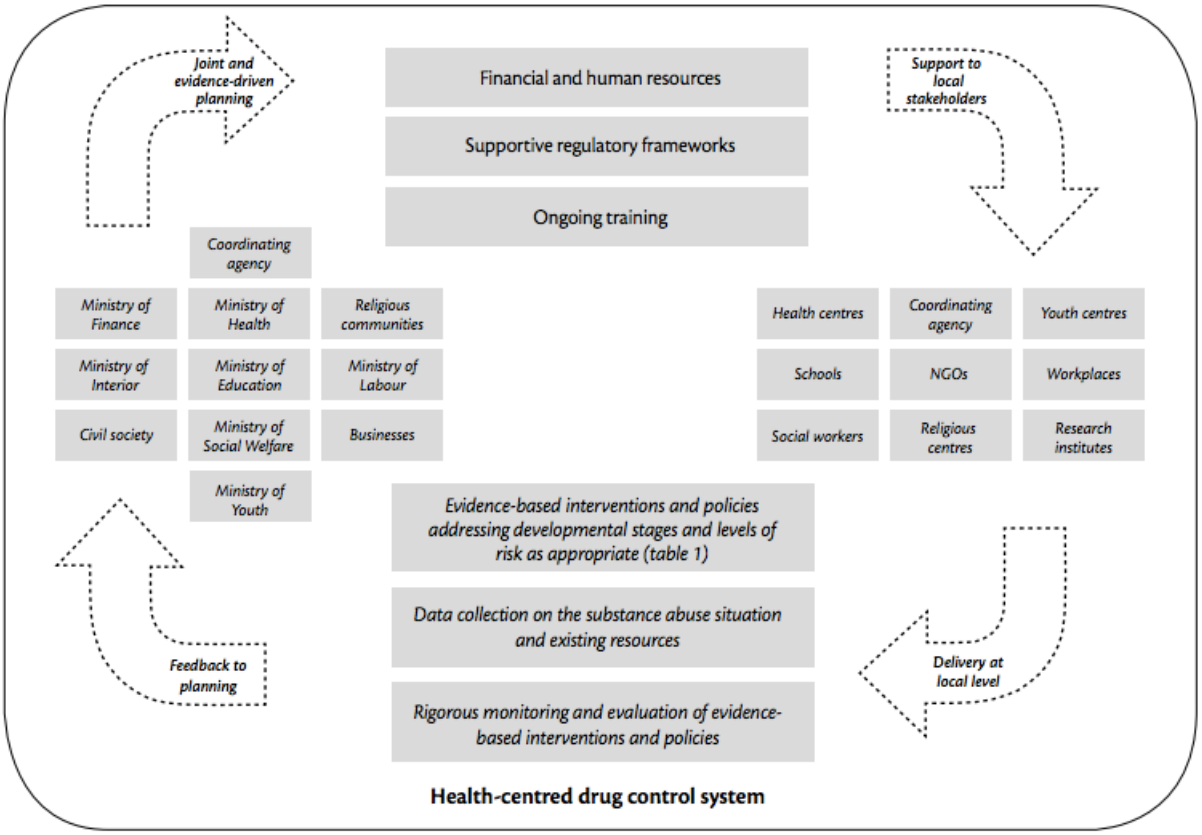

Figure 2 Organizational infrastructure of prevention on a national level
Source: UNODC (2015)

3.4 Science and research

One of the prerequisites for continuously improving quality of any type of prevention services provided is to get feedback on how well we perform in what we do - whether preventive activities actually change something (for example, by reducing the prevalence of drug use among the children population; e.g. Miovský et al., 2015).

In order to build robust evidence-based practices, we then talk about the science of prevention, that provides an understanding of the factors associated with the initiation and progression of substance use: how substance use has affected individuals, families, schools, communities, and countries; and how it can be addressed with effective strategies, policies and interventions (EUPC, in preparation, p 30).

In addition to research, various prevention quality measures – prevention standards - are being introduced as a proof and guarantee of the quality of publicly provided prevention services, while the criteria of quality (standards) are introduced by professionals and professional organizations and regulated and authorized by public authorities (Gabrhelík, 2016).

4 Conclusion

We aimed to (i) introduce prevention and a scientific approach to prevention and (ii) provide arguements that prevention is an important part of socialization process but only if done accordingly.

Risk and protective factors that are linked with risk behaviors can be found on the individual level (biological and personal characteristics), micro-level environments (family, school, work etc.) and makro-level environments (community, society etc.) (Sloboda, 2014).

Based on more than 40 years of collecting evidence we know that risk behaviors are preventable. We also know that prevntion is cost-effective. Prevention as a field of expertise that has a real impact in the society if done accordingly. Therefore, prevention professionals and prevention scientists started to form professional groups with the common interest: to improve the field of prevention through: (i) development and implementation of evidence-based interventions and policies, (ii) education and training of the prevention workforce, (iii) establishment of functional infrastructures in prevention, and (iv) countinuous support of prevention research and prevention science as a whole.

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Influence of the Selected Socio-Economic Indicators on Diabetes Mellitus Mortality in the Slovak Republic in Period from 2005 to 2013

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Abstract

Diabetes mellitus is one of the most serious metabolic disorder for the mankind in the recent years. Many studies demonstrate the fact that the substantial part of the major causes of mortality and morbidity is closely related to the social status and also to the economic position of the population. People with the highest socio-economic status have the best health, whilst the lowest health level is observed in humans with the lowest socio-economic status. Thus, it can be stated there is a very close linkage. In general, diabetes mellitus is associated with other diseases too. The socio-economic aspects play an important role in a field of the related research. The outcome of the analysis shows that the Gini coefficient and a share of the Roma nationality have a positive impact on the standardised mortality rate of the diabetes mellitus, whilst the unemployment rate, the income, the poverty, and the income quintile ratio have a negative influence. The biggest impact is caused by the income quintile ratio, which can be described in the terms of its meaning as one of the most important income indicators. This outcome is able to serve as an elementary part of a platform for further research.

Keywords: Diabetes mellitus, Standardised mortality rate, Income, Poverty, Gini coefficient, Income quintile ratio, Roma nationality.

JEL Classification: N34, P36

1 Introduction

Diabetes mellitus is one of the most common metabolic disorders in the world and the prevalence of diabetes in adults has increased in the recent decades. The urbanisation process has triggered dramatic changes in the lifestyle of the population, which has also led to an increase in risk factors for type 2 diabetes. The prognosis of the disease development is very important for planning financial and other treatment resources, managing health promotion policies and developing prevention programmes (Szabo and Sidor, 2014). Many research teams reflect these negative predictions and try to capture all important factors in order to monitor as closely as possible the trends in the development of these diseases (Guariguata et al., 2014; Walker et al., 2014; Gajdos et al. 2015, Staňková and Papadaki, 2017). Many studies show that majority of the main causes of mortality and morbidity are closely linked to the socio-economic position. As many research studies have shown, people with the highest socio-economic status have the best health status. They are slightly worse at lower levels and the worst health is seen in people with the lowest level (Islam,

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2017). Rahman et al. (2015) respond to these premises confrontationally and prove this by finding that, unlike other advanced countries, the diabetes in Bangladesh is widened among the population with a higher socio-economic status. High prevalence of diabetes, lack of awareness of diabetes and risk factors, less likely to receive adequate treatment in people with lower socio-economic status, create the potential for a rapid increase in the number of diabetes diseases. Rahman et al. (2015) also call for the necessary preventive programmes in the study helping to improve situation.

2 Literature Overview

Diabetes belongs to the group of the chronic non-communicable diseases and according to the statistics, its morbidity records an increasing trend in the world. According to the authors of several research studies, this disease is the most serious for people living in unfavourable socioeconomic conditions (Mc Donald Posso et al., 2015; Rahman et al., 2015; Camelo et al., 2016; Islam, 2017). Significant progress and a serious public health problem worldwide is caused by type 2 diabetes, which brings many chronic complications and puts a heavy burden on patients and the whole society. It also includes increasing economic costs by a growing need for treatment (Morsanutto et al., 2006; Elgart et al., 2014). As stated in the latest study by Turi and Grigsby-Toussaint (2017), adults with diagnosed diabetes have more than twice the mortality risk compared with the overall population. According to Guariguata et al. (2014), 382,000,000 inhabitants were diagnosed with diabetes in 2013 and this figure should increase to 592,000,000 by 2035. A majority of the diabetes diagnosed population lives in low income and middle income countries. Islam (2017) states that the probability of a gradual increase in the incidence of diabetes morbidity and hypertension in the near future will affect population with medium and high social-economic status. Many studies declare the influence of the social and economic conditions on the development of complications in the both types of diabetes (Collier et al., 2015). Turi and Grigsby-Toussaint (2017) report that socio-economic status and social capital, behavioural and environmental factors significantly contribute to diabetes related mortality. Other research teams consider the relationship between the prevalence of type 1 diabetes social-economic status to be controversial (Akerblom et al., 2002; Collier et al., 2015). This is due to the wide variability and the degree of influence of environmental factors – for instance human exposure to virus or undesirable components in drinking water – and also to the socio-economic status of the individual combining with the population density. As reported in the results of their study, this status and gender too have an impact on glycaemic management, the development of cardiovascular risk factors, and the complications of type 1 diabetes. The prevalence of social and economic conditions on type 1 diabetes prevalence is underestimated. Felea et al. (2014) in his study does not differentiate the effects of diabetes on the age of patient and emphasises that diabetes is a major health problem not only for patients but also for their families. Similarly, they highlight the presence of diabetes related complications in several age categories and their adverse impact on the autonomy and quality of life of patients and their family members. In his study, he also focuses on the main risk factors – such as lifestyle, urbanisation, inappropriate eating habits, growing obesity, and so on.

Major associations of diabetes prevalence are studied by Jaffiol et al. (2013) in their study, which focused on the French population. The authors examine and evaluate the impact of deprivation on diabetes prevalence. According to their findings, it increases with deprivation. Deprivation is associated with an adverse health condition and lifestyle. In the next period, they begin to examine in detail the effect of nutrition on the diabetes prevalence in the group of people in the lowest social and economic conditions. Dalsgaard et al. (2012) examine the deeper impact of the social gradient

on ensuring optimal health care for diabetes patients. In their study, they emphasise the importance of monitoring the quality of health care provided in order to be able to assess the optimal healthcare provided for these patients. They call on the significance of prevention programmes and targeted interventions. Walker et al. (2015) highlight in the conclusions of their research the need for intervention programmes that can increase self-confidence and social support, reduce burden of comorbidity, increase adherence and cessation from smoking, and so on.

Hypertension has also a significant effect on the diabetes prevalence. It causes many health problems and also worsens development of many diseases. People with high blood pressure have a higher probability of developing or worsening diabetes (Felea et al., 2014). For people with hypertension, the risk of diabetes presence is increased by 1.5 %. Its prevalence is three times higher in patients with abdominal obesity (Felea et al., 2013). Collier et al. (2015) points to the opposite dependence between diseases – obesity associated with deprivation in diabetes, even with distinct gender differences. This association is most obvious in female sex with type 2 diabetes. Other experts (dos Santos Feltrin et al., 2016) point to the relationship between diabetes and tuberculosis. The probability of tuberculosis is found for diabetic patients. The authors call for a need of the targeted prevention programmes for blood tests as well as for the occurrence of dry cough. Collier et al. (2015) and Jackson et al. (2012) analyse the risk of cardiovascular mortality among women with type 2 diabetes and women without diabetes in their studies. The findings show that the increased risk of cardiovascular mortality seen in women with type 2 diabetes versus women without it can be due to risk factors such as abdominal obesity, insulin resistance, and inflammatory disease. These differences are less noticeable in men.

The relationship between socio-economic status and health outcomes is complex and mediated by many factors, including a differentiated approach to health care, behaviour, psychological and social, and biological factors too. People with lower socio-economic groups are more likely to participate in negative health behaviour – smoking, lower fruit and vegetable consumption, sedentary lifestyles – and are more likely to get overweight or obese (Hemmingsson & Lundberg, 2005; Oluwatowoju et al., 2010; Collier et al., 2015). The risk factors associated with diabetes development are discussed in more detail in the study by Mc Donald Posso et al. (2015). They point out that many preventative measures motivate patients to various sports and physical activities, but a huge role is played also by family history of diabetes, high blood pressure, and so on. in both genders. An interesting study and findings are also provided by Camelo et al. (2016), who examined the impact of socio-economic status during human life and social mobility in the context of diabetes on a group of 12,000 civil servants in Brazil. Accumulation of risk and social mobility is associated with the emergence of diabetes. The results of the analyses are also evidenced by the fact that exposure to social difficulties in the lower age plays an important role in promoting insulin resistance, diabetes incidence and diabetes related mortality. A low level of adult socio-economic status appears to be a more significant factor in the presence of diabetes than the weaker socio-economic position of a younger person due to better insulin resistance and lower incidence of diabetes. Women's changes in the social hierarchy and accumulated exposure to social risks do not have a significant impact on the risk of developing a diabetes, showing differences in mechanisms linking socio-economic positions with lifecycle and diabetes in men and women.

3 Data and Methodology

The data set comes from the two databases – obtained from the Statistical Office of the Slovak Republic (Štatistický úrad Slovenskej republiky) and from the National Health Information Center (Národné centrum zdravotníckych informácií) of the Slovak Republic, which provides primary source of national health statistics under the conditions of the contract.

As the elementary input data for the modelling process the mid-year state of all the population divided by the sex, the age groups and the individual regions in each explored year have been applied. Mortality rate is calculated as age-standardised to the revised European standard population by the age groups adopted by the Eurostat according to the last revision in 2012. It is expressed by standardised mortality rate, which is stated as number of total deaths per 100,000 inhabitants. We have applied the method of direct standardisation to eliminate variances resulted from differences in age structure of the population across the regions and over time, ensuring the necessary conditions for comparing the regions of the Slovak Republic.

We have applied the regression analysis for the panel dataset. The selected methodology of the regression analysis is a between approach. This choice was done according to the accomplished tests that show usage of this methodology as the most appropriate manner to examine the given data set.

There are a few notes, which should be taken into consideration, to exactly specify the chosen income indicators. Unemployment rate – UR – means a ratio of a number of unemployed inhabitants to a number of the economically active inhabitants for the previous year. Mean equivalised net income per household – I – represents a household disposable income divided by equivalent household size. Individual household members are assigned weights – 1 for the first adult household member, then 0.5 per each additional adult member, 0.5 per each adolescent from 14 years of age and over and 0.3 per each child younger than 14 years of age. At-risk-of-poverty threshold – P – is set at 60 % of national median equalised disposable income of individual. It expresses the percentage of inhabitants with an equivalent disposable income below a set boundary. Gini coefficient – GC – is an indicator of monetary poverty, which shows the inequality of income distribution, and is defined as the relationship of cumulative shares of the population arranged according to the level of equalised disposable income, to the cumulative share of the equivalised total disposable income received by them. It can gain values from 0 meaning absolute income equality to 1 signalling absolute income inequality. Income quintile ratio or S80 to S20 ratio – IQR – is a measure of income distribution inequality. It is calculated as a proportion of the total income of 20 % of the richest people in society – located in the top quintile – relative to the total income of 20 % of the poorest people – located in the lowest quintile. Social benefits – SB – include all the types of monetary social help aimed at poor, disabled, or otherwise handicapped people. This indicator expresses the whole amount of euro paid to the inhabitants that are allowed to obtain such a state financial aid. Roma nationality rate – RN – represents a share of the Roma nationality inhabitants to the whole population of the Slovak Republic.

4 Results and Discussion

The general overview of the diabetes mellitus standardised mortality rate is demonstrated by the following maps. They show regional disparities of this variable.

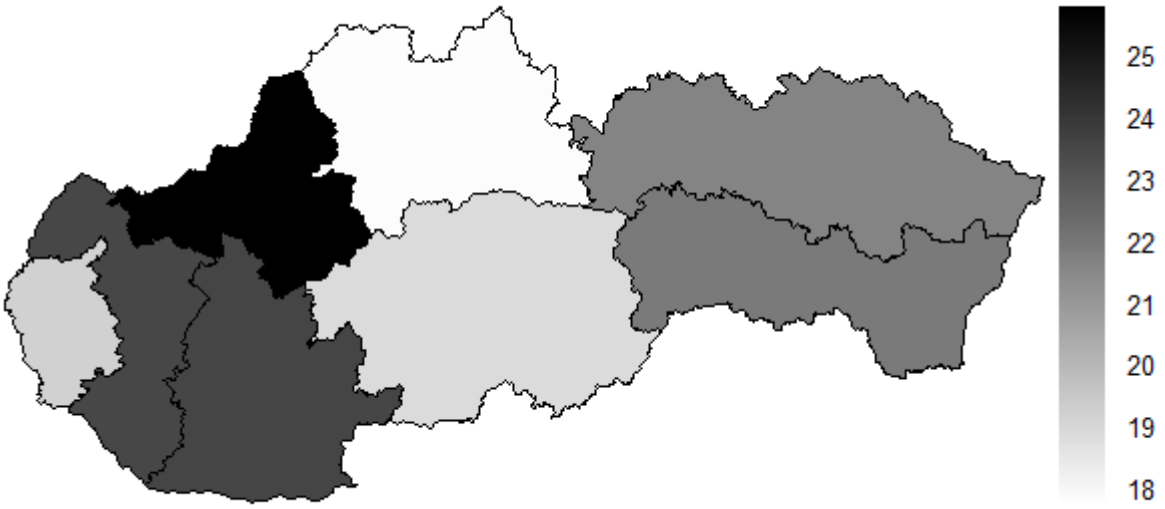

Figure 1 The standardised mortality rate of diabetes mellitus in the particular regions of the Slovak Republic in 2005
Source: Own elaboration by the authors

Figure 1 visualises the standardised mortality rate of diabetes mellitus in the particular regions of the Slovak Republic at the beginning of the observed period in 2005.

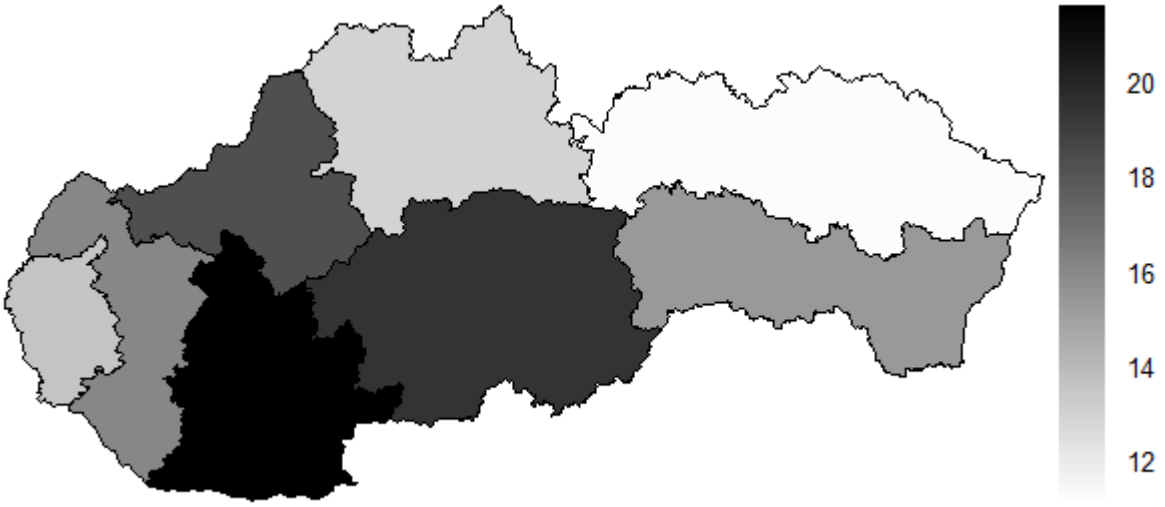

Figure 2 The standardised mortality rate of diabetes mellitus in the particular regions of the Slovak Republic in 2013
Source: Own elaboration by the authors

The state of the standardised mortality rate of diabetes mellitus in the particular regions of the Slovak Republic at the end of the explored period in 2013 is pictured on Figure 2.

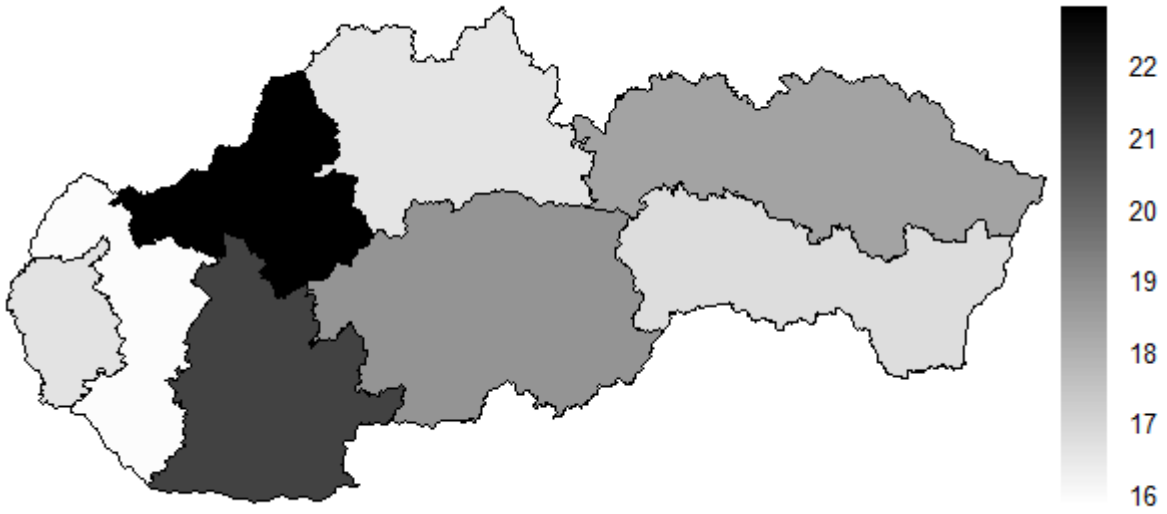

Figure 3 The average standardised mortality rate of diabetes mellitus in the particular regions of the Slovak Republic
Source: Own elaboration by the authors

The average standardised mortality rate of diabetes mellitus in the particular regions of the Slovak Republic throughout the whole observed period from 2005 to 2013 is imagined on Figure 3.

The substantial part of the investigation is done by the regression analysis. The below mentioned regression coefficients are rounded to two decimal places. In Table 1, the whole figures are stated. The regression model series contains the two regression models. The first one involves all the variables that are prepared to enter the modelling process.

The first model's equation has the following appearance:

$$SMR = -3.33\,UR - 0.62\,I - 3.50\,P + 33.05\,GC - 113.41\,IQR - 0.32\,SB + 7.54\,RN$$

The best p-value is reached by the UR variable. Then, the variables IQR, GC, I, RN and P succeed according to their p-values. The worst p-value belongs to the SB variable. Therefore, this variable is excluded from the further modelling process. Its removal does not impact standardised mortality rate.

The formula of the second regression model looks like:

$$SMR = -3.28\,UR - 0.57\,I - 3.15\,P + 30.80\,GC - 106.63\,IQR + 6.49\,RN$$

All the variables involved in the modelling process get better p-values. All of them fully fulfil a five-per-cent significance level that is considered to be an enough statistically acceptable significance level. As it is from the both equations apparent, only small changes appear in the estimated coefficients of the included variables. This confirms the robustness of the model.

The biggest absolute impact on the standardised mortality rate is caused by income quintile ratio – in the order of hundreds. All the other variables influence the estimated standardised mortality rate in the order of units. In terms of an estimated coefficient the lowest impact is measured by the I

variable. Only two of them – GC and RN – have a plus sign in front of their estimated coefficient, whilst the other ones – UR, I, P, and IQR – dispose a minus sign. Also, the SB variable influences the modelled dimension in a negative way – in the previous model.

Unemployment rate influences the standardised mortality rate in a negative way. Each increment of unemployment rate in percentage point subtracts from standardised mortality rate 3.28 deaths.

Income has the lowest numerical effect on the standardised mortality rate. This fact is caused by comprehension of this indicator. It is expressed in an amount of currency units – in our case in euro. Such an approach demonstrates decrease of a number of deaths per 100,000 inhabitants by 0.57 person in a case, when mean equivalised net income per household raises by 1 currency unit.

Poverty behaves very similarly to unemployment rate. Its estimated coefficient is very alike too. Each change in percentage point, which is caused by the inhabitants, who fulfil the requested requirements based on income – their income falls under at-risk-of-poverty threshold, diminishes the standardised mortality rate by 3.15 deaths.

Gini coefficient has the second biggest impact on the standardised mortality rate. A one-unit increment of this indicator is followed by rise of standardised mortality rate by 30.8 deaths.

Income quintile ratio performs very strongly in this regression analysis. The absolutely biggest impact on standardised mortality rate is computed at a level of 106.63 in a negative way. Increment of this indicator by one unit means a decrease of standardised mortality rate by 106.63 deaths, but from a point of view of the income quintile ratio formula, such an expression is only theoretical, because its resultant value ranges from 0 to 1. This supposes changes happen in smaller scale. Therefore, a big absolute value of the estimated coefficient does not vastly lead to considerable increase or decrease of standardised mortality rate. In brief, a one-percentage-point increase of income quintile ratio declines a number of deaths per 100,000 inhabitants by 1.07.

Roma nationality share has a positive impact on the standardised mortality rate in a way which a one-percentage-point increment of the rate is succeeded by an increase of the standardised mortality rate by 6.49 deaths.

Table 1 Summary of the regression models

variable	model 1			model 2		
	estimated coefficient	p-value	significance level	estimated coefficient	p-value	significance level
UR	-3.32887	0.1257		-3.2752	0.02165	**
I	-0.62111	0.178		-0.5716	0.02313	**
P	-3.50011	0.2126		-3.1497	0.03121	**
GC	33.05052	0.1543		30.8016	0.01726	**
IQR	-113.41332	0.1387		-106.6287	0.01426	**
SB	-0.31527	0.7751				
RNS	7.53639	0.1836		6.49	0.01859	**

Legend for the Table : **** denotes a significance level lower than 0.001 including, *** denotes a significance level lower than 0.01 including, but higher than 0.001, ** denotes a significance level lower than 0.05 including, but higher than 0.01, and * denotes a significance level lower than 0.1 including, but higher than 0.05.
Source: Own elaboration by the authors

The previous table demonstrates a summary of the regression coefficients of the involved variables. As it is seen here, the first model involves no statistically significant variable, whilst the second one comprises only the statistically significant variables. Although, they are significant at the third highest level.

5 Conclusion

The paper discusses mortality caused by diabetes mellitus – one of the most serious metabolic disorder in the recent period. Mortality is expressed by the normalised indicator, which is represented by the standardised mortality rate. The aim of this paper is to identify the impact of monitored variables on mortality using the dataset reflecting the figures related to the observed period. The applied indicators are the unemployment rate, the income, the poverty, the Gini coefficient, the income quintile ratio, the social benefits, and the Roma nationality share. The purpose of the analysis is to explore impacts of these variables. Moreover, it is intended to create a platform for the further research.

Diabetes mellitus belongs to a group of the chronic non-communicable diseases. The statistics of its morbidity demonstrate that it has an increasing trend in the world in the recent years. Therefore, it is going to be considered the serious problem for the mankind. There are several aspects which influence its morbidity and mortality too – from social factors to economic factors. This analysis tries to show impacts of the most substantial socio-economic factors related to income.

As the executed regression analysis has shown, there is several socio-economic indicators that possess statistically significant impact on the standardised mortality rate. The only cancelled indicator because of the statistical insignificancy is a value of the social benefits. The two indicators have a positive impact on the explored mortality – these are the Gini coefficient and the Roma nationality share. The first one has the biggest positive impact too – at a level of 33.80. The share of the Roma nationality influences the dependent variable more low by a value of 6.49. On the other hand, the other four variables influence mortality in a negative way. The unemployment rate possesses an impact at a level of -3.28, the income indicates decrease by a value of 0.57, the poverty is also expressed by a -3.15 decline. The highest negative impact is caused by the income quintile ratio and it stands at a level of -106.63.

These factors interact with each other generally. For that reason, it is quite demanding to mark the most significant dimensions form an angle of view of putting into the practice. This analysis demonstrates their statistical significance. It is a question for further analysis to verify these effects. The presented outcome serves as a substantial part of the potential research platform to be created in this field in the future.

Acknowledgements

This contribution is created within the project supported by the Scientific Grant Agency of the Ministry of Education, Science, Research and Sport of the Slovak Republic 1/0945/17 Research of the economic quantification of marketing processes aimed at increasing the value for the patient, multi-dimensional analyses of the marketing mix of health facilities and quantification of their importance in the process of establishing a system to measure the quality and effectiveness of health system in the Slovak Republic.

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Spatial hedonic pricing model for real estate valuation in Košice

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Abstract

The aim of the paper was to analyze real estate hedonic pricing models on empirical data collected in the city of Košice, Slovakia. Data on a total of 576 flats have been collected using advertisements posted by real estate agencies. As a base reference point a simple OLS model was constructed with the price as dependent variable and a set of real estate characteristics as independent variables. The model was then expanded to include a measure of real estate location by including the distance to city center. This model was then compared to a set of spatial models based on a weight matrix formed using the 5 nearest members criterion. Statistically significant variables affecting real estate prices were identified as being consistent among the entire set of models along with the importance of the location of the real estate in relation to price.

Keywords: Hedonic price model, Real estate, Spatial econometrics, Košice.

JEL Classification: R32, R31, C31

1 Introduction

When it comes to real estate, the price variance is relatively large, depending on a very wide range of factors. The method commonly used to apprise real estate are hedonic pricing models, where an econometric model is used with the price as dependent variable and a range of variables important to the buyer as the set of independent variables, allowing the assessment of market price from noneconomic factors (Oduwole & Eze, 2013). While the method has been used since 1928 (Waugh, 1928), it was first used in real estate pricing in 1967 by Ridker and Henning (Ridker & Henning, 1967). Spatial models in real estate pricing can be, on a simple level, divided into two groups. The first defines a city as monocentric, where the city center is the focal point and the price of real estate reflects travel and transaction cost rising further from the center by gradually decreasing (Alonso, 1964). The second group takes into account the fact that local characteristics do not have to be dependent on the distance from the city center. The study of these specifics started by analyzing environmental factors (Ridker & Henning, 1967) and further expanded into analyzing various socio-economic factors (Lynch & Rasmussen, 2001, Cortes, 2004).

The aim of this study is to compare a model using the distance from center as a measure of real estate location (similar models were performed for the same city by Dráb and Horváth (Dráb & Horváth, 2015) and Gazda and Martiniak (Gazda & Martiniak, 2008)) with various spatial models

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which should capture more detail local characteristics on empirical data collected on real estate prices in the city of Košice, Slovakia.

2 Methodology

For the purpose of analysis in this paper the basic form OLS model was used in the form of

$$y = X\beta + \varepsilon \quad (1)$$

where y is the dependent variable, X is the matrix of independent variables, β is the vector of model coefficients and ε is the error term. Expanding on this simple model form are models that include spatial relations. The first form is the Spatial autoregressive model (SAR) that has the form of

$$y = \rho Wy + X\beta + \varepsilon \quad (2)$$

where W is the weight matrix, usually created by assigning a weight of 1 to neighbouring observations and 0 to all others (often utilising the k nearest neighbours algorithm) and ρ is the spatial dependency (Farber and Yeates 2006).The Spatial Durbin model (SDM) is a further extension defined as

$$\begin{aligned} y &= \rho Wy + X\beta + WX\Theta + \varepsilon \\ \Theta &= -\rho\beta \end{aligned} \quad (3)$$

where $\theta = -\rho\beta$ is the model constraint making this in effect a spatial error category model (Viton, 2010, Mur and Angulo, 2005). The last model used was the Spatial error model (SEM) that has the form of

$$\begin{aligned} y &= X\beta + \varepsilon \\ \varepsilon &= \lambda W\varepsilon + \mu \end{aligned} \quad (4)$$

where the error term consists of the weight matrix $W\varepsilon$, random term μ and λ is the spatial dependency. Testing for spatial autoregression was performed using the Moran's I

3 Source of data

As detailed real estate prices are not publicly available, data collected from advertisements of real estate agencies was used (Rehák, 2016). In total, 576 advertised flats located in the city of Košice were included in the analysis, evenly distributed among the city districts. Due to the advertisements not containing the exact address or GPS coordinates of each flat, each flat was assigned the GPS coordinates of the center of the street it was located on, thus aggregating the data to the street level as the lowest common available information. The location of each street center included in the analysis can be seen in Figure 1.

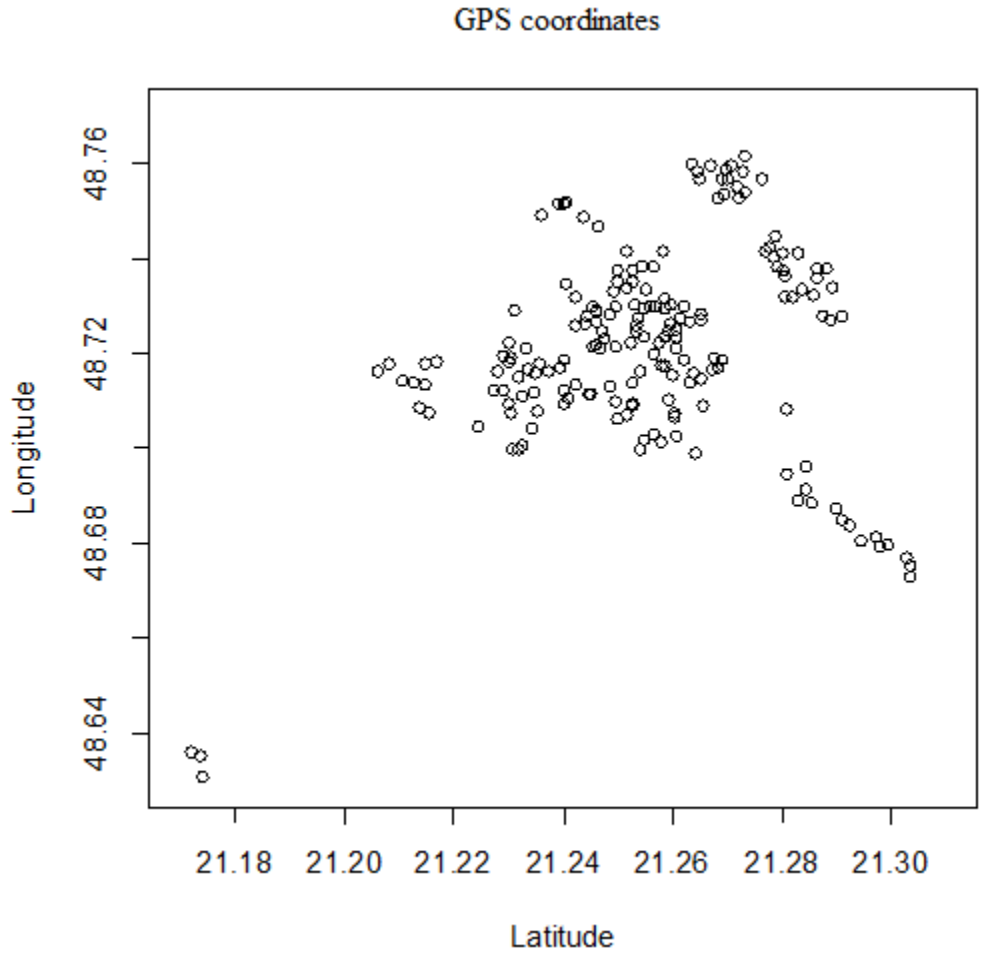

Figure 1 Coordinates of analyzed flats aggregated to street level
Source: Own processing

Using these advertisements, flat characteristics were described by 10 variables:

3.1 Price

Price that the flat was advertised at is the dependent variable in our analysis. A realistic assumption is that the final sale price will differ from this price, but empirical evidence suggests that this deviation is uniform among all flats, and thus the advertised price can be used for modeling purposes(Cheshire & Sheppard, 1989; Henneberry, 1998; Herath & Maier, 2013).

3.2 Floor space

Floor space is a rough measurement of the real estate size and accounts for the majority of variation in real estate prices. It is expressed in m^2.

3.3 Construction

This variable represented the building material of the block of flats the real estate is situated in, with two possibilities, brick or panel construction. Mixed construction is was also encountered in a small number of cases. Flats with brick construction are expected to be more expensive as they

provide better heat and noise isolation properties, longer material life expectancy, although they are usually of older construction than panel blocks of flats (0 mixed, 1 brick, 2 panel).

3.4 State

The current state and need of repairs or improvements is represented in this variable for each given flat and block of flats it is situated in, with 4 levels: 1. Original state, 2. Partial reconstruction, 3. Complete reconstruction, 4. New building. This information is vital and has significant impact on the price of real estate as it captures the immediate or future financial investments required.

3.5 Rooms

This variable simply represented the number of rooms the given flat was divided into, ranging from 1 to 5+.

3.6 Floor

The floor the flat is located at within a block of flats has a significant impact on the price in the cases of either being located at the top or first floor. The top floor is undesirable due to heat problems and potential problems in case of roof damage. The first floor is generally undesirable due to noise from the street and being easy to access from the outside. Another consideration is the ease of access of higher floors in case of elevator problems. In our case we will therefore distinguish between flats located on the first floor (1), the last floor (2), and flats located on all other floors (0).

3.7 Elevator

This variable indicated if the block of flats is equipped by an elevator or not. In a lot of cases brick construction blocks of flats with up to 5 floors are not equipped by an elevator, which has a significant impact on the price of flats located at higher floors in these blocks.

3.8 Cellar

A cellar is considered to be a relatively standard accessory for most flats. This variable simply indicates if the flat is equipped with one or not.

3.9 Balcony

Most flats located above the first floor are equipped by a balcony. If a flat is not equipped by one, in can have a significant impact on the price.

3.10Distance

The location of a flat is among the most important decision factors and thus with a significant impact on price. While it is difficult to characterise the location of a flat as it includes the effects of closeness to schools, hospitals, public transport, shopping centers and many other factors, on the simplest level it can be characterised by the distance from the city center. This distance was calculated using the GPS coordinates of streets discussed earlier and the official GPS coordinates of the city center, utilizing Google Maps travel distance calculator and measured in km.Later, this variable was replaced by using spatial modelsthat should identify location factors for neighbouring flats.The statistics for all variables are available in Table 1.

Table 1 Variable statistics

Variable	Mean	Median	Min	Max
Price	103410	89000	30000	390000
Floor space	74,50	69	22	245
Construction	1,578	2	1	3
State	2,682	3	1	4
Rooms	2,736	3	1	5
Floor	3,668	3	1	13
Max Floor	6,41	7	1	14
Elevator	0,7674	1	0	1
Cellar	0,5608	1	0	1
Balcony	0,6979	1	0	1
Distance	3,122	2,500	0,120	15,000

Source: Own processing

4 Analysis

The first step was to construct a Base OLS model without incorporating any location characteristics for reference, only the flat and block of flats characteristics it is situated in with the price as dependent variable. The results are presented in Table 2.

Table 2 Base model

Variable	β	Std. error	t-statistic	p-value
(Intercept)	9184.03	4984.35	1.843	0.06592 .
Floor space	1311.47	45.56	28.785	< 2e-16 ***
Construction	-5618.54	1707.62	-3.290	0.00106 **
State 2	673.28	3145.35	0.214	0.83058
State 3	11196.08	2847.04	3.933	9.45e-05 ***
State 4	26082.49	3416.68	7.634	9.79e-14 ***
Rooms	-2670.74	1614.47	-1.654	0.09863 .
Floor 1	1044.23	2349.63	0.444	0.65691
Floor 2	-549.98	2809.62	-0.196	0.84488
Elevator	6284.09	2510.41	2.503	0.01259 *
Cellar	-6290.28	2026.71	-3.104	0.00201 **
Balcony	-877.66	2347.62	-0.374	0.70865
R^2	0.7913		BIC	13260.6
R^2_{adj}	0.7873		F-statistic	194.4
AIC	13203.97		p-value	< 2.2e-16
Statistical significance: 0 (***) 0.001 (**) 0.01 (*) 0.05 (.) 0.1 ( ) 1.				

Source: Own processing

The second step was to include the distance from city center variable into the base model to see if it would improve the model. The results of this Base model II with the distance variable are presented in Table 3.

Table 3 Base model II with distance variable

Variable	β	Std. error	t-statistic	p-value
(Intercept)	23792.26	4758.92	5.000	7.69e-07 ***
Floor space	1226.14	42.41	28.913	< 2e-16 ***
Construction	-4784.45	1562.50	-3.062	0.00230 **
State 2	-2513.75	2890.08	-0.870	0.38479
State 3	8043.79	2618.73	3.072	0.00223 **
State 4	22320.60	3142.45	7.103	3.70e-12 ***
Rooms	-851.04	1485.35	-0.573	0.56690
Floor 1	2202.16	2150.00	1.024	0.30615
Floor 2	476.50	2569.41	0.185	0.85294
Elevator	2782.05	2317.82	1.200	0.23053
Cellar	-4887.96	1856.84	-2.632	0.00871 **
Balcony	634.79	2150.12	0.295	0.76792
Distance	-3696.09	348.71	-10.599	< 2e-16 ***
R^2	0.826		BIC	13162.16
R^2_{adj}	0.8223		F-statistic	222.8
AIC	13101.17		p-value	< 2.2e-16

Source: Own processing

As can be seen, the inclusion of the distance variable improved the model according to the coefficient of determination, adjusted coefficient of determination and both AIC and BIC. This result is in line with the study by Gazda and Martiniak (Gazda & Martiniak, 2008), while the distance parameter was not statistically significant in the study by Dráb and Horváth (Dráb and Horváth 2015), even though both studies were performed using data from the same city. Therefore, to further study the effects of flat location, the price variable from Base model II was tested for spatial autocorrelation using the Moran's I measure. The weight matrix for the calculation was created using the 5 nearest neighbour's procedure. The result was a value of Moran's I of 0.18244911with a p-value of 1.124e-07pointing to a statistically significant positive autocorrelation. Therefore, the next step was to create separate spatial models using the Spatial autoregressive (SAR) model, Spatial Durbin model (SDM) and the Spatial error model (SEM) for comparison. The results are presented in Table 4.

Table 4 Spatial model comparison

Variable	SAR	SDM	SDM (lag)	SEM
(Intercept)	**24665.303 (4.218e-07)**	**25472.34297 (4.214e-06)**		**24202.847 (2.904e-07)**
Floor space	**1226.483 (< 2.2e-16)**	**1207.56953 (< 2.2e-16)**	0.61678 (NA)	**1228.376 (< 2.2e-16)**
Construction	**-4784.058 (0.001959)**	**-4682.72059 (0.002984)**	3673.87944 (0.114560)	**-4778.543 (0.001789)**
State 2	-2673.073 (0.319308)	-2446.11904 0.343326	-8524.36930 (0.001394)	-2224.150 (0.434288)
State 3	**7842.017 (0.002109)**	**7894.54883 0.005403**	-757.39845) (NA)	**7966.410 (0.002046)**
State 4	**21745.800 (9.292e-12)**	**20169.61103 7.743e-08**	**12946.90346 (0.039572)**	**21615.158 (3.531e-12)**
Rooms	-852.943 (0.543837)	-462.44776 0.828270	-2338.47805 (0.360093)	-939.434 (0.520491)
Floor 1	2102.556 (0.175813)	2657.38289 0.195375	2366.45008 (0.486280)	2265.531 (0.281496)
Floor 2	313.791 (NA)	357.56606 0.885682	-21.90664 (NA)	698.999 (0.781513)
Elevator	2809.734 (0.217214)	3841.16556 0.099638	-3091.21896 (0.532964)	2876.492 (0.210743)
Cellar	**-4842.806 (0.007944)**	**-5218.42185 0.001961**	-735.58367 (0.904524)	**-4927.602 (0.007147)**
Balcony	705.382 (0.708947)	1017.71862 0.725912	-6546.55667 (0.113456)	992.634 (0.638346)
Distance	**-3728.481 (< 2.2e-16)**	**-3630.50488 1.007e-12**	671.89522 (0.399890)	**-3778.680 (< 2.2e-16)**
Rho	-0.0086542	0.032352		0.13642
p-value	0.62593	0.70744		0.11579
Nagelkerke pseudo R2	0.82612	0.83262		0.54226
Log likelihood	-6536.466	-6525.503		-6535.348
AIC	13103	13105		13101

Source: Own processing

As can be seen, according to AIC the models are relatively comparable, as well as according to the Log likelihood, with showing only a weak spatial influence on the dependent variable. To better understand the differences between the models, Figure 2 presents the comparison of model errors for Base model II, SAR, SDM and SEM models. As for statistically significant variables, again, the models show little to no difference, with the same variables being statistically significant across the whole range of models. In this case, it's really hard to choose between individual models, however, all of the models that include the location of the flat either as a variable or in the model design are preferable to the Base model without the location.

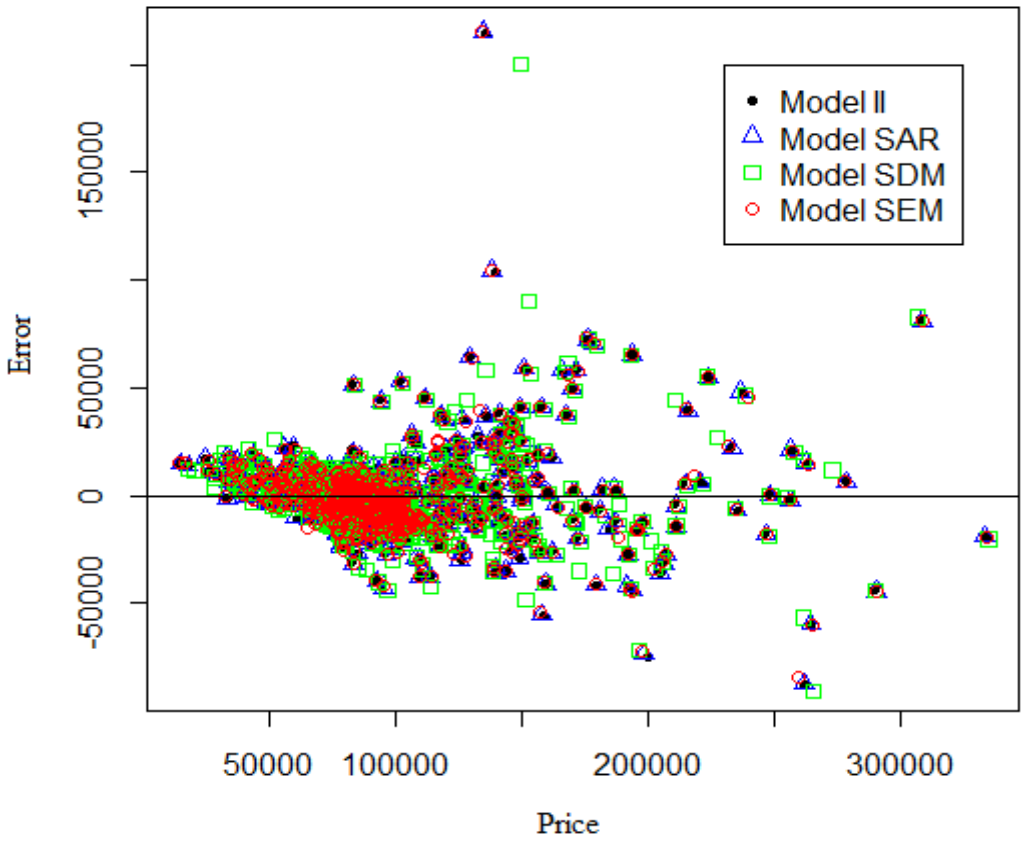

Figure 2 Comparison of model errors for different flat prices
Source: Own processing

As for statistically significant variables, the variable Floor space was statistically significant in all models, with a positive impact on price, as to be expected. Another statistically significant variable was Construction, with panel construction presenting a statistically significantly lower price than brick construction, again, as to be expected. The variable State only had two of its factors statistically significant, meaning that there is no price difference between original condition and partial reconstruction, as buyers expect to invest into renovation in either case, with only complete reconstruction commanding a premium, with new flats being the most expensive. Both Floor space and Construction parameters are in line with both studies performed on the same city (Dráb & Horváth, 2015; Gazda & Martiniak, 2008). The last variable that was statistically significant in all models incorporating the location of the flat was the variable Cellar, where flats not equipped with a cellar were more expensive than flats without, which is counterintuitive. This can be possibly accounted for by the fact that most old flats have a cellar and most new flats do not. This variable was not included in previously mentioned studies.

5 Conclusion

The paper attempted to investigate the effects of location in relation to real estate prices on empirical data. A data set of 576 flats was used, collected using advertisements by real estate agencies. Price was taken to be the dependent variable with the set of independent variables comprising floor space, block of flats construction material, reconstruction state of the flat, number of rooms, floor the flat is situated at, the presence of an elevator, cellar and balcony. First a standard

OLS model was constructed as a reference, not including any data about the location of the flat. The next model was designed by taking the first one and including data about the location of the flat in the form of distance from the city center. This model presented higher accuracy, showing the relevance of flat location. After testing for spatial autocorrelation, a series of SAR, SDM and SEM models was performed using the same set of variables, all of which proved to be more accurate than the first model with no location data. However, it proved difficult selecting a single model, as they all performed comparatively and showing the same set of variables as statistically significant. The exact selection therefore depends on the individual data set.

Acknowledgements

Research supported by the VEGA 1/0886/16 grant.

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Tendencies Leading to Increased Tax Neutrality in the System of Personal Income Tax in the Czech Republic

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Abstract

This paper deals with the description, analysis and comparison of some current changes and measures in the area of personal income tax that occurred during 2017 and are effective from 1 July 2017 and from 1 January 2018. The paper presents some important steps and measures under the package of tax changes in relation to direct taxes, namely personal income tax, which were approved in accordance with the set trend leading to increased tax neutrality in the area of direct taxes in the Czech Republic. These changes in tax legislation in relation to taxpayers of personal income tax primarily relate to changes in the requirements when applying for determination of the tax using a lump sum. The lump sum tax is one of the ways how entrepreneurs can optimize their tax liability. This measure represents the greater attractiveness of the lump sum tax and the efforts of legislators for greater use among entrepreneurial taxpayers. The paper also lists other important changes and measures which relate to the preferred and much more used tax institutions, not only by entrepreneurial taxpayers. Specifically, these are measures relating to changes in claiming expenses as a percentage of revenue, tax benefit for dependent children, discount on placement of a child in pre-school facility, pension and life insurance limits, and others. The above-mentioned changes and measures, which influence the tax optimization and lead to the neutralization of the tax system in the Czech Republic, can generally be considered positive and significant, not only in terms of the redistributive function of the tax but also in terms of fiscal policy itself. These changes reinforced the basic principles necessary for the functioning of the market economy, namely the principle of tax neutrality and tax universality, and represent a positive trend in the Czech tax system.

Keywords: Tax, Taxpayer, Direct taxes, Income tax, Natural person, Tax neutrality, Tax optimization.

JEL Classification: E24, E62, H21, K34

1 Introduction

Every year, the Czech tax system undergoes legislative changes that reflect tendencies leading to increased tax neutrality, especially in the area of direct taxes. In 2017, there were again a number of significant changes not only for payers of personal income tax but also corporate income tax. On 4 April 2017, the Chamber of Deputies approved a long-awaited package of tax changes, which came into force on 1 June 2017 or more precisely on 1 July 2017. Postponing the effectiveness of the act, which should have already been in force from 1 January 2017, results in some application uncertainties, since the adoption of this amendment was not accompanied by the adaptation of the

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relevant transitional measures. The package of tax changes includes changes not only to the Act on income tax (No. 586/1992 Sb.) but also the Act on reserves (Act No. 593/1992 Sb.), Act on value added tax (Act. No. 235/2004 Sb.) and changes in the Tax Code (Act No. 280/2009 Sb.). Draft changes to the Act on registration of sales (Act No. 112/2016 Sb.) were also proposed within the proposed amendments, but these were not accepted. Except for some exceptions, the changes to the Act on income tax and the Act on reserves for determination of the income tax base will be applied for the first time in the tax period of 2018. This paper deals with some important changes within the approved package of tax changes in relation to direct taxes, namely personal income tax, which were approved in accordance with the set trend leading to increased tax neutrality in the area of direct taxes. Direct taxes affect the income of natural and legal persons directly. They are assessed on income (that is subject to taxation) after deduction of expenses incurred to generate, assure and maintain the income, and they are also assessed on the property. The taxpayer and the entity paying the tax is usually the same person (Pšenková, 2017). In order to achieve the defined goal, following methods were used: studying and researching legislative sources, description, analysis, deduction, comparison and syntheses. The methodology used in the paper is based primarily on a quantitative scientific approach focused on interaction and research-related events and a thematic analysis in the area of tax issues.

2 Changes Leading to Increased Tax Neutrality in the Area of Personal Income Tax

As already mentioned, the tax package brought a number of significant changes to tax optimization, which lead to increased tax neutrality in the area of direct taxes. These changes under the Act on income tax include in particular:

- changes in the requirements of the application for tax determination by a lump sum under Sec. 7a,
- changes in claiming expenses as a percentage of revenue under Sec. 7 (7),
- changes in claiming tax benefit for dependent children under Sec. 35c,
- a change in claiming the discount on the placement of a child under Sec. 35bb,
- changes in claiming limits for pension and life insurance under Sec. 15,
- a change in the structure of the tax return form for personal income tax.

2.1 Changes in Requirements for Claiming Lump Sum Tax

The option to fulfil the tax liability by means of predetermined tax in a form of a lump sum is possible under the conditions set in the Act No. 586/1992 Sb., on income tax. The use of this institute under the statutory conditions means that the taxpayer does not have to file a tax return and does not need to keep tax or accounting records (except in the cases covered by Sec. 4 (7) of the Act No. 563/1991 Sb., on accounting). Taxpayers can so minimize the requirements for keeping their records and do not need to record and prove the costs, reducing the probability of possible tax control. Another advantage is that the amount of tax liability is known in advance. The lump sum tax is thus one of the ways how entrepreneurs can optimize their tax liability. The lump sum tax is determined on the basis of incomes and expenses for prior periods and the estimated income and expense based on the expected business activities in that year. The tax office will assess the lump sum tax during the period in question. In 2016, a taxpayer whose annual income in the last three years did not exceed 5 million CZK, both payer and non-payer of VAT, an entrepreneur without employees and an entrepreneur without a cooperating person or in cooperation with a spouse, could

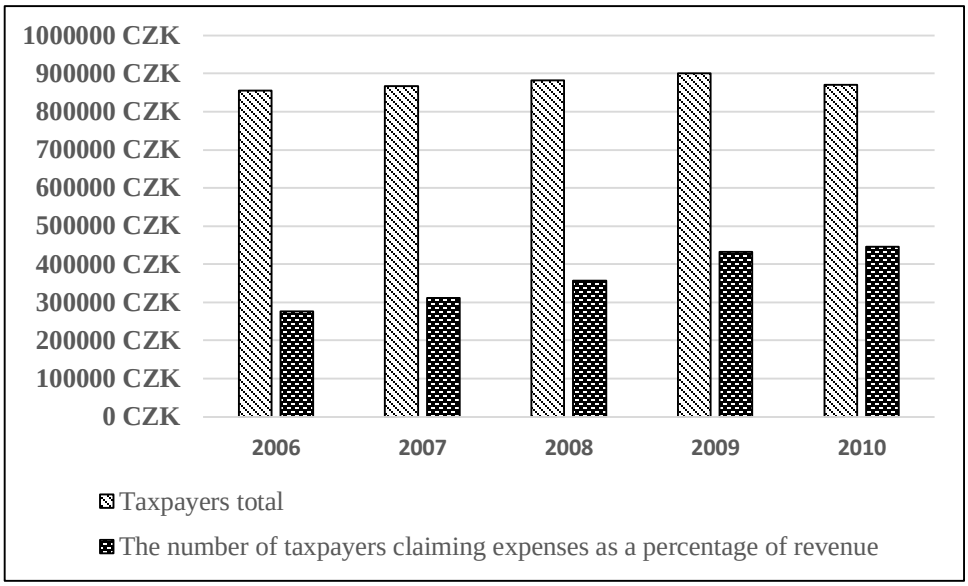
apply for the assessment of lump sum tax provided that the cooperating husband (wife) will also apply for the lump sum tax.

From 2017, taxpayers who have employees or who apart from business also have income from dependent activity can also apply for the lump sum tax. This change represents greater attractiveness of the lump sum tax and the efforts of legislators for greater use among taxpayers as it was only used by a few dozen entrepreneurs in the past. The application for the lump sum tax may be submitted to the tax office by 31 January of the current year, and the amount is usually determined as if there is no minimum tax base. Only for 2017, the deadline for applying for the lump sum tax was postponed to 31 May 2017 and the deadline for tax determination to 15 September 2017. The minimum amount of the lump sum tax after the income tax reliefs is 600 CZK for the tax period. A taxpayer who assumes to be entitled to a tax bonus during the tax period can not claim that bonus when assessing the tax using a lump sum. The tax is then assessed in the normal manner and the whole tax benefit under Sec. 35c of the Act on income tax is claimed in the tax return.

One of the positive aspects of the lump sum tax is a known, predetermined, tax liability. The taxpayer does not have to create a financial reserve for the future tax payment, and there is also no risk of error when completing tax return. An entrepreneur with income only from business activities does not need to file a tax return, which also brings the savings of time and costs of a possible tax consultant and minimum record keeping requirements as there is no need to record actual expenses for the purpose of income tax. This option was very little used in recent years.

2.2 Changes in Claiming Expenses as a Percentage of Revenue

Claiming expenses as a percentage of revenue (instead of actual expenses) is regulated by the Act on income tax in the Sec. 7 (7). The so-called lump sum expenses benefit the entrepreneurs for many reasons. The main reason is often a lower tax liability due to generously set lump sum expenses. When the actual expenses are lower than the lump sum expenses, then the lump sum expenses bring savings on personal income tax, social and health insurance. The great advantage of lump sum expenses is also their simplicity, clarity and minimal administrative burden. This is why some entrepreneurs use the lump sum expenses even if the actual expenses are slightly higher. The lump sum expenses save time and the whole tax agenda is so simple that many entrepreneurs can handle it themselves. Thanks to their simplicity, the lump sum expenses also contribute to the reduction of the shadow economy. The lump sum expenses increased significantly over the past ten years. In 2005, the lump sum expenses were 50% (agricultural production), 25% (trades and other businesses) and 20% (rent). In 2006, the lump sum expenses increased to 80% (agricultural activity), 60% (handicraft trade), 50% (trade), 40% (other businesses) and 30% (rent). Other adjustments to lump sum expenses occurred in 2009 and 2010. The development of claiming expenses as a percentage of revenue from 2006 to 2010 is shown in Graph 1.



Graph 1 Claiming expenses as percentage of revenue in 2006 - 2010
Source: Own processing (MF ČR, 2006 – 2010)

Since 2011, the number of taxpayers applying expenses as a percentage of revenue has been around 50-55 %. In 2013, restrictions for the 40% and 30% lump sum expenses begun to be applied. Since 1 January 2015 until now, all lump sum expenses are limited by a maximum amount. However, the application of the lump sum expenses has also reduced the application of tax reliefs from 2013 onwards. Entrepreneurs using lump sum expenses could not claim the discount on a wife and the tax benefit on dependent children. This measure significantly increased the tax liability of some entrepreneurs. In recent years, the number of entrepreneurs who had income from both employment and self-employment has risen. These taxpayers may apply the tax reliefs mentioned above if the sum of the tax bases (from employment), for which lump sum expenses are not applied, exceeds 50% of the total tax base.

The new tax package approved in 2017 brings new maximum amounts of expenses (lower maximum amounts), but it also returns the option to claim the tax benefit for a dependent child and a discount on a wife (who does not have her own income), even for the tax period of 2017. This means that in 2017 the taxpayer can choose from the following two options:

- apply the expense maximum amount valid for 2017 and not claim the tax benefit for dependent children and the discount on a wife (i.e. as was the case in 2016); or
- apply the new, lower expense maximum amount that will apply from 2018 already in 2017 and at the same time claim the tax benefit for a dependent child and the discount on a wife.

This significant change in the application of expenses as a percentage of revenue contributes to a greater neutralization of the personal income tax system. These tendencies are reflected in the reduction of the lump sum expenses, which in the range above one million CZK usually does not help to reduce the administrative burden (most taxpayers above this threshold already have to record incomes and expenses due to their VAT obligations), but it leads to tax arbitrage between actual and lump sum expenses (Kouba, 2017). Table 1 shows alternative options for claiming lump sum expenses.

Table 1 Options for Claiming Expenses as Percentage of Revenue in 2017 and 2018

Lump sum expenses in % (under Sec. 7 (7) of the Act on income tax)	2017 (without the option to claim tax benefit for children and discount on a wife)	2017 and 2018 (with the option to claim tax benefit for children and discount on a wife)
80% of income from agricultural production, forestry and water management, and income from handicraft industry	maximum applicable expenses up to 1600000 CZK	maximum applicable expenses up to 800000 CZK
60% of income from other industry and trades	maximum applicable expenses up to 1200000 CZK	maximum applicable expenses up to 600000 CZK
40% of the income from independent activities except for incomes under Sec. 7 (1) (d)	maximum applicable expenses up to 800000 CZK	maximum applicable expenses up to 400000 CZK
30% of the income from rents of business property	maximum applicable expenses up to 600000 CZK	maximum applicable expenses up to 300000 CZK

Source: Own processing, Act on income tax

The possibility of applying tax benefit for dependent children and discount on wife with lump sum expenses may be a positive change for lower-income entrepreneurs, but, for example, for entrepreneurs whose income ranges from 1 to 2 million CZK, it might happen that the lump sum expenses will no longer be advantageous for them, and they decide to use actual expenses instead, which may increase the administrative burden due to the need to keep records of actual expenses.

If entrepreneurs claim the expenses as a percentage of revenue, they are obliged to always keep records of incomes, records of receivables generated in connection with the activity from which derives the income from a self-employed activity, records of tangible and intangible assets that can be depreciated; the entrepreneurs - VAT payers must also keep conclusive records of VAT pursuant to the Act on value added tax. If an entrepreneur did not apply expenses as a percentage of revenue in the previous year but applied the actual expenses and for the first time decides to apply the lump sum expenses under Sec. 7 (7) or Sec. 9 (4) of the Act on income tax, it is necessary to adjust the tax base for the year preceding the transition from actual expenses (in accordance with accounting or tax records) to lump sum expenses in the sense of Sec. 23 (8) (b). These are adjustments to the tax base, namely the increase of the tax base with the price of unused stocks, the value of receivables, balances of the legal reserves created, and the reduction of the tax base with the amount of debts (with the exception of advances received and paid), see Sec. 23 (8) (b). The taxpayer is obliged to file an additional tax return (whether for a higher or lower tax liability).

2.3 Changes in Claiming Tax Benefit for Dependent Children

The package of tax changes also brought a substantial change in the rise of amounts claimed in the form of tax benefits for dependent children. The graduated tax benefit for dependent children is valid from 2015 onwards. For 2016, the amounts were also changed during the year. In 2017, the amounts relating to the child tax benefit have changed again, namely for the second child and the third and every other child; the amounts have been once again increased. This change should have a positive impact especially on families with more children. The development of the tax benefit for dependent children between 2014 and 2017 is shown in Table 2 and 3, as well as in the Graph 2.

Table 2 Development of the Annual Tax Benefit during 2014-2017

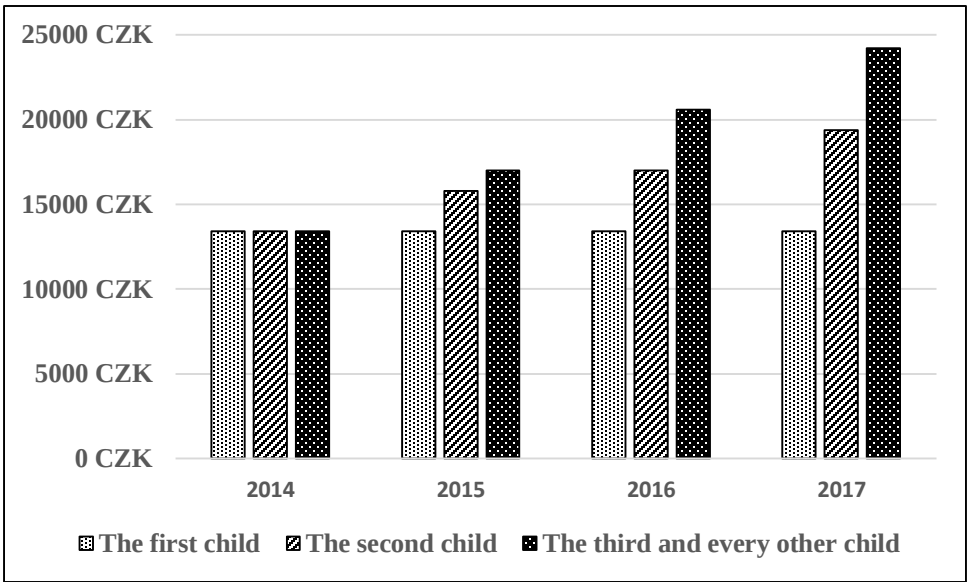
Amount of tax benefit in CZK	2014	2015	2016	2017
The first child	13404	13404	1404	13404
The second child	13404	15804	17004	19404
The third and every other child	13404	17004	20604	24204

Source: Own processing, Act on income tax

Table 3 Changes in the Development of Tax Benefit during 2014-2017

Increase of the tax benefit by CZK	2014	2015		2016		2017	
		monthly	yearly	monthly	yearly	monthly	yearly
The first child	0	0	0	0	0	0	0
The second child	0	200	2400	300	3600	500	6000
The third and every other child	0	300	3600	600	7200	900	10800

Source: Own processing, Act on income tax



Graph 2 Development of Annual Tax Benefit in 2014-2017
Source: Own processing, Act on income tax

As shown in Table 2, 3 and Graph 1, the tax benefit for dependent children gradually increased between 2015 and 2017. No further increase of this tax benefit is expected for 2018 and the following period.

Pursuant to Sec. 35c of the Act on income tax, a taxpayer may apply the tax benefit in form of a tax relief or a tax bonus. If there are more dependent children of the taxpayer in one common household, they are considered together for the purposes of this provision. In the case of the tax bonus there is a change in the conditions for payment of the child tax bonus. The payment may occur if the tax liability is lower than the amount of the tax benefit. A taxpayer whose annual income is at least six times the minimum wage (in 2017 it amounts to 11000 CZK) is entitled to the bonus. From 2017, the range of revenue that is counted towards this limit is reduced, or more precisely the tax bonus will apply only to income from dependent activity (from employment)

under Sec. 6 and from business activity under Sec. 7, but not to rental income under Sec. 9 and capital assets income under Sec. 8. This change reflects practices of taxpayers associated with artificial revenue growth (fictitious rental income) to achieve a tax bonus. The maximum tax bonus is still 60300 CZK per year.

2.4 Claiming Discount on Placement of a Child in Pre-school Facility

With the increase in the minimum wage in 2017 to 11000 CZK, the discount on the placement of the child in pre-school facility has also increased, and its conditions has been clarified. The amount of this discount corresponds to the taxpayer's expenses spent on the placement of the dependent child in the pre-school facility for the tax period (up to now in the specified tax period), up to the minimum wage for the given year. The aim of this at first glance minor change was to increase the legal certainty of the taxpayer and the clarity of the law. In order to apply the discount for the placement of a child, the expenditures of the actual placement of the child in a pre-school facility for the tax period (calendar year) rather than the moment of its reimbursement could newly be a decisive factor. The taxpayer may therefore claim only expenses that actually incurred during the tax year for the child's placement in the pre-school childcare facility.

2.5 Changes in Claiming Pension and Life Insurance Limits

From 2017, the limit for deduction of the contribution paid by taxpayers to their supplementary pension insurance under the supplementary pension insurance contract with a state contribution (concluded between the taxpayer and the pension insurance company under the conditions stipulated by the law) from the tax base has increased. In addition, the limit for deduction of premiums paid to one's private life insurance under the insurance contract between the taxpayer and the insurance company from the tax base has increased. The limits are doubled compared to 2016; at that time the original amount was 12000 CZK and now amounts up to 24000 CZK. This additional tax benefit can be claimed for the tax period of 2017.

2.6 A change in Structure of the Tax Return Form for Personal Income Tax

From 2017, a simplified form of only 2 pages can be used to file a personal income tax return. In addition, the new form can be filled in electronically. Only taxpayers who do not have income from business activities may file the tax return using the new, shortened and simplified form. In the case of income from dependent activity, it must be only income from a Czech employer. The condition is that taxpayers file their tax returns themselves, which means that the usability of this form is considerably limited. Those who in addition to that have rental income or other supplemental income, including income from business activities, will have to use the existing four-page form and related attachments.

3 Conclusion

A tax is a revenue of public budgets, which in the form of a mandatory and usually periodic payment withdraws a part of entity's nominal income on an irreversible basis. The Act on income tax is one of the most important instruments of public finances, not only in terms of the tax system, but also in terms of the revenue flow into public budgets. The taxes so represent a major source of public sector financing and have both a microeconomic and a macroeconomic dimension. In 1993, a new tax system was introduced, which, among other things, fundamentally changed the distribution and redistribution processes in relation to the process of Czech economy transformation. The basic principles necessary for the functioning of the market economy, namely

the principle of tax neutrality and tax universality, have been strengthened. Since then, the Act on income tax has had more than 130 amendments (MF ČR, 2017). Stability is crucial to the success of any reform, which also applies to tax policy (Oh, 2017). An optimal tax system should take into account the issue of fairness in taxation, the cost side of both the state and the taxpayers. It should be noted that the issue of taxation is always an economic and political issue. The income tax includes a number of institutes such as rates, deductions, discounts, exemptions, which are always a political decision and may vary depending on the influence of the ruling political party. However, it is generally possible to state that in recent years the main economic and political issues of the tax policy in the area of pension taxation are for example:

- definition and measurement of the tax base,
- the relationship between the rates of personal and corporate income taxes,
- the rate of progressive taxation of employees' personal pensions and the size of its highest marginal rates,
- and others (Kolektiv autorů, 2005).

Extensive economic theories evaluate how taxes are able to provide the state with the required amount of financial resources and what are the effects of the tax system on overall economic efficiency. The principle of economic efficiency expresses the requirement for the lowest costs associated with collecting taxes. The lump sum tax, which is the same for all entities, shows the highest efficiency as its amount cannot be changed and brings the minimum administrative burden for both the taxpayer and the state; however, it is often contrary to tax justice. In contrast, the uniform (flat) tax also leads to a reduction in the administrative burden of the tax, while maintaining vertical justice and removing deductible items. Although the flat tax of 15% has been applied in the Czech Republic for several years, effective income tax of the rich is considerably higher than for people with average earnings. The actual rate of personal income tax in the Czech Republic ranges from 0 % to more than 20 %. Even in the Czech Republic, there is "hidden" progressive taxation. Changes in social policy, inflation, or even in the phase of the economic cycle also affect the amount of tax burden. The question of taxation is not only an economic but also a political issue. It is usual to reduce the tax burden during the recession, while increasing it during the expansion period. Political decisions and preferences focusing on specific groups of inhabitants are to a great extent influenced by the final form of legislation governing the personal income taxation (Krajňák, 2015). At present, as part of our political intentions, there are proposals to reintroduce a progressive tax. The advantages and disadvantages of tax progressiveness is examined by e.g. Sztyber (2003). Bahl, Wallence (2004) recommend a gliding progressive tax rate as the basis of taxation. This shall imply that one of the tasks of the income tax is to reduce income differences among tax payers (Chen, 2012). Whether it is optimal to have one band or more tax bands is very difficult to establish (Zee, 2005). From a historical point of view, the tax neutrality imposes such level of taxation that does not alter the financial situation of the private sector, which means that all natural and legal persons should pay taxes given their financial possibilities so that the taxation is equitable. The content of the tax neutrality criterion lies in the fact that the retirement, financial and tax situation of taxable entities before and after tax is not to be changed as a result of the taxation. The classic criterion of fiscal neutrality is that taxes should not change the behaviour of entities (citizens) as consumers that is focused on meeting their needs and should not affect behaviour of an entrepreneur in the private sector which aims at achieving profit. Changes in the tax system can also be reflected in supply and demand for labour, thus somewhat affect the behaviour of economic entities in the labour market, and employment or unemployment; more from a regional point of view, for example (Slavata, 2015). As part of the tax package, many

measures have been implemented since 2017 and 2018, which are generally favourable to taxpayers and do not pose any complications for them. These changes in income taxes are significant not only with respect to the redistribution function of the tax, but also with respect to the fiscal policy itself. At present, it is possible to observe and perceive the tendency towards a greater neutralization of the income tax system. One of the actions that lead to the simplification of the tax system is also a new simplified and shortened tax return form for personal income tax for selected taxpayers. Further changes leading to tax neutrality in the Czech Republic can be expected in the coming years. Authors propose to reduce the number of amendments to the Income Tax Act, so that entrepreneurs have a stable legislative environment and do not have to deal with changes in the law. The next proposal is to continue the trend of simplifying tax forms as well as to increase the tax neutrality and tax optimization, not only in the form of setting more favourable conditions for higher utilization of the lump sum tax and expenses as a percentage of revenue, but also other discounts especially for entrepreneurial individuals.

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European Context of General Government Expenditures by Function and their Assessment

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Abstract

Public expenditures in the European context are a condition for financing public needs and for the development of public services. For a more exact classification of public expenditures from the functional point of view, the classification of the functions of the government (COFOG) is used. According to this classification we can classify general government expenditures by ten categories that represent the functional areas of the government (state). Attention is paid to selected categories of general government expenditures by COFOG function, which contribute to the development and cultivation of the human potential. The paper aims to provide an evaluation of general government expenditures by selected function in EU countries, including their similarities and differences. More closely, the paper analyses and focuses on general government expenditures by selected function (social protection, health, education, culture and recreation) in EU countries, as an average of the period 2010-2015, using the methods of cluster analysis and box-plot. The results of the analysed general government expenditures by function showed similarities as well as differences between EU countries. The division of EU countries into three clusters showed that with respect to the amount of general government expenditures on health, education and culture and recreation as % of GDP, the most similar are the countries in the first cluster (mainly Denmark, Finland, Belgium, France, Austria, Luxembourg), compared to the countries in the second cluster (Netherlands, United Kingdom, Czech Republic). By contrast, the largest differences regarding the volume of general government expenditures on social protection and health as % of GDP were found in the countries in the first cluster (Scandinavian countries, France), compared to the countries in the third cluster (Cyprus, Latvia, Romania). The structure of total general government expenditures by function as % of GDP proved that expenditures on social protection and health account for the most marked share in most EU countries.

Keywords: Public finance, General government expenditures by function, Cluster analysis, Assessment, EU countries.

JEL Classification: H50, H75, H76

1 Introduction

Public finances are a part of classical, neoclassical and Keynesian economy. Public finances can be characterized as an instrument of public policies created to implement their targets. From this viewpoint, public finances in relation to public policies fulfill fiscal functions, i.e. allocation, redistribution and stabilization). Classic political economists in terms of the theory of state and the

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theory of public finance define three functions of the government, where also belongs the function connected with the provision of public services. The theory of public finances deals with financing public services in the concept of a number of former and contemporary authors (Samuelson, 1954; Brown & Jackson, 1990; Cullis & Jones, 2009; Hillman, 2009; Aaberge et al., 2010; Stiglitz & Rosengard, 2015). These authors deal with matters associated with the provision of public services by the government from the economic viewpoint, which appear in the theory of state and in public finances.

Public budgets are an important financial tool to ensure and finance functions, needs and tasks of the government and each level and subject of self-government in each country. In connection with the financial crisis, also the issue of knowledge and innovation potential was dealt with in several pieces of research, which have an impact on all levels of budgets, including municipalities (Žarska, 2013). Public demands are financed from public expenditures, which are part of GDP. The majority of developed countries have seen a growing tendency of public budgets as well as public expenditures in recent decades, influenced by the extent and structure of state activities in connection with allocation, redistribution and fiscal stabilization (Sinicakova & Gavurova, 2017; Sinicakova et al. 2017). Public expenditures can be divided into expenditures of the central government and the budget, or into expenditures of regional governmental level and its budget, or local government (self-government) and its budget. The arrangement of public expenditures is used mainly in analytical and comparative research in EU countries (Staehr, 2010; Donath & Milos, 2011; Ferreiro et al., 2013; Mura, 2014; Sawulski, 2016; Pascual Sáez, Alvarez-García & Castaneda, 2017).

The paper focuses on public expenditures in four key areas of the public sector in EU countries. A deeper analysis is provided of the general government expenditures by COFOG, which are associated with the cultivation of the human potential (social protection, health, education, recreation and culture) and which are contributing to the development of public services in these areas. The aim is to provide a comprehensive evaluation of the general government expenditures by selected function in EU countries as an average of the period 2010-2015, including their similarities and differences. The aim is to evaluate general government expenditures in EU countries as an average of the period 2010-2015 by applying cluster analysis, which enables division of the countries based on the expenditures by internal similarity and also to specify differences and extremes using the box-plot. The following research question is tested: Do general government expenditures on social protection and health have the most significant functions in the structure of total general government expenditures (as % of GDP) in EU countries?

2 Theoretical background and literature review

With the range of financing of public goods and services grows the significance of the public budget and the public sector of the given country. Financing and ensuring of public needs in the public sector requires public expenditures. Mikušová Meričkova and Stejskal (2014) deal with the essence of public financing and production of assets of collective consumption (using the example of services of public libraries), where the public sector plays a major role. The size of the public sector in the European Union and international comparison serves as an indicator of total public expenditures which are allocated to public needs to GDP, expressed in %. Evaluation of the size of the public sector in EU countries, including structural analyses, was provided by Freysson (2011) or Halásková and Halásková (2017, p. 45). Pascual Sáez, Alvarez-García and Castaneda (2017);

Ferreiro et al. (2013) or Freysson and Wahrig (2013) argue that except minor deviations, developed countries typically show significant dynamics in the growth of public expenditures. According to the European Commission (2012), when evaluating dynamics of public expenditures, it is necessary to consider indicators of the evaluation and what properties are being observed. Apart from the share of public expenditures in GDP, dynamics of public expenditures and the analysis of changes in its structure can be counted also by means of indicators showing important proportions within total public expenditures. Public expenditures, however, are influenced by a number of factors. Hallaer and Queyranne (2016) identify areas where there is scope for increasing expenditure efficiency, with a view to achieving higher quality and more sustainable fiscal consolidation. The impact of spending is assessed against other European countries. Based on these results, the paper then provides policy options for expenditure reform in each of these areas, drawing on successful reform episodes in other countries. In many countries, decisions about the use of public resources are connected with a negative factor, corruption, dealt with by, for instance, Kasík (2012).

Structure, trends and quality of public expenditures, including the development of public sector in EU countries, are dealt with by many authors and studies e.g. European Commission (2012); Ferreiro et al. (2013). Mura (2014, p. 5) analyzed public expenditures in selected areas of public sector (education, R&D, infrastructure) and their economic growth, using the example of six Eastern European countries in the period 1990-2013. Pascual Sáez, Alvarez-García and Castaneda (2017) provide evidence of the impact of government spending on economic growth in the European Union countries. The results obtained suggest that government expenditure is not clearly related to economic growth in the European Union countries in the period 1994-2012.

For a more exact classification of public expenditures from the functional point of view, the classification of the functions of the government (COFOG), important for international comparison of policies on expenditures, which helps to overcome organizational and methodological differences, is applied. According to functional classification COFOG we can classify the public services in the form of ten categories that represent functional areas of the government (state). Public expenditures by function are in the European context a topic of interest, dealt with, for instance, by Halásková and Halásková (2014, 2017), when selected general government expenditures in EU countries were analyzed, associated with the development of the services of welfare state and the area of human potential, applying the method of multidimensional scaling. Szarowska (2013) examines the trends of government expenditures in the core member states of the European Union (EU15) in the period 1995-2010. The results state significant differences in size and importance of public sector in the selected countries. Research confirms cyclical development of government expenditure on GDP and Wagner´s law in EU15 member states during 1995-2010. Another author, Sawulski (2016), compared public expenditures by function in Poland, with an average of EU and CEE countries in 2014. He focused on the expenditures on social protection, education and general public services. Donath and Milos (2011) analyzed the questions of state performance, the quality of public finance and their effects on growth. The authors try to reveal the effects of capital spending (functional classification of public expenses “COFOG”) on economic growth in EU member states in the period 2000-2006.

3 Data and Methodology

The paper makes use of secondary statistical data obtained from Eurostat-statistic database. Economy and finance subsection Government statistic. In particular, data available from the Annual government finance statistic (General government expenditures by function COFOG) were used. The selected set comprises 28 EU countries (Belgium-BE, Bulgaria-BG, Czech Republic-CZ, Denmark-DK, Germany-DE, Estonia-EE, Ireland-IE, Greece-EL, Spain-ES, France-FR, Croatia-HR, Italy-IT, Cyprus-CY, Latvia-LV, Lithuania-LT, Luxembourg-LU, Hungary-HU, Malta-MT, Netherlands-NL, Austria-AT, Poland-PL, Portugal-PT, Romania-RO, Slovenia-SI, Slovakia-SK, Finland-FI, Sweden-SE, United Kingdom-UK). Selected categories of general government expenditures by function in EU countries (social protection, health, education, recreation and culture) are evaluated as an average of six years, namely 2010-2015 (2010 is the initial year of the Europe 2020 strategy, and 2015 is the half of the period of the strategy and it also is the last year with the available data).

Key methods of the scientific work are analysis, comparison and abstraction in the theoretical and methodological framework, and synthesis and partial induction in drawing conclusions. The analysis of similarities and differences of general government expenditures by selected function in EU countries is carried out by use of cluster analysis. Cluster analysis is a multi-dimensional statistical method used to classify objects. It enables sorting observed units into several groups so that similar units occurred in the same group, and, in turn, so that units from other groups differed fundamentally. In the processing stage, hierarchical cluster analysis was used, and the resulting distances between the individual objects (EU countries in the present case) were visualized by means of a diagram called dendrogram. The horizontal axis expresses the distance between the clusters. The vertical axis enables finding the required level of clustering. The dendrogram demonstrates the process of the analysis, which enables going through the results in both directions and finding an optimal result (Everitt et al., 2011). Cluster analysis and box-plot were used in the analysis of the range of public expenditures and the size of public expenditures by function in EU countries in the analysis by Ferreiro et al. (2013).

Further, EU countries were compared using Box-plot, which is a form of graphic visualization of numerical data through their quartiles, dividing the statistical set into quarters, when 25 % of the items are below the values of the lower quartile *Q0.25* and 75% below the upper quartile *Q0.75*. The middle “box” of the diagram is delineated by the third quartile from the top, the first quartile from the bottom, and between those the line defining the *mean value* is found. The height of the box represents an *interquartile range*. The lower vertical line (lower whisker) corresponds with values found beneath the box in the distance not more than the factor of 1.5 of the size of the box. The end of the whisker corresponds with the lowest such value from the set. Similarly, the upper whisker corresponds with the highest value from the set. Apart from whiskers (below and above them) are seen points which correspond with the so-called outliers (Everitt et al., 2011). The calculations in the following part are the output of the SPSS Statistics 24.0 software.

4 Results

In this part, general government expenditures by function in the EU are analyzed, followed by the evaluation of the general government expenditures by selected function in EU countries using cluster analysis.

4.1 General government expenditures by function in EU average 2010-2015

Public expenditures, according to the functions of governmental institutions (COFOG), in the EU are designed for ten categories of expenditures. General government expenditures by function COFOG in EU (28) as average of the period 2010-2015 (% of GDP) is seen in Figure 1. Figure 1 include General public services (6.8 %), Defense (1.4 %), Public order and safety (1.8 %), Economic affairs (4.5 %), Environmental protection (0.8 %), Housing and community amenities (0.7%), Health (7.2 %), Recreation, culture and religion (1.1 %), Education (5.1 %), Social protection (19.3 %). As Figure 1 shows, general government expenditures allocated on social protection in % of GDP (social quota) in EU represent one of the most significant areas of public expenditures by function of government institutions and indicate the amount of expenditures on social protection in the given country. Currently they account for almost 20 % of GDP.

Another significant representation of general government expenditures by function from the period 2010-2015 are expenditures on health in the EU. Financing of health care and its specificities were dealt with by, e.g. Jakubowska and Horváthová (2016); Jaworzyńska (2016). The level of health services which a country can offer to citizens is a criterion of its total, both economic and cultural development. The third category of expenditures that have to be mentioned in connection with welfare state are total public expenditures on education in % of GDP, which account for approximately 5% in the EU (Freysson, 2011; Halásková and Halásková, 2014, 2017).

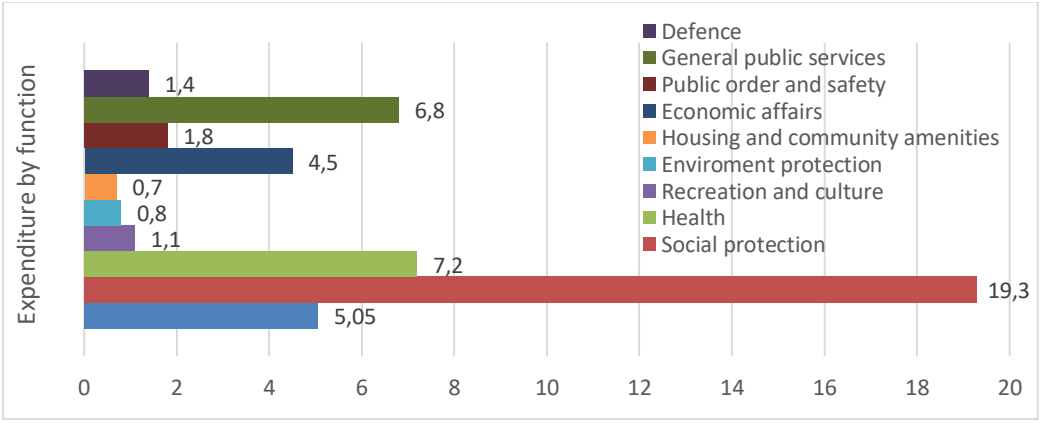

Figure 1 General government expenditures by function COFOG in EU average 2010-2015 (% of GDP)
Source: Eurostat (2017) and authors calculation

4.2 Assessment of general government expenditures by selected functions in EU countries with the use of cluster analysis

In the analysis of the selected categories of general government expenditures (social protection, health, education, recreation and culture) in EU countries as the average of 2010-2015, cluster analysis was used. Division of EU countries into three clusters based on their internal similarities by the evaluated general government expenditures is shown in Table 1 and the dendrogram (Figure 2).

Table 1 EU countries according to clusters by selected general government expenditures % of GDP in 2010-2015

First cluster	Second cluster	Third cluster
DK, FR, FI, BE, DE, EL, IT, LU, AT, SE	CZ, IE, ES, HR, HU, NL, PL, PT, SI, SK, UK	BG, EE, CY, LT, LV, MT, RO

Source: Authors

The first cluster comprises ten countries, and most similar countries in this cluster are France, Finland and Denmark. The same similarity in the first cluster is also seen in Germany, Greece, Luxembourg, Italy, Austria, Belgium and Sweden. The lowest similarity in the first cluster is in Luxembourg and Finland. The second cluster includes 11 countries, where the most similar in terms of their expenditures are the Czech Republic, Ireland, Croatia and Slovakia. The same similarity in the second cluster is seen in Hungary, Poland, Spain, Netherlands, United Kingdom, Portugal and Slovenia. The lowest mutual similarity in the second cluster is seen between Spain and Ireland. The third cluster comprises seven countries, which demonstrate similarity with regard to the analyzed categories of general government expenditures (see Figure 2).

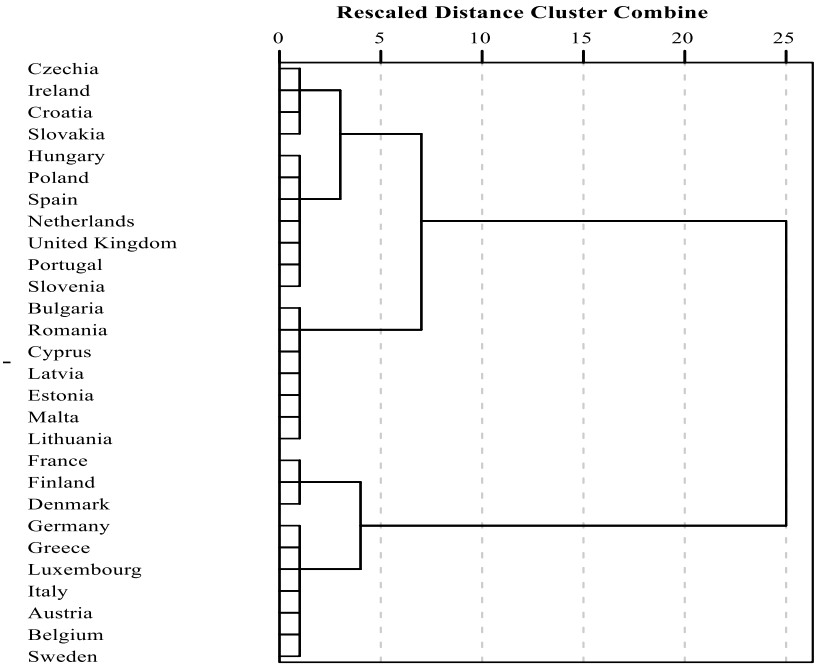

Figure 2 Dendrogram according to general government expenditures by selected function in EU countries (2010-2015) % of GDP

Source: Authors

Figure 3 The box-plot of general government expenditures by selected functions (social protection, health, education, culture and recreation) in years 2010-2015 is represented by graphic visualization of numeric data. By means of the box-plot, the EU countries are divided into three clusters. **The first cluster** represents countries (DK, FR, FI, BE, DE, EL, IT, LU, AT, SE) which, as opposed to other EU countries, are characterized by the highest general government expenditures on social protection as % of GDP, with a mean value of 21.1 and dispersion of values from 18.7, in LU, to 24.4, in DK, and the highest general government expenditures on health (from 5.6 to 8.6 % GDP, with the mean value of 7.2 % GDP). An outlier of general government expenditures on health is represented by LU, with 4.8 % GDP. **The second cluster** has the highest representation

of countries (CZ, IE, ES, HR, HU, NL, PL, PT, SI, SK, UK) which, as opposed to the countries in the first cluster, have lower values of general government expenditures on social protection as % of GDP, with the mean value of 16.3 and range of values from 13.1 (CZ) to 18.2 (PT, SI), as well as lower expenditures on health (from 5.1 % GDP in HU to 8.1 % GDP in NL, and the mean value of 6.9). An outlier of general government expenditures on health is represented by PL, with 4.7 % GDP. By contrast, this cluster of countries reaches the lowest general government expenditures on education as % of GDP, with the mean value of 5.1, and comparable expenditures on culture and recreation (mean value 1.3) compared to the first cluster.

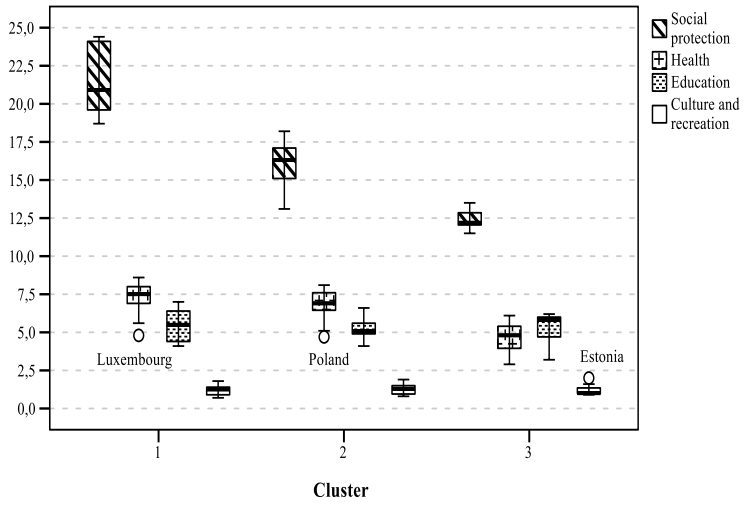

Figure 3 Box-plot according to general government expenditures in EU countries (2010-2015) % of GDP
Source: Authors

The third cluster consists of BG, EE, CY, LT, LV, MT and RO. Unlike the countries of the first and second cluster, these countries demonstrate the lowest general government expenditures on social protection as % of GDP (mean value 12.2), the lowest general government expenditures on health (mean value 4.8) and expenditures on culture and recreation (0.9-1.6 % of GDP). By contrast, this cluster (apart from BG and RO) shows high general government expenditures on education as % of GDP (mean value 5.8). The volume of total expenditures on education, or total general government expenditures in % of GDP, varies in the given countries, which results from their economic situation and defined priorities in education policies. A comprehensive list of mean values according to general government expenditures in EU countries as the average of 2010-2015 is seen in Table 2.

Table 2 Mean values of general government expenditures by clusters of EU countries (average 2010-2015)

Mean values by expenditures (as % of GDP)	Social protection expenditures	Health expenditures	Expenditures on education	Culture and recreation expenditures
cluster first	21.1	7.2	5.5	1.2
cluster second	16.3	6.9	5.1	1.3
cluster third	12.2	4.8	5.8	1.0

Source: Authors' calculation

Results of the analyzed general government expenditures by function COFOG by means of cluster analysis and box-plot showed similarity between EU countries mainly in terms of general government expenditures on health, education and culture and recreation as % of GDP. By contrast, the largest differences were seen in the volume of general government expenditures on social protection and health as % of GDP.

5 Conclusion

Public budgets are important financial tools for ensuring and financing of functions, needs and tasks of the individual levels of public administration in EU countries. The development and structure of general government expenditures is analyzed at the level of countries, self-governments and at the international level. The most frequently used comparison is the share of general government expenditures on GDP. The results of general government expenditures by function (as % of GDP) in the development of the human potential in EU countries as average of the period 2010-2015 showed that general government expenditures on social protection in % of GDP dominate in all countries, representing the key item, while the second most significant item are general government expenditures on health, which confirmed the research question. These results are supported by other studies and research of the European Commission (2012) just as an analysis carried out in EU countries by Freysson and Wahrig (2013). By contrast, the lowest general government expenditures as % of GDP as average of 2010-2015 were found on recreation and culture in all EU countries in the present research, where the role of the public sector in financing of these services is small. This trend of the structure of general government expenditures is confirmed by the analysis of, e.g. Freysson (2011).

Results of the analyzed general government expenditures by function COFOG applying cluster analysis and box-plot showed similarities as well as differences between EU countries. The analysis and comparison of general government expenditures by selected function in the period 2010-2015 shows that with respect to the amount of general government expenditures on health, education and culture and recreation as % of GDP, the most similar are the countries in the first cluster (mainly Denmark, Finland, Belgium, France, Austria, Luxembourg), compared to the countries in the second cluster (Netherlands, United Kingdom, Czech Republic). By contrast, the largest differences regarding the volume of general government expenditures on social protection and health as % of GDP were found in the countries in the first cluster (Scandinavian countries, France), compared to the countries in the third cluster (Cyprus, Latvia, Romania). Marked differences in the volume of general government expenditures by function (social protection and health) are also visible in other research (Halásková & Halásková, 2014, 2017) using the method of multidimensional scaling, or a study by Freysson and Wahrig (2013). Differences in the individual countries can be explained, according to Pestieau (2006), not only by different forms of financing of social security (from public budgets from taxes, the Beveridge model, or insurance funds from insurance fees from the individual subjects, the Bismark model) and forms of public financing of health (from taxes through the national budget, or from public health insurance). Differences in the range and financing of social insurance and health are also associated with other factors, such as the economic level of the country, social arrangement, historical traditions of the country, etc.

General government expenditures by selected function in EU countries were evaluated as aggregate items of expenditures. But there is also a more detailed analysis available, by sub-sections of the COFOG classification (the structure of these expenditures). The European dimension of general

government expenditures and their changes in connection to the economic growth or evaluation of efficiency creates room for open questions, which may serve as a topic for further research.

Acknowledgements

This paper was supported within Operational Programme Education for Competitiveness (Project No. CZ.1.07/2.3.00/20.0296).

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Modification of Twin-Win certificate and its design

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Abstract

This paper focuses on design of the reverse twin-win certificate with the aim to present the nature of this certificate´s creation. There is provided the profit function in analytical form and developed the formula for pricing of this certificate. We conclude with the findings that this product is created through the process of financial engineering as the underlying asset together with options, namely up-and-out call options and vanilla call options. We also propose the reverse twin-win certificates on the iShares 20+ Year Treasury Bond ETF with different levels of its parameters and preformed profitability analysis of the selected certificates to the investor at the maturity date, showing which parameters the investor should focus and are significant for the profit profile.

Keywords: Reverse twin-win certificate, Vanilla option, Barrier option, Profit function, Fair value.

JEL Classification: G11, G13

1 Introduction

Reverse twin-win certificates belong to the group of modern innovative financial products called structured products. Structured products consist of multiple investment instruments, one being generally a finance derivative, usually vanilla and/or exotic option. Several studies (Benet *et al.*, 2006; Bluemke, 2009; Rossetto & Bommel, 2009; Hernandez et al., 2011; Hernandez et al., 2013) deal with the structured products.

Investment certificate is a security, the value of which is derived from the value of an underlying asset. The underlying asset is usually a share in a company, a basket of shares or an index. There is a suitable kind of certificate (linear, guaranteed, airbag, discount, outperformance, turbo, bonus etc.) for every estimated development of an asset (growth, fall or stagnation) or for every attitude to risk (conservative or aggressive investor). Investment certificates are created through the process of financial engineering as a combination of underlying asset with derivatives, often an option (vanilla and/or exotic option).

Valuation of every investment certificate is based on pricing by duplication methods. The value of the investment certificate is identical to the value of replicating portfolio. Replicating portfolio is created as a combination of the position in underlying asset together with option position. Papers (Burth et al., 2001; Wilkens et al., 2003; Grunbichler & Wohlwend, 2005; Stoimenov & Wilkens, 2005; Henderson & Pearson, 2011) deal with the issue of the valuation. In the papers (Younis &

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Rusnáková, 2012; Rusnáková et al., 2014, Gordiaková & Harčariková, 2014; Šoltés & Harčariková, 2015) authors create the replicating portfolio to investment certificates using analytical form of profit functions. Following the mentioned studies we provide our certificate analysis.

The aim of this paper is to perform an analysis of the reverse twin-win certificate. We apply portfolio replication method to price the certificate. The application to the the iShares 20+ Year Treasury Bond ETF is provided. Based on data set, we design the reverse twin-win certificate with various levels of the barrier. We provide the profitability analysis for the potential investor at the maturity date. Our findings help to raise the ability of retail investors to understand these sophisticated products constructions.

2 Research methodology

Today investment certificate´s market is widened and a lot of commercial and investment banks offer various types of these innovative products. Investment products (referred to as structured investments) have a significant place in the structured products´ segment. These products contain two main components as the underlying asset (to be referred to as UA henceforth) together with the derivative tool, mainly an option component (combination of plain-vanilla and barrier option). Options are the significant part of every investment certificates, therefore methodology of the paper must be based on these instruments.

Geman (2005) defines option as a financial contract giving its holder (the owner or the buyer) the right (on the other side not the obligation) to buy (call) or sell (put) UA at a specified price (the strike or the exercise price) of the option on a specified date (either at the expiration date of option - European style or at any time within a specified option expiration period - American style). The call/put option seller (the writer) receives the option premium for buyer´s right. The barrier level (also known as the second strike price) is typical for barrier options. According to Taleb (1997), there are total 16 types of barrier options that depend on the activation/deactivation of options (in/out option) and the placement of the barrier level (up/down option). Through the analytical expression of the profit functions of the classic vanilla/barrier options the papers (Rusnáková et. al., 2014; Bobriková & Harčariková, 2015) prove the nature of the capped bonus, capped twin-win and reverse bonus certificates creation. The pricing of bonus certificates is investigated by Baule and Tallau (2011). Wilkens and Stoimenov (2007) describe the empirical analysis for long and short index certificates pricing in the German market. And Hernandez et al. (2013) provide the valuation of outperformance certificates.

On the basis of existing studies we can explore the financial engineering principles to the reverse twin-win certificates creation using the analytical expression of the options. The profit function of these certificates is expressed by the formula (5) and the fair value by the formula (6), what is based on the value of its individual components. According to the presented approach we can simultaneously apply our research to the iShares 20+ Year Treasury Bond ETF.

Consequently, we need to obtain values of the vanilla and the barrier option positions. For our approach, there are used real European vanilla call option prices gained from Yahoo Finance. There is also Haug pricing model (Haug, 2007) used to evaluate the position in European style of up and knock-out call barrier option prices in statistical program R due to lack of real data.

3 Analysis of reverse twin-win certificates

Reverse twin-win certificates are the modification of twin-win certificates, which can be available for those investors who wish to benefit from significant drop in the market, but do not also exclude slightly growth. If the UA value increases above the barrier level, then the investor loses from the UA price increasing (up and knock-out call barrier option is deactivated). However, the maximum loss is a limited by the purchasing price in the UA price growth. The barrier level is set above the initial UA price. On the other hand, if the barrier level is not reached, investor receives a cash payment equal to the actual UA price at maturity (i.e. gains from UA price growth).

Let us denote the UA price at the issue time $S_{0,}$ the price at the maturity date S_T, the barrier level B, the multiplier p, the fair value of the certificate k_0, then the profit function of the reverse twin-win certificate at the maturity date T is:

$$P(S)=\begin{cases} -p\cdot(S_T-k_0) & if\ S_T<S_0, \\ p\cdot(S_T-k_0) & if\ \max\limits_{0\le t\le T}(S_t)<B\wedge S_T\ge S_0, \\ -p\cdot(S_T-k_0) & if\ \max\limits_{0\le t\le T}(S_t)\ge B\wedge S_T<2S_0, \\ -p\cdot k_0 & if\ S_T\ge 2S_0. \end{cases} \qquad (1)$$

The reverse twin-win certificate is formed by

- selling of the UA at the spot price S_0 and the price at the expiration date S_T

$$P_1(S_T)=p(S_0-S_T), \qquad (2)$$

- buying of 2 up-and-out call options on UA with the strike price referred to as the actual spot price S_0,the barrier level B, the premium c_{BUO} for an option

$$P_2(S_T)=\begin{cases} -2pc_{BUO} & if\ S_T<S_0, \\ 2p(S_T-S_0-c_{BUO}) & if\ \max\limits_{0\le t\le T}(S_t)<B\wedge S_T\ge S_0, \\ -2pc_{BUO} & if\ \max\limits_{0\le t\le T}(S_t)\ge B\wedge S_T\ge S_0, \end{cases} \qquad (3)$$

- buying of call options on UA with the strike price referred to as 2 the starting price $2S_0$, the premium c_B for an option

$$P_3(S_T)=\begin{cases} -pc_B & if\ S_T<2S_0, \\ p(S_T-2S_0-c_B) & if\ S_T\ge 2S_0. \end{cases} \qquad (4)$$

There is used a European-style of options for the same underlying asset and with the same expiration time. The alternative investment´s profit function introduced as a sum of individual positions (2), (3) and (4) has a form:

$$P(S)=\begin{cases} p\cdot(S_0-S_T-2c_{BUO}-c_B) & if\ S_T<S_0, \\ p\cdot(S_T-S_0-2c_{BUO}-c_B) & if\ \max\limits_{0\le t\le T}(S_t)<B\wedge S_T\ge S_0, \\ p\cdot(S_0-S_T-2c_{BUO}-c_B) & if\ \max\limits_{0\le t\le T}(S_t)\ge B\wedge S_T<2S_0, \\ -p\cdot(S_0+2c_{BUO}+c_B) & if\ S_T\ge 2S_0. \end{cases} \qquad (5)$$

At the maturity date the buying of the UA will be depending on the actual market situation and the reaching/not reaching of the barrier by UA development during time to maturity. The fair value of the reverse twin-win certificate for the multiplier p is:

$$k_0 = p(S_0 + 2c_{BUO} + c_B) \qquad (6)$$

Certificate´s issuer can obtain a profit only if the selling certificate´s price is above the fair value k_0, i.e. $k_0 > p(S_0 + 2c_{BUO} + c_B)$.

4 Application to the fund TLT

In this section, we propose reverse twin-win certificates on the iShares 20+ Year Treasury Bond ETF(TLT) with different levels of its parameters and perform the analysis of their profitability for to the investor at the time of maturity.

4.1 Data

The iShares 20+ Year Treasury Bond ETF (TLT) seeks to track the investment results of an index composed of U.S. Treasury bonds with remaining maturities greater than twenty years. Given shares are chosen due to downward trend on the basis of their historical returns. The actual price of the iShares 20+ Year Treasury Bond ETF is 122.42 USD on 12th April 2017. The price of the index is very volatile, what it is seen in its historical prices and the historical volatility at the level of 17.34%. Therefore, there are expected changes of the shares development. The common stylized data about the certificates is in the Table 1. For showing we consider buying one share of that fund.

Table 1 Basic characteristics of the iShares 20+ Year Treasury Bond ETF at the issue date

Underlying asset	iShares 20+ Year Treasury Bond ETF (TLT)
Underlying price (S0)	122.42 USD
Issue date	12.04.2017
Maturity date (T)	15.12.2017
Multiplier (p)	1:1
Dividends	-

Source: Yahoo.Finance

Let´s assume, investors expect decline of TLT in the future (up to December 2017) and believe the UA to remain under the pre-set barrier with the aim to gain from the bear market. Following the assumptions, our proposed certificates are analyzed and compared to each other. In this case we consider different levels of the barrier, i.e. 125, 130, 135, 140 and 145 USD, where calculated up and knock-out call barrier option prices (results in the Table 2) depend on the input parameters such as the strike prices, the barrier levels, the maturity date, the risk-free interest rate and the implied volatilities and the fair values are calculated according to relation (6).

4.2 Results

Let us propose reverse twin-win certificate (RTW) as as the replicating portfolio, i.e. a combination of a short position in TLT with the actual price 122.42 EUR, a long position in 2 up and knock-out call options with the strike level 122.42 USD, barrier level 125 USD, option premium 0.01 USD per option, maturity date 15th December 2017 and a long position in call option in TLT with strike level 244.84 USD, option premium 4.94 USD per option, maturity date 15th December 2017.The profit function at the maturity of the designed reverse twin-win certificate is represented by the following equation:

$$P(S)=\begin{cases} -S_T+117.46 & if\ S_T<122.42, \\ S_T-127.38 & if\ \max\limits_{0\le t\le T}(S_t)<125\wedge S_T\ge 122.42, \\ -S_T+117.46 & if\ \max\limits_{0\le t\le T}(S_t)\ge 125\wedge S_T<244.84, \\ -127.38 & if\ S_T\ge 244.84. \end{cases} \quad (7)$$

The purchase certificate´s price k_0 based on (6) equals 127.38USD. The results of designed certificate show, the profit profile depends on the reaching/not reaching the barrier level during time to maturity. If the barrier level 125 USD is not reached, the profit profile depends on the actual underlying asset price at the maturity date. In this case is valid the higher the investor´s profit is based on the lower TLT price at the maturity date. On the other hand, if the barrier level is reached and TLT is in the range of<125; 244.84> USD, the investor takes a loss, where the given loss is increasing with TLT´s growth. The maximum loss is 127.38USD/ certificate.

The comparison of the profit from designed reverse twin-win (RTW) and linear certificate (equals underlying asset UA) on TLT with the barrier level 125.00 USD depending on TLT price performance at the future trade date *t* of the certificates (if the barrier level is not (left figure)/ is (right figure) broken during time to maturity) is illustrated in the Figure 1.

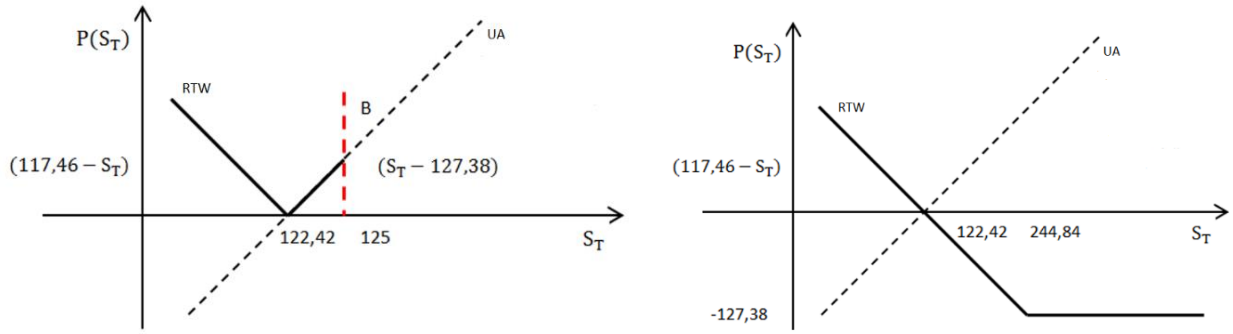

Figure6 Profit profile of reverse twin-win certificate if the barrier level is not reached (left figure) or is reached (right figure)

Notes: UA underlying asset, RTW reverse twin win certificate, B barrier level, S_T spot price of TLT at the maturity date

The same method is used for next designed reverse twin-win certificates (variants RTW1-RTW5) with different parameters, where all information are summarized in the Table 2.

Table 2 Selected characteristics of reverse twin-win certificates

Certificate	B	S_0	$c(2S_0)$	$c_{UO}(S_0)$	k_0
RTW1	125	122.42	4.94	0.01	127.38
RTW2	130	122.42	4.94	0.02	127.40
RTW3	135	122.42	4.94	0.14	127.64
RTW4	140	122.42	4.94	0.43	128.22
RTW5	145	122.42	4.94	0.95	129.26

Source: Authors

Profit profiles of all designed certificates at the future trade date used in our analysis can be provided upon a request. Let´s look at the relation between the change of the issue pricek_0 and the

change of the barrier level B detected using the selected certificates. Our results from the Table 2 indicate positive influence of the barrier level (variants RTW1. RTW5).on the certificates price k_0. i.e. the growth of the barrier (further to the actual price S_0) causes growth of the issue price and vice versa.

Finally. the most important role in investor´s choice is given by the selection of investment certificates based on the appropriate parameters and expectations of the future UA´s price performance.

The modification of reverse twin-win certificates using cap level can be created by (2). (3). (4) and by selling put options with the strike price equals the cap level. Design of the given certificate will be the subject of the next research.

5 Conclusion

In this paper we focused on the design of reverse twin-win certificate. On the basis of the existing empirical studies. the scientific problem of our paper was to examine the nature of this investment certificates creation using portfolio replication method. We demonstrated that the profit of reverse twin-win certificate can be replicated by the combination of a short position in some underlying asset. a long position in 2 up-and-out call options. a long position in call options with bonus level and short position in a call options.

Our empirical approach is applied on the iShares 20+ Year Treasury Bond ETF(TLT) and perform the analysis of their profitability for to the investor at the time of maturity. We proposed reverse twin-win certificates with different barrier levels. The relation between the the certificates price and barrier level was detected.

This paper has given a new approach integrating the design of the investment certificates using the option pricing by duplication methods. The main aim was to perform an analysis of the reverse twin-win certificate creation through the analytical expression of the replicated profit profiles. Performed analysis should help to understand the construction of the reverse twin-win certificates. as well as the influence of the individual factors.

Acknowledgements

The work was supported by the Ministry of Education of the Slovak Republic under grant VEGA No. 1/0967/15: Approaches for fiscal imbalance solution in terms of the EU and in the context of the systemic crisis.

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First Czech study of social costs of elder abuse and neglect – case study on Prague

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Abstract

The main objective of the paper is to introduce a methodology for a quantification of social costs of elder abuse and neglect (EAN). Economic aspects of EAN have not been studied in the Czech Republic yet, and also abroad this is a quite unexplored area. Qualitative research methods are employed – the systematic review (worldwide), focus groups, and expert interviews. A modification of the Social Return on Investment (SROI) method is suggested for EAN social costs estimation; the modification allows to calculate the resulted losses. For the SROI calculation, EAN is divided into three groups: financial abuse, domestic abuse, and neglect of care for elderly. In the first group of financial abuse, the social loss was estimated to be CZK 5.8-7.7 million for Prague in 2016. The second group of domestic abuse was assigned the loss of CZK 0.9-1.9 million for Prague in 2015. The resulting loss was not determined for the third group, neglect of care for elderly, because the available data are so limited that they do not allow the calculation. According to the experts´ opinion, these costs should be considered for a minimum estimation of real costs, since the issue is rather hidden and the real extent is unknown.

Keywords: Senior population, Elder abuse and neglect, Social Return on Investnement, Social costs.

JEL Classification: J14, I31

1 Introduction

It is expected that the share of people that can be classified as elder (over 60 years old) will increase from 20 % to 28 % in Europe during the period 1998-2025, while the oldest group over 80 is growing most rapidly. Thus, a large population emerge that requires nursing care. That´s why

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seniors are spoken about as a "graywave" that constitutes a threat of economic and political instability. At the same time, Europe is, according to the UN statistics, the continent with the oldest population (Bužgová & Ivanová, 2007). The Czech Republic is a part of these trends.

All over the world, at least 1.6 million people die due to violent acts or abuse (Krug et al., 2002). Seniors create a special risk group. Ageing is connected with biological changes, there is an increasing number of chronic diseases, as well as an increasing frequency of polymorbidity due to cardiovascular diseases, diabetes mellitus, osteoarthritis, osteoporosis, dementia, etc. (Gavurova & Vagasova, 2016; Soltes & Gavurova, 2015). The prevalence of at least one of these diseases is nearly 90 % in people over 75 (Čevela et al., 2014). Thus, these individuals become weaker, more vulnerable, and less independent. Professionals speak about frailty in elderly (Bužgová a Ivanová, 2007).

The notion "elder abuse and neglect" (EAN) means harassment, abuse and neglect in seniors, i.e. various forms of maltreatment (physical attacks, material or financial abuse, neglect of care by a third person, psychological and emotional abuse, sexual harassment, or systematic abuse). Research has shown that persons suffering from a kind of dementia are exposed to a larger risk of abuse (Cooney et al., 2006).

EAN is a global problem growing together with population ageing. According to Martinková et al. (2009), the prevalence of EAN amounts to 3-10 % of the global senior population. They also give an estimation of 60,000 affected seniors in the Czech Republic. Behind abuse and neglect of these people there are large healthcare, community and social costs directly associated with abuse and neglect, or with prevention (Gutman & Yon, 2014). EAN is studied in a series of papers; an overview of them can be found in the thesis by Haunerová (2017).

The objective of this paper is to introduce a methodology for quantification of social costs of EAN in the Czech Republic, and to verify the applicability of the designed methodology based on the Social Return on Investment (SROI) method in an original field study conducted by the authors in Prague.

2 Methods

The study was executed by a joint research strategy applying both qualitative and quantitative methods to data from the period since 2014 to 2016. Due to the character of the research problem, data were collected using the focus group method in the sense of Miovský (Miovský, 2006) and structured interviews with actors (Potůček, 2008). Publicly available data were analysed, as well as unpublished data of the Police of the Czech Republic, and both public and internal data of helping organizations. A systematic literary review of both national and foreign resources was carried out searching recognized international databases. Out of 164 retrieved papers from the period since 2002 to 2016, only four papers focused on the economic impact of the EAN were used in the study; these papers were selected on the basis of their relevancy to and usefulness for the research. The costs were calculated in the structure suggested by Haunerová (2017) in the area of the financial abuse of elderly, domestic violence and neglect of care. Both direct and indirect costs were included. The social costs were calculated using authors´ own modification of the SROI method (Banke-Thomas et al., 2015). An important method employed in data assessment and model construction was a panel of experts (Ivlev et al., 2015, Ivlev et al., 2015a) and expert

estimation (Hughes, 1996). Last but not least, modelling was used to create a model of social costs (Lave & March, 1993).

3 Approaches to economic evaluations of EAN

Two problems must be solved in economic cost analyses: cost assessment or estimation and incorporation, and cost effectiveness calculation of preventive programs. In the following text, individual studies in this field are analyzed and their approaches are discussed. Due to a shortage in studies dealing in cost issues of EAN, also papers focused on other types of interpersonal violence were chosen, provided their methodology may be applicable to a study in EAN.

Most studies in economic evaluation of preventive programs in interpersonal violence differ in the applied methodology and included costs, so that their direct comparison may be difficult. It is not easy to prove both potential effects (decline in violence and financial benefits), however, all available studies show that preventive programs are more cost-effective (Watters et al., 2004).

The crucial paper was published by Brent in 2015. He divides elderly abuse and neglect into two umbrella categories, financial and nonfinancial offenses, while nonfinancial offenses cover physical abuse, sexual abuse and psychological abuse. The seriousness of any particular offense is evaluated based on the information whether the victim was willing to prosecute the abuser, which is the fundamental assumption of the analysis. Due to this willingness we can conclude that the victim is unwilling to continue the abusive relationship. The willingness to proceed in this way differs in relation to the type of violence. Brent based his work on the methodology and data of Brownell (1998), while he used the willingness to prosecute in the context of the cost benefit analysis (similarly to the willingness to pay). Then he suggested a method how to transfer this willingness to prosecute into monetary terms based on a Probit model, while the victims of serious nonfinancial offenses created a group most inclined to prosecute the abuser (89-90 %) (Brent 2015). Brent points out that in the case of financial abuse, the value of psychological damage should be added to the nominal financial loss; it is caused by the fact that the abuser is often a person that was trusted by the victim (a family member, caregiver). The value of nonfinancial offenses was estimated to be between USD 40,000 and 50,000 per offense, which corresponds to USD 80,000 to 100,000 in 2014 prices. Nearly all forms of abuse were found to be associated with a low social support. For instance, if sending policemen or social workers to visit seniors at risk cost annually USD 40,000-60,000 to prevent one offense, this would be effectively spent public funds (Brent, 2015). Inspiration can be taken also from papers by Muller et al. (2014) and Peterson et al. (2014).

4 Situation in Prague and in the Czech Republic

Quite a lot of papers have been published in the Czech Republic dealing with EAN, however, according to our review, none of them was focused on social costs or any other economic issue of this phenomenon. From the point of view of seniors themselves, this topic was partly discussed by Buriánek and colleagues in their report *Domestic violence – violence towards men and seniors* (2006). Based on a set of research questions they commented on bribes some seniors give to their caretakers. In the sample of respondents (n= 550), about half of them reported such an experience. However, the authors did not study economic issues any more. An important position among organizations aimed at elder abuse has the non-profit organization Život 90 that operates a service called “Senior telefon” (emergency phone assistance). In 2014, this line recorded 462 calls due to abuse, which is a slight increase as compared with 2013 (Život 90).

The regional directorate of the Police of the Czech Republic in Prague provided the authors with classified data on the total damage caused to seniors by financial abuse (see Table 1). Generally, these are frauds sorted according to keywords. The most frequent keyword is "grandchild", when an unknown person pretends to be the victim´s grandchild in order to get some money. Another keyword is "truck"; in this case, the offender stops a senior in the street and explains that his employee had an accident in a truck and urgently needs money for a surgery. They usually leave counterfeited dollars as a deposit. The other group are frauds committed by members of the senior´s own family. In 2014 the damage caused to seniors amounted to CZK 32.9 million, while in 2015 the total damage was only CZK 25.8 million. The decreasing trend continued in 2016, when the damage totaled CZK 22.6 million. In these statistics, a senior is a person over 65 years old. The data provided by the Police revealed that the highest amount of documented financial loss was recorded in seniors living in Prague.

The statistical data provided by the Police are insufficient for an application of Brent´s methodology. However, the Police have available similar detailed data on individual cases that could be analyzed by a modified Brent´s method, which might bring interesting results. In the USA, the group that is most inclined to prosecute the abuser are the victims of serious nonfinancial offenses (89-90 %) (Brent 2015). However, the victims of nonfinancial offenses are unwilling to prosecute the abuser in the Czech Republic. It might be possible to utilize statistics of Intervention Centers, though. We can consider the willingness to utilize subsequent care in Intervention Centers for the limit of seriousness. If a senior becomes involved in an active collaboration with such a center, the cases can be usually solved, and we can say that the victim is unwilling to continue the abusive relationship. An application of such an analysis would be preferential as regards necessary time, as well as less complicated for the Police than the modification of SROI we present below. However, it is not clear what would be its results like in the Czech environment, as the character of individual cases, the culture and the behavior of seniors differ.

Table 1 Number of reported cases and criminal offenses in Prague

Year	2014	2015	2016
Number of all reported cases	802	747	635
Number of criminal offences	692	637	544

Source: Statistical data of the Police of the Czech Republic (Haunerová 2017).

5 Application of SROI for EAN in Prague

Most input data for the SROI analysis are expert estimations from focus groups based on statistical data that provided only numbers of cases. That´s why three scenarios (positive, realistic and negative) were designed describing the social impact of EAN.

The results of the positive scenario can be regarded only as a minimum lower estimate of the real costs. Opportunity costs were not provided by any of the focus groups, they are just modelled based on the assumption that a senior would have the lost money on a savings account in a bank or in a building society. Hence, the average loss is multiplied by the interest rate of 1-2%. Another modelled parameter is a financial valuation of senior´s time. In this case, the spent time (the time

loss) is multiplied by the minimum wages in the country. Moreover, what is also not included in our model is the work of volunteers due to non-existence of reliable data.

Table 2 and Table 3 provide a summary of results of the SROI applied to financial abuse and domestic violence. As concerns neglect of care, neither the impact map was created, nor the total negative impact to the society were calculated, because the authors were unable to obtain enough data or expert estimates. Individual phases are based on the SROI methodology (see the Methods and the References).

Table 2 The SROI impact map of financial abuse

The impact map for financial abuse											
Phase 1		Phase 2 (in CZK)				Phase 3			Phase 4 (in CZK)		
Stake-holders	Changes	Inputs	Value – positive scenario	Value – realistic scenario	Value – negative scenario	Amount	Duration	Infor-mation sources	Impact – positive scenario	Impact – realistic scenario	Impact – negative scenario
Seniors	Loss of financial means and time	Financial loss per case	47673	47673	47673	93	1 year	Police statistics	4 433 589	4 433 589	4 433 589
		Opportunity cost	477	715	953	93	1 year	Model	44 336	66 504	88 672
		Transport	This input was not monetarized								
		Time	248	372	496	93	1 year	Model	23 064	34 596	46 128
Police	Loss of financial means and time	Personnel costs per case	14000	22400	33600	93	1 year	Focus group	1 302 000	2 083 200	3 124 800
		Transport	63	95	142	93	1 year	Focus group	5 859	8 835	13 206
Život 90 - counselling	Growing costs of providing services	Work of lawyers (volunteers)	This input was not monetarized								
Život 90 - Senior telefon	Growing costs of providing services	Personnel costs	80	174	282	36	1 year	Focus group	2 880	6 264	10 152
		Operational costs	446	446	446	36	1 year	Data of Život 90	16 056	16 056	16 056
Family members	Loss of time, financial support of seniors	Transport	This input was not monetarized								
		Time	This input was not monetarized								
Total									**5 827 784**	**6 649 044**	**7 732 603**

Source: Haunerová (2017) and the authors

Table 3 The SROI impact map of domestic violence

The impact map for financial abuse											
Phase 1		Phase 2 (in CZK)				Phase 3			Phase 4 (in CZK)		
Stake-holders	Changes	Inputs	Value – positive scenario	Value – realistic scenario	Value – negative scenario	Amount	Dura-tion	Information sources	Impact – positive scenario	Impact – realistic scenario	Impact – negative scenario
Intervention Centers	Growing costs of providing services	Personnel costs	1280	1584	1920	79	1 year	Focus group and APIC data	101 120	125 136	151 680
Police	Loss of financial means and time	Personnel costs	5600	16800	28000	18	1 year	Focus group and statistics	100 800	302 400	504 000
		Transport	63	63	63	18	1 year	Focus group	1 134	1 134	1 134
		Expert opinions	5000	20000	35000	8	1 year	Focus group	40 000	160 000	280 000
Život 90 - Senior telefon	Growing costs of providing services	Personnel costs	160	174	188	381	1 year	Focus group and statistics	60 960	66 294	71 628
		Operational costs	446	446	446	381	1 year	Život 90 data	169 926	169 926	169 926
Život 90 counselling	Growing costs of providing services and time of volunteering	Personal costs – social workers	3200	4350	5640	43	1 year	Focus group and statistics	137 600	187 050	242 520
		Volunteering – lawyers	This input was not monetarized								
General practitioner	Increase in number of visits		180	180	180	122-304	1 year	UZIS, model	21 960	27 360	54 720
Healthcare system	Rise in ambulance calls and number of hospitalization	Hospitali-zation costs	This input was not monetarized								
		Emergency medical service	3500	4250	5000	4-8	1 year	Model, interview	14 000	25 500	40 000
Seniors	Health and/or psychic state worsening, more frequent physician office visits	Decrease in QoL (QALY)	This input was not monetarized								
		Time	496	558	620	122	1 year	Model	60 512	68 076	75 640
		Transport	This input was not monetarized								
Community	Financial loss from increased council housing, growing personnel costs for social workers	Average rent	80 100	96 120	112 140	2	1 year	Focus group, model	160 200	192 240	224 280
		Personnel costs	955	1242	1528	47	1 year	Focus group	44 885	58 351	71 816
Total									**913 097**	**1 383 467**	**1 887 344**

Source: Haunerová (2017) and the authors

6 Discussion and limitations of the pilot study

The greatest problem in analyzing social costs of domestic violence is an absence of reliable data. The required statistics are not only publicly unavailable, often they even do not exist. The Police of the Czech Republic has best existing pre-arranged data, although they are not publicly accessible. The senior citizen association Život 90 has quite good publicly available data, as well as Intervention Centers (established according to the Social Services Act No. 108/2006 Coll.) and the non-profit organization Bílý kruh bezpečí. On the other hand, no data have been collected in the healthcare network and by social workers of the community care service. Also the issue of prevalence estimation has not been solved in a satisfactory way yet. The main reason is unwillingness of abused seniors to report the violence, or their health state does not allow it. Another drawback of this paper follows from the lack of statistical data: a large part of data used in the social costs calculation come from expert estimates.

Most of economic analyses dealing with violence have used the time period of one year. Hence, a choice of any other interval would make any comparison of results difficult (Waters et al., 2004). Therefore the period of one year was chosen in this study as well. In case of domestic violence, the decreased quality of life has not been monetarized. However, the quality of life is generally supposed to decline. Different methods can be used to express the quality of life in economic terms. A paper published in the USA showed that the abused seniors die earlier than those who never met any kind of abuse (Krug et al., 2002). This was proved by Bond and Butler (2013), who showed that the risk of death among abused and neglected seniors grows 3.1 times within three years since the abuse started. After assessing all factors that might have affected the mortality (age, sex, social support level, diagnosis) they concluded that abuse causes an extreme interpersonal stress. No similar study has been done in the Czech environment yet, however, we can assume that this phenomenon exist also in the Czech Republic, although the exact scope can differ.

7 Conclusion

A modification of the Social Return on Investment (SROI) method enabling to calculate the generated losses is suggested for assessment of social costs of the EAN. For the purpose of the calculation, elder abuse and neglect is divided into three groups: financial abuse, domestic abuse and neglect of care. In the first group of financial abuse, the social loss was estimated to be CZK 5.8-7.7 million for Prague in 2016. The second group of domestic abuse was assigned the sum of CZK 0,9-1,9 million for Prague in 2015. A resulting loss was not determined for the third group, neglect of care for elderly, because the available data are so limited that they do not allow the calculation. According to the experts´ opinion, these costs should be considered for a minimum estimation of real costs, since the issue is rather hidden and the real extent is unknown. The applicability of the CBA methodology according to Brent (2015) was also investigated. It seems promising, although there are not publicly accessible data for it in the Czech Republic at present. However, the Police disposes with the necessary data that could provide them with interesting results when substituted into Brent´s methodology.

Acknowledgements

The authors wish to express their thanks to the Police of the Czech Republic and to the representatives of the involved non-profit organizations for their kind participation in the research.

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Technology eFusion and its market potential

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Abstract

The objective of radioactive waste management is to deal with radioactive waste in a manner that protects human health and the environment, now and in the future without imposing an undue burden on future generation. National regulations and internationally recommended standards and guidelines have been developed dealing with radiation projection and radioactive waste management. It has been an exemplary feature of radioactive waste management that special attention has been given to projection of future generations. Particular consideration is given to potential radiation exposure, the possible need for surveillance or maintenance, and economic consequences. The aim service is to fulfill innovative strategies, to increase the competitiveness of enterprises through research and development capacities of transferable results of research and development into application practice. Concept preparation, core research, development, and application practice for all partners who are interested in collaborating in implementing innovative ideas, focused primarily on research and development of technologies for systemic use of land resources. We offer engineering support and supply of new technologies for production systems and robotic workplaces related to the use of land resources, training and training of specialists in research and development of new technologies in various fields.

Keywords: Cluster, Nuclear waste, Earth resources, Utilization, Waste management, eFusion.

1 Introduction

The Technology Cluster was focused with target to consolidate efforts and R&D activities in different technical disciplines which allow developing the technology and products for effective utilization of Earth resource in global perspective.

The cluster providing activities for innovation strategy, increasing of competitive capabilities for business sector based on the transfer R&D results to application field, preparing the feasibilities studies and concepts, basic research, R&D services for partners active in development of technology for systematics Earth resource utilization, support in engineering activities for transfer of innovations to application fields connect to Earth resource utilization.

The technology is based on synergy of thermal, pressure and sound energy is allowing reaching the deep horizons unreachable for conventional drilling technologies. Thermo-baro-sonic technology is working on the basic principles of an inverted rocket engine and therefore shared knowledge and the dissemination of ideas in this area creates conditions for achieving the

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objectives of the research and development tasks in close cooperation with the working team of the Technical University in Kosice (eFusion, 2015).

The main aim is development of eFusion technology as whole, and for all eFusion technology basic components which are: drilling head, high capacity hydrogen storage system, control and monitoring system build on artificial intelligence, robotics, mining and energy transfer and distribution (eFusion, 2015).

2 Technology

eFusion – Ground breaking technology for the drilling and boring of the holes into the earth surface by using thermal, pressure and acoustic energy. Technology eFusion develop the way for utilization of deep dry geothermal energy with high impact on the energy efficiency, stability and environment and bring the clean and independent source of energy for each place and each demand around the globe, due the science and technology. Technology eFusion will bring to the life the solution for final storage repository for nuclear waste and allows sets the new standards in construction segment with new level of safety.

2.1 Innovation

- Contact-free, costs effective technology which makes drilling and boring of the deep holes possible at depths and location which have been inaccessible so far, deep limit for this this drilling technology is depth where the rocks get into a plastic state.
- Linear increase of costs with drilling depth against exponential at conventional drilling technologies.
- No need for additional casing, as the casing is created while drilling through the melting process.
- Free diameter selection for drilling from small to big diameters, thru modular constriction capability.
- No rotation parts and compact and smart design.
- Easy to install, maintain and operate.
- Superior efficiency in drilling solutions.

2.2 Prototype and results from test drilling

Working prototype was created in 2012 and test drilling was done in stone pit in Slovakia. 14 meters deep whole in stone pit was reach in 1 hour, in the Andesite rock. Prototype was fixed in vertical position by crane and movement during drilling was provided without pushing forces, movement was based on the external influence of drilling head, only.

Figure 1 Hole done with eFusion prototype
Source: eFusion (2015)

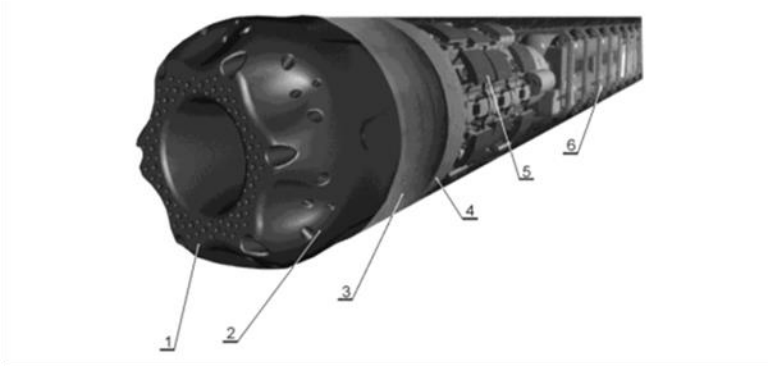

Figure 2 eFusion prototype for construction works
Source: eFusion (2015)

Figure 3 eFusion prototype
Source: eFusion (2015)

3 Market potential and an economic view of the demand applicable for eFusion technology

3.1 Mining and drilling global market related to raw materials

Global market estimation for Mining and drilling activities related to raw materials are on the level 19 Mld. EUR. Superior efficiency of eFusion technology as instrument for reach the 10 % of global market share in drilling activities related to raw materials, within next 10 years.

3.2 Underground transport infrastructure

China is investing more than 87 Mld. EUR in year 2015 for building the underground transport infrastructure with length equal to 1700 km. Global market estimation for underground transport infrastructure is on level 200 Mld. EUR. Drilling activities which are our target area represent 40% of total budget from underground transport infrastructure costs.

Free diameter selection for drilling from small to big diameters, thru modular constriction capability, together with superior efficiency of eFusion technology as instruments for reach the 10 % of global market share in drilling activities related to underground transport infrastructure within next 15 years (Management of Hazardous Wastes, 2016).

3.3 The final disposal of nuclear power, high-radioactive or heat-generating waste

Estimated costs for the construction of final nuclear waste disposal sites are at the level indicated in the table below, building up nuclear waste dumps is an ecological debt that needs to be solved in the next decade (Lee & Ojovan, 2016).

Within following 25 years most of countries which are using nuclear power will be working on projects or will works will already on new type of facilities for final storage of nuclear waste. Germany is in preparation phase for this storage facilities in these days and there are already selected potential locations for these facilities. Works on feasibility study for these two storage facilities for storage radioactive waste with total capacity of 300 000 m^3 with costs estimation on level 30 Mld. EUR are ongoing, as well. We use information from Germany work-in-process for global market cost estimation related to final storage facilities for nuclear waste and estimation cost for these facilities is on level 950 Mld. EUR. Drilling part of these activities which are our target area represent approximately 50 % of total costs. Time frame for build a final nuclear storage facility is approximately 20 years from start day and base of that we predict average level of market for this activity on level 20 Mld. EUR per year.

The main aim is achieving 80% of global market share of drilling activities related to final nuclear waste facilities construction. This target is reflecting fact that for main construction are stets extremely strict criteria which is eFusion technology capable to fully keep.

Nuclear power by Country in 2014								
Country	Number of operated reactors [Pcs]	Capacity Net-total [Mwe]	Generated Electricity [GWh]	domestic generation [%] of share	Operating reactors [Pcs]	Rectors under construction [Pcs]	Average power per reactor [Mwe/Reactor]	Cost for nucler waste storage system base on German forecast [Mld. EUR]
Argentina	3	1 627	5 258	4.0%	3	1	542	4
Armenia	1	375	2 266	30.7%	1	0	375	1
Belarus	0	0	0	0	0	2		0
Belgium	7	5 927	32 094	47.5%	7	0	847	15
Brazil	2	1 884	14 463	2.9%	2	1	942	5
Bulgaria	2	1 926	15 014	31.8%	2	0	963	5
Canada	19	13 500	98 588	16.8%	19	0	711	34
Czech Republic	6	3 904	28 637	35.8%	6	0	651	10
Finland	4	2 752	22 646	34.6%	4	1	688	7
France	58	63 130	418 001	76.9%	58	1	1 088	157
Germany	9	12 074	91 784	15.8%	9	0	1 342	30
Hungary	4	1 889	14 778	53.6%	4	0	472	5
China	29	24 140	123 808	2.4%	26	23	928	60
India	21	5 780	37 835	3.7%	21	6	275	14
Iran	1	915	3 724	1.5%	1	0	915	2
Japan	48	42 388	0	0.0%	43	3	986	105
Mexico	2	1 330	9 312	5.6%	2	0	665	3
Netherlands	1	482	3 874	4.0%	1	0	482	1
Pakistan	3	690	4 578	4.3%	3	2	230	2
Romania	2	1 300	10 754	18.5%	2	0	650	3
Russia	34	24 654	169 065	18.6%	34	9	725	61
Slovakia	4	1 814	14 420	56.8%	4	2	454	5
Slovenia	1	688	6 061	37.2%	1	0	688	2
South Africa	2	1 860	14 763	6.2%	2	0	930	5
South Korea	24	20 717	149 199	30.4%	24	4	863	51
Spain	7	7 121	54 860	20.4%	7	0	1 017	18
Sweden	10	9 470	62 270	41.5%	10	0	947	24
Switzerland	5	3 333	26 468	37.9%	5	0	667	8
Taiwan	6	5 032	40 801	18.9%	6	0	839	13
Turkey	0	0	0	0	0	2		0
Ukraine	15	13 107	83 123	49.4%	15	(IAEA) or 0 (WNA	874	33
United Arab Emirates	0	0	0	0	0	4		0
United Kingdom	16	9 373	57 918	17.2%	16	0	586	23
United States	100	99 244	798 616	19.5%	99	5	1 002	247
World total	**439**	**376,821 MWe**	**2,410 TWh**	**10.9%**	**437 Pcs**	**66 Pcs**	**753 Mwe/ Reacto**	**950 Mld. EUR**

Figure 4 Nuclear power by country 2014
Source: eFusion (2014)

3.4 Power energy sector - Development of EGS (Enhanced geothermal system) – source of clean energy

EGS are capable of supplying base and regulation load power, with continues energy supply regardless of time of year and time of day. It require careful development of the thermal field, in keeping with selection of final repository fields with hard rock having overburden of at least 1000m. The locations have to be selected for political and public consensus, supported by in-situ experiments and widespread monitoring of the substrate material.

For building the power plant based on EGS principle with total nominal power at level 25 MWh-1 is need to create 5 deep holes to deep level 4 500 m – 5 500 m, approximately. An actual cost per deep hole with best available technology on the market is 8 MEUR/hole. Decreasing or minimalize the cost per deep hole is fundamental premise for future extension of Enhanced geothermal systems and for bring the clean energy for global demands. Costs savings on deep hole coming from using the eFusion technology is on level 60% and represent total costs on level 3.2 MEUR/deep hole, for today. eFusion technology is significantly opening the market with clean energy for global demand with using the EGS power generation. EGS is ready to cover the global power demands related to base and regulation power what is not reachable for other kind of alternative energy sources.

Decreasing the costs related to holes creation will lead to significant extension of EGS power generation with estimation 500 new EGS power plants per year with power 25 MWh-1/ EGS plant. Market potential in this case represent 8 Mld EUR/year (5 holes x 3.2 m EUR/hole x 500 EGS units). Just for calculation purpose, to cover the full nuclear power energy generation in Slovakia are needed 60 EGS power plants with nominal power 25 MWh-1/ EGS plant, what represent the market potential on level 960 MEUR in Slovakia only. From this calculation and global energy demand is perspective in building of 500 EGS power plants per year in global perspective is negligible share.

The aim is 80 % of global market share of drilling activities related to EGS power generation as clean source of energy in global perspective with in following 10 years (ORC, 2013).

4 Conclusion

Technology eFusion for land use was established to concentrate research, production, supply and engineering development capacities on development of new technologies and equipment to enable efficient and rational use of land resources. The global objective of the project is in direct correlation with the fulfillment of the priorities and tasks of the Operational Program Research and Innovation is to create an environment for increasing the innovation potential of the Slovak Republic in industry and services focusing on the preparation of sustainable development. At the same time, we want to contribute to achieving the objectives set out in the Slovak Republic's Innovation Strategy 2014 – 2020.

The objectives of the strategy are, among other things, to achieve a state where innovation will form an integral part of as many economic activities as possible in support of the direct support of excellence and smart specialization, aimed at improving collaboration between universities, research centers and businesses with the overall impact of improving the ability to commercialize and adopt innovations and technologies in application practice.

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Actual Trend in Incidence of Noncommunicable Diseases and Disparities of CVD and Neoplasm Mortality under the Slovak Condition

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Abstract

Nowadays, the highest incidence of current disease and mortality among the population is caused by noncommunicable diseases. We are experiencing a high increase in patients receiving hospitalization as a consequence of heart failure and neoplasm disease in many countries around the world. This leads to problems of public health sustainability and the burden on the economy of all systems. One of the aims of this study is to attract attention to the seriousness of the issue of CVD and neoplasm disease and to recall the importance of prevention and healthy lifestyle. In this sense, we are focusing on total mortality of noncommunicable diseases in Slovakia and on the influence of selected socio-economic factors. At first, this study is focused on evaluation of CVD and neoplasm diseases' incidence under Slovak condition, secondly, by using the distance from a fictitious object method we examine the actual seriousness of mentioned diseases at the regional level - regions, and thirdly, by using a linear regression we examine the impact of selected socioeconomic indicators on death because of CVD and neoplasm at the national level. The results of this analysis can provide important information for policy makers as well as for individuals while increasing the interest in the prevention of these serious illnesses and their eventual fatal consequences.

Keywords: Noncommunicable diseases, Cardiovascular disease, Neoplasm, Mortality, Socioeconomic factors.

JEL Classification: I10, I15

1 Introduction

At the present, noncommunicable diseases such as cardiovascular disease (CVD), neoplasm or diabetes repesent a threat for human health and, on a global scale, these chronic diseases are neglected despite growing awareness of their serious consequences (Soltes & Gavurova, 2014, 2015). In this context, attention should be drawn to the unfavorable development of the health status of the population considering cardiovascular diseases that kill more people than all types of neoplasms together (Kamenský & Murín et al., 2009). The Slovaks do not know or underestimate the seriousness of CVD and according to a survey of the Slovak Society of Cardiology, more than 75 % of the respondents consider the oncological disease as the greatest threat. Only 16% of respondents think that heart disease is the most serious (Domok, 2016). Under Slovak conditions, noncommunicable diseases are accounted for about 90% of all diseases in 2015. The results of another survey conducted by Slovak respondents confirm the low level of awareness of the problem of CVD and emphasize the need of raise awareness of a healthy lifestyle and the importance of

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regular preventive examinations that can improve the individual's health (Magurová et al., 2011; Michalski, 2016a; Michalski, 2016b; Bartáková et al. 2013). According to Geneau et al. (2010) and Alleyne et al. (2013) CVD and neoplasm disease from the category of chronic diseases should be located in a central position in global health and increase the involvement of addressing this issue in policy programs. The mortality rate for noncomunicable disease is similarly related to many economic and behavioral factors (Zahra et al., 2015; Bem & Michalski, 2015; Michalski, 2008; Michalski, 2016c; Šimrová et al. 2014). The effect of the global economic crisis may be related to increased unemployment and reduction of health care expenditures (Watkins et al., 2015).

Over the last two decades, the incidence of heart failure hospitalization in almost all countries has risen sharply (Korda et al., 2016, Dukát & Baráková, 2006, Mensah & Brown, 2007). This leads to problems of sustainability of public health and the burden on the economy of all systems (Szabo & Sidor, 2014). At the same time, this unfavorable situation can be only partially explained by population aging (Dukát & Baráková, 2006; Marešová et al., 2016; Riečanský, 1998). Despite this increased number of human hospitalizations due to CVD difficulties, CVD mortality generally declined by men as well as by women (Bhatnagar et al., 2016). On the contrary, Zahra et al. (2015) write about the existence of large gender differences in CVD mortality rates. If we take a look at more up-to-date with these diseases, according to World Health Organization statistics (WHO, 2017), noncommunicable diseases generally cause up approximately 40 millions deaths annually, whereby 15 millions of them die at working ages from 30-69 years. The population trend of CVD and neoplasm disease plays a key role in social and economic consequences (Stuckler, 2008; Baustein et al., 2015). Treatment of CVD diseases and neoplasm and the cost of their hospitalization or prevention are among the most costly diseases in recent years (Suhrcke, et al., 2006; Schofield et al., 2013). According to a survey in Australia, due to early retirement of individuals caused by CVD problems there is a loss of GDP in the country of over 740 million dollars per year (Schofield et al., 2013). As the number of diagnosed CVD and neoplasm disease is unfortunately growing and developed countries are threatened by population aging, in the long time horizon it is not realistic to maintain a stabilized trend in financial expenses of medicines in the sense of demographic development or the use of new diagnostic methods (Balážová VSZP, 2016). Another problem may be the need to increase users fees and subsequently the burden for some patients (Clark at al. 2017). In the annual report for 2015 the largest health insurance company in Slovakia (VSZP) published the costs of medicines and medical devices that reached more than 8 million euros (VSZP, 2015). Cost effectiveness is extremely important to achieve the double objective of fiscal sustainability and access to quality health care for all residents (Mohelská et al., 2016). According to the report on healthcare, long-term care and fiscal sustainability systems developed by the European Commission (EC, 2017), spending on health care and long-term care has increased in the last decade in all European Member States. The impact of government spending on healthcare in relation to mortality has been studied by many other authors (Karanikolos et al., 2013; Reeves et al., 2013; Renton et al.; Granados et al., 1991; Filmer & Pritchett, 1991).

Social inequalities in the health and mortality of noncommunicable diseases have become a major issue not only for epidemiologists but also for sociologists. According to studies (Elo, 2009; Glymour, 2014; Walsemann, 2016), socio-economically disadvantaged people assumed a higher risk of heart disease. As a consequence, one of the possible alternatives for reducing the global burden of CVD is the elimination of inequalities in the socio-economic position of individuals in the fight against cardiovascular disease. From a social point of view, education also plays a significant relevant role in the prevention of CVD (Korda et al., 2016; Gavurova et al., 2017), what

is confirmed also by the Swedish study (Tiikkaja et al., 2009) where authors discover a relationship between female respondents expressing influence of education on risk persistence of CVD mortality. Poor labor conditions in the labor market and subsequent unemployment can affect and increase the risk of mortality. Individuals suffering from CVD problems can not participate in the labor force in the long run, which during the period leads to unfavorable impacts on both the individual and the state itself and its economy (Schofield et al., 2013; Lau et al., 2012). In this context, our aim is to analyze and quantify socioeconomic factors affecting the mortality of the Slovak population caused by CVD and neoplasm at the national level. Subsequently, at the regional level, we compare the mortality rate for CVD and neoplasm in individual regions using the distance from fictitious object method and linear regression. We would like to attract attention to the seriousness of the CVD and neoplasm disease, and to recall the importance of prevention and healthy lifestyle.

2 Methodology

In our analysis, we focus on noncommunicable diseases known as civilization diseases, which are at present the main cause of all mortality not only in Slovakia but also worldwide and thus kill the largest proportion of the population every year. In this sense, at the first part our analysis deals with the overall mortality rate for noncommunicable diseases in Slovakia and with the impact of selected socio-economic variables. In the second part, we compare CVD and the mortality rate of the Slovak population among the regions at the level NUTS 3.

In the linear regression model, the explained variable is the share of CVD mortality and neoplasm disease on total mortality in Slovakia. Data were obtained from available OECD Health Statistics databases, The World DataBank, DATAcube (Slovak Statistics). We use a time period that covers the 16-year horizon of 2001-2016.

As explanatory variables, the following macroeconomic indicators were selected:

- **Total Unemployment (UNMP) -** Unemployment rate refers the number of unemployed people as a percentage of the labour force, where the latter consists of the unemployed plus those in paid or self-employment. Unemployed people are those who report that they are without work, that they are available for work and that they have taken active steps to find work.
- **Unemployment with Secondary Education (UNMPS) -** Unemployment with secondary education shows the unemployment rates of people according to their upper secondary non-tertiary education level. The unemployed are defined as people without work but actively seeking employment and currently available to start work. This indicator measures the percentage of unemployed 25-64 year-olds among 25-64 year-olds in the labour force.
- **Unemployment with Tertiary Educatio**n **(UNMPT) -** Unemployment with secondary education shows the unemployment rates of people according to their tertiary education level. The unemployed are defined as people without work but actively seeking employment and currently available to start work. This indicator measures the percentage of unemployed 25-64 year-olds among 25-64 year-olds in the labour force.
- **GDP Growth (GDPG) -** Annual percentage growth rate of Gross Domestic Product at market prices based on constant local currency. Aggregates are based on constant 2010 U.S. dollars. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products.

- **Total Health Expenditures as % of Gross Domestic Product (THEXP) -** Indicator measures the final consumption of health care goods and services (i.e. current health expenditure) including personal health care (curative care, rehabilitative care, long-term care, ancillary services and medical goods) and collective services (prevention and public health services as well as health administration), but excluding spending on investments.
- **Alcohol consumption (ALCC) -** is defined as annual sales of pure alcohol in litres per person aged 15 years and older. This indicator is measured in litres per capita (people aged 15 years and older). Alcohol use is associated with numerous harmful health and social consequences.

The above-mentioned analyzed variables were selected for their ability to express their influence - their impact on mortality was studied by several authors and studies (Soltes & Gavurova, 2015; Gavurova et al., 2017; Halliday, 2014; Gravellea et al., 2012) because they have a certain impact on the health status of the population.

We estimate the following models for CVD and neoplasm mortality:

$$\textit{The Share of CVD Mortality on Total Mortality} = \beta 0+\beta 1*UNMPt + \beta 2*UNMPSt + \\ + \beta 3*UNMPTt + \beta 4*GDPGt + \beta 5*THEXPt + \beta 6*ALCCt + \varepsilon t \quad (1)$$

$$\textit{The Share of Neoplasm Mortality on Total Mortality} = \beta 0+\beta 1*UNMPt + \\ + \beta 2*UNMPSt + \beta 3*UNMPTt + \beta 4*GDPGt + \beta 5*THEXPt + \beta 6*ALCCt + \varepsilon t \quad (2)$$

3 Results and Discussion

In this part of the study we focus on evalluation of the incidence of CVD and neoplasm mortality at the level of Slovakia, secondly by using the distance from the fictitious object method we examine the actual seriousness of examined diseases at the regional level, and thirdly by using linear regression we analyze the impact of possible selected socioeconomic indicators on death caused by CVD and neoplasm at national level.

Figure 1 shows the development of the mortality rate of the Slovak population caused by the CVD on total mortality during the period 2001 to 2016. On can see that during the observed period CVD reached the highest mortality rate in 2001. In the following years the decreasing trend of CVD deaths was observed, but the number of deaths in the last year of 2016 increased slightly and contributed to the highest share of deaths (48%) from all diseases in Slovakia. The development of neoplasm mortality rates over the same reference period is shown in Figure 2. From 2001 to 2012, minor fluctuations in the incidence of neoplasm were observed and their course was relatively stable. However, the proportion of mortality on neoplasm has risen sharply since 2012, reaching almost 29% of all mortality rates in 2016. A similar high rate of CVD mortality and neoplasm disease was also the results of other foreign studies (Korda et al., 2016; Bhatnagar et al., 2016; WHO, 2017; Dukat & Barakova, 2006).

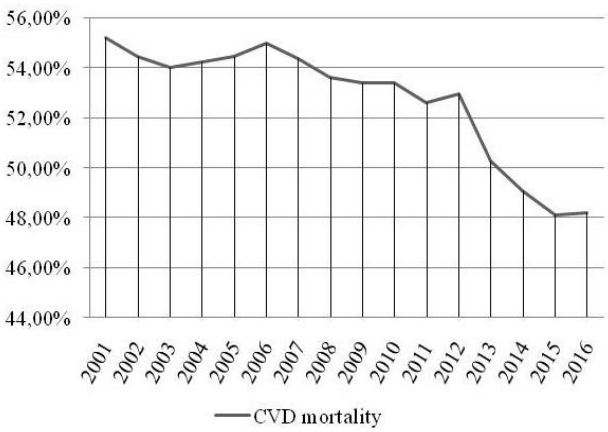

Figure 1 The share of CVD mortality on total mortality
Source: Own processing according to data from DATAcube Statistics

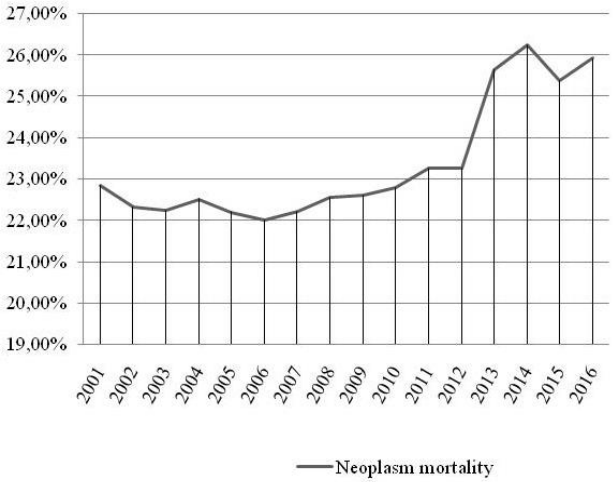

Figure 2 The share of Neoplasm mortality on total mortality
Source: Own processing according to data from DATAcube Statistics

Figure 3 shows the mortality rate of the Slovak population caused by CVD, which is one of the most serious diseases of the present time, causing the greatest human losses among all other diseases. One can see that the smallest share of mortality rates for the year 2016 is recorded in the western part of Slovakia in the Trnava region. On the contrary, this disease affects most people in the Prešov and Trenčian region.

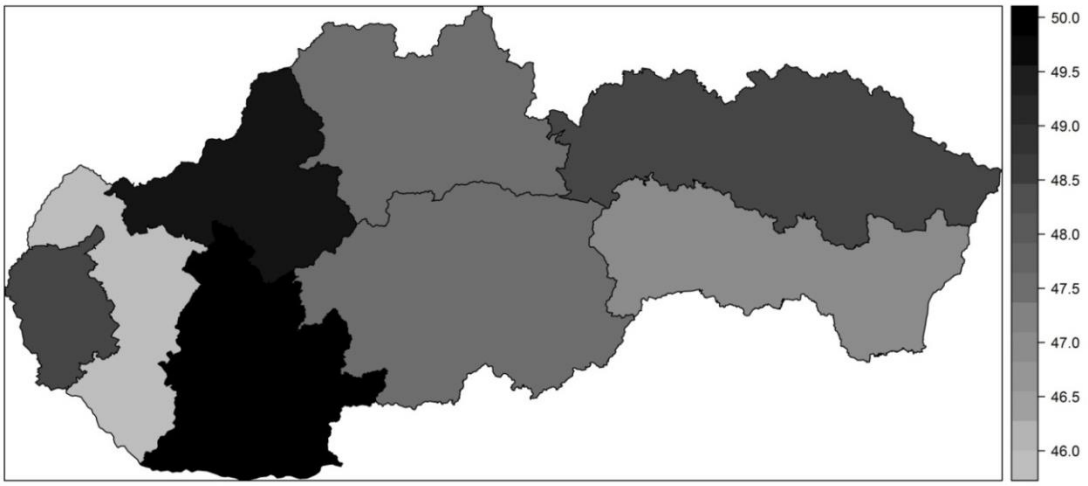

Figure 3 Disparity v úmrtnosti na CVD a Neoplasm ochorení na regionálnej úrovni Slovenska
Source: Own processing according to data from DATAcube Statistics

Furthermore, to investigate the disparities in CVD mortality at the regional level, we used the distance from a fictitious object method by creating an integral pointer. This method consists of the comparison of individual objects (Stankovičová Vojtková, 2007), for which we will consider 8 Slovak regions (level NUTS 3). Within this method, a fictitious object can achieve the best values, so the region is compared with the region that will reach the lowest possible death rate of CVD. According to Figure 4, we considered the Bratislava region (BA) for the fictitious object at the

most time, which has the lowest CVD mortality rates compared to other regions. At the beginning of the observed period (from 2001 to 2006), Prešov region (PO), Banská Bystrica region (BB) and Trenčín region (TN) peaked the highest point distance from our fictitious object (BA). Since 2006, the PO and TN regions have been increasingly distant, with the greatest extreme distance of more than eight points in 2013. However, in the last three years, there has been a significant change in the number of deaths in individual counties. In the last year 2016, the status of the fictitious object obtained Trnava region with the lowest CVD mortality rate. The four-point difference at the distance from our new fictional object was placed in the Nitra and Trenčín regions, where prevail the largest share of all CVD deaths (in both cases almost 50 % of the total mortality).

We have also used this method to investigate the mortality rate for neoplasm over the same time period. In this case, however, the status of the fictitious object acquired different regions in the observed period and there was no more stable leadership status of the fictional object between regions with a relatively low neoplasm mortality rate. Since 2008, the status of the fictitious object has been preserved mainly by Eastern Slovakia (PO, KE).

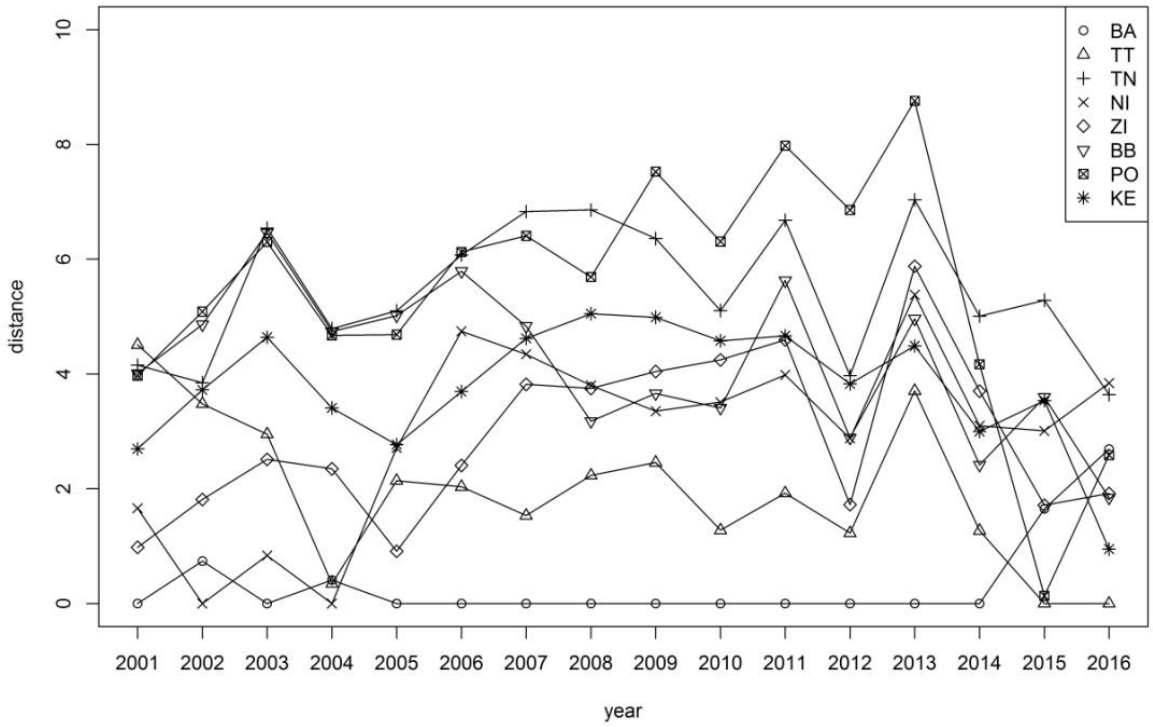

Figure 4 Comparison of mortality on CVD at the regional level (NUTS 3) in Slovakia
Source: Own processing according to data from DATAcube Statistics

Based on the six selected socio-economic indicators (total unemployment, unemployment with secondary education, unemployment with tertiary education, growth of gross domestic product (GDP), total health care expenditures as % of GDP and alcohol consumption), we have compiled linear regression model, by which we estimated the variables namely the ratio of CVD and neoplasm mortality rates on total mortality. We have explored the effect of defined explanatory variables on the mortality associated with these diseases. By testing, we found that both models as a whole appeared to be statistically significant, but some of their variable statistical significance

did not reach. For this reason we have in the next step created partial models that were absent from these statistically insignificant variables.

The second model, focused on CVD mortality, contained only statistically significant variables, such as total unemployment, unemployment with tertiary education, and total healthcare spending. The same result was also found in testing the proportion of neoplasm mortality. The results from testing of the second models are explained in Table 1 and Table 2. From Table 1 one can see that the model explains 84.58% variability of the explained variable. The model as a whole is statistically significant as well as all their explanatory variables.

According to the model results from Table 1 and Table 2, we can say that if the explanatory variable unemployment rate (UNMP) increases by one percentage point, the share of mortality caused by heart disease will increase by 0.65 % and the proportion of mortality caused by neoplasm by 0.34 %. Unemployment of tertiary education (UNMPT) is even more effective, meaning that if the unemployment of tertiary education rate increases by 1 %, the CVD mortality rate grow by 1.78 % and the neoplasm by 1.2 %. Similar findings came from Halliday (2014), which highlighted the fact that rising unemployment by one percentage point increases the probability of CVD mortality even more than 7 %. Taking into account noncomunicable diseases, in countries with high income per capita and higher employment rates is assumed lower mortality rate. On the other hand, Gravellea et al. (2012) did not denote any statistically significant relationship between income inequalities, employment, and population health.

Table 1 CVD mortality – Linear regression

	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	0.406013	0.039320	10.326	2.53e-07	***
UNMP	0.006522	0.001083	6.022	6.01e-05	***
UNMPT	0.017798	0.002341	-7.604	6.30e-06	***
THEXP	-0.016035	0.004390	3.653	0.00331	**
		Adjusted R-squared: 0.8458			
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1. Residual standard error: 0.009433 on 12 degrees of freedom. Multiple R-squared: 0.8766, Adjusted R-squared: 0.8458. F-statistic: 28.42 on 3 and 12 DF, p-value: 9.781e-06					

Source: Own processing according to OECD and DATAcube data

Smaller but still significant impact on mortality rate have also the total healthcare spending in given country. Table 1 and Table 2 identify this explanatory in both models as statistically significant. If the total health expenditures (THEXP) increases by 1%, the death rate for heart disease in Slovakia will decrease by 1.6 % and the mortality rate on neoplasms will decrease by almost 1 %.

Table 2 Neoplasm mortality – Linear regression

	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	0.2948502	0.0265163	11.120	1.12e-07	***
UNMP	0.0033592	0.0007304	-4.599	0.000612	***
UNMPT	0.0119915	0.0015784	7.597	6.35e-06	***
THEXP	-0.0099483	0.0029601	-3.361	0.005666	**
		Adjusted R-squared: 0.8177			
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1. Residual standard error: 0.006362 on 12 degrees of freedom. Multiple R-squared: 0.8541, Adjusted R-squared: 0.8177 . F-statistic: 23.42 on 3 and 12 DF, p-value: 2.642e-05					

Source: Own processing according to OECD and DATAcube data

In the context of the beneficial impact of higher healthcare spending inducing lower mortality rate caused by CVD or neoplasm, these changes are desirable. However, on the other hand the rapid growth in health care costs burdened public systems. If countries do not bring the necessary reforms in the foreseeable future, the economies of developed countries will be unbearable and unsustainable by 2050 (OECD, 2015). According to other OECD statistics, purchasing power parity compared with 2012 has risen by 7 % in Austria, 11 % in the United States. And as the population grows, the OECD estimates that today health system absorbs 6% of GDP of member countries, in 2030 this number will increase by 9 % in 2030 and by 14 % of GDP in 2060 (Grman 2017; EC 2016). The raising of health spending is caused by new technologies, higher expectations of patients, and also by the growing needs of the aging population as well as the deteriorating lifestyle of the population (OECD, 2015).

4 Conclusion

The most serious diseases of the present time, causing the greatest share of deaths, include CVD and neoplasm disease. Despite modern medical technology mortality rates on mentioned diseases are rising globally. The aim of this study was to examine the current issue of CVD and mortality in the Slovak population at the national and regional level. Using the distance from the fictitious object method and the linear regression, we found that although CVD had a decreasing trend of mortality the number of deaths in the last year of 2016 slightly increased and caused almost half of the deaths from all diseases in Slovakia. The incidence of neoplasm disease and its course was relatively stable, but from 2012 the proportion of neoplasm mortality increased sharply. In the last three years, there has been a significant change in the number of deaths in individual regions of Slovakia. In 2016, the status of the fictitious object was obtained by the Trnava region with the lowest CVD mortality rate. The largest share of all CVD deaths currently prevails in the Nitra and Trenčín regions. In terms of neoplasms disease, since 2008 the status of the fictitious object was predominantly maintained by the eastern Slovakia (PO, KE) with the lowest death rate for these diseases. Subsequent testing found that within socioeconomic factors the overall unemployment, unemployment of tertiary education and total health care expenditure have the largest impact on mortality caused by CVD and neoplasm disease. Lower unemployment and higher spending on health care have a positive impact on the decline in death rates of these serious illnesses. In addition to these socioeconomic factors, physical activity of individuals, healthy lifestyle, smoking, or alcohol use are still considered to be the most important risk factors influencing the incidence of noncommunicable diseases. Therefore, support from the state or different interest groups and

organizations to raising awareness of the issue, especially its prevention, are a key components of the reaction to noncommunicable diseases.

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Control in Public Administration with a Focus on the Areas of Control of the Supreme Audit Offices in Slovakia and the Czech Republic

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Abstract

The aim of this contribution is to assess the structure of the control systems of the public administration in the Slovak Republic and in the Czech Republic and to focus on the activities of the Supreme Audit Office of the Slovak Republic, which is defined by law as a public authority, independent in its inspection activity, subject only to law, and which, from the viewpoint of its activity, carries out the external control. In both the countries the system of control in the public administration is divided into the external and the internal types of control. However, the bodies designated for the performance of the external control and the performance of the internal control differ between the countries. The activity of the Supreme Audit Office in the Czech Republic does not cover all the entities belonging to the public administration, which means it cannot influence the control of the public finances as a whole.

Keywords: Control system in public administration, Internal control, External control, Area of control, Supreme Audit Office.

JEL Classification: H72, H73

1 Introduction

The control of the public administration either represents an indispensable part of the process of the performance of the public administration itself – the so-called internal control – or it complements the process of the execution of public administration –the external control. Control is considered one of the primary functions of management (planning, organising, leading, controlling). Especially in the circumstances of the public sector, that is in the conditions of public funds management, the existence of an efficient system of control is indispensable. The role of control is the observation and elimination of deviations from the norms, provision of information for the management's decision-making, selection of measures and repressive tools for the elimination of defects, motivational and educational influence on the objects of the control, as well as institutional fulfilment of its individual functions. By the accession of the Slovak Republic to the European Union and the following decentralisation and transfer of competences of the public administration onto lower levels of management the system of control in the public administration changed dramatically.

Control is an inseparable part of managing and decision-making processes. It represents an act and a process which by way of feedback provides information about the achievement of objectives.

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Control as a subsystem of managing activity may be defined also on the basis of its particular functions, which we understand as regulation, negation, motivational, educational and institutional tools (Benčo et al., 2001).

The word "control" comes from a French compound wordwith its roots in the Latin language, meaning a phenomenon, or rather an activity, which may be termed also as: verification, regulation,examination, oversight, supervision (Králik & Kútik, 2013; Klierová & Kútik, 2017).

Control is an indispensable element of the activities of the public administration, since every social organisation and public administration contains in itself sources of potential mistakes and bureaucratic structures (Hendrych, 2009; Tušan & Bánociová, 2016).

Control in the public administration represents a specific manner of management of public issues. In the public administration there has to exist a complete system of retrospective control, which represents theregulatory system of the public administration (Tej, 2002).

Public administration as a purposeful activity contains in itself control as part of its own activity, as well as part of a wider meaning of purposeful activity in the society, and it is subject to control by other entities. Control of public administration in its general sense provides the execution of all the necessary activities in the corresponding extent, direction and time (Škultéty, 2008; Medveď et al., 2011).

For the definition and activity of control and audit the Lima Declaration is important, which defines that audit is a natural part of public finances management because the management of public funds is management of public resources. Audit is not used for its own sake – it is an inseparable part of the system of management whose goal it is to reveal deviations from the accepted norms and breaches of principles of efficiency and economy of financial management in a timely manner so that it be possible to adopt corrective measures in individual cases which would prevent such breaches or would at least make them more difficult to occur (Oláh, 2005, 2009; Nemec et al., 2010; Matějová et al., 2017).

2 Goal and Method

The goal of this contribution is to evaluate the control system in the public administration in the Slovak Republic and the Czech Republic, its division and structure, and to analyse theoretically the activity of the Supreme Audit Offices in the control systems of public administration of the Slovak Republic and the Czech Republic.

The information and data used for the analysis were obtained by study of specialist literature and laws,acquired from the annual reports of the Supreme Audit Office, and gained by controlled interviews with the competent workers of the Supreme Audit Offices in the Slovak Republic and the Czech Republic.

We have evaluated the division of control systems in the Slovak Republic and the Czech Republic and the authorities performing the control. We compared both the systems to each other. Subsequently we analysed the activity of the Supreme Audit Offices in both the countries focusing on their areas of control in the public administration.

3 Comparison of the Systems of Control of the Public Administration in the Slovak Republic and the Czech Republic

The goal of control in general is the prevention of degradation of the public administration and the protection of legal entities and natural persons belonging to the public administration from activities which run contrary to the legal regulations.

The control system of public funds in the Slovak Republic consists of independent control authorities, with some of them having a transversal character. The subject of the control in the public sector is the inspection of efficiency, economy, effectiveness and impact of financial, material and human resources (financial inspection), accord of the activities executed with the legal norms, directives and regulations of the superior authorities, achievement of the objectives and intentions, fulfilment of the measures taken to correct the defects discovered.

The organisation of the control activity is based on a two-level control of public finances, where the first level consists of the internal control and the second level is represented by the external control.

In the public sector of the Slovak Republic, the internal control is carried out in the public administration, in regional and local authorities, in public institutions, in state-owned and municipal enterprises. The subject of the internal control is above all the inspection of the fulfilment of objectives, transparency, reliability and the explanatory power of information, observation of economy and efficiency of the use of the public resources, the achievement of contribution in the provision of public property, management of the entrusted and own assets. The authorities that carry out the internal control are listed in Table 1.

During the external control the audited entity is not subjected to or managed by the authority which is performing the audit there. The elements of the external control are summarised in Table 1.

The control in public administration is called the public controlin the Czech Republic. It is divided in the same way into the internal and the external, but from a different viewpoint than in the Slovak Republic. The internal control is performed within the system and the controlling entities are bodies of the public administration (it is thus carried out by the public administration itself). External control is performed by external entities which stand outside the public administration. Here belongs the controlling activity of the legislative body and the representative bodies, the Constitutional Court, the administrative and general courts, the Public Defender of Rights, the public prosecutor's office, the Supreme Audit Office, control performed by administrative bodies, control performed on the basis of citizens' initiative. A partly independent area is the control over public self-governing corporations.

Table 1 System of Control of the Public Administration in the Slovak Republic (SR)

Control System of the Slovak Republic	
Internal Control	**External Control**
Control in the Public Administration	National Council of the Slovak Republic
SR Government	SR Supreme Audit Office
SR Government Office	Administrative judicial system
SR Ministry of Finance	Prosecution
Administrators of budget chapters	Auditors
Control in the regional and local authorities	Public Defender of Rights and Freedoms
Regional and local authorities	Public control
Higher regional unit authorities	
Control in public corporations	

Source: Processed by the author

Table 2 Public Control in the Czech Republic Compared to the Slovak Republic

Control System of the Czech Republic	
Internal Control	**External Control**
Hierarchical control = Service-related supervision	Parliamentary control (in SR, the SR National Council)
	Judicial control (in SR,administrative judicial system)
Specialist supervision	Budget control (in SR, control of the SR Supreme Audit Office)
	Control carried out by administrative authorities (in SR, internal control)
State supervision	Control on the basis of citizens' initiative (in SR,public control)
	Public Defender of Rights (in SR, Public Defender of Rights and Freedoms)

Source: Processed by the author

The area of internal control is understood in the Czech Republic differently from the Slovak Republic.

Within the internal control here we distinguish between the control which focuses on the activities of the governments in the relations of hierarchical superiority and inferiority, and the control which focuses on the fulfilment of duties of the entities of administrative law, which stand outside the hierarchical relations of superiority and inferiority.

Three types of internal control belong here:

1. hierarchical control (service-related supervision) – of the personnel or of objects, which is based on the relations of superiority and inferiority. It is carried out by authorities of public administration in the relations of superiority and inferiority, including the control within the respective authority of public administration. The standards of evaluation are lawfulness, efficiency and economy.
2. specialist supervision (general or special) – it is not hierarchical. This control is focused on the material content of the activity of the entity audited.
3. state supervision – control of self-governing bodies (cities, municipalities, regions) or other public institutions. For example the supervision of the management of resources provided to municipalities from the state budget.

The bodies which perform the internal control in the Slovak Republic are from the viewpoint of public control division in the Czech Republic ranked into the area of the external control, such as control performed by administrative authorities.

4 Evaluation of the Areas of Control of the Supreme Audit Offices in the Slovak Republic and the Czech Republic

The Supreme Audit Office in each country fulfils the role of an independent authority which controls the state's management.

4.1 Area of Activity of the Supreme Audit Office in the Slovak Republic

The Supreme Audit Office of the Slovak Republic is a state body which is independent in its control activity. The position and area of activity of the Supreme Audit Office of the Slovak Republic is defined by Sections 60–63 of the Constitution of the Slovak Republic and Act No. 39/1993 Coll. on the Supreme Audit Office of the Slovak Republic as amended.

The Supreme Audit Office of the Slovak Republic performs its controlling activity on the basis of the resolution of the National Council of the Slovak Republic and according to its own Audit Plan.

The Office audits the management of the resources of the budgets, which are approved, by law, by the National Council of the Slovak Republic or the Government of the Slovak Republic; it audits the management of property, property rights, financial resources, obligations and claims had towards the state by public institutions, municipalities, higher territorial units, state-owned legal entities, public institution-owned legal entities, municipality-owned legal entities, higher territorial unit-owned legal entities, legal entities established by municipalities or legal entities established by higher territorial units; property, property rights, financial resources and claims which were provided to the Slovak Republic, legal entities or natural persons within development programmes or due to other similar reasons from abroad; property, property rights, financial resources, claims and obligations for which the Slovak Republic has provided a guarantee; property, property rights, financial resources and claims of legal entities performing activities in the public interest.

The area of control activity of the Supreme Audit Office of the Slovak Republiccomprises:

a) the government, ministries and other central authorities of the state administration of the Slovak Republic and authorities that report to them
b) state authorities and legal entities for which the role of the founder or the establishing body is performed by central authorities of the state administration or other state authorities
c) municipalities and higher territorial units, legal entities established by municipalities, legal entities established by higher territorial units, municipality-owned legal entities and higher territorial unit-owned legal entities
d) dedicated funds of the state, public institutions established by the law, public institution-owned legal entities, state-owned legal entities
e) natural persons and legal entities

4.2 Area of Activity of the Supreme Audit Office in the Czech Republic and Its Comparison with the Slovak Republic

The existence of the Supreme Audit Office in the Czech Republic is stipulated by the Constitution of the Czech Republic and its activity and its powers are regulated by Act No. 166/1993 Coll. on the Supreme Audit Office. The Supreme Audit Office fulfils its function autonomously and is independent of the legislative power as well as the executive and the judicial powers.

The Supreme Audit Office of the Czech Republic performs control of management of the state property and financial resources collected under the law to the benefit of legal entities with the exception of resources collected by municipalities and regions within their independent activities; the control of the state annual accounts; control of the observation of the state budget; control of the management of resources provided to the Czech Republic from abroad; control of issuing and redemption of the government bonds and control of awarding state contracts.

The Supreme Audit Office inspects how the state manages the state assets and resources obtained from abroad. It expresses its opinion with regard to the state annual accounts and thus supervises the observation of the state budget. The area of activity of the Supreme Audit Office of the Czech Republic does not cover the control of municipalities, cities and regions, nor the control of state-owned companies and companies owned by regional and local authorities.

As the regional and local authorities do not belong within the controlling authority of the Supreme Audit Office in the Czech Republic, the number of entities the Supreme Audit Office may control is much lower. The numbers of entities covered by the controlling activities of the Supreme Audit Office in Slovakia and the Czech Republic are listed in Table 3.

Table 3 Numbers of Entities under the Controlling Authority of the Supreme Audit Office

	2014	2015	2016
Area of control of the Supreme Audit Office in the Slovak Republic – the number of all the entities of the public administration	7,634	7,285	7,693
Number of entities in the area of control of the Supreme Audit Office in the Czech Republic	755	755	758

Source: Processed by the author

Entities within the area of control of the Supreme Audit Office in the Czech Republic are budget chapters, state organisation units, self-financed organisations, state enterprises, health insurance companies and state funds. Entities within the area of control of the Supreme Audit Office in the Slovak Republic are likewise all these entities, but in addition to them also all the regional and local authorities (municipalities, cities, regions and the budgetary entities and self-financing organisations established by them).

5 Conclusion

By assessment of the structure of the control systems in the public administration in Slovakia and the Czech Republic we discovered that in both the countries the control system is divided into internal and external, but the understanding of this division differs. Both the internal and the

external control in the Slovak Republic are understood in the Czech Republic as external control. The internal control in this country is different, as it is carried out within the system and the controlling bodies are authorities of the public administration (it is thus carried out by the public administration itself).

By analysis and evaluation of the Supreme Audit Offices we found out that the Supreme Audit Office in the Slovak Republic is empowered to inspect all the entities of the public administration. In the Czech Republic this is not so. The Supreme Audit Office of the Czech Republic has no influence over the public finances as a whole. It audits the entities of the public administration, except the regional and local authorities which numerically represent a substantial portion of the public administration.

In most countries the area of control of the Supreme Audit Office covers the whole public sector, including the regional and local authorities and the state-owned business companies. In some countries the Supreme Audit Office also oversees the management of political parties.

Acknowledgements

This paper has been elaborated within the project VEGA No. 1/0559/16.

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Substitute Family/Family-like Care for Children in Slovakia

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Abstract

It is generally understood that the family is a primary unit where a child should grow up. That a child is most appropriately raised in a family environment, without interference of the outer subjects, is also an underlying principle of the Slovak legislation related to the child care and child rights protection. However, there are occasions when the safety or upbringing of a child may be seriously endangered and when removal of a child from its birth family becomes unavoidable. In these cases, the system of public care for children plays critical role. The Slovak system adopted several forms of alternative care to temporarily replace original family and substitute for the primal parental care. The objective of the paper is to emphasize positive achievement in the Slovak system of the substitute care, in terms of a change in the structure of the provision of alternative care for children. The paper advocates for a transition towards more family-like forms of substitute care, even when the institutional/residential form was necessary. Examining recent statistics, we aim to indicate that the process of "deinstitutionalisation" of the substitute care is already (and successfully) underway in Slovakia. Besides this, the topic of alternative care is supplemented here by the wider (demographic and economic) context of the changing family behaviour (as a part of larger societal change); and the paper points out particularly the most profound features of these changes.

Keywords: Substitute Family Care, Alternative Personal Care, Foster Care, Substitute Institutional Care for Children, Children´s Homes, Professional Families.

JEL Classification: J11, J12, J13

1 Introduction

Recent changes in the family behavior related to more general societal and economic changes, accompanied with the new demographic phenomena, such as (well acknowledged) postponement of marriage and of parenthood, more frequent occurrence of cohabitations, more children born outside marriage, single parents phenomenon, increasing divorce rate etc., led to a new shape of the family and to a significantly lower number of children over time and constantly decreasing share of the child population in size of the total Slovak population. Not only has the fertility rate dropped to its historic lows (hitting the bottom in 2002, when it reached 1.18 children per woman, according to the Statistical Office of the SR –SO SR, 2017; and recovering slightly by 2016, to 1.48), the number of children decreases year by year (with a minor rebound observed only recently, in 2016), nevertheless, the number of children living outside their family increases.

Not only there are fewer children in Slovakia, but the general family structure itself and common habits are changing; former traditional family standards are eroding. The crude marriage rate slumped shortly after 2000 (although not profoundly), and again in 2010-2013; the divorce index

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(divorces per 100 marriages) more than doubled already between 1990 and 2005 (and peaked in 2006, when one in two marriages were collapsing; however, a positive, and swift downturn trend in divorce index has been observed since 2014; also the marriage rate has recovered recently). Particularly the issue of divorced women became serious, the number of divorced women surpassed 100 thousand in 1993, ten years later their number was higher by 50 % (over 155 thousand divorced women in 2003); it took only six years to add another 50 thousand to the number (surpassing 200 thousand in 2009), and today there are more than 264 thousand divorced women in Slovakia. The number of divorced men is lower, but increases at a similar pace. In both cases, men and women, the share of divorced persons in total men/women population app doubled since 2000 (while the share of divorced women in the total women population rose from 5 % to 9.5 %, the share of divorced men increase from 3.8 % to 8 %).

The phenomenon of being single is also getting greater importance, especially when reproductive age is considered: while before mid-90s only 10 % of women aged 25 to 44 years were still single, in 2006 they represented one quarter of the women population of that age, and today, as much as 38 % of women aged 25-44 have never been married. The situation is even more striking when looking at men of this age. Starting with one fifth in mid-90s, the share of single men in total men population aged 25 to 44 surpassed 38 % (today´s value for women) already in 2007 and today, more than a half (51 %) of men of this age have never entered into matrimony.

No wonder that almost 40 % of children in Slovakia today are born out of wedlock (to compare, it was only 7.6 % at the very beginning of 90s and the share rose to 18.3 % by the start of the new millennium; Slovakia is approaching the EU average in the last years; based on Eurostat figures comparison; Eurostat, 2017). Not only changes in the societal perception but also economic reasons stand behind the trend of the postponed childbearing, also clearly visible across Europe. In Slovakia, the mean age of woman at childbirth rose to 28.8 years (30.5 for the EU average; latest Eurostat data available for 2015), when compared to 26.6 years in 2000. Looking at the changing demographic features, however, is only a narrow view on one side of the problem. We can see obvious economic rationale behind the changing family behavior and childbearing attitudes. The family structure loses its former multi-generational character, the parents rely more on their own (time and cash) funds when ensuring upbringing and care to their children. The requirements are higher; the forms of child public care and education are no longer completely free of charge. Growing individualism and competition pressures across the various aspects of the society influence family structure and intra-family relations. The parents' perception is that they work more, spend more time in work and work-related activities (even unpaid), travel more and farther to get a job (this is particularly true in some less-developed regions), get less support from state or other members of their extended family.

And indeed, the employment rate of women rose from 57.2 % in 2000 to 62.7 % (2016); the one for men increased from 70 % to 76.9 % between 2000 and 2016. The trend, on the one hand beneficial for the labor supply side and for the economy (Slovakia´s approaching the goals set for the overall employment rate), and of course positive in terms of the personal income and economic stability of the individual/family – but it is rarely taken into account what contributed to this success. Getting unsatisfactory part-time jobs, greater extent of commuting, migrating for work, increased work-family life imbalance. The trade-offs made by parents when deciding whether to accept unfavorable conditions in order to maintain a job could have also influenced the stability of the family, and/or decision of the motherhood and parenthood. Although the data says that the

average number of weekly hours spent in the main job declined for both sexes (in case of the Slovak women, from 41.5 hours worked per week in 2000 to 38.8 hours in 2016; and in case of men, from 43.5 hours per week to 41 hours), for both sexes the values are still above the EU average (particularly for women who in Slovakia spend over 5 hours more in their main job each week when compared to the EU28 average; Slovak man spends weekly 1 hour more working in his main job compared to his EU average counterpart). The average length of commuting between work and home is lower than in Europe (in average), but the data on daily commuting does not reflect the number of cases of employed persons working far from their homes for longer periods (a week to several weeks), or the number of persons working abroad in a short-term (number of cases working abroad for the period below one year, captured in the Slovak Statistical Office data; especially the high numbers for the Prešov and Košice regions).

This brief overview only illustrates how complicated became the conditions for balanced family life compared to the past. Today´s families are much more compact and more frequently children live with only one parent. Higher importance given to the professional career along with the higher expectations related to satisfying the needs of the family members to the extent that is considered to be "a common living standard" by the today´s society/communities, lead to increased parental absence in the child´s upbringing, both, at the physical and mental/emotional level. Commuting to work, or even more serious, migrating for work outside the original territory (leaving other family members at home), naturally decreases frequency of personal contact with the children. In many cases (especially in some regions), the children are temporarily cared for, or accompanied by family members other than parents.

Furthermore, there is a special category of families, where the children found themselves entirely without parental care from any serious reason; the situation that requires assistance of the public bodies. However, it is forbidden by law to remove a child from its birth family and place to the alternative care institution solely upon the living standard reasons, such as poor housing or economic situation of parents (article 54 of the Family Code), but there is still number of occasions when the safety or upbringing of a child may be seriously endangered and when removal of a child becomes unavoidable. In these cases, the system of public care for children plays critical role. The Slovak system adopted several forms of alternative care to temporarily replace original family, but the birth family is still seen, also as defined by the legislation, as a primary place where the children should grow up. The features and parameters of the alternative care provision are defined by the system of the social and legal protection of children", under the wider framework of the protection of child rights concept.

However, even in the difficult situation of this especially vulnerable group of children, we can see some positive signs and improvements in the last years. The substitute family care (which means that a child is cared for in a natural family environment, even though not by its birth family) is taking the precedence over residential institutional forms of alternative care, not only formally (in the legislation), but also in actual alternative care provision. The second, not less important positive moment is that even in institutional forms, the way of upbringing and care provision is being transformed. The care provided in the so-called "professional family", or by the "professional parent", became the preferred form of an alternative institutional care, and the number of cases has increased notably. Along with professional families, small communities substituting for the original family care are being established in the children´s homes. We can call these types of institutional care "family-like" forms of substitute care, as they actually try to replace the natural

family environment by the most similar alternative. The goal of the article is to emphasize the significance, argue for, and prove (based on the data) mentioned transition towards greater importance of substitute families and family-like forms of alternative care.

2 Children Deprived of Parental Care

In 2016, there were app 14 thousand children in Slovakia living outside their biological family. Unfortunately, the data confirms negative trend of a rise in the size of this group of children, children separated from the parents, labeled also as "social orphans". It is a matter of concern especially when taken into account declining number of total child population in Slovakia (see Graph 1 for development during the last one and a half decade, but the trend is persisting over longer time span). Children in substitute (alternative) care constitute app 1.3 % of (visibly diminishing) total child population in Slovakia, in 2000, their share was below 1 % threshold (12.5 thousand of children living outside their birth families were in the system at that time).

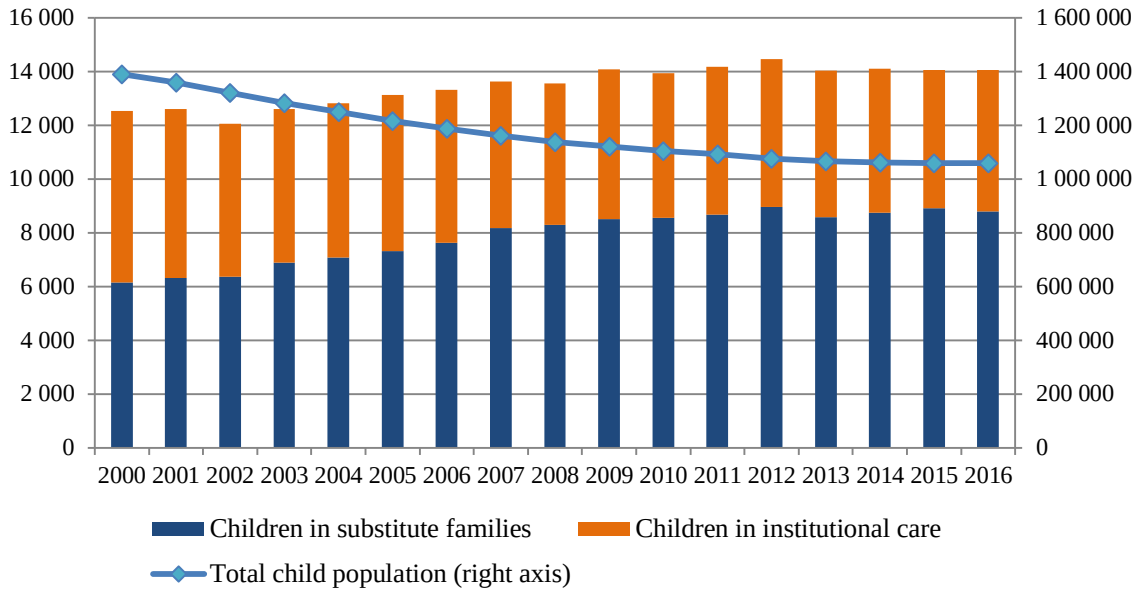

Figure 17 Population of children in the SR, total and children in substitute care (2000 – 2016)
Source: Based on data of the Statistical Office of the SR (SO SR),2017 and the Central Office of Labour, Social Affairs and Family, 2017

However, there is a positive momentum concerning developments in the group of social orphans, and it is related to the type of care they were provided with. While at the beginning of the millennium, the share of children in the substitute family care was equal to the one of children placed to the institutions providing alternative care, today, majority of children without parental care live in a natural family environment (8 799 children in substitute families vs. 5 266 children placed to the institutions; Graph 1 clearly illustrates this shift over time).

The term "alternative care" is introduced in the Slovak legislation by the Family Code (article 44), which defines alternative care as a set of several specially arranged, interlocked, and mutually conditioned temporary measures, which may substitute for a personal care of parents provided to a minor child in cases when parents do not provide, or are not able to ensure such personal care. The Family Code (Act no. 36/2005 Coll. on the Family and amendments and supplements to the

Act) is a major piece of legislation concerning family affairs, but the most comprehensive law related to the provision of alternative care and to other aspects of the concept of child rights protection is the Act no. 305/2005 Coll. on Social and Legal Protection of Children and Social Curatorship (and amendments and supplements to the Act). They both constitute a legal framework for provision of formal alternative care in Slovakia, precisely defining conditions of all types of personal, as well as residential care.

Alternative care, as distinguished by the law (the Family Code), includes:
1. entrustment of a child to the personal care of a natural person other than parent (hereinafter referred to as "alternative personal care");
2. foster care;
3. institutional care.

The Act no. 305/2005 Coll. introduces the term "substitute family environment" (part 3 of the Act; "Ensuring of the substitute family environment") and defines 1) foster care and 2) adoption as "alternative family care". We can consider these two types of alternative family care, along with above mentioned alternative personal care (this one is a subject to different regulations and lower requirements, as it is usually a kinship care, and is defined in details by the Family Act), to be the main forms of *substitute family/family-based care* provided to children without parental care (i.e. to social and/or biological orphans).

The legal acts address a situation when a child finds itself without any care, or when his or her life, health, or physical, mental, or social development is seriously endangered. In such cases, the local "authority of social and legal protection of children and social curatorship", in whose county a child resides, should appeal to a court with a proposal for a preliminary measure to be ordered by the court, to provide a child with a safe place to stay (temporary personal or residential care) and secure that child´s essential needs are met. Child can be separated from the birth family only in serious and unavoidable cases. After removal of a child from the family, corrective measures to improve family situation and to restore original family care to a child should be implemented. The assistance to the family should be provided by the responsible authorities (the Act no. 305/2005 Coll. regulates organisation of the alternative care provision, including responsibilities of the public bodies; substantial role in this aspect is played by the Central, as well as local offices of labor, social affairs and family; but also municipalities and accredited entities help to solve the family crisis situations). Alternative care, which establishes a relation between underage child and other person, can only be ordered by the court´s decision. When taking a decision on the form of the alternative care, the court should always follow "the principle of the best interest of a child" (set by the UN Convention) and the child should also be involved in the decision taking regarding the alternative care (subject to the maturity of a child).

3 Substitute Family Care in Focus

A tradition of institution of the family is deeply anchored in the Slovak society, so large part of the children who couldn´t be raised by their parents have always been entrusted to the care of the members of their extended family (mostly grandparents). Also today, the legal system of alternative care provision is based on the principle that alternative personal care and foster care (both of them family-based types of substitute care) always take precedence over the institutional forms of alternative care.

However, even at the beginning of the millennium, half of the children deprived of parental care were still being placed into institutions. Since 2001, though, substitute family care gradually increases its dominance in the structure of the alternative care provision (as it was illustrated by Graph 1). In fact, while the total number of children in the system of alternative care has increased by 12 % since 2000, the number of children provided with the substitute families rose by 43 %, at the expense of the number of children in institutional care, which declined by 18 %. Today, more than three out of five children without care of their birth parents live with their substitute families.

There are three main types of substitute family care, which differ in some basic aspects. The most common form, *alternative personal care*, means that a child was entrusted to the personal care of a natural person (permanent residence in the SR is a condition), who will provide care to the child in person, to the same extent in which it is provided by parents. This form of alternative care is usually awarded to a person known to the child (members of child´s extended family, or close family friends). That is the reason why these persons, unlike prospective foster parents, do not have to be listed in the registers of applicant for the alternative care provision and do not have to attend special preparation courses. Since the alternative personal care is mostly provided by the relatives of a child, also the term kinship care is being used. Birth parents are not suspended of parental rights, and they have right to meet their child entrusted in alternative personal care. The person providing care manages child´s property only in common matters.

In 2016, out of app 6.5 thousand children in alternative personal care, more than 4.8 thousand were cared by grandparents, which together with children in care provided by other relatives (kinship care) represent 92 % of total children in alternative personal care. Most of children were placed to the alternative personal care as their circumstances met the conditions of being neglected (if identified reasons are considered). More details on the number of cases by particular reason of placement to the kinship care are displayed in Table 1.

Table 1 Alternative personal care by reason of placement and relation to the child, 2016

		No. of children	Reasons of placement						
			Neglected children	Upbringing problems	Placed from institution care	Parents imprisoned	Barriers on parents side	Orphans	Others
Children in APC		6 518	2 422	56	186	160	645	4	3 045
Of which cared by	**Grandparents**	4 856	1 881	43	107	65	456	3	2 301
	Other relatives	1 169	370	10	57	53	141	0	538
	Close persons	493	171	3	22	42	48	1	206

Source: Ministry of Labour, Social Affairs and Family (2017b)

In cases when the parents do not, or cannot provide care to their child, or the child has been removed from the biological family due to violation of his/her rights, and if alternative personal care was not available, then the second type, *foster care*, is considered. In compliance with the international standards, foster care in the Slovak system is the case when a child is placed by the responsible authority to domestic environment of the family other than child´s own family. Foster parent is a

natural person selected and qualified for the foster care provision (the condition of the SR residence is again present here), and should be listed in the register of applicants interested to provide foster care (the provisions regulating registers of children in need of alternative care and registers of applicants/prospective foster care providers are included in the Act 305/2005 Coll.).

The third form of family-type care, *non-parent custody* of a child, or guardianship, refers to a situation when both parents died, or were deprived of parental rights, or execution of their parental rights was suspended, or they lack full legal capacity, so that they no longer can represent their child in legal sense. In these cases, the court shall appoint a custodian/guardian to an underage child: a custodian will represent the child, manage his/her property, and must also ensure proper upbringing of the child. The custodian is not obliged to provide care to the child by himself/herself, but if does so, it is considered as a type of alternative personal care. Parents may suggest a person to become a custodian of their child. Table 2 provides summary of individual forms of alternative personal care.

Table 2 Children by individual forms of family-based alternative care, 2015 and 2016

	Alternative personal care	Foster care	Custodial care	TOTAL
2015	6 484	1 847	571	8 902
2016	6 518	1 719	562	8 799

Source: Ministry of Labour, Social Affair and Family of the SR (2017a)

Although also *adoption* is understood as a type of substitute family care, formally, it is not included in the statistics on numbers by types of alternative care. Actually, adopted children are no longer in the system, as the act of adoption legally changes their status. Adoptee is getting the same legal status as a child of the birth parent/s, and this applies also to the relations between adoptee and relatives of his/her adoptive parents. Adoptive parents are not entitled to receive state support in form of alternative care allowances, while foster parents or persons providing alternative personal care do get this type of allowances. In the Slovak system, excluding cases when parents resigned from executing their parental rights or are not known or died, adoption is considered as the last resort option, since it means termination of parental rights of the birth parents. All other types of alternative family or residential care include promoting of a contact between the child and the birth parents; restoration of relations in original family and effort to reintegrate the child with the family is always a priority (if possible and in compliance with the best interest of the child). That is the main reason why only 124 children were adopted in 2016, out of which 6 were adopted abroad.

4 Institutional Form of Substitute Care under Transition

Institutional care may be ordered by the court only if upbringing of a child is seriously endangered or violated and when it was not possible to provide child with alternative personal care or foster care. If child´s parents are alive and they were not deprived of parental rights and obligations, or execution of these rights and obligations was not suspended, they remain child´s legal representatives and manage child´s property (even while the child is in the care of an institution). When taking a decision about an institution where the child is going to be placed, the court should consider child´s emotional relations with the parents, siblings, and/or other close persons with respect to further preservation of these relations (the name of the institution is stated in the court´s order). The effectiveness of the ordered care is examined at least twice a year.

In Slovakia, children´s homes are the most common institutional care facilities providing substitute care for children without parental care. They are established to execute courts orders: orders of alternative care, provisional measures, and corrective measures. Children´s homes are the facilities of temporary, but also long-term substitute residential care; they may provide care to children until the age of majority (18), with a possibility to extend it to the age of 19. The children home´s must facilitate continuity in the contact between the child and his/her birth parents; and may also allow for a short-term stay in the parent´s care, if appropriate.

The organisation of provision of the care in children´s home is undergoing major transition over the last years, in order to move from previously known numerous collectives of children, residing in large premises, to smaller communities, living in apartments or family houses, which are able to create more *family-like* environment. In these cases, the care for children is provided either in individual groups, or in professional families. In *individual groups*, the number of children is limited; the group has independent boarding and budget management, it is established either in the individual apartment, family house, or a separate part of the children´s home, where the children are supervised and raised by the carers and other employees of the children´s home.

Professional family is also an organizational part of the children´s home, but daily care and regime looks more like an actual family. Professional parent is an employee of the children´s home, who takes care of a certain number of children in a family house or apartment, provided by the children´s home or owned/rented by the employee. Professional parent should meet minimum qualification requirements for providing such care and should have passed the special course on alternative care provision. Since this position is a work arrangement based on the Labour Code, none legal relation is established between professional parent and children in his/her care. It is a form of providing 24-hour individual care to a child formally placed to an institutional substitute care. If the care is provided by an individual, the rule of minimum of one and maximum of three children placed to his/her care applies, if the care is provided by a married couple, minimum of three and maximum of six children applies. The children´s home assigns monthly cash transfer to each professional family unit, in order to ensure basic needs, such as boarding, clothes, etc. (professional parents do not receive alternative care allowances from the social system, like foster parents do). The main social advantage of this type of family-like care is stability of the care given to the children in unit and first of all, consistency in the person of carer. This form also enables to place siblings to the same family-like unit. The institution of professional families is not new to the Slovak system, it was launched in 1993, but started to be implemented in larger extent after 2005 Act no. 305/2005 Coll. Although professional parents do not have status of the parents in relation to the children in their care, they can get assistance/consultations similarly to foster and adoptive parents, e.g. they may join Association of substitute families, where they are associated with adoptive and foster parents; besides other, the Association provides training and assistance when taking child to the family, or submits proposals in legislation preparation, etc.

In 2016, out of total 14 065 children without parental care, 37.44 % lived in the alternative care institutions, of which majority (4 406 children) were placed in the children´s homes (83.75 %). More than 10 % of children (1 468 children), living in institutions, are provided with the care in 653 professional families. The number has rapidly grown, especially in recent years. To compare, in 2000, only 0.92 % of children in institutions were placed to the professional family. However, even today, together with children in (above mentioned) individual groups, only slightly more than one fifth of children in alternative care institutions gets these types of family-like individual care.

But the fact that, along with the growing portion of alternative personal care and substitute families in the system, also in the institutional form of care the number of children receiving family-like individual care is on rise, is the most significant success of the system transition. Following table (3) provides the summary of the organisation of substitute care in Slovakia, the success in deinstitutionalisation of the care is visible especially in longer span (comparison to the year 2000 is included).

Table 3 Population of children outside their biological family, by type of alternative care (and shares in %)

	2000		**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Total child population in SR	1 390 424		1 103 452	1 091 056	1 075 328	1 066 036	1 061 180	1 058 282	1 059 438
Children outside biological family	**12 541**		**13 944**	**14 184**	**14 455**	**14 029**	**14 099**	**14 059**	**14 065**
- as % of total child population	*0.902*		*1.264*	*1.300*	*1.344*	*1.316*	*1.329*	*1.328*	*1.324*
A. - in substitute family*	6 147		8 546	8 661	8 958	8 583	8 743	8 902	**8 799**
- as % of children outside family	*49.02*		*61.29*	*61.06*	*61.97*	*61.18*	*62.01*	*63.32*	*62.56*
B. - in institution**	6 394		5 398	5 523	5 497	5 446	5 356	5 157	**5 266**
- as % of children outside family	*50.98*		*38.71*	*38.94*	*38.03*	*38.82*	*37.99*	*36.68*	*37.44*
- of which in prof. families***	116		986	1 139	1 333	1 394	1 480	1 453	1 468
- as % of children outside family	*0.92*		*7.07*	*8.03*	*9.22*	*9.94*	*10.50*	*10.34*	*10.44*
- of which in community groups	-		-	-	1 231	1 403	1 314	1 403	1 527
- as % of children outside family	-		-	-	*8.52*	*10.00*	*9.32*	*9.98*	*10.86*
- of which in other groups	6 278		4 412	4 384	2 933	2 649	2 562	2 301	2 271
- as % of children outside family	*50.06*		*31.64*	*30.91*	*20.29*	*18.88*	*18.17*	*16.37*	*16.15*

* Alternative personal care, foster care and custodial care (without adopted children). ** Children´s homes, re-education centre, crisis centre, resocialisation centres, diagnostic centres, social services facilities. *** Professional families are units of the children´s homes.

Source: Based on data of the Central Office of Labour, Social Affairs and Family of the SR, 2017

5 Conclusion

Examining recent statistics, we demonstrated that the process of "deinstitutionalisation" of the substitute care is already (and successfully) underway in Slovakia. There is some other important aspect contained in the fact. The first area of importance concerns advantages in a form of higher quality of care provision: transition towards family and family-like forms of alternative care creates an opportunity to address the needs of the children in substitute care more appropriately and thoroughly. Actually, there is also an economic reason, which advocates for the higher share of substitute family care in the system. When public finance is considered, we can examine efficiency of public spending related to the substitute care. Using data on budgetary programme "Social Inclusion" (under the administration of the ministry of labour), in concrete on budgetary sub-programme "Care for vulnerable children", we can state that out of total actual budget fulfilment (in this sub-programme) of 90.5 million EUR in 2016, 14.71 % of the budget was spent on alternative family care allowances and benefits (direct cash transfers which include one-off allowances upon child´s entrustment to the substitute family and cessation of the substitute care, recurring allowances for a child in substitute family and for the substitute parents, and supplement to this recurring allowance and special recurring allowance for taking substitute care of disabled children). This covers state budget cash support to app 63 % of the children in the system, and their substitute parents. However, for remaining 37 % (children in the institutions), the same budgetary programme needed to spend over 64.6 million EUR to cover costs of public children´s homes and other 11.5 million EUR to cover costs of substitute care in non-state children´s homes, together making up for 84.15 % of the budgetary resources for Care for vulnerable children. From this aspect, providing care to children in substitute families consumes incomparably less resources from the budget than upbringing children in children´s homes.

The plan of deinstitutionalisation of the substitute care for children is part of wider strategy of deinstitutionalisation of social services; transition from institutional to community type of care is a profound system change, aiming to create conditions for, and to secure, independent life of person's dependent on assistance of the society, in a natural social community environment; the process, which has been systematically developed since 2000. Most of children´s homes do humanise care for children also by changing their organisational structure and administrating care in family houses or apartments. The result of the deinstitutionalisation process is that while in 2000, 50 % of children without parental care were placed to standard large groups in institutions providing alternative care, today the number declined to only 16.15 % (see Table 3), so app 84 % of children in the system are either cared for in the substitute families, or get care in family-like environment of professional families and smaller community and individual groups. That is an indisputable achievement. However, there are still limitations and failures to be solved (for details see e.g. Rušinová – Konrádová, 2015), such as insufficient prevention programs or more active promotion of restoration of the family environment in cases when the family is undergoing a crisis situation from the side of the local authorities. However, we do see a comprehensive cooperation between governmental and local authorities on one side, and care providers, NGOs, and various groups and associations of the other side in this aspect.

Acknowledgements

This paper was supported by VEGA (Scientific Grant Agency of the Ministry of Education of the Slovak Republic and of Slovak Academy of Sciences) under the project contract [nr. 2/0182/17] and by IVF (International Visegrad Fund) under the contract [nr. 21650186].

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Financial Situation Assessment Dilemmas of Selected Capital Groups

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Abstract

Management is a process that determines the effective running of business activity and the prospects for a company development. At present the management of a company frequently decides to merge business entities or to merge an entity into a capital group. Joint action is intended to improve the financial situation of companies, protect them against liquidity loss and improve financial performance. As for the capital groups and their management the issues seems to be complicated and requires necessary experience and high qualifications. The consolidated financial statement is an integral part of the documentation of the capital group. The purpose of this article is to assess whether consolidation of financial statements affects the improvement of the entities' indexes in a group compared to the individual financial statement of the parent company.

Keywords: Capital group, Consolidation, Parent company.

JEL Classification: G32, G33

1 Introduction

Company management processes are becoming increasingly complex due to the large variability in business conditions and increased competition. Competition seems to be everywhere, it appears in places where it was not before (Porter, 2001). In the current business environment characterized by intense competitive pressures, organizations need to implement strategies to manage costs and reduce these costs not only on a short-term basis, but also over the long term (Henri, Boryal, & Roy, 2016). This situation very often makes micro, small and medium-sized enterprises cooperate. A real opportunity for increasing competitive capacity includes co-operation with other entities, creation of capital groups, group purchasing organisations, sector purchasing groups or clusters.

Mergers and acquisitions are the measures taken in the context of external growth. Thanks to the corresponding aggregation of the action of several or more economic entities, one can achieve a much better result than the sum of results achieved acting independently. A consolidation of members of a given group is the basis for negotiations with producers (Blair & Durrance, 2014).

Capital groups also have a scale effect during joint purchasing which positively influences their financial performance. Capital group should sometimes function like grpup purchsing

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organizations. Group purchasing organisations are a straightforward example of multi-bucket operations that impact positively on the financial liquidity and profitability of group entities. The purpose of purchasing organisations is to protect the individual companies against strong competition and to increase the bargaining power (Zimon, 2017). Typical defects are organizational costs and loss of flexibility (Schontanus & Telgen, 2007). In addition, inter-organizational trust is one of the most frequently-discussed success factors for group purchasing (Schotanus, Telegen, & de Boer, 2010). Members confidence In the purchasing group was clearly a success factor for the group's activities. (Nollet, Beaulieu, & Fabbe-Costes, 2017) A purchasing group is an entity that uses collective purchasing power to obtain a discount (Yang, Cheng, Ding, & Li, 2107). To be successful a GPO must be able to foster and maintain the commitment of its members. (Doucett, 1997). The success of the capital groups also depends to a large extent on the parent company and its support to the other participants.

A multidimensional activity allows achieving more effective results by entering into numerous and diverse, indirect and direct relationships with other actors in the process of economic integration. By making such connections, there are capital groups that have a lot of financial management opportunities for individual participants in such an organization.

In order to verify these assumptions, the following research methods have been used:
• Analysis method
• Cause and Effect Method

The use of these methods has allowed to conduct research and formulate conclusions.

2 Dependencies in the consolidation of financial statements

The capital group has been defined in the Accounting Act as the parent company and its subsidiaries. A similar definition is included in International Accounting Standards - IAS 27 (IAS, 2013) - as the parent company and all its subsidiaries. There are many motives for the formation of capital groups, but each one is an inspiration to increase the effectiveness of a single company within the group as a whole. A business combination can lead to a parent-subsidiary relationship where the acquirer is the parent and the acquiree is the subsidiary of the acquirer.

The relationships that occur in the group of subsidiaries create the need to consolidate financial statements that reflect the capital relationships of companies. The management of the company is responsible for preparing the consolidated financial statements. Information is very important. A well-executed consolidated report has a strong influence on the assessment of the whole group. Group accounting policy is a set of accounting policies applied by the parent company. The use of unified accounting policies within the capital group makes financial data comparable, and thus enables the creation of consolidated financial statements. Each company in the group keeps their books of accounts and annually prepares their individual financial statements (Chłodnicka, Czerny, & Niedźwiecki, 2016). On the basis of these reports the parent company prepares a consolidated report for the group as a whole.

One method of consolidation is the full method. Full consolidation rules are regulated by Art. 60 par. 1 of the Accounting Act and IFRS 3 and IFRS 10. This method consists in aggregating the

individual items of the relevant financial statements of the parent company and its subsidiaries in a full value, irrespective of the share of the parent company in the ownership of the subsidiaries.

The adjustments at the time of acquisition include:
- elimination of long-term investments (a purchase price),
- elimination of the equity of a subsidiary,
- introduction of goodwill or negative goodwill (in the light of national legislation as a separate item in the balance sheet) and a gain on occasional acquisition (in the light of international rules - as a result of the group - profit attributable to the parent at the time of acquisition),
- introduction of minority (non-controlling) shares.

As it is clear from the considerations, the essence of the full consolidation method is the aggregation of the full value (hence the name of the method) of the individual financial statement items of both parent company and subsidiary entities belonging to the group regardless of the parent company's ownership interest in subsidiaries (subsidiary), taking into account exemptions and corrections of a positive and a negative nature (Remlein, 2004). The data included in the balance sheet, profit and loss statement, cash flow statement, statement of changes in equity and notes to the notes are included. A group of economic entities is treated as a specific economic entity and the ownership of other entities is shown as a minority share (uncontrolled share). One needs to remember that shares (uncontrolled) of minority value will change depending on the outcome of the subsidiaries. Only the part of the result of the subsidiary depending on the percentage will belong to the group.

When starting a full consolidation, the parent company must follow the following steps (Remlein, 2004):
1. valuation of net assets of subsidiaries (fair value),
2. summing up individual items of financial statements,
3. capital adjustments,
4. calculation and recognition of the difference in consolidation,
5. calculation and recognition of equity interests in subsidiaries belonging to entities outside the capital group,
6. exclusion of "duplicate" values arising from intra-group transactions,
7. exclusions of gains/losses arising from intra-group transactions included in the assets of the entities that are included in the consolidation,
8. deductions of consolidation differences,
9. distribution of financial results of subsidiaries:
    - part attributable to the capital group,
    - part of the non-capital group.

Consolidation exclusions are out of record, i.e. they do not require any accounting records. Accounting records in each entity remain unchanged and are beyond the reach of consolidation procedures. The following transactions are subject to the following exclusions:
• Revenues and costs related to business transactions between entities subject to consolidation,
• Unrealized gains and losses included in the assets of the entities subject to consolidation arising from internal transactions,
• Elimination of receivables and liabilities,
• Elimination of dividends received from subsidiaries.

The main purpose of the consolidated financial statements is to show the financial position and assets of the group. Such presentation must be done fairly and clearly and it should show the results and positions of the group as if it was a unitary entity, i.e. with the principle of unity. This process allows the combination of standalone financial statements to create a transparent consolidated financial report. Apart from the method of full consolidation there is a property rights method. This method is by the parent company, a partner of a co-subsidiary or a significant investor. The adjustments related to this method involve the adjustment of the share based on the change in price assuming all increases or decreases in net assets that have occurred since the date of establishment of the entity to the balance sheet. The purchase price of shares is adjusted by:
• Share in the result of a subsidiary,
• Share in other changes in equity of this entity.

As in the case of subsidiaries, the difference between the purchase price and the net assets of the subsidiary according to the Accounting Act is determined this way. However, according to international guidelines (IAS 28, 2013), when the goodwill is created it is not included in the assets of the consolidated balance sheet, it does not adjust the purchase price and is not subject to depreciation. In the case of a surplus of net assets over cost when a negative goodwill arises, it is recognized in the income when determining the investor's share of the profit or loss of the associate for the period in which the entity acquired the goodwill. When analyzing the relationship between the preparation of a consolidated report, a method of group assessment would be sufficient to justify the use of the equity method.

3 Analysis and assessment of selected capital groups

In order to assess the financial condition of the Asseco Poland capital group, a preliminary analysis of the capital group was carried out on the basis of the consolidated financial statements and the separate financial statements of the parent company. The analysis was based on the financial statements of 2014, 2015 and the year 2010 was used to extend the study period.

A number of indexes was selected for the assessment of the company and the whole group, which could answer the question of what the overall situation of the group was, or whether there was a need to evaluate the continuation of the business.

An initial financial analysis began with the calculation of the asset structure index. The values of this inex are shown in Table 1.

Table 1 The value of the asset structure index of the Asseco Group and the parent company

		Indexes values [%]		
		2010	2014	2015
Asset structure index	Capital group	244.43	210.46	183.11
	Parent company	781.68	703.74	756.33

Source: Own research

The index of the parent company was the highest in 2010 – 781.68 %. It can be concluded that the group's performance was influenced by the high values of the parent company's inexes. The value

of the structure index far exceeds 100 %, which indicates high fixed costs of the company and immobilization of the assets. On the other hand, an increase in the ratio to high levels means the changes taking place in the company, the restructuring processes that positively affect the company development. Perhaps such an operation was intentional in the parent company to improve the group's performance. This may also be due to the specific nature of the business. Table 2 presents the selected indexes for the assessment of the parent company and the capital group.

Table 2 Selected indexes of the capital group and the holding company Asseco Poland S.A. in selected years

Index name		Indexes values [%]		
		2010	2014	2015
Index of fixed assets coverage with equity	Capital group	105.60	74.40	67.77
	Parent company	99.17	102.89	100.42
Current assets coverage index	Capital group	58.48	49.96	56.01
	Parent company	55.13	37.43	55.85
Share of working capital in total assets	Capital group	16.97	32.21	35.32
	Parent company	6.25	12.44	11.68
Current assets coverage index	Capital group	58.48	49.96	56.01
	Parent company	55.13	37.43	55.85

Source: Own research

The fixed asset coverage index of fixed assets should exceed 100 %. A surplus of more than 100 % may be used to finance a portion of current assets.

The results of the coverage index of current assets with a short-term capital indicate that current assets are not fully covered by a short-term capital. Its value is below 100%, so it can be assumed that working capital is partly funded by fixed capital. A further analysis of the asset financing is presented in Table 3.

Table 3 Financial safety index

Index name		Indexes values [%]		
		2010	2014	2015
Fixed asset coverage index with fixed capital	Capital group	1.11	1.15	1.33
	Parent company	1.10	1.09	1.06
Current liquidity index	Capital group	1.17	2.00	1.78
	Parent company	1.05	2.67	1.79
Total debt index	Capital group	0.18	0.25	0.30
	Parent company	0.05	0.09.	0.11
Fixed asset coverage index with fixed capital	Capital group	1.11	1.15	1.33
	Parent company	1.10	1.09	1.06

Source: Own research

A company with a high fixed asset coverage index has more creditworthiness. As shown in the Table this index is similar in the whole group and in the parent company it is higher than 1, i.e. the group is financially stable. It seems that the parent company seems to have a big influence here. These inexes are accompanied by liquidity and debt ratios. The companies surveyed have financial liquidity and the low level of indebtedness testifies to the financial independence of the enterprise - Table 4.

Table 4 Results of profitability indexes in the surveyed capital group

Index name		Indexes values [%]		
		2010	2014	2015
Profitability index of sales	Capital group	9.60	8.48	7.94
	Parent company	22.17	21.97	19.58
Profitability index of assets	Capital group	4.56	4.95	5.38
	Parent company	6.23	5.26	4.57

Source: Own research

The higher the levels of these indexes, the better the financial situation is. The indexes of the parent company influence on the behavior of good results throughout the group. At the end of the pre-analysis, the selected indexes were taken into account for the specifics of the analysis of capital groups, namely the impact on the financial result of the capital group of the parent company and the share of minority shareholders in the consolidated financial results. The formulas in the results Table were used. The results are summarized in Table 5.

Table 5 Values of selected indicators taking into account the analysis of capital groups

Index name	Index value [%]		
	2010	2014	2015
The influence of the parent company on the consolidated financial result	85.10	62.23	57.51
Minority shareholders share in consolidated equity	16.56	33.74	35.73

Source: Own reserach

The calculated indexes indicate the significant influence of the parent company on the result of the group. The high value was in 2010 – 85.10 %. In subsequent years the impact on financial performance was lower and amounted to 62.23 in 2014 and 57.51 in 2015.

In 2014 and subsequent, the share of minority shareholders in the group's equity increased from 16.56 to 35.73 % in 2015. This means that the group was still open to new shareholders, which was also positive. However, there are a number of questions that arise: if one has a parent company, then is it profitable to join a group, what benefit does the parent company have by expanding its group, and whether consolidation improves performance?

Capital groups are specific structures operating in a free market economy and therefore the financial result of the entire group should depend on the activities of the subsidiaries. However, as the above analysis showed, this was not always the case. Thus, for the verification purposes another group, namely Elektrim Capital Group S.A. was investigated. It was financially analyzed on the basis of consolidated reports from 2013, 2014, and 2015, as these were years of group changes. The inex analysis was analogous to the previously studied group, which allowed us to assess the efficiency and effectiveness of management in the Elektrim SA Capital Group. The indexes and the calculated values together with the desired values are presented in Table 6.

Table 6 Results of profitability indexes in the surveyed capital group

Index name		Inexes values [%]		
		2013	2014	2015
Profitability index of sales	Capital group	-944,00	10,30	-44,00
	Parent company	-4,43	71,19	-221,93
Profitability index of assets	Capital group	-31,00	3,10	-17,00
	Parent company	-51,17	29,25	-27,58

Source: Own research

The net return on sales index indicates how much net profit sales revenue generate. One should strive to maximize the value of the index. These indexes in 2013 and 2015 were very low. However, it can be seen that not necessarily the parent company had an influence on the group's indexes in those years. The high value of this index means that the business is profitable. In 2014, the return on assets was 3.10 %. This means that for every PLN involved in the activity of assets there were 3 groshes of profit. However, in 2015 again the value of the index fell.

Table 7 Financial safety index

Index name	Index value			
		2013	2014	2015
Fixed asset coverage index with fixed capital	Capital group	63.70	52.20	52.30
	Parent company	17.80	46.20	15.60
Current liquidity index	Capital group	0.70	0.60	0.20
	Parent company	0.00	0.00	0.00
Total debt index	Capital group	39.9	69.5	81.80
	Parent company	88.30	59.30	87.60

Source: Own research

The higher the value of the first index, the greater the financial safety. The current liquidity index is below one, which indicates the difficulty of regulating current payments. The high debt index, especially in the parent company, reports high levels of foreign capital. Table 8 presents another index of company safety.

Table 8 Index of fixed assets coverage with equity

Index name		Indexes values [%]		
		2013	2014	2015
Index of fixed assets coverage with equity	Capital group	-	35.00	23.21
	Parent company	11.89	41.15	12.74

Source: Own research

Equity should be sufficient to finance non-current assets, which should be at least 100 %. If the index value is lower than 100 %, it means that a part of the property is financed by foreign capital, which indicates the company unfavorable financial situation. Together with other indexes, it is helpful in assessing the risk of adverse financial situation. As it is clear from the whole of the research conducted here, the influence of the parent company on the capital group is great.
Another example is the acquisition of Bank BPH S.A. The realization of the largest merger in

Poland was carried out in 2007. Did acquisition and consolidation improve the performance of the group? Is it a better financial situation? In order to answer such questions, an analysis of the financial situation of the Pekao Group and Bank BPH in the acquisition year was presented. Subsequent presentations and analyzes were subject to financial statements in the subsequent two years of operation of the newly enlarged capital group. These procedures serve to provide an assessment of the effectiveness of the merger, as well as an indication of the key effects of the investment.

The basis for assessing the effectiveness of the acquisition is to check whether the increase in the number of subsidiaries resulted in an increase in the Group's profits. The financial statements of the Pekao SA Group for the year 2007 show the following financial data (in PLN thousand) [3]:

Table 9 Basic financial records in 2007 for Pekao and BPH

Specification	(in thous. PLN)
Pekao SA	
Assets	108 568 683
Equity capital in total Liabilities	8 979 015 99 589 668
Dane BPH	
Assets	13 027 447
Equity capital in total Liabilities	1 472 912 11 554 535

Source: Own research

Macroeconomic situation of the acquired bank in 2007 was very good. Table 10 shows the selected indexes in the Pekao and BPH.

Table 10 Selected indexes in the Pekao and BPH in 2007

Specification	Pekao ratio size	Specification	BPH ratio size
Return on ROA assets	2.5 %	Return on ROA assets	2.2 %
ROE return on equity	25.2 %	ROE return on equity	12.1 %
Cost / income ratio C /I	51.1%	Cost/ income ratio C /I	64.8 %
Total debt	0.89	Total debt	0.81
Equity debt ratio	8.06	Equity debt ratio	7.17

Source: Own research

Table 11 presents data on the composition of assets and liabilities of the PKO Capital Group in 2008-2009 (PLN thousand), i.e. after acquisition.

Table 11 Assets and liabilities of Banku Pekao

Specification	2008 (in thous. PLN)	2009 (in thous. PLN)
Assets	134 635 986	156 478 685
Equity capital in total Liabilities	23 555 231 109 930 637	26 253 122 130 225 563

Source: Own research based on the consolidated financial statements of the Pekao SA Group for the year ended on 31 December 2009

[3] Consolidated financial statements of the Pekao SA Group for the year ended on 31 December 2009

After an increase in assets, it is evident that the group is continuing to grow and is enjoying popularity in the market. Despite the increase in the company's assets, the financial result decreased. It can be argued that despite a continuous development of the group and widening its offer, operating income does not need to be large at all. The reasons may be different, but among other things, restrictions on the granting of loans, growing costs of running business. Pekao SA has been the leader of the banking sector for many years in terms of equity, equity, loans and deposits.

On the other hand, how do financial ratios (Table 12) show the following data on newly formed capital group?

Table 12 Financial ratios of capital group

Specification	2008 Ratio size	2009 Ratio size
Return on ROA assets	2.7 %	1.8 %
ROE return on equity	22.2 %	13.2 %
Cost / income ratio C / I	45.8 %	47.9 %
Total debt	0.89	0.87
Equity debt ratio	8.6	6.6

Source: Own research

Profitability ratios show some decline in profit and turnover in the bank. Although the value of these measures has fallen by almost half, it does not necessarily reflect the new group. One cannot forget that the profitability of a bank depends on the financial situation of the society - potential customers. The merger did not undermine the organizational structure of the group.

4 Conclusion

The consolidation process consists of many complex phases and is work-consuming primarily, but does the final result allow a real assessment of the capital group as a single coherent entity? The information from this report should clearly and reliably present the group's financial position. From the various reports analyzed, apart from the ones presented in the article, it is sometimes difficult to actually read and evaluate the situation. Many times it seems that it is creative or makes creativity. Are there justified reasons for creating capital groups, holding companies, gaining new business, increasing turnover, minimizing costs, or expanding an existing brand? Business entities operating within the capital group are better able to adapt to the changing market environment. The parent company acquires additional companies and broadens its market share by acquiring additional companies. Managing a capital group is a demanding task for the managers of the parent company. There is also a reaction of the recipients of such mergers, expansion of the business, some are behind, but there are also negative premises.

In the market there are companies operating as notorious hunters, companies undecided and those who wait for better opportunities and those that constantly benefit from the opportunities for development. However, there are also situations where there is a first takeover and then a fragmented connection. By analyzing the researched groups, one can formulate conclusions:

- Relations are necessary but need to be reliable,
- Consolidated reports prepared using the full method do not give a clear picture of the group's financial position as many negative information is hidden by corrections,

• Capital groups and other relationships between entities can be created but this method of consolidation should be moved away,
• According to the authors of the publication, the method of property rights is definitely the better method,
• Answering the question of whether consolidation improves the results of the analysis it can be answered that, in the Asseco Poland group, the dominant entity has basically all the indicators, similarly in the second group analyzed - Elektrim, only those indicators are quite unfavorable.

The researched groups together with the dominant entities are very well recognized in the market, but is everything so perfect?

The analysis conducted shows that the entities surveyed in many different branches and sectors have merged or absorbed, but have they changed fundamentally the indicators or just indicators on paper, perhaps these consolidations are just fashion.

Consolidation in recent years has become a very popular issue due to the increasing number of mergers and acquisitions. It is important that there are no manipulations and speculations.

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Maritime Transport

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Abstract

The condition of maritime transport is a reflection of global economy tendencies. Increase in shipped goods is related to development and cooperation of world economy. Maritime shipping is one of the important power points of global economy, next to informatization and communication. The prospects for it are clear - it must be ready for new technological challenges, move goods faster and lower the costs. And also interoperate with other means of transportation.

Keywords: Oceans, Container ships, Tankers, Seaports, Seaport infrastructure.

JEL Classification: Z3

1 Introduction

In a globalizing world the trade is constantly rising in importance - and so is the transportation of goods. In this context the significance of maritime transport is rising too. As 73 percent of our globe is covered by seas and oceans, the majority of goods transportation, especially over long distances, is done by ships. Maritime transport however, requires not only vessels, but also a well-developed infrastructure of ports and harbors. The future of maritime transport should be viewed in the light of its total shipped goods weight increasing by about 3 percent annually.

2 Types of marine vessels and forms of exploitation

In commercial shipping, basic and essential forms of ship operation international shipping is essentially:

- liner shipping,
- Irregular shipping, otherwise known as tramping,
- Cabotage,
- Other commercial shipping services.
- The features of liner shipping are:
- Cyclical handling of specific ports according to timetables,
- mainly general cargo and container shipments, including regular deliveries of crude oil, coal, etc.
- Tariff billing system.[2]

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On the other hand, in irregular shipping, decisions are often made at the last minute. Here are the agents called supercargo who search for loads and set freight rates. Mostly these are full-ship loads. This method is mainly used for bulk cargo, but also for general cargo. There are of course also other ways of using the ships, as floating magazines. For example, in the Norwegian and Icelandic fjords practically always anchored dozens of large tankers with full loads. This is a strategic reserve of the European Union countries in the event of an oil crisis. Similarly, oil companies in the United States. There, in turn, a number of tankers anchor as warehouses mainly in ports located over the Gulf of Mexico.[3]

Different types of ships are used in liner shipping. Of course, these are intended for the carriage of general cargo. Among them are:

- Universal conventional cargo shipments, both for the transport of conventional and bulk cargo, in small quantities. Most of the cargo hold of these vessels is cooled so that food can also be transported also in the tropics. Most of these types of vessels are designed to carry out loading and unloading operations on their own. They have ship cranes called bombs. The point is that there are still harbors, and paradoxically, ports where the lack of basic transshipment facilities;
- Semi–container ships - general cargo carriers adapted to the carriage of cargo in containers as well as in the conventional formula;
- Multi-tasking multinationals - very popular nowadays ships that can carry very different goods, also oversized. These ships are equipped, among others, into the big deck cranes. Some of them are equipped with side doors or stern doors. These units allow you to carry out loading and unloading work on a level system;
- Containers - these vessels have holds equipped with guides that significantly facilitate handling. Currently, large container ships of over 100 000 BRT are loaded with several or even 12 to 14 containers loaded with container shelves. These ships run between highly automated specialist ports such as New Orleans on the US East Coast and Rotterdam, Havre, Antwerpia or Hamburg. On the west coast of the US, such a port is San Diego, from which the cargoes depart and come mainly to Shanghai, Yokohama or Surubai / Indonesia/; Here it must be added that the container port naturally becomes also Gdansk, which services are used by large container ships of the grand Danish company Maersk.[4]
- Boats - increasingly useful vessels due to the fact of use when loading and unloading only the horizontal loading system through the entry gates.
- Barangays - These are rather rare ships whose tanks are flooded as docks to which large barges are affected by the goods. This way they can handle ports and a low-draft landing. These types of ships are also intended for war time as great landing craft - mothers. For example, the British series of Sir Lancelot ships;[5]
- Ferries - vessels used for the carriage of rolled cargo, ie road sets, popular TIRs. Some of the ferries are also adapted for the carriage of railcars;
- A separate group also includes refrigerators that are designed for the carriage of deep-frozen goods (below -18˚C) and only refrigerated.
- In irregular shipping (tramping) there are also ships of various types and destination. These are among others:

1 E. Januła, T. Truś, Z. Gutowska, Spedycja, Difin, Warszawa 2011, s. 36 i nast.

4 Ibidem, s.56.

5 Sprawocznik po inostrannym flotam.Izdatelstwo.Obrona.Moskwa.2004.s.356

- Tankers or tankers - most often these are big units 200 and more thousands. The biggest tanker at present is 600 thousand, but due to immersion it can literally enter only a few ports in the world. Currently, the tankers are 300,000 tons. As empty - beneath the water ballast, they pass through the Suez Canal - this is the maximum capacity of this channel - and already with cargo picked up in the Persian Gulf are heading around Africa through the Mozambican Channel, both to European and American ports. It should be added that as already written, some of the tankers are used on fixed routes in liner shipping.[6]
- Reddish and ore - also big ships carrying ore from Australia, Brazil and South Africa to Europe, USA and Japan.
- Multipurpose trains - ships carrying other cement, steel, etc. goods. It should be noted that many of these ships are old, practically disassembled. Especially in the so-called. The "low-cost" flagship ships also have the "Liberty" type, the tens of thousands built during the war.

3 Charter and buking

In maritime as well as inland navigation there are two general types of contracts for carriage of goods:

- Buking,
- Charter.

In general, a regular shipping contract is concluded between the owner of the cargo or the forwarder acting on his behalf and the shipowner or the ship's tenant. The carriage is carried out under the conditions established by the liner carrier. In practice, however, a classic deal is rarely used. Substitutes are detailed here. The most important of them is that the goods must be delivered to a certain place within a certain time. So you have to provide a substitute ship if the liner is spoiled for example. There is always a penalty in the contract for the contract if the charge is not delivered for a specified period of time.[7]

Another contract / type is a charter contract. This is the delivery of all or part of the ship. For total disposition and also for freighter responsibility.
In practice it stands out:

- Charters for a specific cruise,
- Charters for a specific time.

Increasingly, there are also formulas of bareboat charter, i.e. empty lease without crew and without fuel ship. It must then only represent specific technical and cargo characteristics. The specific arrangements in the charter agreement are the name and the exact description of the vessel and the position of the vessel at the time of conclusion of the contract as well as the date of substitution of that vessel in the specified port of loading. As you can see from the above formulation of the letter, the contract charter is quite detailed and the following issues must be fixed in it:

- Port of loading and unloading,
- Type and quantity of cargo,
- Freight rates and method of payment,
- Any arrangements for participation in the costs of loading and unloading,

[6] E. Januła, Podstawy Transportu i Spedycji, Difin, Warszawa 2014, s.67.
[7] Z .Brodecki. Prawo ubezpieczeń morskich.LEX.Sopot.1999.s.34-26

- The question of time for loading and unloading,
- Technical condition and admission of the ship to shipping,
- Insurance formula for the ship, crew and cargo.[8]

So all issues must be meticulously regulated. During the loading and unloading, a document is created that records all events that have a significant impact on the vessel's stay in port.

The time charter contract is a civil-legal document between the contractor and the landlord, the charterer.[9] There are clauses in this type of clauses:

- sign the contract parties,
- ship designation,
- duration of the contract,
- date and place of transfer,
- date and place of return,
- envisaged transport - that is the operating area,
- price and quantity of fuel (bunker) at the time of transfer and return of the ship,
- charter fee,
- terms of arbitration,
- amount of commission for the broker.

This contract specifies in detail the rights and obligations of the following parties:

- Owner,
- Charterer
- The ship's captain.

Under some contracts charterer, operates the vessel at his own discretion, but only within the established zone.

4 Basic documents on maritime transport

In maritime transport there are several basic documents that must be obligatory to be drawn up on every trading voyage. These include the helm:

- this is the receipt of the entire shipment intended for shipment. Nomenclature comes from the fact that historically in the British navy this type of document always signed the helmsman, who was then deputy captain. The position and functions of the senior and first officer are much later times.
- the helmsman's quota determines exactly the type and amount of cargo. It also includes the date of completion of the loading. Comments may be submitted if the condition of the goods or, for example, packaging, raise concerns.[10] In some ports where the practice of receiving cargo is not established on the so-called. The ship's side, but in the magazine the helm is replaced by a dock.[11]

[8] Ibidem.s.74.
[9] E. Januła, T. Truś, Ekonomika logistyki, Difin, Warszawa 2010, s.146.
[10] E. Januła, Podstawy Transportu i Spedycji, Difin, Warszawa 2014, s.89.
[11] Międzynarodowa konwencja o bezpiecznych kontenerach.Genewa.02.12.1972.Dz.u1984.nr.24.poz.118

The sea bill is also a document confirming acceptance of the goods on board the ship for carriage and at the same time the obligation to deliver it to the authorized entity at the port of landing.
The bill of lading is a legal proof of the ownership of the goods. It is also in this sense a valuable paper.

In the aspect of Article 131 of the Maritime Bibles Maritime Bill of Lading (because it is must also be inland) must include:

- carrier identification,
- shipper identification,
- customer identification,
- the name (s) as well as the ship's register and flag,
- cargo marking,
- identification of the external characteristics of the cargo, possibly packaging,
- characters that will allow identification of cargo,
- definition of freight,
- name of the port loaded,
- the name of the port or port of discharge,
- number of bill of lading issued (original only),
- the date and place of the bill of lading,
- authorized captain or representative of the carrier.

It may happen that the carrier is not listed. Then the ship's owner is the alleged carrier. And he is legally responsible for the recipient of the cargo.
There are special cases where the carrier may refuse to enter the bill of lading defining the goods. Then, if there are serious grounds for suspecting that the data does not correspond to the facts.[12]
Also, if the markings of the load are not permanently marked on individual pieces of cargo. However, the weight of the goods is accepted based on the results of measurements made only on land.
In practice, the following bill of lading is used:

- bill of lading already loaded,
- bill of lading for goods accepted for loading.[13]

Another very important document is the shipping note. This is somewhat forced and introduced documenting the use of larger and faster liner ships. Transmission of documents has often led to document congestion, since the conventional maritime bill of lading has to go through a very complicated banking route through a verification system.

In this situation, shipowners already started in the 1980s, because it forced the situation, introduce e-mail. The first such document was: Express cargo bill. This document is nothing but a substitute for the bill of lading.

In this document computerized transport documentation was prepared in the form of landing manifests.

[12] E. Januła, T. Truś, Z. Gutowska, Spedycja, Difin, Warszawa 2011, s.95 i nast.
[13] Ibidem.s.99

The e-mail capabilities allowed for the preparation of an analog document for the verification at the port of discharge, but at the time of the anticipated arrival of the ship at the port of destination.

The International Maritime Committee (CMI) issued in 1990 a normative document, / design / which began to be called a sea freight bill.

She also subsequently adopted this document also the International Chamber of Commerce Based in Paris.

Consequently, the shipping note was permanently attached as a normative document in international agreements.

The cargo manifest is, in turn, an obligatory document that must be held by the master of the ship. Ship Manifesto - also used is the name "ship manifest" must be held by the ship's captain.
This is an overall cargo compilation of goods loaded on board by destination. This is, in other words, a record of shipments according to the data containe in bills of lading. On the basis of the loading manifest, the agents at the ports of destination draw up landing manifests, which may show any differences that may have occurred during the journey or wrong landing. [1415]

The landing manifest is also commonly used as a customs document. It is then called a customs manifest and it also represents other customs declarations. In our country, legal relationships related to shipping are regulated in the Maritime Code. This code basically covers the overall issue of shipping services as well as insurance. It is worth noting that it also regulates administrative provisions. It should be noted that shipping has always been international. Hence Also, the provisions of the Maritime Code are compatible with the provisions of international conventions.

From these documents the most important is the Brussels Convention of 1924 concerning the rules of bill of lading. This convention was amended in 1968 by adapting
It's up to the new terms and rules (Visby Rules).

An important document is also the Hamburg Convention, which, although it was enacted as early as 1978, was not fully implemented in 1992. This Convention specifically lays down the concepts of carrier and its liability in quantifiable amounts for the freight carried. [16]
The Geneva Convention is also used for maritime transport about international multimodal transport of goods. It comes from 1980.

5 Freights

The basic concept is freight calculation, the determination of the value of transport service based on price list. In sea freight, the freight tariff is based here. Simply make the carriage to be paid.

[14] Marciniak -Neider ,D .Rozliczenia w handlu zagranicznym.PWE.Warszawa.2004.s.326 i nast.
[15] Neider J., Marciniak- Neider D., Transport intermodalny, PWE, Warszawa 1977, s.203 i nast.
[16] E. Januła, T. Truś, Z. Gutowska, Spedycja, Difin, Warszawa 2011, s.95 i nast.

International markets operate on individual carriers' tariffs and conference tariffs. The latter is a joint corporate fare of carriers (shipowners) associated in one shipping conference or consortium. Most often, this type of conference carries out trade on specific routes or the sea alone.

The Maritime Trade Tariff is a set of rules, rules and standards applicable to the freight lines of a particular line or shipowners associated in a conference.

Most often, potential contractors present a table with the following information:

- determination of the tariff and its owner,
- fare range (water area),
- tariff rules,
- register and description of the goods,
- freight rates in the form of a catalog,
- tables of land transport to and from land transport,
- list of character codes, etc.

It should be remembered that container tables contain very elaborate construction. It must take into account a number of additional factors.

As of today, the use of freight rates symbolic markings, as in international trade, the FOB or CTIF symbol for professionals contains a lot of news, so the professional terms of freight rates are legible without any difficulty.[17]

The calculation of the price of the carriage of goods is done in a very simplified way At the same time very transparent. Here, the conversion unit is usually the freight tonne that occurs as a tonne or tonne. Of course the weight is 1000 kg - sometimes there is also a ton of English 1016 kg and even so. Short ton American, ie 907 kg. Freight tonnage is a cubic meter or 40 cubic feet.[18]

This is where professional markers are used. If, for example, the rate is accompanied by the W symbol, it means that the output base for this rate is the weight. W / M symbol means, The base rate is alternatively two tones.

The problem is somewhat different when the freight base is art, that is container, or pallet. At the container the problem is minimized, just specify simply type and size of the container. With pallets, big bugs (for transporting eg. cement) the problem is already more complicated.

Freight tariffs also provide for additional charges, which are added to the basic. Special items are added for transporting extremely (or very) heavy items or exceed the dimensions of the ship's hatch.[19]

Common freight allowances are:

[17] P. Sikorski..Spedycja w praktyce.-wiekXXI.PWT.Warszawa.2008.s.79

[18] E. Januła, T. Truś, Gospodarka Elektroniczna, Difin, Warszawa 2011, s.183.

[19] M. Ciesielski .Sieci logistyczne.Wyd.AE.Poznan.2002.s.268-274

- bunker,
- valuation allowance,
- container repository container,
- terminal container terminal.

There were also, but in the initial period of containerization, the premiums for container shipments. Currently, however, uniform freight rates apply.

6 Handling cargo in a seaport

The basic Polish seaports operate under the Act of December 20, 1996 about ports and marinas. They are also subject to the provisions of the Commercial Companies Code. These strategic ports are:

- Port of Gdansk SA,
- Port of Gdynia SA,
- Port of Szczecin-Swinoujscie SA.

In the latter case, both ports share a significant distance. Yet, as an economic mechanism, they work as one entity. The situation is similar in Gdansk. Although only a short distance separates the Port of Gdansk from the North, the North Port was a legal entity for several years. Since the entry into force of the law mentioned above, both ports are also one economic entity.[20]

Ports are based on a transshipment terminal. Each large port has at least a few specialized transshipment terminals. Sometimes the name of the pier is used in the mass cargo system. For example, North Port has pikes: fuel, coal, ore, etc.

All cargo dockers, freight forwarders, shipowners, customs agencies and other entities are customers of the port terminal. In order to carry out a transhipment operation, a number of normative documents must be issued to enable this operation to be carried out.

- Job A - manipulation - ie the document allows for loading and unloading. The A order is issued by freight forwarders and other cargo authorities,
- Order B - This document allows you to place your shipment with or without packaging

In storage areas. Orders B issue the same entities as above,

- Order C - this is different proof of release and receipt of goods. This document makes it possible to take loads from storage space. These orders are issued by analogous entities,
- Landing - import manifest. This document allows any landing work from the arriving vessel. This document is issued by the company's representatives,
- Load export list - this document allows for a complementary loading onto the vessel. Export lists are issued by agents or other representatives of the shipowner.

7 Mass, bulk and container terminals

Contemporary terminals must be increasingly automated, and there must be a fast and complementary document circulation system. Such an example, but not the only system, is

20 E. Januła, T. Truś, Z. Gutowska, Spedycja, Difin, Warszawa 2011, s.146.

universally known COLONS. This type of standardized system significantly facilitates all documentation work and, in turn, loads are labeled with bar codes.

Individual terminals have their own detailed rules, but they can not depart from certain general frameworks and findings. It should also be noted that pirates and mass terminals have far fewer customers than bulk and container ones. Simply "mass" customers handle loads of tens and hundreds of thousands of tons, and in container terminals, it is not uncommon for a customer to have a cargo loaded into only one container. [21]

It is important in the terminal role of forwarding agent. He is a legitimate representative of his client and works closely with the staff of a particular terminal. The Freight Forwarder establishes and plans - together with the terminal handling of the freight service. Typically, the forwarding agent will present its freight plans at the terminal for the next week. On the other hand, a typical acquisition takes place unless otherwise agreed in advance 24 hours.

Execution of specific operations by the terminal must be preceded by placing orders A, B, or alternatively C. Placing an order is an option for the operator to start a particular load operation. The forwarder should also be present at the reception and passing railway wagons. In his duties lies the delivery of railway documents. Also in all contacts with customs agencies. When preparing Sad documents and other forwarders is essential.[22]
The forwarder must also cooperate with:

- The Harbor Master,
- Border Guards,
- Port Guard,
- SANEPID,
- WIJHARS - (EU Compliance Controller) and alternatively also the Border Veterinary Control Point - GPKW and Inspectorate for Plant Protection and Seed Production IORiN.

8 Polish Ports of Commerce

In general, Polish ports are located in two large teams. One team is counting over Gdańsk Bay Gdynia Team - Gdańsk with North Port. The advantage of this port complex is that the Gulf of Gdańsk is a deep reservoir with a good red partially covered Hel Peninsula. These ports are generally anti-freeze at least under normal conditions. It is worth noting that while the ancient port of Gdansk is located in the estuary of the Dead Vistula River and the Motlawa River, the port of Gdynia is a typical artificial harbor.
The Port of Gdansk can accommodate the largest Baltic vessels called "baltimaxy". Restrictions are the depths of the Sund Strait and the Great Belt - 18.3 m in the loftiest place. Currently, baltimaxers are considered as tankers up to 105 thousand BRT and red ore with a payload of up to 96 thousand. BRT. However, no special, broader but submerged vessels adapted to the Baltic Sea are being built. Such are eg. lakes (on big US lakes - but they are long and narrow vessels, Because it's about the size of mucus).

[21] Neider J., Transport międzynarodowy, PWE, Warszawa 2008, s.126.
22 E. Januła, T. Truś, Z. Gutowska, Spedycja, Difin, Warszawa 2011, s.182.

The Szczecin-Swinoujscie port complex is completely different. Szczecin is located in the estuary of the Odra River and was a traditional sea-river port in Gdańsk. It is currently heavily muddy and practically enter Szczecin without the risk of only 45 thousand ships. BRT, but currently accepts only 35,000. Water in Szczecin in winter is freezing, because it lies in fact over the Oder River and not over the open sea. Icebreakers and tugs, each winter must use a lot of power to clear both the port and the shipping channel Szczecin - Swinoujscie.[23]

The second one is made up of two port sections: the proper Swinoujscie and the Oder Port, which face each other at the estuary of the Swina to the Baltic. Swinoujscie was a kind of avant-garde of Szczecin. There was even a time when some of the loads were being unloaded in Swinoujscie, so that the lighter ship could already sail to the rest of Szczecin. Now it is unprofitable. Szczecin is connected by waterway - Odra - Havel canal with Berlin, but real loads to and from Berlin are not going through Szczecin only through Roztock, Kiel and to a small extent by Greinswald.[24]

Although Szczecin – Swinoujscie. Complex is located 680 km closer to the West than Gdynia - Gdańsk, development opportunities are much more modest here. Along the southern coast of the Baltic Sea at about 2.5 to 3 knots sea current flows from the West on the east. Unfortunately, this current effectively floods the sand and silt with a water track linking Swinoujscie to the open sea. The Pomeranian Bay on which Swinoujscie lies is unfortunately a shallow: 2 - 6 meters. Maintaining nearly 70 km of sea track and 65 km of track from Szczecin to Swinoujscie is a great expense. You have to remember that if you want to keep the track deep at 16 meters and so much need regulations and navigation conditions it is at Swinoujscie - the open sea, it has to work all year round six large dredgers. At the same time, when the big frosts, the plate of the Pomeranian Bay freezes.[25]

Port capacity - transhipment of both ports is estimated at 30 million tonnes, Gdynia at 20 million tonnes, North Port at 45 million tonnes and internal port in Gdańsk about 14 million tons. Polish ports of the central coast are Kolobrzeg, Leba, Ustka and Darlowo. There are others, but they are rather a base for fishing. Once in the 70s of the 20th century the transhipments in Kołobrzeg reached 1.5 million tons altogether and Ustka 800 thousand. Tons per year. It must be mentioned that Ustka has shipyards that perform fishing boats and very technologically advanced lifeboats.

9 Terminals and forwarding in Polish ports

In Gdansk port, in practice one big company operates: Port Gdanski Eksploatacja Sp. zo.o. PGE. It also includes a significant part of the wharf. In addition, there are also small specialized companies, such as Siark-Port, a transshipment and service company specializing in sulfur transshipment. Then "Chemski" Sp. Z.o.o., also specialized in reloading according to the naming. Separate reloading companies carry out transhipment operations in the Northern Port. These are the Port-North Transhipment and Repository, which reloads liquid fuels and coal.
In addition, the liquefied gas company transfers LPG.

In Gdynia there are more transshipment terminals. I will mention only some:

[23] E. Januła. Szlak Odry .Studium krytyczne./w/Silesia-Schlesien.com..Nr.78./Dostęp.11.09.2017/
[24] E. Januła, Droga Odry /w/ Warunki bezpieczeństwa, Pr. Zbiorowa, Wyd. WSB, Poznań 2017, s.278-289.
[25] Ibidem.

- BCT - reloading of containers and cars,
- BTZ - Baltic Grain Terminal,
- MTMG - Gdynia Mass Storage Terminal - handling bulk goods, fertilizers, liquid, etc.
- In the Szczecin-Swinoujscie port complex, there are terminals of many companies such as:
- Bulh Cargo - reloading all types of cargo without containers,
- Port Shipper - cargo handling of general cargo and containers,
- Port Services Company "Elewator",
- Swinoujscie ferry terminal - car and rail ferry services.

Container terminal equipment must be very advanced. The terminal must be adapted to containers 20 ', 30', 40 ', 45' which forces them to equip themselves with very different cranes and grippers. The most common terminal is universal: sea-rail-car, sometimes also sea-river. It is rather technically difficult to form and disassemble container lines, which can be car columns, trains or also have a CFS consolidation warehouse.[26]

There are several kits in the sea terminal. STS-TT-RTG-T / W - container quay (STS) discharges containers for towed semi-trailers by terminal tractors (TT). These tractors bring containers to the storage areas. Here, in turn, its work is performed by a gantry crane (RTG). Here containers are removed from the semi-trailer and sets it to the component blocks (up to 7 and up to 9 layers). According to the conversion rate and technical norms with one STS must cooperate 3 RTG and GTT. This type of organization, on a slightly smaller scale, uses BTC in Gdynia.[27]

One of the big European ports in Rotterdam uses a fully automated terminal just behind the STS desktop. Containers are placed on storage yards by AGV automatic cars. These are delivered by automated ASC overhead gantries. Cranes stack containers according to the system and load for inland waterways and trucks as indicated by the TSS computer system.

Ports include ships of varying size, for example Gdynia Container Terminal includes container ships, car carriers and ro-ro vessels. As far as Gdynia BTC is concerned, it is mainly the transport of cars by land transport and the importation of containers by land. Although the plans assumed that the rail would operate the terminal at least about 35% of the weight, its share never exceeded 20%. Currently, the terminal supports only about 10% of the terminal.
Other equipment has terminals for conventional bulk cargo handling. The loading equipment must be much different here because loads are taken and exported in very different shapes and sizes.

The terminal must have several shore cranes with different lift and range. It is important to note that loads are particularly heavy. Then mobile cranes: wheel or rail vehicles with a hoist of up to 100 tons or floating. This can be up to 800 tons. Cranes must be equipped with various specialized hooks and handles.

Special terminals are also designed for servicing ro-ro vessels. Here the landing and loading is used by side doors and gates in the bow and stern. Loads either leave themselves (cars, etc.) or are

[26] J .Neider D. Marciniak –Neider .Transport intermodalny.PWE.Warszawa.1997.s.211.
[27] E. Januła, T. Truś, Z. Gutowska, Spedycja, Difin, Warszawa 2011, s.151 i nast.

transported to suitable trails or cassettes. This road gets loads to warehouses or directly to cars or rail. Of course, the ro-ro terminal must have cranes to handle ro-ro vessels or cranes, jaw stackers.

The ro-ro terminals also dominate the handling of terminals as carriage and delivery. Ro-ro terminals differ from ferries that they do not have passenger service halls and ferry terminals do not perform any additional handling.[28]

The mass terminal is a transshipment platform of an entirely different system. This should be a long wharf, where the ships to the kei are unloaded by grapple or bucket hoists. There must also be bulldozers, belt conveyors, pneumatic conveyors, pavers and liquid cargo mobile pumps and piping assemblies for the transshipment of fuels.

10 Conclusion

As objective situation tells, maritime transport is a branch still developing. Currently the problem is in its further economization, i.e. evolutionary reduction of costs. In this area a tendency of transitioning from general purpose to specialized ships can be seen. The most progress can be seen in oceanic container shipping, as container is a packaging that allows multimodal transport which facilitates faster transport time and prevents cargo damage. However, containerization requires not only building of very large container ships but also very complicated and costly infrastructure in seaports that become bases for fast cargo transshipment onto rail or road transport. At the same time a decline in shipped amount of oil can be seen - which is a sign of oil consumption reduction and increasing significance of renewable energy sources.

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[28] E. Januła, T. Truś, Ekonomika logistyki, Difin, Warszawa 2010, s.263.

Functional areas as an expression of implementing a new paradigm of regional development. Case study Poland

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Abstract

The current needs in the field of the management integration result directly from the new territorial approach to the development policy, which consists in the departure from the perception of regions defined by administrative boundaries in favour of individual potentials, barriers and interactions (Wyrwa, 2017). The new approach assumes the departure from sectoral management to territorially integrated management, which consists in integrating the actions of different public bodies into non-administrative and functional territories, characterized by similar socio-economic and spatial characteristics. This approach should enable to ensure high efficiency, added value and better use of territorial potentials. This article is to demonstrate a new approach toward regional policy in the European Union (EU) and to clarify the significance of functional areas that constitute a tool for implementing this policy in Poland's regional development policy. Research proceedings were commenced from analyses of literature and legal acts within the scope of researched areas.

Keywords: Regional development policy, Functional areas, Case study, Regional integrated development.

JEL Classification: H7, H83

1 Introduction

The new regulations of European cohesion policy and Polish development policy put a great emphasis on the territorial dimension of public policies. M. Grochowski claims that „the relationships in the authorities - competence - territory system should be defined in a new way, taking into account the multiplicity of the entities involved in the governance, the need to share power and competence, the requirement of the cooperation between different levels of administration and management". The fundamental challenge for effective territorial management is creation of institutional structures and organizational solutions which will, above all, lead to a consensus on strategic goals of the development and sources of financing necessary to achieve the set goals.

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They assume the departure from sectoral management to territorially integrated management, which consists in integrating the actions of different public bodies into non-administrative and functional territories, characterized by similar socio-economic and spatial characteristics. This approach should enable to ensure high efficiency, value added and better use of territorial potentials.

This article is to demonstrate a new approach toward regional policy in the European Union (EU) and to clarify the significance of functional areas that constitute a tool for implementing this policy in Poland's regional development policy.

2 Methodology

In the research proceedings, ananalysis of the literature on the subject and provisions of legal acts as well as national strategic and planning documents regarding functional planning and functional areas was carried out.
It is in the article that the following analyses were carried out:

1. Of the literature on the subject of a new approach to regional policy in the European Union (EU).
2. Terminological analysis and of characteristics of the types of functional areas as well as their significance for activities within spatial planning and strategic planning was presented.

The terminological analysis presented in the article is a basis for further analyzes within functional areas in Poland. The detailed explanation of the concepts, presentation of the features of functional areas will foster the correct selection of indicators necessary for their delimitation. It will translate into the proper actions of the authorities at the later stage - appropriate targeting of the support measures. It applies especially to the planning areas for which planning documents should be developed in the form of a spatial development plan or a development plan and a development strategy.

3 A new paradigm of regional development

According to the traditional concept, which states that „regional development is a systematic improvement of the competitiveness of economic entities and the standard of living of the inhabitants and the economic potential of the regions, contributing to the socio-economic development of the country as a whole" (Brol, 2006, p. 13), the crucial aspect of this development is economic growth of the region and its goal is to increase social welfare and prosperity (Potoczek, 2003). Additionally, regional development leads to the following (Strahl, 2006, p. 26):

1. increased relative importance of the region in the country,
2. increased economic efficiency (optimization of operating conditions of economic entities),
3. leveling of intraregional and interregional differences,
4. increased regional competitiveness and innovativeness.

In the literature, development in relation to territorial units refers to the concept of territorial development. A. Noworól proposes to think to territorial development as a human living environment, comprising four components: 1) spatial environment, 2) human capital, 3) organization, 4) territorial system management, as a specific component of the „organization" subsystem.Brol (2008, p. 33-34) argues that „territorial development is when a harmonized and

systematic action of the community, local government and other actors operating in the area is aimed at creating new, and improving the existing, utility values, creating favorable conditions for the economy and ensuring regional and ecological order of a regional or local territorial unit".

It is now stressed that enhancing the competitive position of the region can be achieved through the use of specific resources that are emerging in the new functional and spatial structures, as evidenced in the EU development policy by efforts to implement a territorial and integrated approach to stimulating development through building the so-called functional areas.

The main report drawn up by Barcé (2009), although highlighting the weaknesses of cohesion policy, often related to sectoral thinking, also outlined a „territorial approach" toward regional policy. Since 2009, a new regional development paradigm has emerged in the EU and the concept of regional policy has become geographically focused. The new policy is based on the principle of an integrated territorial approach and it relies on the use of endogenous potentials in individual areas (Rosenkiewicz, 2012, p. 71). This approach should enable to ensure high efficiency, value added and better use of territorial potentials. New policy (Nowakowska, 2015, p. 15) of:

1. evaluation of development factors, emphasizing diversification and diversity of resources as a source of the socio-economic development,
2. focusing the policy on strengthening internal and external functional relationships to increase territorial cohesion,
3. increasing mobilization of local/regional entities as well as strengthening social dialog and public-private partnerships for territorial development,
4. creating an institutional partnership and integrating actions of public entities (integration of policies towards entities and sectors, identification and implementation of common development goals),
5. territorial differentiation of development policies - departure from the universal development policy model in favor of the sustainable development policy determined by specific resources, problems and mechanisms of territorial development.

By building new functional and spatial structures, functional areas, territorial capital is defined as a set of elements that represent the region's competitive potential. This includes: natural resources; public, private and mixed (public-private) goods; human, social and relational capital; organizational; relational and cognitive resources (Capello et al., 2011). It results in temporary coalitions of local government units within the framework of functional links and the integration of activities in time and space during the implementation of partnership-based development projects.

The concept of building territorial capital in functional areas requires integrated management (Barska & Jędrzejczak-Gas, 2016). Development cannot be perceived solely in terms of the final results (that is, the desired effect in a static sense of the word), but should rather be considered as a process of creating new developmental conditions (that, the desired effect in a dynamic sense of the word). These prerequisites are essential for the need to implement changes in regional development management. Partnerships are intrinsic in the entire process: internal partnerships - between stakeholders of the same local government unit, and external partnerships - between individuals. Based on this principle, three basic partnership demands can be distinguished (Gawroński, 2014, p. 53):

1. common objectives,

2. mutual communication – uninterrupted and free flow of information between the partners,
3. mutual tolerance - acceptance, equality of subjects, and transparency.

Integrated management also requires integrated planning perceived as a more appropriate model for dynamic and variable in time and space territories. It is not only about holistic and integrated thinking in sectoral or spatial planning but also about creation of a new integrated planning system and plans adequate to modern economy characteristics (Wyrwa, 2017).

Integration must occur in spatial, social, economic, natural and management-related dimensions. Integrated territorial investments, which in the formal sense have been proposed for the first time in 2014-2020, are put forward to implement territorial-oriented development policies. As proposed by the European Commission, they should be particularly applicable in the development of cities and functional areas, by increasing their involvement in the management of EU funds. In the current development policy programming landscape, functional areas have become units where development funds are to be directed.

4 The concept of functional area in Polish regional development policy

Contemporary understanding of functional areas is linked to the growth poles theory, which are centers distinguished by their concentration and centralization of social and economic activities. Around the growth poles, according to the theoretical concept, a functionally integrated central development zone, characterized by the advantage of centripetal forces above the centrifugal force, should be formed (Szafranek, 2015). This approach emerged from the critique of the use of the specialization and resources of all regions.

In the spatial development policy of Poland, the term „functional area" has been in use since 2011, when the Council of Ministers adopted the document „The National Spatial Development Concept 2030" (NSDC 2030) (The Ministry of Regional Development, 2012), in which the term in question was first introduced. This was the result of the application of the new paradigm of Poland's development, initiated in 2010 with the document „The National Strategy of Regional Development: Regions, Towns, Rural Areas" (NSRD) (The Ministry of Regional Development, 2010) – an attempt to apply the just mentioned paradigm of territorially targeted policy to regional policy. The assumption of those government documents is therefore to designate areas with shared geographic features (functional areas) and to direct toward them a set of integrated actions in order to take advantage of their specific potential.

The definition of a functional area formulated in the NSDC 2030 is based on the definition of „a problem area", i.e. „an area of a particular phenomena within the scope of the spatial economy or appearing spatial conflicts" indicated in the spatial development plan for the province or referred to in the study of conditions and directions for the spatial development. Due to the fact that this definition does not exhaust the concept of the functional area, the NSDC 2030 extends it and adds as follows: „a compact spatial arrangement consisting of functionally related areas characterized by common conditions and expected, uniform development objectives" (The Ministry of Regional Development, 2012, p. 178).

Since the entry into force of NSDC 2030, the Polish legislation has witnesses a number of legal changes aimed at adapting legal acts to the provisions of the document. The Act on spatial planning

and development was amended and a definition of functional area was put forward, designating it to be „an area of particular spatial economy or spatial conflict, constituting a compact spatial layout consisting of functionally related areas, characterized by common conditions and shared development objectives envisaged for them".

The functional area definitions presented above consist of two parts. The first one is a citation of the concept of a problem area and refers to phenomena and conflicts occurring in space. On the one hand, these are areas valuable for investments, in which opposing policies meet, on the other hand, these are areas of accumulation of negative social, economic, natural and technical phenomena, requiring intervention by public authorities and support for investment activities. The second part of the definition applies to the features that are determinants of a functional area. They include:

1. integrity, continuity of the spatial arrangement,
2. a system of functional links,
3. uniform geographical features (socio-economic, spatial),
4. a uniform set of potentials or problems,
5. common development goals.

The definition of a functional area can also be found in other national documents, which pay attention to other features of functional areas, such as: spatial separation, spatial cohesion, strong influence of a town zone in which numerous urbanization processes take place:

1. „a spatially separated territorial complex characterized by common geographical features (socio-economic and spatial)" (The Ministry of Regional Development, 2011).
2. „a spatially cohesive zone of a town influence characterized by the existence of functional links and advance urbanization processes, standing out from the environment and becoming similar to the main town in some respects" (The Ministry of Regional Development, 2013) .

Functional areas are, therefore, areas that combine common goals and tasks. Their determinants are not the boundaries of cities and municipalities, but rather region-specific problems. Designation of functional areas may be based on different sets of criteria of the content-related nature associated mainly with the purpose of their delimitation.

5 Typology of functional areas in Poland

In Poland, the typology of functional areas was presented in the Act on spatial planning and development and NSDC 2030. It is in the Act that functional areas are divided on the basis of their importance for spatial policy and the authorities responsible for specific areas are indicated (Table 1). Three groups of functional have been distinguished:

1. functional areas of supra-regional significance,
2. functional areas of regional significance,
3. functional areas of local significance.

Table 1 Typology of functional areas in Poland

Types of functional areas (FAs)		Method of designation
FAs of supra-regional significance (important for spatial policy of the country)	**OBLIGATORY**	– determined by the local regional government[4] – upon an ordinance, uniform criteria for the entire country
FAs of regional significance (important for spatial policy of the province)	**OPTIONAL**	– determined by the local provincial government – based on own criteria
FAs of local significance (important for spatial policy of the commune/municipality)		– determined by the local municipal government – based on own criteria

Source: Own elaboration based on the Spatial Planning and Development Act

Types of functional areas of supra-regional importance include:

1. Urban functional area of a voivodeship center.
2. Rural functional area.
3. Functional area of a particular phenomenon on a macroregional scale, including:
   - Mountain
   - Żuławy
4. Border functional area.

A functional area may cover more than one voivodeship.

However, NSDC 2030 indicates the following types of functional areas, which can be determined at various management levels (national, regional and functional) (The Ministry of Regional Development, 2012, p. 193-206):

1. Urban functional areas (provincial centers, including metropolitan ones, regional, subregional, local).
2. Rural functional areas (participating in the development processes, requiring support for development processes).
3. The functional areas of a particular phenomenon on a macroregional scale (the coastal zone, Żuławy, mountain areas, closed areas, the Polish exclusive economic zone at sea, soil protection for purposes of agricultural production, areas exposed to the risk of flooding on a scale of river basins).
4. Areas of shaping the development potential requiring programming of protective activities (environmentally valuable areas, cultural landscape protection areas, areas of protection of water resources, areas of strategic mineral deposits).
5. The functional areas requiring restructuring and development of new functions using the instruments of the competent regional policy (the areas with the lowest development level and

[4] There is a three-tiered territorial division and three levels of self-government in Poland: municipal, district and provincial. Currently in Poland there are 16 provinces (voivodeships), 314 districts (poviats), 66 cities with district status and 2478 municipalities (*gminas*). Only a part of local and regional tasks are carried out by government administration departments, which directly address the Council of Ministers, the Prime Minister or individual ministers. The core part of administrative tasks, of not-national significance, is implemented by local governments. This is done by local government bodies that are subordinate to the appropriate local (municipal, district) or regional or regional community (province) and which represent its interests.

deteriorating development perspectives, towns and other areas losing existing socio-economic functions, the areas with the lowest access to services determining development opportunities, border areas, areas with the lowest availability of transport to centers of voivodeship).

The last two types are problem areas.

While analyzing the types of functional areas specified in the NSDC 2030, it should be noted that they differ substantially in terms of their importance (application) for the practice of spatial planning. There are two main groups of these areas that can be distinguished here:

1. Areas of the planning nature, showing clear functional links for which there is an obligation, recommendation or possibility to develop a spatial plan or development plan and development strategy.
2. Areas of the diagnostic nature, which include specific functions of areas of specific spatial phenomena or where specific spatial phenomena occur.

Table 2 Types of planning and diagnostic functional areas

Functional areas of the planning nature	Areas of the diagnostic nature
– voivodeship centers, including metropolitan ones, – regional centers, – subregional centers, – mountain areas; – border areas,	– rural functional areas, – soil protection areas for agricultural purposes, – confined areas, – areas exposed to the risk of flooding in river basins, – environmentally valuable areas, – areas of protection of cultural landscapes, – areas of protection of and shaping water resources, – areas of strategic mineral deposits, – areas of the lowest development level and deteriorating development prospects, – towns and other areas losing their current socio-economic functions, – areas with the lowest level of access to goods and services conditioning development opportunities, – areas with the lowest transport accessibility to voivodeship centers.

Source: Own elaboration based on the NSDC 2030

Functional areas of the planning nature coincide with functional areas of the supra-regional importance (except for rural functional areas), which are essential for the spatial development of the country.

6 Delimitation of functional areas

Functional areas are delimited to utilize endogenous territorial potentials, promote territorial specialization and minimize conflict situations. At the same time, introduction of different types of functional areas crossing administrative boundaries of communes (the smallest statistical unit -

NTS 5)[5] is an operation for balancing the development level of the areas. Ideally, functional areas should be characterized by similar social, economic and spatial traits, which allow them to be treated as an object of public policy interventions. Their spatial extent can be determined by studying economic, social or environmental ties. Functional areas are delimited both to support increase in the regions' competitiveness, to build territorial cohesion as well as to counteract marginalization of problem areas (Haffner & Gibas, 2013).

Functional areas in Poland make for a separate planning category (The Ministry of Regional Development, 2012). Supraregional and regional areas are delimited by voivodship self-governments. The last ones - on their own initiative or at the request of local or poviat governments. Proposals and suggestions for the above-mentioned functional areas are forwarded by a voivodship self-government to obtain opinions of all local government units that would be located within such an area. Opinions of local governments are not binding for the voivodeship - they can be taken into account or not. However, the opinions should be given during a conference with representatives of all local government units, which is summoned by the self-government of the voivodship. Further spatial policy towards the functional area must be conducted in consultation with local governments.

When it comes to functional areas of the local importance, they are delimited by a commune self-government. However, the legislator does not specify, on the basis of which specific criteria it should be done. The above-mentioned general regulations apply here.

According to the regulations in force in Poland, the functional areas are delimited with the assurance of:
1. continuity and compactness of the delimited area consisting in the designation of an area enclosed by a common border,
2. availability of indicator data making it possible to delimit a total area, whose spatial extent enables to solve existing or anticipated problems and development of new functions in these areas.

The detailed conditions for delimitation of functional areas and determination of their boundaries within functional area types shall be specified by the Regulation by the Minister competent for regional development, taking into account:
1. ensuring delimitation of functional areas in a uniform way throughout the country
2. taking into account the parameters characterizing the given type of a functional area (Article 49c point 5 of the Act on spatial planning and development).

The main purpose of creation of functional areas is creation of conditions for starting and strengthening cooperation based on the use of endogenous potential of the given territory. The

[5] Communes are the basic units of spatial management in Poland. NTS - Nomenclature of Territorial Units for Statistics - classification of territorial units introduced by the Regulation of the Council of Ministers of 13th July 2000 on introducing the Nomenclature of Territorial Units for Statistics (NUTS). It corresponds to the classification of Territorial Units for Statistics (NUTS) in force in the European Union, in accordance with Regulation (EC) No 1059/2003 of the European Parliament and of the Council of 26th May 2003 (Journal of Laws no. Urz. UE L 154 of 21st. 06. 2003 as amended) NTS 4 (poviats (equivalent to a county) and cities with poviat status) and NTS 5 (communes, including municipalities with poviat status) represent local levels. (source: GUS web site http://stat.gov.pl/statystyka-regionalna/jednostki-terytorialne/nomenklatura-nts/ as of February 2, 2014)

selected and focused regional policy interventions, which should remove structural problems, may be directed to functional areas.

Functional areas are supposed to be a next institution which facilitates and extends the perspective of spatial planning: especially on the regional and supraregional scale. Indeed, there have been some restrictions on these levels, sometimes separation of economic and geographic assumptions from existing opportunities, so far.

7 Conclusion

The spatial dimension of both EU and Polish policy is part of a broader process of integrated development. This concept assumes, above all, the improvement of policy management by enhancing the co-ordination of cohesion policy with sectoral policy and complementarity of the latter with regional policy, which at national level should be regarded as coherence of development policy actors (Kokocińska, 2015).

The concept of „functional area" is linked to a new approach to development policy, namely territorially oriented policy. Integrated actions, accounting for the diversity of social, economic and territorial contexts in particular areas, gradually replace the existing sectoral approach to the undertakings. The main purpose of creation of functional areas is creation of conditions for starting and strengthening cooperation based on the use of endogenous potential of the given territory. This is intended to contribute to building a competitive advantage for specific local government units, and thereby its development and improvement of the living conditions of its inhabitants by increased access to, and enhancement of, public services The selected and focused regional policy interventions, which should remove structural problems, may be directed to functional areas.

Functional areas are supposed to be a next institution which facilitates and extends the perspective of spatial planning: especially on the regional and supraregional scale. Indeed, there have been some restrictions on these levels, sometimes separation of economic and geographic assumptions from existing opportunities, so far.

It is in Poland that the priority is currently researching the internal potentials of individual areas of voivodeships. Regional authorities should have knowledge on the internal differentiations, among others, on resources, conflicts occurring in it and development opportunities in a given time horizon, and thus knowledge about functional areas. In the context of the provisions of the Act on spatial planning and development as well as the documents, i.e, „The National Spatial Development Concept 2030" (NSDC 2030) (The Ministry of Regional Development, 2012) and „The National Strategy of Regional Development: Regions, Towns, Rural Areas" (NSRD) (The Ministry of Regional Development, 2010) development of appropriate techniques for the development of individual functional areas will allow them to properly manage and compete with other regions.

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The Disruption Economy: The Development of Personal Identification in the Digital Age

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Abstract

Digital transformation is everywhere and it is picking up pace. Any further change in today's disruption economy, however, is conditioned by further development of the personal identification systems. Digitalization namely has led to storing personal and financial information offline or online, making identification a critical issue. This paper therefore deals with the development of personal identification on the Internet. It describes the personal identification process and it also discusses the potentials of usability of the facial recognition and other innovative personal identification approaches. The review highlights that, today, most tech services recommend or require hard, cryptic passwords with characters, capital letters, and numbers in them, but there is always a trade-off between simplicity and safety. Fortunately, as this paper shows, some new innovative forms of personal identification are on their way. Particularly, biometric technology seems to be the most promising. Of course, wearable biometric-based devices will also eventually play a central role in the future, as they will allow multifactor personal identification methods as a more stable and more secure way to control data access, to be developed.

Keywords: Biometrics, Disruption Economy, Digitalization, Personal Identification, Security.

JEL Classification: L63, L81, O14, O33

1 Introduction

Digital transformation is not an option. It is everywhere and it is picking up pace. Every single economic sector or company is affected by this disruptive development, and every single economic activity, business process or model winds up being put to the test. As a result, on the one side, some industries and sectors will go extinct, as digitalisation brings with it challenges of unprecedented dimensions, and on the other side, other new business activities and sectors will arise, as new technologies can give rise to entirely new and disruptive approaches. Therefore, the successful companies of today are digitalised companies (Nambisan, 2017). These companies are stirring up global markets and overtaking even traditional 100-year-old firms with breathtaking speed. Abolhassan (2017) also states that, in today's digital age, digital transformation is essential and critical to corporate success and growth. Curley and Salmelin (2018) agree and add that the same, though at a different intensity, holds true for all industries and sectors of the economy.

Verhoef and Lemon (2013) suggest that what many successful companies have in common in today's disruption economy, is their consistent focus on customer value and the use of various innovative technologies and superior software platforms, including those for sophisticated personal identification, which enable them to attract and maintain a very large number of customers. This is

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how e.g. Airbnb became the largest hotel provider in the world without owning a single accommodation facility (Cramer & Krueger, 2016), and how Uber became a global transportation technology company without owning a single car (Guttentag, 2015; Abolhassan, 2017).

Any further change is, thus, conditioned by further development of the personal identification systems, as more and more processes and decisions are made online, and digitization has led to storing personal and financial information offline or online, making identification a critical issue. The way how people authenticate themselves when they want to access digital devices or information within them namely has not changed yet. The username and password system that was developed at Massachusetts Institute of Technology almost 50 years ago is still a foundational requirement for most substantive e-commerce transactions and other online activities. Therefore, *in today's digital age, the primary question is the personal identification within the scope of various business processes*. Where the path will lead shows e.g. the new iPhone X, which uses a facial recognition algorithm to unlock the smartphone and make it possible to use it. This algorithm is also set so that a forced unlocking of the smartphone can be recognized. This positively influences the customers feeling of security and opens up space for further development.

In light of this, this paper deals with the development of personal identification on the Internet. It describes the personal identification process and it also discusses the potentials of usability of the facial recognition and other innovative personal identification approaches. The review show that, today, most tech services recommend or require hard, cryptic passwords with characters, capital letters, and numbers in them, but there is always a trade-off between simplicity and safety. Fortunately, as this paper shows, some new innovative forms of personal identification are on their way. Particularly, biometric technology seems to be the most promising. Of course, wearable biometric-based devices will also eventually play a central role in the future, as they will allow multifactor personal identification methods as a more stable and more secure way to control data access, to be developed.

The remainder of this paper is organized as follows. Section 2 deals with the terms digitalization and personal identification process and it also provides a review of personal identification systems. Section 3 discusses the usability, future trends, and development areas or sectors in the personal identification at the time of digital disruption. Finally, Section 4 concludes this paper.

2 The development of personal identification in the digital age

Today, there are three concepts that are often lumped together under the term "identification". These concepts are: (1) *authentication* describing the way how a subject can prove that he truly is who he claims to be; (2) *personal identification* representing associating an identity with a subject; and (3) *authorisation* involving associating capabilities or rights with a subject (Garfinkel & Spafford, 2002; Gürkaynak, Yilmaz, & Taskiran, 2014; Curley & Salmelin, 2018). Despite the differences in these concepts, the term "identification" as meaning both authentication and identification will be used in the rest of this paper.

2.1 The fourth industrial revolution

Figure 1 suggests that there are more than 3.5 billion internet users worldwide with a global penetration rate of 48 percent. Wang, Wang, and Liu (2016) also state that daily internet usage

plays a significant role in the everyday lives of consumers and other economic agents in the connected world.

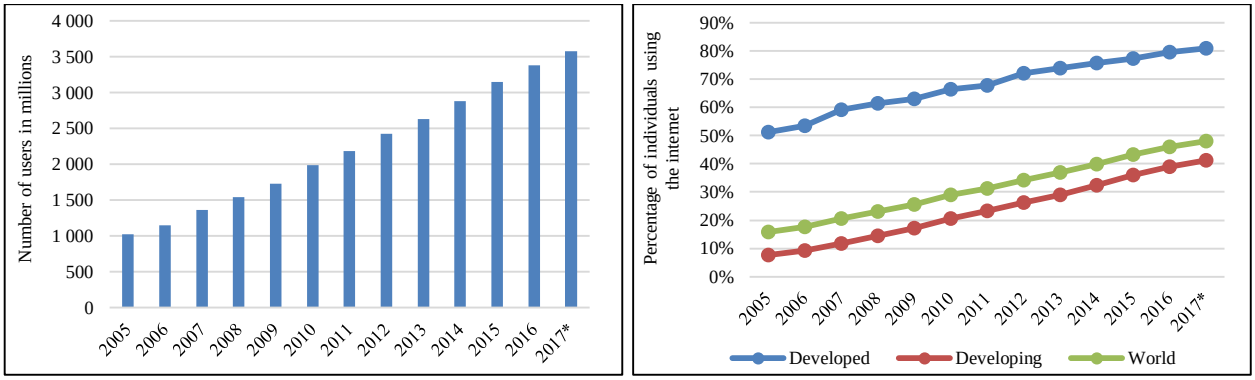


Figure 18 Number of internet users (left) and internet user penetration (right) worldwide from 2005 to 2017
Source: Statista (2017)

Since the late 1990s, the Internet and the emergences of new disruptive technologies have accelerated development of forms of human interaction and communication through online platforms. Email has been a staple of this unprecedented online experience (Abolhassan, 2017). Subsequently, the rise of social networks and mobile social apps have revolutionised the notion of online interaction and communications and the divide of the public and personal online space (Villareal, 2017).

Whereas, however, the majority of internet access was based on a fixed-line connection to traditional desktop personal computers, the growth of revolutionary mobile technologies, WiFi, laptops as well as mobile devices e.g. smartphones and tablets, have completely and radically changed the online landscape. Interestingly, in countries with weak technological infrastructures, the new mobile technologies and mobile internet has enabled people to access the web and to participate in the global information exchange. Notable examples are mobile banking and the ability to provide people with a global (online) platforms in order to broadcast their issues and to co-ordinate and support rescue efforts during times of natural disasters, unrest and crises (Labrecque, von dem Esche, Mathwick, Novack, & Hofacker, 2013; Curley & Salmelin, 2018).

In the last few decades, however, we face the digital age. *Digitization*, in general, *stands for the translation of analogue activities and processes into a machine-readable language in order to make this data available anytime, anywhere* and to let activities of communicating computers and robots be carried out.

Digitization is one of the mega-issues of today and will inevitably change society and the economy in many ways. Some of these changes are already visible and can no longer be thought away from everyday life (Nambisan, 2017). For example, new forms of communication determine the social life of people and the use of computers and the Internet have become standard in their life. Corporate value chain and customer behaviour have also changed. Facebook and other similar platforms implement business models that were unimaginable just a few years ago and are thus among the most valuable and successful companies in the world.

Therefore, according to Villareal (2016), the digitization of production along the entire value chain holds enormous potential. It significantly increases flexibility of production, efficiency, and productivity, reduces costs and increases product quality. However, it requires a trustworthy personal identification system.

Online sales via B2B and B2C e-commerce, moreover, have not only expanded the volume and reach of traditional retail and wholesale trade, but have also changed the entire business infrastructures across various industries (see e. g. Nambisan, 2017). Last but not least, the reach of online commerce has enabled small and independent companies to pursue their business activities across local borders. Figure 2 also suggests a steady growth of global digital buyer penetration and a steady growth of e-commerce share of total global retail sales from 2015 to 2021.

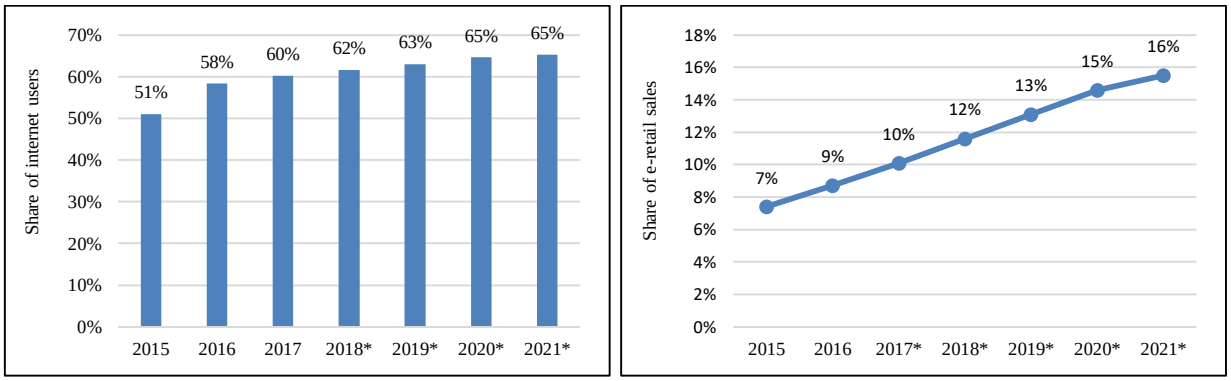


Figure 2 Digital buyer penetration worldwide (left) and e-commerce share of total global retail sales (right) from 2015 to 2021
Source: Statista (2017)

One of the results of this development, except the emergence of the big data phenomenon, is the development of new payment methods (see Figure 3), where 42 percent of online buyers worldwide said they definitely preferred to pay by credit card and 39 percent of online buyers worldwide said they preferred electronic payment methods, e. g. PayPal. This again highlights the importance of the issue of security and personal identification in the digital age.

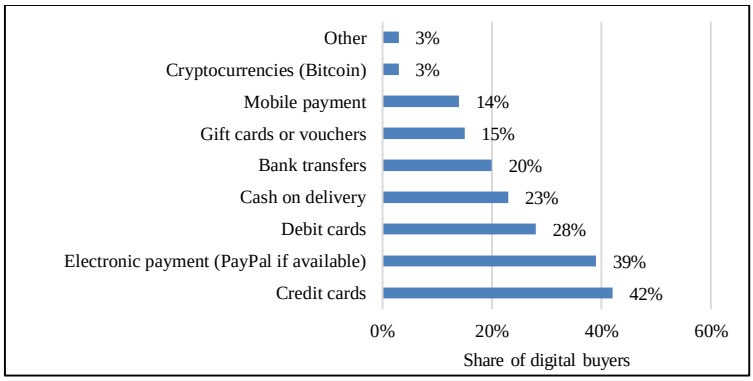


Figure 3 Preferred payment methods of digital buyers worldwide as of March 2017
Source: Statista (2017)

Of course, the changes that have already taken place are only the proverbial tip of the iceberg. In the years to come, the economy is likely to change so much in the course of digitization that it is right to speak of *the fourth industrial revolution* (Jung, Kleibrink, Köster, Lichter, & Rürup, 2016).

The challenges involved, however, must be accepted without losing the opportunities. Companies that fail to recognize the need to digitize are at risk of falling in international competition. Therefore, the digitalization process in the economy should be done on three levels: (1) process level; (2) product level; and (3) the level of business models.

Like in the case of previous industrial revolutions, sceptics and proponents are also today facing each other. The sceptics fear a mass substitution of human labour by machinery and associated rising unemployment. Proponents, on the other hand, see digitalization as an opportunity to establish new products, business models and production processes (Curley & Salmelin, 2018). Thus, it is in the political interest to quickly create suitable framework conditions for the digitalization of the economy (Moreau, 2013).

2.2 Identification process and its need

For much of human history, the way how people provide their identity was by showing up. People were born into their communities and were known in their community by their faces, their word, and their actions. In other words, there were a biometrics-based personal identification process.

Since the late 1990s, paper-based personal identification techniques have been used, e. g. driver`s licenses, passports, credit cards, and other kinds of identity cards. However, verification of photos and signatures on these documents can be relatively subjective. Moreover, documents and identity cards can be lost, stolen or copied, and one of the key items contributing to the success of paper-based identification systems is the reputation of the organization that issues these documents.

In today's digital age, the simplest digital authentication systems are based on username and passwords. Also these systems, however, have some disadvantages, as a username and/or a password can be lost, stolen or copied. Moreover, traditional paper-based systems, concern themselves with absolute identification, whereas username and password systems are concerned with relative identification (Garfinkel & Spafford, 2002). Because they are simple to use and require no special hardware, passwords continue to be the most popular authentication system used in the world today (Celko & Jánszky, 2014).

Another way that people can authenticate their identities is through the use of various token-physical objects whose possession somehow proves identity. However, tokens have similar problems than the username and password systems. In other words, token-based systems don't really authorize or identify individuals. They only authorize the token. For this reason, in high-security applications token-based systems are frequently combined with some other means of personal identification. This is often referred to as two-factor authentication (Bonneau, Herley, Van Oorschot, & Stajano, 2015).

A technique becoming more commonly used is to make various physical measurements of the person and compare the measurement with a profile that has been previously recorded, i.e. biometric. Many kinds of biometrics are possible, e. g. footprints and walking style, images of a person's face, iris, or retina, fingerprints, hand geometry, etc. Compared with passwords and access tokens, however, biometrics have clear advantages. Firstly, under normal circumstances, it is not possible to forget or lose own biometric, and secondly, biometrics can't readily be shared, copied, or stolen (Curley & Salmelin, 2018).

Digital signatures had a significant security advantage, especially for e-commerce. But, they also have a specific problems as well. For a person to prove his or her identity to someone using a digital signature, that person needs to have the public key of the identified person already on file. That is, being able to create a digital signature simply proves that the second person has possession of a private key of the identified person (Keinz, Haupt, Herberth, & Schnaderbeck, 2017). The use of digital certificates and a public key are attempts to tie absolute identity to digital signatures.

Unlike other systems, biometric techniques can be used for both relative and absolute personal identification. But all biometric techniques exhibit a certain level of false positives. Furthermore, a person's biometric "print" must be on file in the database before that person can be identified (Jain, Bolle, & Pankanti, 2006).

Biometrics in wearable form are now becoming an integral part of day-to-day life. Biometric wearable devices are probably the future of biometric technology, e-commerce and mobile commerce (Hill, 2015). Biometric wearable devices are being used to aid their users in day-to-day tasks that include payment transactions and fitness monitoring, such sophisticated devices will additionally continue to benefit the medical industry and other industries of the economy (Hillebrand, Spandl, Schäfers, Rotax, Schwieger, Peters, & Haug, 2010).

Therefore, today, sophisticated multifactor authentication is a method that can significantly improve the security for accessing an application or web site. Factors are often translated as passwords (what you know), a card or token (what you have), a biometric (something you are), and a wearable biometric-based device (where you are). The use of two or more of these factors when logging into an online platform is called multi-factor authentication (Unar, Seng, & Abbasi, 2014).

Figure 4 shows authentication methods preferred by consumers for payments as of May 2017. Is suggests that 53 respondents prefer fingerprint scanning and only 10% of respondents prefer behavioural biometrics.

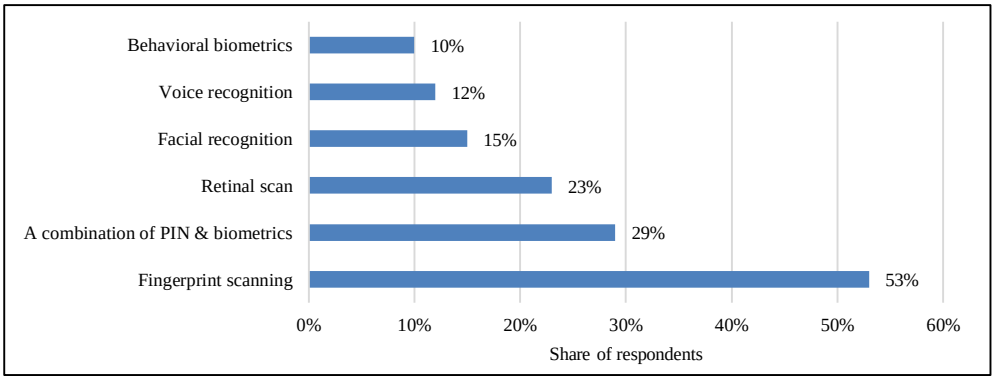
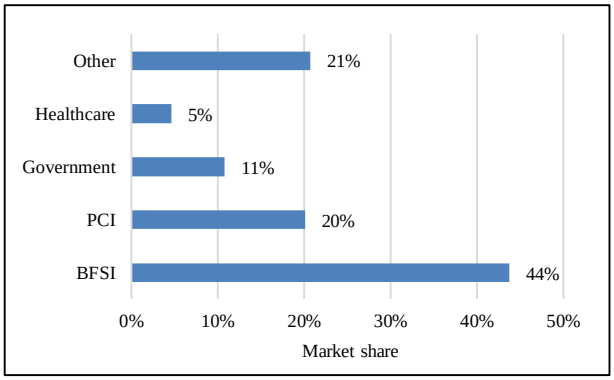


Figure 4 Authentication methods preferred by consumers for payments as of May 2017
Source: Statista (2017)

3 Segments in which the personal identification process plays a role

The disruption economy is the economy in terms of new, disruption technologies, and it is fuelled by digital companies and its employees. The disruption economy includes an array of sectors. Because of the big data phenomenon and the need to ensure that all transactions are secure, *in today's digital age, the primary question is the personal identification within the scope of various business processes and sectors of the economy*.

Figure 5 therefore shows the share of the global two-factor authentication market by end user in 2016. It suggests that personal identification is a crucial issue in Banking, Financial services and Insurance and in the Payment Card Industry. It directly relates to the term "Fintech" meaning the companies operating in the financial technology sector, mainly small start-up companies which develop innovative technological solutions in such areas as online and mobile payments, big data, alternative finance and financial management.



Notice: PCI = Payment Card Industry; BFSI = Banking, Financial services and Insurance

Figure 5 Share of the global two-factor authentication market by end user in 2016

Source: Statista (2017)

The reason of this also is the fact that the mobile phone becomes the most important channel for the customer approach. It will serve as a crucial, intelligent shopping assistant in the future. The goal must be, on the one hand, to enable customers to interact seamlessly with all channels via the mobile phone and, on the other hand, to collect data about the customers via all channels so that they can be addressed in a personalized way. Therefore, QR code shopping in public places, mobile shops, virtual shops, curated pop-up shops with limited edition products, shopping via digital glasses, shopping as an interactive high-tech experience, combination of stationary retail and e-commerce, and other disruptive shopping opportunities have to be based on a secure, but easy-to-use personal identification system (Lebrecque et al., 2013).

In other industries where a test is needed, there may be a multifactor authentication system needed when the tests are conducted online. Logistics can be another good example. Moreover, with many QR codes at many airports, the simple identification systems are insufficient even if face recognition is already running in the background. It may be similar in the area of the rail transportation industry. Trading would also be affected (Châlons & Dufft, 2016).

Sophisticated multifactor authentication systems play also an increasingly important role in the public sector, as they can prevent abuse of the social system, or encourage voter participation in elections. Because the convergence of technology and medicine has pushed healthcare to the brink of a major disruption that the pharmacy industry has, until recently, been slow to recognize, multifactor authentication systems are also increasingly important in digital healthcare. The next

relevant industries are e-learning and digital education, air transportation industry, and as a tool for identification of employees in the workplace, etc. (Shoval & Isaacson, 2007; Bennett, 2008; Helmrich, 2017).

4 Conclusion

The digital age has an unstoppable impact on processes throughout the economy. With disruption, however, comes the opportunity for eruption - the closing of one door and the innovative opening of another. „Information technology […] has [thus] become an essential element of firm capability and a source of sustainable competitive advantage." (Lin, 2007, p. 93) It's therefore critical to have control over access to our data, systems and premises. Today, however, the username and password authentication process and the paper-based system are still a foundational requirement for most substantive online transactions and activities. But passwords and identification cards are easily lost, stolen or copied. Biometric technology seems to be the most promising. It uses a unique physical trait to recognize legitimate or registered subject. Of course, wearable biometric-based devices will also eventually play a central role in the future, as they will allow multifactor personal identification methods as a more stable and more secure way to control data access, to be developed.

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Factors affecting customers' attitudes towards purchasing products online

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Abstract

The e-commerce became the regular way of conducting business and there is a massive adoption of purchasing products online. As changing potential sellers is easier than ever in the online environment, companies should optimize their website based on the customers' preferences in order to provide them with the experience that will drive the growth in purchases and generated profit. The main objective of this paper is to determine factors that affect the consumers' willingness to purchase product from an online store in the condition of Slovak market. We administered a survey questionnaire among 232 university students in order to make them evaluate the criteria they tend to when purchasing online. Afterwards, we conducted principal components analysis in order to reduce the number of these criteria and create meaningful factors (components). Although we needed to exclude several variables from analysis, we were able to extract 7 components that explains almost 80% of the variance in the data: the factor of price, availability, social proof, scarcity, product details, conditions and social media activity. In order to extract components, we used varimax rotation to remove ambiguity in results. We believe that extracted factors will help companies and marketing agencies optimize e-commerce stores to make them more favorable for their visitors. Although several variables were removed from analysis, we still consider them to be important and the future research should focus on gathering more data in order to assign them to factors more precisely.

Keywords: E-commerce, Online shop, Website optimization, Factor analysis, Principal components analysis.

JEL Classification: M31

1 Introduction

The development of the Internet and its unlimited worldwide impact were the basis to outreach the entrepreneurship to the new spheres. Electronic commerce (abbreviated e-commerce) allowed companies to sell without the necessity to set up brick-and-mortar stores. Moreover, the way of doing international trade has changed, too (Freeme & Gumede, 2012). E-commerce became the regular way of conducting business (Downing & Liu, 2014) while significantly contributes to the economic growth (Dumitriu, Voicu, & Dumitrescu, 2013). In the growing competition of online stores, it is inevitable to monitor factors that affect potential customers during their buying journey. By not doing so, companies put themselves to the risk of losing their customers in favor of their competitors. This paper provides the overview of customers' perception towards selected factors during online shopping. The contribution lies in the use of gathered knowledge by entrepreneurs

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(companies), as well as agencies focused on developing websites and online stores. While companies can take advantage of these information to optimize the running store, web agencies can take advantage of these information as a guideline during the development of new e-shops. Agencies can also use the information to build a selling strategy for their clients.

E-commerce is a form of business which is conducted in the online environment while the Internet behaves as an unified platform that connects buyers and sellers (Tan, 2013). Ullman (2013) consider e-commerce to the range of possible commercial transactions conducted online. Each website that is able to generate income (or its intention is to generate income) can be included in this category. Qin (2010) defines electronic commerce as social and economic activities between participants, while computer devices and the Internet is used. However, with the rapid development and penetration of mobile devices, this definition can be considered as outdated. Minculete (2013) states that e-commerce and e-business should give up the letter 'e' because the use of e-commerce technologies is on its rise and they became the regular part of marketing initiatives.

The core instrument used in e-commerce is undisputedly electronic shop (abbreviated e-shop). E-shop is a store operated in the environment of the Internet (Beyon-Davies, 2012). Currently, it is possible to develop the e-shop by using free platforms (such as WooCommerce) that can be implemented into content management systems (Beleščák, 2014). Pilík (2014) states that in Czech republic alone, there is an increase of 800 new e-shops every year. As was mentioned in the beginning of the paper, e-commerce has its benefits for small- and medium-sized enterprises. MacGregor and Vrazalic (2007) claim that these benefits are not noticeable in time of e-commerce implementation in companies but companies will start to notice them later. Trading via modern technologies allows a quick response to the emerging trends in purchased products. Thanks to this possibility, even small- and medium-sized companies are able to be more flexible and it gives them the competitive advantage over big corporations (Cantú et al, 2014). Seer, Berács and Pop (2012) discuss that use of e-commerce is important especially in companies located in developed and emerging countries.

While analyzing the current state of discussed issue, the analysis of already published research in the area is critical. Pilík (2013) conducted a questionnaire survey among 706 pseudo-randomly chosen respondents. The survey was conducted between June and September 2012, while the main purpose of the survey was to determine factors affecting online purchase. The results of the survey proved that 87.5 % of respondents used the Internet for product purchasing, while 32.7 % of respondents use the Internet to purchase products regularly. Based on this research, age and the Internet literacy affects the purchase in the most significant way. There was found a negative dependence between online purchase and the Internet literacy. The majority of respondents were mostly afraid of product testing, claims, problems with product returns and delivery of the wrong product.

The research conducted by Masínová and Svandová (2014) was conducted on the sample of 167 respondents. The results shown that product description, solving the claims, product photos, payment options and time to response are among factors that affects customers' satisfaction in the major way. These factors happened to be important especially for the Internet users purchasing clothing. Moreover, Bucko and Vejačka (2011) discuss that one of the factors affecting the purchasing online is trust and security of the environment and connected identification of users (or communicating parties). In their research, Vilčeková and Sabo (2014) analyzed the sample of 1,067

respondents, while research was conducted between January and April 2013. Based on the results of the survey, the factor analysis was conducted. As a result, 6 factors describing the relationship towards the country of origin of purchased product. Based on the research results, it was found that country of origin matters more to the older respondents compared to younger ones. The topic of factors influencing online shopping can be also found in papers by Novotný and Duspiva (2014), Štefko, Dorčák and Pollák (2011) and Bačík, Szabo and Fedorko (2014).

2 Sample, methods and procedures

The main objective of this paper is to determine factors that affect the consumers' willingness to purchase product from an online store in the condition of Slovak market. Our goal was to eliminate the number of criteria affecting the online purchase and create new latent variables (factors) that could gather summarized information within.

In order to achieve our objective, the survey questionnaire was conducted. The general sample consisted of all Internet users located in Slovak republic. For the purpose of our study, the sample was not selected randomly – we selected the sample purposely. As we consider Generation Y (born between 1980 – 1995) to be the major group of Internet users with purchasing potential, our focus was aimed to this particular group. As we were looking for a group of people with the higher level of the Internet literacy (as we wanted to avoid the entropy in terms of theory of marketing communication), we selected university students to be appropriate subjects for our study.

The survey was administered in February and March 2015, and in December 2015 via questionnaire consisting of 17 items. We focused on responses provided to one particular item: '*How important are the following criteria for you during the online purchase?*' The evaluated criteria was as follows: price of the product, shipping, discounts and special offers during the purchase, price comparison with brick-and-mortar store, payment method, delivery time, reviews about product, reviews about seller, limited product quantity, time-limited offers, free shipping, security certificate, product details, product photos, website graphics, easy-to-use navigation, customer service before the purchase, position in search engine results page, mobile optimization of the website, ease of accessibility of terms and conditions, ease of accessibility of shipping conditions, website activity, social media activity, number of followers on social media, seller's country of origin. Respondents selected their answers from the modal options in the interval from 1 = very important to 5 = not important at all. Criteria (or options, factors) were selected based on the previous researches.

In order to achieve the objective set in the beginning of this part of the paper, the exploratory factor analysis will be used to analyze the data gathered from the survey. The main purpose of factor analysis is to evaluate the structure of mutual relationships among variables. Subsequently, it is important to find out if there is a possibility of splitting variables into groups while correlations within the group would be significant and at the same time, correlations between groups wouldn't be significant. By applying factor analysis, new variables called factors are created from the original variables (Stankovičová & Vojtková, 2007).

Basic assumption for use of factor analysis is the existence of sufficient correlations among data in the data matrix. To analyze this correlations, it is possible to use various tests:

- **Bartlett sphericity test:** null hypothesis assumes the correlation matrix to be an identity matrix.

- **Kaiser-Mayer-Olkin test (KMO):** compares sizes of experimental correlation coefficients to sizes of partial correlation coefficients. It is highly recommended that KMO value is higher than 0.5 (Meloun et al., 2012).
- **MSA:** provides the level of degree of inner correlations between original tokens and expresses how they are predicted by other tokens. It is recommended to not conduct factor analysis when MSA is lower than 0.5 (Coussement et al., 2011).

If the assumption is met, the next step is to estimate parameters of the factor model. In this phase, principal components analysis will be used. It is a statistical method that uses orthogonal transformation to convert the set of correlated observations into set of observations with no correlations among them. If k is the number of principal components and n is number of variables, then $k \leq m$ (Wu, 2016). The next step is the determination of common factors. As Kráľ et al. (2009) and Meloun et al. (2012) explains, the number of common factors should be based on certain criteria. We will use the principle of Eigenvalues (factors with Eigenvalues higher than 1 are considered to be significant) and criterion of explained variance (selected factors should explain as high proportion of total variability as possible).

When number of factors is determined, we can compute the factor saturations. During this computations, the situation connected to ambiguity of the results might happen – one variable can correlate with more factors. In order to maximize differences between factors, the rotation is used. Thanks to the rotations, factor loadings (correlations between variable and factor) get into the shape that allows more exact and easier explanation. We distinguish between orthogonal rotation (e. g. varimax, equamax, quartimax) and oblique (e. g. oblimin, promax) (Ronco & De Stéfani, 2012). In our analysis, both orthogonal and oblique rotation will be used in order to find the best possible explanation of factors.

3 Results and discussion

232 respondents joined the survey, however, we analyzed only 221 cases after the removal of missing and extreme values. The average age of the respondents was 21.72 years (in the interval between 18 do 26 years) and median of age was 21 years. The sample consisted of students attending study at Faculty of Management, University of Prešov in Prešov (78), Faculty of Public Administration, Pavol Jozef Šafárik University in Košice (88), and Faculty of Arts, Pavol Jozef Šafárik University in Košice (55). 24.89 % of the respondents stated their gender was male, 75.11 % of respondents stated their gender was female.

Table 1 describes the descriptive statistics (mean, median, standard deviation) of the criteria we measured in the survey. It is possible to see that price of the product is the most important criterion when purchasing goods online. Discounts, price comparison with brick-and-mortar stores, payment method, delivery time, and reviews about the product, product description and pictures can be also considered to be among the most important evaluation criteria when conducting such a purchase. In Table 1, it is also possible to see that criteria such as number of social media followers, social media activity, website activity, mobile optimization, search engine positions, and limited quantity of the product are considered to be of less importance for the participants of our survey. However, the descriptive results of this survey are not the primary purpose of this study, so we are not going to dive deeper into these results.

Table 1 Criteria of online purchase (characteristics)

Criterion	Mean	Median	Standard deviation
Price of the product	1.34	1.00	0.564
Shipping	2.05	2.00	1.048
Discounts and special offers during the purchase	1.93	2.00	0.941
Price comparison with brick-and-mortar store	1.80	2.00	0.919
Payment method	1.91	2.00	1.065
Delivery time	1.81	2.00	0.933
Reviews about the product	1.90	2.00	0.907
Reviews about the seller	2.06	2.00	0.968
Limited quantity of the product	3.07	3.00	1.138
Time-limited offer	2.99	3.00	1.183
Free shipping	2.08	2.00	1.188
Security certificate	2.57	2.00	1.247
Product details	1.98	2.00	0.988
Product photos	1.59	1.00	0.988
Website graphics	2.67	2.00	1.154
Easy-to-use navigation	2.22	2.00	1.095
Customer service before the purchase	2.07	2.00	1.020
Position in search engine's results	3.11	3.00	1.186
Mobile optimization of the website	3.36	3.00	1.216
Accessible terms and conditions	2.47	2.00	1.178
Accessible shipping conditions	2.36	2.00	1.142
Website activity	3.08	3.00	1.177
Social media activity	3.08	3.00	1.137
Number of social media followers	3.46	4.00	1.189
Seller's country of origin	2.45	2.00	1.281

Source: Own processing

As a first step in our analysis, we need to determine if use of factor analysis is the suitable method to analyze our data matrix. In the beginning, we created correlation matrix which showcased many small and moderate correlations between variables. It is a sign that data might be suitable for the analysis, however, we have to confirm it by using abovementioned Bartlett's sphericity test and KMO test.

As was mentioned, Bartlett's sphericity test tests tries to accept or reject the following null hypothesis:

H_0: The correlation matrix is an identity matrix.
H_A: The correlation matrix is not an identity matrix.

With p-value of $2.2e^{-16}$, we can reject the null hypothesis on the significance level $\alpha = 0.05$. The correlation matrix is not an identity matrix. Kaiser-Mayer-Olkin test with overall MSA value of 0.79 means that factor analysis is suitable for our data.

Before principal components analysis was conducted, we needed to decide how many factors will serve as an outcome of the analysis. Based on Eigenvalues higher than 1.0, we selected 8 factors to become the outcome of the initial analysis. As factor saturations were not clear enough, we used orthogonal method varimax to rotate the factors. The results of the analysis shown that two

variables (position in search engine results, country of seller's origin) had lower communality (h^2) than recommended value 0.5. We decided to remove these variables and repeat the procedure. When the procedure was repeated, we found another variable (customer service before the purchase) to has lower communality than 0.5. Moreover, we found that factor loadings for other 7 variables (price comparison in brick-and-mortar store, free shipping, safety certificate, website graphics, easy-to-use navigation, optimization of website for mobile devices and website activity) were not clear and variables correlated with more than one factor. We decided to remove all these variables from analysis and repeat the procedure one more time.

We again performed Bartlett's sphericity test and KMO test to determine if the data are still suitable for factor analysis despite many variables were removed. We were able to reject null hypothesis in Bartlett's sphericity test with the p-value of $2.2e^{-16}$. Overall MSA in KMO test was still above 0.5 at the level of 0.64. These two test proved we can continue in our analysis. To determine how many factors will be used, we conducted initial principal components analysis and analyzed Eigenvalues and explained variance. Figure 1 displays scree plot with Eigenvalues.

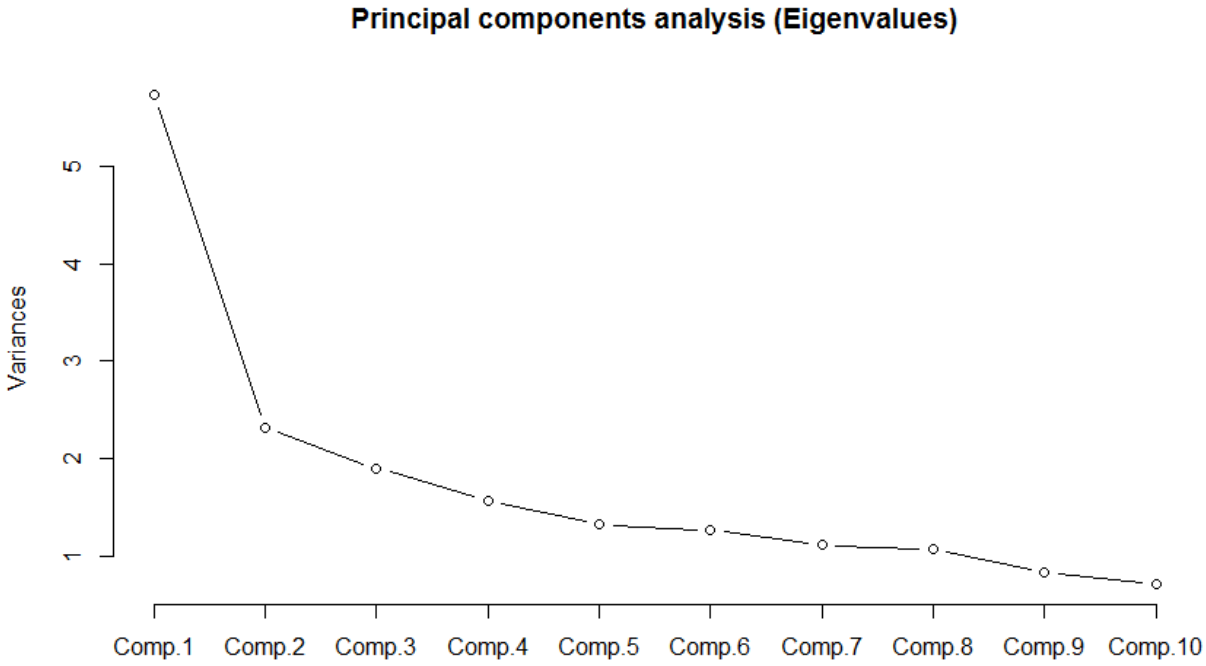

Figure 1 Scree plot (Eigenvalues)
Source: Own processing in R

Based on the Eigenvalues, we found 7 factors will be sufficient number of factors for our analysis. This number of factors explained 79.71% of variance in the data. As non-rotated solution was not sufficient – the results were not clear, we decided to try varimax, equamax and quartimax rotation. We did not try olique rotation as we didn't want factors to correlate between each other. All rotation types provided us with almost similar results. We decided to stick to varimax. Table 2 displays generated rotated components (RC) and factor loadings.

Table 2 Principal components analysis

Variable	RC1	RC2	RC3	RC5	RC4	RC7	RC6	h2
Price of the product	-0.02	**0.85**	-0.04	-0.11	0.03	0.02	0.02	0.73
Shipping	-0.01	**0.74**	0.00	0.09	-0.08	0.10	0.32	0.67
Discounts and special offers	0.10	**0.74**	0.11	0.25	0.18	-0.04	-0.05	0.67
Payment method	0.02	0.20	0.01	0.09	0.04	0.14	**0.80**	0.71
Delivery time	0.15	0.01	0.18	0.11	0.14	-0.02	**0.77**	0.68
Reviews about the product	0.04	0.05	**0.91**	-0.03	0.08	0.10	0.11	0.87
Reviews about the seller	0.04	-0.02	**0.90**	0.08	0.08	0.15	0.00	0.86
Limited quantity of the product	0.04	0.01	0.09	0.10	**0.91**	0.00	0.04	0.84
Time-limited offer	0.09	0.07	0.08	0.14	**0.87**	0.15	0.08	0.83
Product details	0.20	-0.02	0.20	0.18	0.04	**0.81**	0.01	0.76
Product photos	0.10	0.07	0.12	0.00	0.13	**0.87**	0.09	0.81
Accessible terms and conditions	**0.94**	0.01	0.04	0.15	0.04	0.10	0.00	0.92
Accessible shipping conditions	**0.95**	0.02	0.03	0.10	0.07	0.10	0.09	0.93
Social media activity	0.24	0.02	0.01	**0.86**	0.08	0.10	0.08	0.82
Number of social media followers	0.08	0.06	0.04	**0.90**	0.17	0.04	0.06	0.85

Source: Own processing

Based on the table above, it is possible to define components (factors) as follows:

- **RC1 – The factor of price:** this factor merges variables that affects the price of the purchase`
- **RC2 – The factor of availability:** this factor covers variables associated with ease of the ordering process itself;
- **RC3 – The factor of social proof:** this factor covers people's urge to confirm the product they are going to purchase is good;
- **RC4 – The factor of scarcity:** this factor merges variables that affects the speed of people's choice. Together with social proof, scarcity is among Robert Cialdini's (2006) Weapons of Influence;
- **RC5 – The factor of product details:** this factor merges variables connected to the presentation of the product;
- **RC6 – The factor of conditions:** this factor merges variables associated with easiness to access various conditions;
- **RC7 – The factor of social media activity:** this factor merges variables connected to store's activity on social media.

Table 3 Principal components analysis

	RC1	RC2	RC3	RC5	RC4	RC7	RC6
SS loadings	1.94	1.87	1.77	1.75	1.72	1.52	1.38
Proportion Variance	0.13	0.12	0.12	0.12	0.11	0.10	0.09
Cumulative Variance	0.13	0.25	0.37	0.49	0.60	0.70	0.80
Proportion Explained	0.16	0.16	0.15	0.15	0.14	0.13	0.12
Cumulative Proportion	0.16	0.32	0.47	0.61	0.76	0.88	1.00

Source: Own processing

Table 3 showcase that rotated component 1 explains the highest proportion of variance in the whole reduced dataset (13 %) and 16 % of variance among all components – perhaps because it consists of 3 variables and rest of the components includes only 2 variables. On the contrary, rotated component 6 explains only 9 % of the proportion variance for the whole data set and 12 % of the variation among factors.

4 Conclusion

As online shopping became the regular part of people's lives, optimization of e-commerce stores is crucial in order to provide the experience expected by website visitors (potential customers). The positive experience might result in higher revenues, the negative one might result in permanent loss of customers. The main objective of this paper was to determine factors that affect the consumers' willingness to purchase product from an online store in the condition of Slovak market. Based on the theoretical background, we conducted survey questionnaire among university students and afterwards analyzed the perception of selected criteria by users when purchasing products online. When conducting factor analysis, we initially needed to reduce the size of analyzed data matrix because of low communality or ambiguity in results of principal component analysis. Afterwards, we were able to extract six rotated components explaining almost 80% of variance in the data – the factors of price, availability, social proof, scarcity, product details, conditions and social media activity. The factor of price explained the largest part of variance in the data. We assume the price is especially important for university students, as in majority of cases, they are not employed and thus, their financial budget is limited. Although several variables were removed from analysis, we still consider them to be important criteria when purchasing products online and should not be overlooked when optimizing e-commerce store. The area of future research should focused on collecting more data in which it might be possible to find more clear patterns and assign these variables into factors. The limitation of this study might lie in the size and structure that was available for analysis, the data collection term (as customers' perceptions and attitudes change quickly in this dynamic environment), and the methods of factor analysis and rotation used to conduct this analysis.

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Fiscal Rules and the Cyclicality of Fiscal Policy

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Abstract

Fiscal rules play an important role in supporting fiscal sustainability, responsibility and credibility, nevertheless, they might be accompanied with boosting pro-cyclical pressures on fiscal policy. Therefore we analyse how the fiscal rules contribute to cyclical behaviour of fiscal policy which is represented by government expenditures. We estimate dynamic panel model using data of EU 28 countries with fiscal rule index as interaction variable. Due to the heterogeneity of government expenditure we also analyse the cyclicality of government expenditure components. The cyclicality of total government expenditure is not significantly affected by the presence of fiscal rules, however, the same is not true for the cyclicality of government consumption and investment. More specifically as the fiscal rule index increases, government consumption and investment behave more counter-cyclically. The fiscal rule index threshold where pro-cyclicality changes to counter-cyclicality was identified to be 1.812 for investment and 2.242 for consumption.

Keywords: Fiscal rules, Fiscal rule index, Fiscal policy cyclicality, Generalized method of moments.

JEL Classification: E62, H50

1 Introduction

Strengthening the importance of fiscal rules became an important task for fiscal policies after the crisis in 2008. Growing interest in fiscal rules in literature stems from gradual increase in their numbers as well as this reflects their important role in conducting fiscal policy what might have significant implications for understanding of fiscal cyclicality. Although the primary objective of fiscal rules is to promote budgetary discipline, considerable attention is paid to their impact on the cyclicality of fiscal policies. The ability of fiscal rules to improve budgetary discipline is well supported by empirical literature. However, the same is not true when it comes to assessing the impact of fiscal rules on fiscal cyclicality (Fatás et al., 2006). On the one hand Nerlich et al. (2015) or Alberola et al. (2016) find that the presence of fiscal rules dampens a pro-cyclical response of fiscal policy in OECD or EU countries. On the other hand Fatás et al. (2006) argue fiscal rules deepen pro-cyclicality of fiscal policy. Even though fiscal rules in the form of determinant of fiscal cyclicality is not supported by economic theory, the practical significance is certainly justified.

In the following section we will estimate dynamic panel model (fiscal reaction function) in order to assess fiscal cyclicality. Empirical literature is not consistent in selecting the cyclicality indicator of fiscal policy. Our indicator of fiscal cyclicality is government spending. This decision is in line with the recommendation of Kaminsky et al. (2004). Traditional indicators such as fiscal balance

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or government spending and revenues in ratio to GDP are on the one hand affected by policy makers but on the other hand, they are also affected by economic fluctuations. Moreover, Fatás et al. (2006) advocate the use of government spending to assess the impact of fiscal rules. They argue that proving the possible impact of fiscal rules on expenditure behaviour is more challenging and policy relevant than demonstrating the same impact on the budget on which fiscal rules are in many cases applied. However, Lane (2003) pointed out that cyclical behaviour of government expenditures is affected by heterogeneity between expenditure components. For example we cannot expect that reaction of transfers to output movements is similar to expenditure components without automatic stabilizer property. Therefore it is appropriate to analyse the cyclicality of particular government expenditure component. We closely analyse the cyclicality of government consumption expenditure, investment, social benefits which represent transfers as well as interest payments.

Yet another unresolved problem arising in the empirical literature is the lack of consensus regarding the choice of control variables for the fiscal reaction function. Therefore, when specifying a model and selecting variables, we follow common practice. The aim of the paper is to detect the interconnection between cyclical movements of expenditures and fiscal rules within our dynamic panel model taking into account aforementioned facts.

2 Methodology

In this section we assess the cyclicality of fiscal policy using the methods for the analysis of panel data. The advantage of these methods compared to the methods for the analysis of times series stems from improved efficiency which is the results of larger data sample (Baltagi (2008)). Moreover, it allows us to include additional control variables that refine the estimates of cyclical behaviour of fiscal policy. The effect of fiscal rules is analysed by the following relationship

$$G_{i,t} = \alpha_i + \mu_t + \gamma G_{i,t-1} + \beta Y_{i,t} + \lambda (Y_{i,t} \times \mathrm{FRI}_{i,t}) + \theta \mathrm{X}_{i,t} + \varepsilon_{i,t} \qquad (1)$$

where $G_{i,t}$ represents total government expenditure or specific component of government expenditure (expressed as a rate of growth), $Y_{i,t}$ is an indicator of economic cycle (growth rate of GDP), $\mathrm{X}_{i,t}$ includes all control variables, $\varepsilon_{i,t}$ is disturbance, μ_t are time effects and α_i are fixed effects. Variable $\mathrm{FRI}_{i,t}$ is the fiscal rule index created by European commission. The fiscal rule index is a comprehensive score, a summary indicator of the fiscal rules strength which is constructed for every EU 28 country as well as year. The fiscal rule index is based on fiscal rule strength indices for each fiscal rule. The fiscal rule strength index is based on 5 criteria: legal base, binding character, monitoring and enforcement bodies, correction mechanisms, and resilience to shocks. The idea standing behind the decision to use the fiscal rule index is the fact that the fiscal rule itself is not sufficient to ensure budgetary responsibility without legislation incorporation or with the competence of government to easily modify fiscal rule. The fiscal rule strength index credibly indicates whether the government's commitment to budgetary responsibility is trustworthy and serious. We expect that the positive changes in the strength of fiscal rule will force the government to re-evaluate the expenses due to changes in output. Index $i = 1, \ldots, \mathrm{N}$ denotes countries and $t = 1, \ldots, \mathrm{T}$ denotes time period.

In order to reduce potential omitted variable bias additional control variables enter the model. First of all we include variable debt to GDP ratio which provides an information on government's intention to stabilize public finances (Bohn, 1998; Golinelli et al., 2007) emphasize that the interpretation of the results should be cautious if given variable is missing in the model. Another control variable is inflation. According to Persson (1997) the omission of inflation causes the bias of cyclicality parameter. Even though Persson (1997) pointed to the relationship between cyclicality indicator and fiscal balance, we expect that the problem of bias concerns government spending as well. Alternatively we can mention argumentation of Fatás et al. (2003). The inclusion of inflation ensures that the co-movement between government spending and output is not affected by monetary instability in times of high inflation but rather by fiscal policy. The purpose of the last control variable, terms of trade, is to take into account the effect of external shocks on fiscal cyclicality. All these variables are frequently used in empirical studies of fiscal cyclicality (Égert, 2010; Lledo et al., 2009)

Cyclicality of fiscal policy is expressed by the coefficient β which corresponds to variable representing economic cycle. Interpretation of the coefficient is following: if $\beta > 0$ ($\beta < 0$), then fiscal policy is pro-cyclical (counter-cyclical). Fiscal policy is a-cyclical if $\beta = 0$. Individual effects included in specification (1) should take into account the heterogeneity between countries. Common shocks between countries, and hence the problem of cross-sectional dependence is addressed by the inclusion of time effects. In addition we include lagged dependent variable which absorbs the inertia in government expenditure. Lagged dependent variable is not relevant from a theoretical point of view, however, the inclusion of this variable is a common practice in related studies.

Specification (1) involves the interaction between GDP growth and the fiscal rule index. The interaction allows us to analyse the effect of index of fiscal rule to cyclical behaviour of government expenditure and particular components. We calculate the changes in cyclical behaviour as

$$\frac{\partial E\left[G_{i,t} \middle| G_{i,t-1}, Y_{i,t}, \mathrm{FRI}_{i,t}, \mathrm{X}_{i,t} \right]}{\partial Y_{i,t}} = \beta + \lambda \, \mathrm{FRI}_{i,t} = \omega \qquad (2)$$

It follows that cyclicality is not constant, on the contrary, it might alter due to changes in the fiscal rule index. Assuming negative value of parameter λ the marginal effect of higher output on government expenditure gradually decreases with higher value of the fiscal rule index. In other words, fiscal policy is more pro-cyclical (counter-cyclical) with the increasing strength of fiscal rule if parameter λ is positive (negative).

In line with the recommendation of authors Judson et al. (1999) we prefer GMM type estimator to estimate equation (1). More specifically we apply the two-step system GMM estimator which uses lags of differenced regressors as instruments in equation defined in levels. Due to relatively high T the problem with proliferation might appear with serious negative consequences (Roodman, 2006). Therefore it is recommended to reduce the number of lags of endogenous variables used as instruments or to use collapsed matrix of instruments. In our case we use both options, we restrict the number of instruments to not be higher than the number of countries (rule of thumb: Roodman, 2006). The lag restriction for lagged dependent variable is 1-2 and 2-3 for economic cycle indicator (the same approach used Golinelli et al., 2007). The same authors also recommend to use time

effects which to some extent decrease cross-sectional dependence of error term. Cross-sectional independence is assumed by Arellano-Bond (A-B) test of autocorrelation, it is also required by robust estimation of standard errors of coefficients. Cross-sectional dependence is a common problem of macroeconomic data, hence the inclusion of time effects is essential. Last but not least the time effects help to decrease omitted variable bias (Golinelli et al., 2007).

The estimation of equation (1) is based on two-step system GMM estimator which is robust to heteroskedasticity and autocorrelation. Since the estimated standard errors are downward biased we avoid this problem using Windmeier correction. To obtain correct GMM estimates, exogeneity of instruments is necessary. In addition to A-B test we apply Hansen test of validity of instruments which is robust to heteroskedasticity. The power of the test can be weakened in the case of excessively high number of instruments. For this reason it is required to restrict the number of instruments and monitor whether p-values are approaching 1 (Roodman, 2006).

3 Data

The estimation of the model (1) is based on annual unbalanced data of EU 28 countries in 1996-2015. The reason standing behind the decision to use annual data is unavailability of some control variables (for example the fiscal rule index) on quarterly basis. Annual data is also preferred choice in similar empirical studies. Moreover, it also simplifies the comparability of the results with other cyclicality studies.

We analyze the cyclical stance of fiscal policy on variable government expenditure. Real government expenditure and real GDP are in the form of logarithm, subsequently we apply difference transformation which is standard adjustment of given variables in studies of cyclicality (Lane, 2003; Lledo et al., 2009; Guerguil et al., 2017). Annual data of nominal GDP, government expenditure and deflator GDP was drawn from AMECO database. Nominal GDP, government expenditure or expenditure components were deflated by GDP deflator. Remaining control variables such as debt to (nominal) GDP ratio, inflation (growth rate of index of consumer prices) and growth in terms of trade were constructed using AMECO database.

4 Results

Figure 1 contains the results of estimated equation (1). The results in column (1) and (2) do not confirm the statistically significant effect of fiscal rules on cyclicality of total government expenditure. Moreover total government expenditure is a-cyclical due to the insignificant coefficient which corresponds to GDP growth. The coefficient for lagged debt to GDP ratio is negative and statistically significant which indicates that EU 28 countries conduct fiscal policy that stabilizes public finance. Similar result for government expenditures estimated Culha (2016) for developed countries or Turrini (2008) for original euro area countries. The remaining control variables appear to be statistically insignificant in this case.

Heterogeneity which is present in government expenditures is a reason to analyse selected expenditure components. It might be the case that fiscal rules interacted with GDP affects particular component differently. Indeed, the results confirm our expectations. Although the effect of fiscal rules is insignificant in the case of total government expenditure the same is not true for all expenditure components.

Government consumption expenditure is significantly pro-cyclical in column (3) without control variables. The effect of fiscal rules is negative but statistically insignificant. The inclusion of control variables in column (4) increases pro-cyclical response of government consumption compared to situation in column (3). However, the presence of stronger fiscal rules in terms of the factors which determine the fiscal rule index dampens pro-cyclical character of consumption expenditures (negative and statistically significant coefficient). Government investment in column (5) is similarly as consumption expenditure significantly pro-cyclical item. Cyclicality coefficient is even more than twice as large as in the case of consumption. The result is not unusual in similar empirical studies (Égert, 2012; Lane, 2003). Regarding the effects of fiscal rules on cyclicality we can say that increase in the quantity and quality of fiscal rules decreases extremely high pro-cyclicality of investment. The results in column (6) are robust after we include control variables. Pro-cyclical reaction is slightly higher, however, the impact of fiscal rules is more effective in fighting pro-cyclicality. Social benefits seem to be a-cyclical expenditure item (column (7) and (8)). The sign of cyclicality coefficient β is as expected negative which implies that higher output growth decreases social benefits but the coefficient is not statistically significant. Fiscal rules do not significantly affect cyclical response of social benefits as well. The last analysed component, interest payments, behave a-cyclically, moreover, fiscal rules have no effect. A-cyclicality of interest payments is quite common in related studies (Ilzetzki, 2008).

Regarding the diagnostic of the model the Hansen test of over identifying restrictions confirms the validity of instruments for total government expenditure, consumption and investment but not for social benefits and interest payments. In terms of the A-B test, the instruments used are valid because the test does not indicate the presence of autocorrelation of second order in residuals. The existence of first order autocorrelation is expected because the A-B test is applied to residuals in first differences, which are mathematically related.

Estimator	System GMM									
Dependent variable	Government expenditure		Consumption		Investment		Social benefits		Interest	
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*
Dependent variable (t-1)	-0.087 (0.055)	-0.070 (0.064)	0.146 (0.167)	0.120 (0.106)	0.189** (0.076)	0.173 (0.104)	0.293** (0.107)	0.263** (0.106)	0.067 (0.076)	0.134 (0.101)
GDP growth	0.294 (0.201)	0.196 (0.230)	0.790** (0.333)	0.843*** (0.200)	2.013** (0.843)	2.125** (0.861)	-0.071 (0.432)	-0.258 (0.399)	-1.219 (2.663)	0.191 (1.656)
GDP growth*FRI	0.169 (0.156)	0.164 (0.162)	-0.323 (0.227)	-0.376*** (0.129)	-1.024** (0.494)	-1.173** (0.512)	0.089 (0.182)	0.127 (0.187)	0.399 (1.271)	-0.044 (1.036)
FRI	-0.130 (0.420)	-0.087 (0.403)	0.759 (0.576)	1.052*** (0.341)	2.812* (1.576)	3.789** (1.787)	-0.393 (0.455)	-0.330 (0.422)	-2.477 (3.667)	-1.498 (0.128)
Debt (t-1)		-0.039*** (0.013)		-0.000 (0.008)		0.012 (0.027)		-0.018 (0.012)		-0.046 (0.048)
Inflation		-0.035 (0.022)		0.065** (0.026)		-0.027 (0.056)		-0.033 (0.058)		0.567*** (0.128)
ToT growth		0.182 (0.180)		-0.082 (0.107)		0.773* (0.439)		-0.174* (0.201)		-1.674 (0.451)
Constant	0.316 (0.865)	2.556** (1.040)	-0.541 (0.755)	-1.304 (0.884)	-0.717 (3.551)	-6.498 (4.303)	1122 (1.272)	2.352 (1.408)	1.395 (7.539)	3.473 (5.494)
Number of observations	529	528	530	529	530	529	530	529	530	529
Number of countries	28	28	28	28	28	28	28	28	28	28
Number of instruments	28	28	28	28	28	28	28	28	28	28
Hansen test	0.355	0.386	0.248	0.477	0.524	0.283	0.049	0.054	0.048	0.047
A-B test for AR(1)	0.004	0.006	0.035	0.023	0.000	0.001	0.002	0.002	0.010	0.008
A-B test for AR(2)	0.348	0.280	0.670	0.477	0.524	0.484	0.877	0.965	0.420	0.254
Period	96-15	96-15	96-15	96-15	96-15	96-15	96-15	96-15	96-15	96-15

Significance: *** 1%, ** 5%, * 10%. Standard errors in parentheses are robust against heteroskedasticity and autocorrelation. Time effects are included but the results are not shown.

Figure 1 Regression results
Source: Author's calculations

To formulize specific recommendations for fiscal policy we may ask what is the level of the fiscal rule index which alters pro-cyclical response of the government consumption and investment to counter-cyclical? Following Calderón (2004) we can calculate this threshold value as:

$$FRI^{*}_{i,t} = -\frac{\beta}{\lambda} \qquad (3)$$

where $FRI^{*}_{i,t}$ is the threshold value of the fiscal rule index. Depending on the observed value of the fiscal rule index the specific expenditure component is a-cyclical, counter-cyclical or pro-cyclical ($FRI = FRI^{*}_{i,t}$, $FRI > FRI^{*}_{i,t}$, $FRI < FRI^{*}_{i,t}$). The evolution of cyclicality value ω in relation to fiscal rule index captures Figure 2. For more comprehensive analysis of cyclical stance we construct 95% confidence intervals. Following Greene (2000) we calculate standard error which is necessary for construction of confidence intervals as

$$Var\left(\frac{\partial E\left[G_{i,t}\left|G_{i,t-1}, Y_{i,t}, \mathrm{FRI}_{i,t}, \mathrm{X}_{i,t}\right.\right]}{\partial Y_{i,t}}\right) = Var\left[\beta\right] + \mathrm{FRI}^{2}_{i,t} Var\left[\lambda\right] + 2FRI_{i,t} Cov\left[\beta, \lambda\right] \qquad (4)$$

The values of the FRI indicator on the x-axis in the Figure 2 are within the range -0.96 and 7.00. The lowest observed value -0.96 was in the past attributed to several countries and the maximum value of 4.10 (dotted vertical line) can be currently observed in Bulgaria. Notice that as the fiscal rule index increases pro-cyclical stance of government investment and consumption transforms to counter-cyclical. We identified the threshold value for government investment (right graph) to be 1.966 for the model without control variables and 1.812 for the model with control variables. Currently we can identify only 12 countries with the value of the fiscal rule index lower than 1.812[2]. Notice that for the highest observed value of the fiscal rule index (4.10) the corresponding confidence intervals includes 0. Value ω is significantly lower than 0 if fiscal rule index exceeds the value 6.35 (for the model with control variables). However, we can find no country which exceeds this value.

Regarding the consumption (left graph), threshold value is higher compared to the investment. For the model without control variables it is 2.446 and for the model with control variables it is 2.242. Coefficient λ in model without control variables seems to be statistically insignificant. This explains wide confidence intervals which reveal that the estimate of ω for arbitrary value of the fiscal rule index cannot be lower than 0 on 95% significance level. On the other hand, the inclusion of control variables makes the estimation of ω significantly lower than 0 in the case when the value of fiscal rule index exceeds 6.80. Notice that zero value of the fiscal rule index leads to the value of ω which is equal to parameter β.

Notice that government investment is compared to consumption highly pro-cyclical in the case of low or negative value of the fiscal rule index. However, even small increases in the fiscal rule index change the cyclical stance towards counter-cyclicality of investment more rapidly than in the case of consumption. Therefore investment achieves its threshold at a lower level of the fiscal rule index than government consumption. In other words, the introduction of superior fiscal rules in terms of the factors that determine the fiscal rule index helps more effectively in reducing pro-cyclicality of investment than in the case of any other expenditure item.

[2] Austria, Belgium, Denmark, Estonia, Greece, Finland, Croatia, Sweden, Slovenia and UK

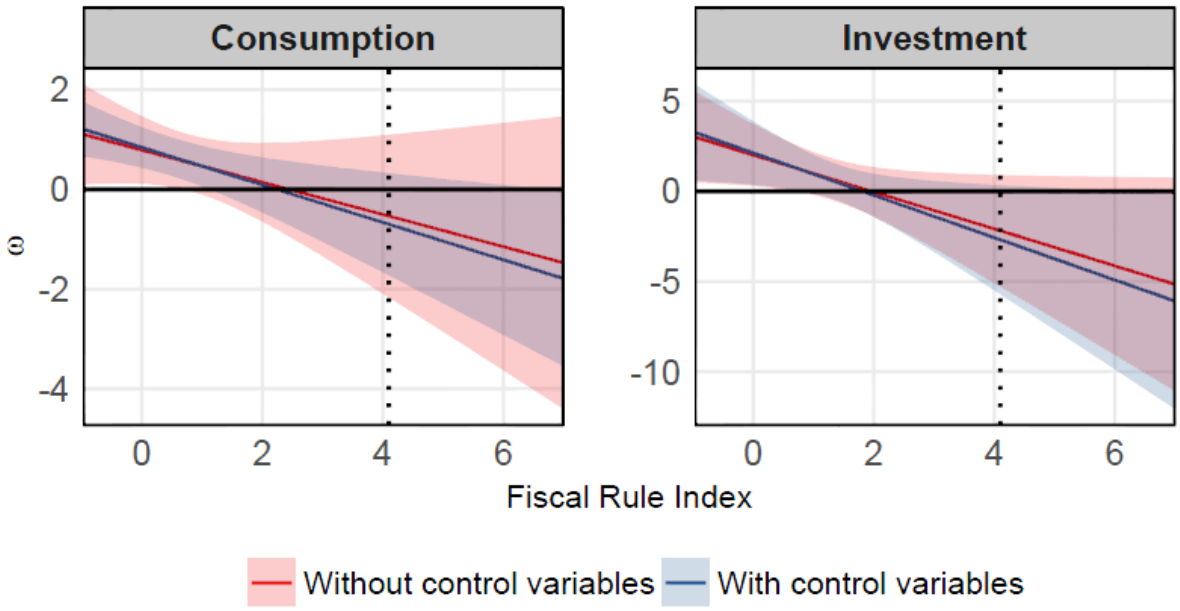

Figure 2 Evolution of cyclicality depending on the fiscal rule index
Source: Author's calculations

5 Conclusion

This paper has closely analysed potential effects of fiscal rules on cyclical stance of fiscal policy. Following the recommendation of Kaminsky et al. (2004) our analysis of fiscal policy cyclicality is restricted to the analysis of the cyclicality of government expenditure and particular components. We estimated dynamic panel model of EU 28 countries using two-step system GMM estimator, which is currently preferred choice when dealing with dynamic specification of the panel model and the problems of endogeneity. In order to assess the effects of the fiscal rule index on cyclicality of government expenditure we treated the fiscal rule index as variable interacted with economic cycle indicator. The aim of the paper was to analyse the impact of fiscal rules represented by the fiscal rules index to the cyclical stance of government expenditure components. Results concerning fiscal cyclicality are in line with the empirical literature. They confirmed high differences in cyclical stance of government expenditure components, therefore this justifies requirement to analyse the cyclicality of expenditure components separately. Cyclicality of total government expenditure is not significantly affected by fiscal rules. In line with our expectations we found a strong pro-cyclical response in government consumption and investment. However, improving quantity and quality of fiscal rules causes weakening of pro-cyclical stance of particular expenditure component towards more counter-cyclical stance. Therefore, our results are more inclined to the group of studies confirming counter-cyclical impact of fiscal rules (Nerlich et al., 2015; Alberola et al., 2016). For our contribution to empirical literature we consider the quantification of threshold of fiscal rules index which changes cyclical stance of fiscal policy. The results suggest that the value of ω which ensures a-cyclical stance of government consumption and investment is approximately 2. This level is attainable since many countries are currently above this threshold level. However, there is no country with the value of ω high enough (more than 6) to ensure that the cyclical stance of government consumption or investment is significantly lower than 0. Therefore, this value might be misleading since we have no sample for this level of fiscal rules index. We can conclude that fiscal rules are good choice when it comes to stabilization of

public finances, moreover our results also confirm that they help in dampening cyclicality of highly pro-cyclical component – government investment.

Acknowledgements

The paper was elaborated within the project VEGA No. 1/0994/15.

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Using a Diagnostic Approach in Business Management

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Abstract

This paper deals with the importance of using a diagnostic approach in business management. The goal of the paper is to describe the genesis and development of the business diagnostics in the world, with a special attention to the Czech and Slovak Republic, and to present some new trends, approaches, diagnostic models and some other ideas related to this area. The historical genesis, analogy, analysis, synthesis, comparison of selected diagnostic models and creative thinking are the main methods used in the paper. Moreover, the new diagnostic model, which stems from the Weisbord's six-box model, which was updated and modified according to the later knowledge based especially on the Kaplan's and Norton's balanced scorecard system. This new model is able to use both quantitative and qualitative indicators in the frame of the following seven areas: leadership, purpose, structure, processes, people, marketing and finance. This model can become a base for the next research and development of business diagnostics. Lastly, the qualities and characters of people as the most important factors of business success are stressed in the paper.

Keywords: Business diagnostics, Diagnosis, models, Balanced scorecard, Business success.

JEL Classification: M10, M19, N80

1 Introduction

The objective of science is a systematic observation, identification, description, investigation and theoretical explanation of reality. Although humankind did remarkable progress in many scientific areas, it would be very naïve to think that nowadays we have some unchangeable theories (whether in business management, economics, medicine, physics or in other fields). Many of the theories had to be corrected or totally changed when confronted with reality. According to critical rationalism by Popper (1997) every statement, although many times validated in reality, is still a hypothesis. We can never be sure about the truth of none of the statements concerning reality. That is why the falsification (systematic looking for examples when the theory is not right) or new and different points of view on seemingly well-known objects can significantly help the scientific progress (Kašík, Peterková, Wozniaková, & Ludvík, 2013). Business diagnostics, using many analogies from other scientific disciplines, has a strong potential to improve our understanding of business. For example, it is well-known truth that early and right diagnosis in medicine or engineering is able to save lives or save a lot of money that otherwise would have to be spend on repairs or replacement of machines or technology. Although there are still some discussions concerning the appropriateness of using analogies from other disciplines in business management, the analogy is clear in this case. The early and right recognition of problems or symptoms of business crisis can save the existence of the business or its important tangible and intangible assets.

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Most of the business failures that happened at the beginning of this millennium could be avoided if their management used the managerial diagnostic approach.

Even if the diagnostics is very important in managing the businesses and its benefit is evident, it sometimes seems to be a forgotten discipline. Nevertheless, the fundamentals of business diagnostics can be found back to the beginning of last century in the book by Kent (1913) who continued in works done by the founders of the Scientific Management Taylor (1911) and Gannt (1903). I would also like to mention the publications concerning the business diagnostics by Mikoláš (1990), Kašík, sr. (1994a, 1994b, 1994c) and Michalko (Kašík & Michalko, 1998; Michalko, 1999; Michalko, 2002) in the Czech Republic and Čorejová (2008) and Neumannová (2012) in Slovakia.

Therefore, the goal of the paper is to describe the genesis and development of the business diagnostics in the world, with a special attention to the Czech and Slovak Republic, and to present some new trends, approaches, diagnostic models and some other ideas related to this area. The most important factors related to the business success are mentioned at the end of the paper.

2 Theoretical Background of Business Diagnostics

The term diagnosis is of Greek origin and it means to distinguish or to know (Merriam-Webster Dictionary, 2017). Diagnostics is generally the art or practice of recognition and its methods and the business diagnostics is then a discipline focused on the recognition and evaluation of the factors influencing the business health. It also deals with investigation, formulation and verification of approaches, methods and techniques to identify and evaluate the level of business health and develops the names, characteristics and classification of business diseases analogous to medicine diagnosis. Business diagnostics is a relatively new discipline and therefore its terminology is still developing (Kašík & Michalko, 1998).

At the same time, the business diagnostics is a field dealing with a broad area from internal business processes to external factors influencing a business. It tries to explain important events and processes proceeding not only in business but also in business environment, having substantial impact on business and its performance.

When we want to understand business operation better, we usually establish on it some structuring of points of view. It seems to be purposeful to distinguish three levels of thinking with three different questions (Kašík et al., 2013):

1. At the material level: What does a business consist of?
2. At the functional level: How does a business work?
3. At the purposeful level: What is the purpose of a business?

At the material level, business organisations seem to be a transformation system as they convert inputs into outputs and exchange matter, energy and information with their environment. At this level, conditions and processes are measured in quantities; they can be explained by laws of nature and are results of rational planning and decision-making.

People involved in the transformational processes are regarded as the workforce whose labour is one of the inputs into the process. Information is measured quantitatively in bits. This physical

assessment can be extended with economic assessment, when conditions and processes are measured not only in physical units but also in money units (transformational process is then regarded as the process money – products – money).

At the functional level, we ask the questions about the level and way of business functioning. We know from some other disciplines (biology, medicine, ecosystems) that viability of the whole system depends not only on the characteristics of the elements but mainly on the kind of interactions. Moreover, business is regarded as an open system and its functioning can be understood only in the context with its environment. Similarly, we know from cybernetics that immaterial, information processes are primary for system functioning. Material-transformational processes are secondary (they are only consequence of the immaterial processes). It uses systems thinking instead of just analytic thinking. Moreover, we try to cope with complexity. Models of living organisms or ecosystems seem to be usable analogies. We can use efficiently plentiful knowledge from biocybernetics (application of cybernetics to biological science) about events in complex viable systems, e.g., irreversible processes, self-organization, self-management, homeostasis, entropy, etc.

At the purposeful level, business is perceived as a system embodied in society and serving to human purposes. Conditions and processes are results of human intentions and are assessed based on value attitudes. Worker is a man with its own value, communication means creating human relations and information is usable knowledge for a receiver. This level of assessment usually does not play any role in natural science; on the contrary, it is deliberately neglected. However, it is very difficult to understand behaviour of people and social systems without this level. At this level of thinking, analogies to natural (but not human) systems are methodologically without sense. On the other hand, we can use knowledge of other disciplines like philosophy, individual and social psychology and sociology if we want to avoid too naive pictures about people and businesses. From scientific point of view, we try to find rather "understanding" than "explanation" (Kašík et al., 2013).

2.1 Approaches in Business Diagnostics

Although there are many approaches we can use in business diagnostics, the following four approaches are very often mentioned (Kašík & Michalko, 1998; Kašík & Franek, 2015):

- approach based on analogies,
- pragmatic approach,
- cybernetic approach,
- philosophical approach.

The approach based on analogies is clear because the term diagnostics got in the business management from medicine. However it is not the only term, we commonly use the terms healthy or sick business, business diseases and illnesses, capital injections, etc. (Weisbord, 1978; Levinson, 2002). Kent (1913) uses the term business diagnostician and describes the microbes that affect businesses and other authors stress the perception of business as a living organism (Paterson, 1966; Teng, 2010).

The pragmatic approach is dealing with facts and actual occurrences. When solving problems in business, it uses a practical, sensible way that suits the conditions that really exist now, rather than obeying fixed theories. It is often based on experience and practices that showed to be effective in

past. However, when using pragmatic approach we should be very careful not to be in conflict with ethical norms (O. C. Ferrell, Fraedrich, & L. Ferrell, 2016; Sroka & Lorinczy, 2015).

There are important information flows not only inside a business but also in interaction with its environment. The identification, processing and using of the information are the sine qua non conditions for the excellent business management. Incorrect or insufficient information (due to, e.g., low level of communication between the elements of the business) can cause some serious business problems or crisis. Therefore we can also perceive a business as a cybernetic system stemming from the Wiener's definition of cybernetics as „the scientific study of control and communication in the animal and the machine" (Wiener, 1948) and the Bertalanffy's definition of system "as a set of interacting components" (Bertalanffy, 1968). From the cybernetic point of view, business is an open system with a feedback loop. Openness means that there is an exchange of material, energy and information between a business and its external environment and the feedback loop refers to a situation where the part of the output is used for new input. There are two kinds of feedback loops in systems: reinforcing and balancing, also called positive and negative feedback loops. For example, a business generates profit by selling its products which is then reinvested in business projects which lead to successful business development and more income generation (reinforcing or positive feedback loop) or the products are not selling well in the market which influences the ability of the business to buy new inputs and if not reacting properly to the situation it can even lead to bankruptcy (balancing or negative feedback loop).

Philosophical approach focuses on the raison d'être of a business, its subsystems or even the business processes. For example, when setting up a business, we know that it is very important to define its mission. However, in business diagnostics it is also important to compare the formal statement of the company's mission to the real business activities, i.e. the congruence between the formal and the informal system of the business (Weisbord, 1978; Nadler & Tushman, 1977, 1980).

2.2 Types of Business Diagnostics

We can distinguish three main types of business diagnostics (Kašík & Michalko, 1998): global diagnostics, functional diagnostics and diagnostics of factors of production.

Kašík and Michalko (1998) state that the global diagnostics is focused on the business diagnostics from the five points of view: (1) business as a system, (2) financial health and value, (3) strengths and weaknesses, (4) problems and crises and (5) potentials.

When doing the functional diagnostics, we focus on the particular functions of the business, e.g., marketing, finance, production, etc. Although the functions are prominent during this kind of diagnostics, the high-quality diagnosis is not possible without the systemic approach to business and seeing the functions in mutual relations. It means that the root causes of problems, e.g., in marketing can be found in different functions or subsystems of the business.

Diagnostics of factors of production focuses on the factors that influence the transformation process in business. The factors of production can be perceived as the interrelated elements with relations to the business environment. The result of realized combination of production factors is the particular product. Under the classical view of economics, the factors of production consist of land, labour, capital and entrepreneurship. In contrast to this classification, the factors of production can

be classified into three groups in business diagnostics (Wöhe, 1995): elemental factors (business assets and labour), dispositive factor (management) and additional factors that stems from the interaction between business and its external environment (e.g., taxes, interest etc.).

2.3 History and Development of Business Diagnostics

Business diagnostics in the world

One of the first mentions of using medicine terms in the area of business management can be found in 1913. William Kent, co-worker of Taylor and Gannt, shows in his publication „Investigating an Industry: a Scientific Diagnosis of the Diseases of Management" (Kent, 1913) that the foundation of scientific management is „the critical observation, accurate description, analysis and classification of all industrial and business phenomena" (Kent, 1913). The above-mentioned book is mostly written as a case study of a hypothetical business, in which there is a business diagnostician, formerly a doctor of medicine, who nowadays deals with treatment of business diseases. Based on his knowledge and experience from medicine, he concluded that a business is a certain kind of a living organism, which suffers from evident or hidden difficulties. Besides bad luck and accidents, he has found the following microbes that affect businesses: "(1) conceit, the owner thinking that he knows his own business and that no one else knows it as well as he does, (2) ambition, or too great progressiveness, trying to be the leader in new things, (3) inertia, or too little progressiveness, waiting till your rivals succeed with a new thing before investigating whether you ought not to have it, (4) recklessness, making changes in the business without counting the cost, (5) fickleness, or the lack of "stick-to-ativeness" - the successful man is like a postage stamp, sticks to a thing till he gets there, (6) stupidity, or too great "stick-to-ativeness", sticking to a thing after it has proved a failure, (7) nepotism, putting one's relations into prominent positions just because they are relations." (Kent, 1913). Kent emphasizes that these seven microbes are not possessions of the business itself, but of its owners or managers.

Thomas Paterson (1966) is another significant author who contributed to the development of business diagnostics. He describes six primary functions that exist in almost every living organism: (1) intaking of substrate, (2) processing of substrate, (3) reaction on environment, (4) support of organism's elements, (5) recovery of organism's elements and (6) organization of previous five functions. He also states that analogical functions can be found in an operating business. Businesses react on their environment and the highest reason of this reaction is their effort to survive. The survival is also the ultimate goal of the elements of the business which are basically the people who work in the business (however, the survival of the business can be reached even if some of the elements will not survive). Paterson also focuses on the decision-making process between the reception of incentive and the reaction of a business. Sometimes it seems that the business does not react to the incentive, nevertheless the decision-making process can be proceeding. There are also some situations, when the reaction is not necessary or desirable, e.g., if the incentive is not above the threshold.

When mentioning the authors who stress the analogies between business and living systems, it is important not to forget about Katz and Kahn (1978) who draw the attention not only to analogies but also to the differences between the social and the biological systems. According to Katz and Kahn, for example, the social systems do not have fixed physical boundaries, they can more easily change their elements, the anatomy of biological systems can be examined in a post-mortem analysis but when a social system ceases to function, there is no longer an identifiable structure, in

short, social systems are characterized by much greater variability (Katz & Kahn, 1978). They also do not omit the importance of the nature of the business environment - its stability, turbulence and degree of organization (Katz & Kahn, 1978).

However, it is not possible to mention all the authors because in the last decades the business diagnostics has been a fast-growing and developing discipline with many scholars around the world dealing with the subject (Howard, 1991; Harrison & Shirom, 1999; Marion, 1999, Mimick & Thompson, 2006; Plauchu & Tairou, 2008, Teng, 2010).

Business diagnostics in the Czech and Slovak Republic

The publications dealing with the business diagnostics appear in the former Czechoslovakia (divided in two countries the Czech and Slovak Republic in 1993) at the beginning of the seventies of the last century. Habr and Vepřek (1972) are among the first authors who bring the main information about the systemic approach to solving business problems and about systems theory and its disciplines. They describe the basic ideas of system analysis and synthesis which are used in business diagnostics. They do not understand business diagnostics only as an identification of dysfunctions, pathologic events and their causes but also stress the importance of identification of positive business potentials. Therefore business management should not be focused only on the information necessary for the adaptive strategy (which is usually used in medicine) but also for the offensive strategy which can mean the shift of the present standards and norms.

In 1976 another author Šáda defines the business diagnosis as a specific kind of business analysis which investigates and evaluates business indicators as symptoms of future business development and tries to early reveal the possible disorders and deformations that could threaten successful development of the business and reaching its goals (Šáda, 1976).

Čestnější (1980) admits the usefulness of some analogies from medical and technical diagnostics that have long history and are well developed but he also emphasizes the carefulness when using some analogies. He also describes some methods that can be used in business diagnostics (e.g., brainstorming, decision-making matrices, questionnaires, correlation analysis etc.). Nowadays, many of these methods are used in investigating, evaluating and assessing not only individual businesses, but also macroeconomic factors or public institutions (Drastichova, 2015; Slavata, 2015; Halaskova, 2016; Stefko, Gavurova, & Korony, 2016).

I would like to also mention Mikoláš (1990), Kašík, sr. (1994a, 1994b, 1994c) and Michalko (Kašík & Michalko, 1998; Michalko, 1999; Michalko, 2002) who are considered to be the founders of business diagnostics at the Faculty of Economics, VŠB-Technical University of Ostrava.

In Slovakia, the business diagnostics is very successfully developed in Žilina (Čorejová, 2008) and in Bratislava (Neumannová, 2012).

2.4 Process of Business Diagnostics

Weisbord (1978) presents an interesting and simple process of business diagnostics that comes from the ideas of the well-known social psychologist Lewin (1946). He perceives diagnosis as one step in the framework of the action research consisting of the following four phases: (1) data collection, (2) diagnosis, (3) action and (4) evaluation. In the data collection, we should be

interested about all the accessible data relevant to the situation. They can be in the form of easily handled quantitative data but also in the form of opinions, ideas and feelings. The diagnosis means identifying gaps between what is and what ought to be as supported by the data. Action is planning and carrying out steps that will improve things and during evaluation or rediagnosis we ask the question: What is the gap now? (Weisbord, 1978).

Rogers and Fong (2000) use a practical framework for identifying and analyzing business issues that has been tested and used by business consultants. The framework consists of the following five phases that are performed in sequence: (1) identify symptoms, (2) establish the facts, (3) establish causes, (4) evaluate alternative approaches to addressing the problems and (5) select and justify the best solution (Roger & Fong, 2010). Although the first two steps are closely related (facts can be symptoms and symptoms can be facts), the authors find it useful to distinguish the symptoms from the facts because the symptoms are perceived as business problems (e.g. high level of employee turnover) but they are usually not able to explain the causes of the problems. In these cases, we need to know some other facts to discover the reasons of the situation.

3 New Trends, Models and Ideas in Business Diagnostics and Management

Recently we could have witnessed to emerge a number of diagnostic models that were designed to help in diagnostic process (Burke & Litwin, 1992; Falletta, 2005; Burke, 2008). The aim of these models is to indentify key variables (factors or areas) and their interactions in order to help us in understanding of business behaviour as a whole or its parts. The majority of these diagnostic models are based on the principles of the “open systems theory” that has been developed throughout the 1960s (Bertalanffy, 1968). However, there are available new theories, models, concepts and ideas that, in my opinion, can be used in process of improving the former diagnostic models by appropriate replacement of the key variables or synthesis of the models. One of the well-known and promising concepts that are used extensively in business and industry, government, and non-profit organizations worldwide is the balanced scorecard system. The balanced scorecard is a relatively new approach to strategic management. The authors of this system are Robert Kaplan and David Norton who published an article "The Balanced Scorecard - Measures that Drive Performance" in Harvard Business Review in 1992 which was first step to their later bestseller "The Balanced Scorecard: Translating Strategy into Action" published in 1996. The Balanced Scorecard is used in strategic management as a system of four perspectives: learning & growth perspective, internal processes perspective, customer perspective and financial perspective. Setting objectives, measures, targets and initiatives in those four perspectives enables interconnection with business strategy. Although there are some other tools and analyses that can be used in industrial practice (Kozel, Mikoláš, Vilamová, Chuchrová, & Piecha, 2016), the balanced scorecard has become one of the most important tools with prominent place in strategic management.

The attempts to update the diagnostic models or make a synthesis with other systems (e.g., balanced scorecard) can be seen in the papers focused on this area (Kašík, 2013; Zhang, Schmidt, & Li, 2016). Based on the strengths of the above-mentioned balanced scorecard and the Weisbord’s six-box model and previous research (Kašík, 2013), there is a proposal of a new seven-box model that focuses on seven modified business areas: (1) purpose, (2) structure, (3) people, (4) internal processes, (5) marketing, (6) finance and (7) leadership. This new model keeps the central position of leadership, including, e.g., determination of appropriate leadership style in relation to organization purpose, keeping balance among the other five areas and diagnostic of business

strategy. It also saves the box with purpose whose diagnostics should be one of the first activities of business diagnostician. The box labelled people includes education, training and employee development, but also involves diagnostics of the internal relations (individuals, groups, departments, people and technology) and remuneration system. The box with structure involves diagnostics of the organizational structure (e.g., fitness in relation to purpose, industry, environment, size of business) and the box with internal processes involves measurement of internal processes quality (especially time and variability). The diagnostics of marketing is another very important area focused on the determination of the level of relations with customers including their requirements, expectations and satisfaction. Finally yet importantly is the finance area, which is focused on the amount of available financial resources, capital structure, financial ratios, measures of value etc. When diagnosing one of the seven areas, it is necessary to determine some standards to which we can compare the recognized actual condition and the required conditions or standards in particular areas should be congruent at the same time.

As I started the history of business diagnostics by Kent who focused on the diseases of management, I would like to emphasize what are, in my opinion, the most important things for business success. Covey (1989), who refuses some modern trends for proven principles, proposes the answer, for example, in his inspiring book The 7 Habits of Highly Effective People. He focuses on what could be called the character ethic as the foundation of success - things like integrity, humility, fidelity, temperance, courage, justice, patience, industry, simplicity, modesty, and the golden rule (Covey, 1989) which carries us back to inspirational and truthful Bible verses (Matthew 7:12, Luke 6:31). Therefore, the qualities of people and their characters are the most important factors for business success.

4 Conclusion

This paper has presented the importance of using diagnostic approach in business management. It has focused on the history and development of this discipline in the world and in the Czech and Slovak Republic and has described some new trends and ideas in this area. The new diagnostic model, which has been presented in the paper, stems from the original Weisbord's six-box model, which was updated and modified according to the later knowledge based especially on the Kaplan's and Norton's balanced scorecard system. This new model is able to use both quantitative and qualitative indicators in the frame of the following seven areas: leadership, purpose, structure, processes, people, marketing and finance. This model can become a base for the next research and development of business diagnostics. Finally, qualities and characters of people as the most important factors of business success have been emphasized in the paper.

Acknowledgements

This paper was supported within Operational Programme Education for Competitiveness – Project No. CZ.1.07/2.3.00/20.0296.

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Regression Model dependencies of selected cost types in the mining Industry

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Abstract

The regression model is one of the means of economic analysis, which can also be used in the field of cost management of extractive and mining companies. Apart from the systemic and strategic cost management, researching dependency using regression models support a reliable means of determining the direction and assistance in management decisions. The article is based on data from the cost items of extractive and mining enterprises, which were processed in context of the cost research for all mining enterprises in the Slovak Republic. Containing a theoretical description of the use of analysis, determine the starting cost data by size category of companies and of course the actual implementation of dependency analysis. The core part of are regression models for the dependence of the critical cost element compared to other analyzed cost types. The result of these models is to identify in what size categories there is a verifiable depending on the selected cost types and what direction it is necessary to move in the setting of strategic cost management. The result of the analysis is to determine the extent of a critical cost type affects to the cost of other types, if any. The aim of using outputs is to contribute to the systemic cost reduction Extractive and mining enterprises of the Slovak Republic with a view to increasing the liquidity of these companies and improve their position in the competitive environment. As the mining industry is a unique industry in terms of "expensive" for machinery and technological equipment, this kind of analysis can provide significant support for functioning of Slovak extractive and mining companies.

Keywords: Mining Industry, Slovakia, Regression Model, Costs dependencies, Cost relations, Cost analysis.

JEL Classification: L72

1 Introduction

Contemporary market conditions are forcing companies from all business industries to reduce their costs. Presently (Sivakumar, 2015; Rajnoha & Dobrovič, 2017; Virglerova et al., 2017; Jonek-Kowalska, I. 2017; Zwolak, 2016; Rajnoha & Lesníková, 2016; Arsov & Naumoski, 2016; Burianová & Paulik, 2014) in many countries, the mining sector intends to augment their production operation with private participation due to the challenges that they are facing like, cost

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reduction, improving capital project management, employee management, environmental impacts, enhancing corporate social responsibility, global economy crisis, etc. As a support means to achieve this goal there are different analyzes, while in developed economies is quite often used the so called cost management (Špičková & Myšková, 2015), consisting of a systematic set of different analyzes logically linked together to form meaningful functioning system to achieve the so called rational cost reduction (Gavurova et al., 2016). In the current business environment (Institute of Cost Accountants of India, 2014), the cost management has become a critical factor in the existence of many enterprises. It is not a substitute for simple cutting costs. Costs must be managed strategically. The institute argues that strategic cost management is the application of cost management techniques so that also lead to an improvement in the strategic position of the company and reduce costs. One of the reliable analysis of this kind is also exploring dependence of two variables using a regression model. Methods (Ronald R. Hocking, 2013; Andrei et al., 2016) of Applied Regression Analysis, Analysis of Variance or Linear Statistical Models contributed significantly to developments in all areas of research and are still widely used (Becerra-Alonso et al., 2016).

Management of each company currently endeavour to reducing costs while trying to ensure the logical framework and maintain quality. Financial management (Rossidah Wan Abdul Aziz, 2013; Illmeyer et al., 2017; Niño-Amézquita et al., 2017; Zizlavsky, 2016; Ključnikov & Belás, 2016; Myšková et al., 2016) is an important issue nowadays either in profit organizations or non-profit organizations. It is defined as management of the finances to achieve financial objectives. Financial management plays three roles that are financial planning, financial control and financial decision making. Extractive and mining enterprises in Slovakia are no exception to this trend. The introduction and implementation of a functioning cost management system will be essential for this type of companies because mentioned kind of industry is enormously costly in terms of investment in a unique mining technology and equipment. Their purchase and maintenance is generally considered one of the most expensive items ever. The mining industry (Rybár et al., 2005) is quite unique when compared with other typical production industries. The volume of funds required for a new project is immense, depending on the commodity type, extraction method, mine size, annual extraction, location and a large number of other parameters.

The Slovak Republic is still in early development of using the cost management, and it is more preferred in companies with foreign capital. There are not as well developed as in Western countries, the United States and in Japan. Another important aspect that should be taken into the account is the relationship between energy security and economic growth as shown in Tvaronavičienė et al. (2015).

In this article were used cost data derived from research of cost items of all extractive and mining enterprises in the Slovak Republic for the years 2011 to 2013. From the data of the name and classification of the company to the mining group has been created own database with details of the enterprise size category and the individual cost items from the official Income statement account of each selected company. Cost data were obtained from an online database of Financial Administration of the Slovak Republic, www.registeruz.sk and www.zisk.sk, additionally data from annual reports and Web Sites of selected enterprises. A considerable number of companies could not be included in further analysis because of the several reasons that would not guarantee the uniformity the data collected.

The results of previous analyzes of realized (structural analysis and Pareto analysis) clearly identified as the so called critical cost element – the costs of Production (in Article labeled as R8). From this reason arose the need to verify the fact whether between the critical cost type and other cost types exists relevant addiction that help define the direction of the solutions for reducing costs in extractive companies.

The basic research question sounds: is there a link between the incurrence of a critical cost type and the incurrence of another cost type? The aim is to identify the most significant relationship between critical cost type and other cost type, or types. We assume that if these cost types affect each other, will be easier to identify the intended cost reduction.

2 Methods and data

For analysis in this article has been selected regression analysis. As this method was already widely used by several application-level results in the mining industry (e.g. Govindan et. al., 2014; Khoo, 1994) we also used this method to determine the dependency between the relevant cost type.

Trend or Regression analysis is a summary of statistical methods and procedures, in this case used to study the interaction between two (or more) cost types, specifically to help estimate the dependent cost values through regression model. The importance of the field of analysis of cost controlling is that it can be observed dependence of the cost of other economic indicators, e.g. profit, revenue, productivity and so on. In this paper it is looking for dependencies between critical cost type and other cost types. An example of this analysis is also tracking costs and depending on enterprise performance and setting the trend for the future based on the regression function.

Simple linear regression - linear regression model - If, after plotting the {xi, yi} has a scatter plot trend of direct dependence (individual points lie on a straight line:

$$Y' = B_0 + B_1X \quad (1)$$

or it does not deviate from) point estimate of the regression line is:

$$y'j = B_0 + b_1x_j \quad (2)$$

and this dependency is the best estimate of the linear regression model.The constant b_0 in graphic representation of the regression line determined by the point where the line intersects the y axis. Coefficient B_0 moves straight line in space, so also called intercept. Coefficient b_1 is the slope of the regression line and indicates how many units of measure (in average) change in the dependent variable when the independent variable changes by one unit of measurement. It is this factor giving information on the course of dependence and it is called the regression coefficient.

Between the characters may however be dependency X and Y. This dependency may be characterized as a straight line:

$$X' = A_0 + A_1Y \quad (3)$$

and its estimate is the line:

$$x'j = A_0 + a_1y_j \quad (4)$$

In calculating A_0 and A_1 is procedure analogous when calculating the coefficients B_0 and B_1. If there is two-sided dependency lines are called pooled regression lines (linear regression models of both types form a pooled regression models) and regression coefficients associated regression coefficients. Linear regression lines (models) together form the so called correlation scissors. The are more open, the lower the dependency (and vice versa).

The correlation diagram (Correlation chart) is a graphic representation of two cost types (correlation). In the quality is generally used a so called pair-wise correlation (comparing two cost types). The deployment of points in chart that correspond to each pair of values of the relevant variables characterizes the direction and the degree of tightness depending on the monitored costs. As it was found the extreme values of incurred costs of Production (R8) in comparison with other cost types, it proceeded to exploring of dependence the R8 to other cost types.

Constructing process and implementation is following: definition of the independent variable X and the dependent variable Y; Obtaining a sufficient number of ordered pairs [xi, yi] (recommended min. 30 ordered pairs, optimally 50-100); Representation of ordered pairs in a rectangular coordinate system; The analysis of points to the deployment of the graph; Determine the relationship between variables X and Y; Calculating the coefficient of correlation.

Cost types were selected for analysis and included to the database, based on the relevance and completeness of data. This means that cost types, which were not provided in the databases, were not completed for each company (or they were zero to 99% incidence, and not relevant for the analysis).

During the processing of cost data from income statements to the database in Excel it was found that certain statements include zero, in some cases, these values were missing. Due to this fact, the total number of analyzed enterprises decreased from the original number of enterprises identified of 257 to the number of 124. Each company operates in an area of mining, some companies even in two or more areas. Due to large data there is given no table with more specific values, data and commercial names. There may be mentioned final state of enterprises in the database according to mining area (Figure 1).

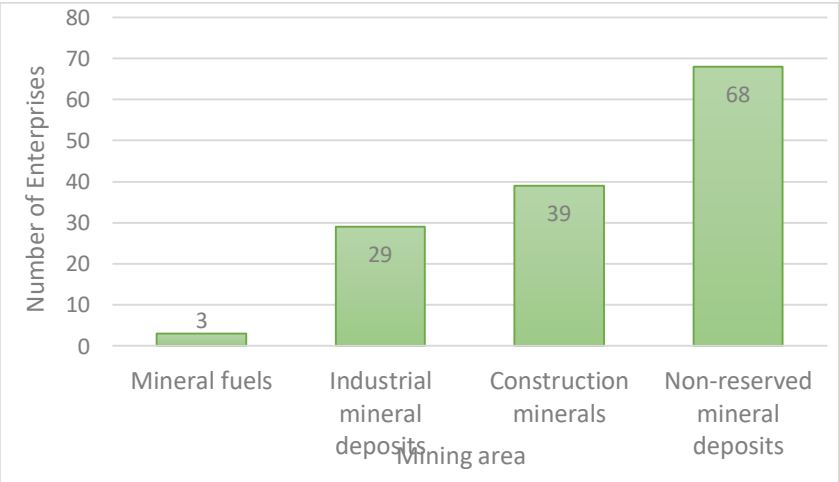

Figure 1 Final state of enterprises in the database according to mining area
Source: Authors

As mentioned earlier, the range of subjects that were included in the research covers entirely all mining and extractive industry in Slovakia, according to the current state. It is necessary to note that the process requires several years duration. Processing of all data, analysis performing, and results achieve have been undertaken from 2013 to 2016. This is based on data available in 2011 to verification of each subject identity. For the purpose of classification and data preparation was before Pareto analysis the Structural analysis performed. Based on the structural analysis of extensive information from own database, the resulting average values for each size category and the cost type were provided in summarization table (Table 1) in order to compare these values according to the principles of the Regression analysis.

Table 1 The average value of the costs incurred by size category

Size category	Year	Average R2 (€)	Average R8 (€)	Average R12 (€)	Average R17 (€)	Average R18 (€)	Average R23 (€)	Average R39 (€)
Large	2012	2893919	56254450	20300587	1643032	8371365	5105171	998601
	2013	2891126	57824163	20154742	1788371	10992434	4260084	1791054
	2014	2657783	60267768	20279982	1797446	9672099	3934728	1906109
Medium	2012	639707	5708512	1661201	69759	647285	339791	81584
	2013	609543	5330482	1580026	79643	639822	358452	77275
	2014	589205	4899465	1538301	84074	666889	257959	79958
Small	2012	326648	1101926	322964	21475	325967	100913	17618
	2013	326594	958701	303376	21551	206935	62480	16510
	2014	287812	975797	304718	23670	193273	101475	24934
Micro	2012	22965	351199	61799	6055	78106	9180	7616
	2013	21383	348114	60893	6108	64183	24087	5704
	2014	26901	346662	58234	5598	88527	9812	4562

Legend: R2 - Cost of merchadise sold; R8 – Production; R12 – Personnel expenses; R17 – Taxes and fees; R18 - Amortitzation and value adjustments to non-current intangible assets and depreciation and value adjustments to property, plant and equipment; R23 - Other operating expenses; R39 – Interest income.

The analyzed enterprises were allocated by size category of enterprise, focusing on the number of employees. Enterprises are divided by the size of the micro, small, medium and large. To determine the size of the enterprise may be used several criteria. In the scientific literature is considering quantitative and qualitative criteria and for optimum assessment is recommended to combine them. Those criteria are in particular the number of employees, turnover, profit and capital.

The European Commission issued a recommendation in 2003 when it adopted Directive no. 2003/161/EC, which defines small and medium enterprises in order to enhance their competitiveness. Enterprises from the database were classfied by the above mentioned directive of the EU.

As far as we know, there is no similar research that analyzed the cost types of mining enterprises throughout the country. To a large extent this is surely due to the sensitivity of selected data, which are usually secret of most businesses, especially for conservative companies in Slovakia. The work can not therefore be compared with other detailed research or scientific references which took place in the world. For the purpose of dependency analysis was used statistical software JMP Pro 9 from SAS Institute Inc.

3 Critical cost type

As mentioned in Introduction, the range of subjects that were included in the research covers entirely all mining and extractive industry in Slovakia (scientific sample represents 257 subjects in total), according to the current state. It is necessary to note that the process requires several years duration. Processing of all data, analysis performing, and results achieve have been undertaken from 2013 to 2016. This is based on data available in 2011 to verification of each subject identity. For the purpose of classification and data preparation was before Regression model the Pareto and Structural analysis performed. Based on the structural analysis of extensive information from own database, the resulting average values for each size category and the cost type were provided in summarization graph (Figure 1 to 4) in order to compare these in Regression model. Later described regression model based on summary data for all size categories of enterprises together. The values for Figure 2 are shown only for clarity, of the total sample data.

Critical cost type of Production (R8) consists of Consumed raw materials, energy consumption, and consumption of other non-inventory supplies and costs of Services also. Major proportion of costs in the mining enterprise are essentially a mechanisms and machines intended for excavating, drilling, transportation and other activities, which are a necessity for processes in the extractive and mining company. This is linked with so expensive operations such as maintenance of these equipments, repair and replacement of spare parts. Exactly these activities fall below the cost of the Production in the service part. Machinery, equipment and spare parts usually have a unique character and their availability and production is considerably limited and highly specialized. These are factors which mining or extractive company differs from other types of enterprises.

As already mentioned, the cost type of the Production include Consumed raw materials, energy consumption, and consumption of other non-inventory supplies, while amount of the costs of this nature is influenced only to a certain extent. Below the cost of the Production, belongs also the group of costs - services, which already provide considerable scope for reducing the cost with maintaining the quality dimension and logical framework. Financial managers extractive and mining enterprises should focus precisely on the critical cost type.

Following are summary results based on the structural analysis in every considered size categories with an linear cost tracking.

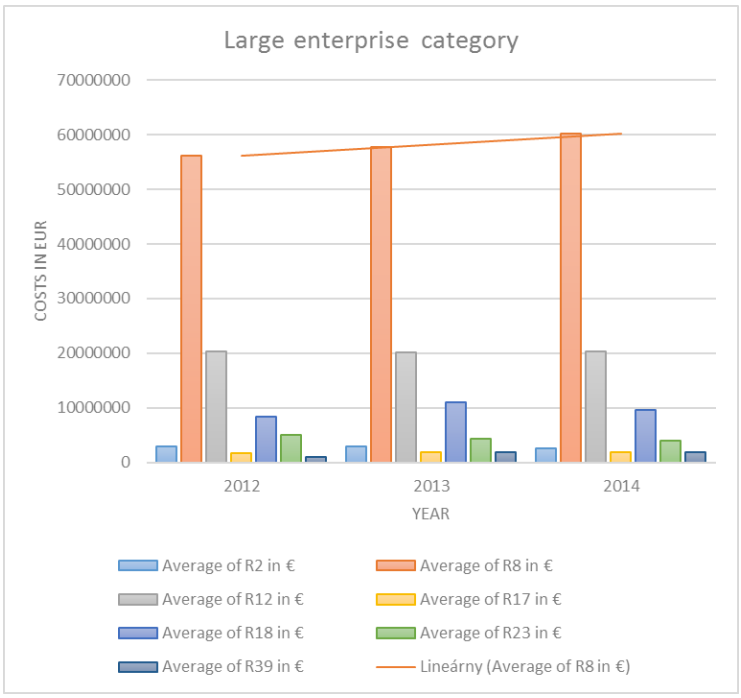

Figure 1 Summary results of structural analysis in large size category
Source: Authors

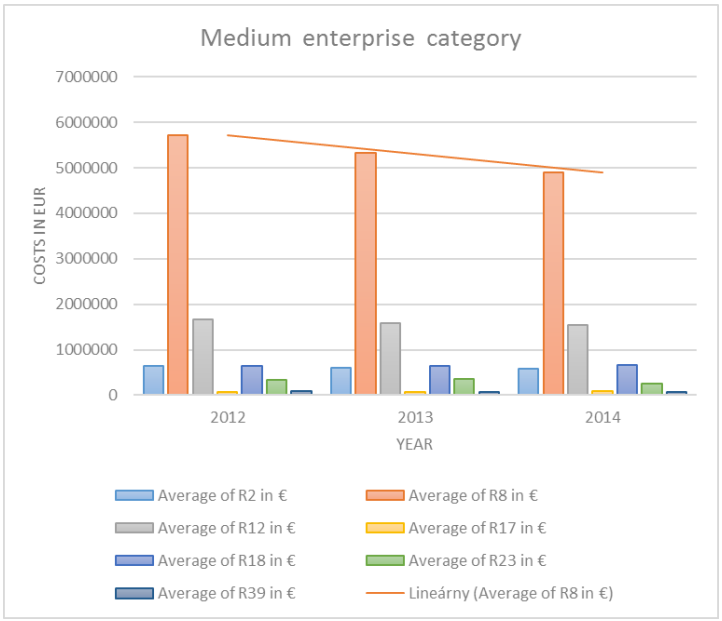

Figure 2 Summary results of structural analysis in medium size category
Source: Authors

As seen in Figure 2, critical cost type in large enterprises has increasing trend. This phenomenon occurs only in large enterprises, which is the only cathegory with increasing costs related to production from the four size categories.

Quite contrary, in Figure 3 which representing the category of medium enterprises, the critical cost type has declining tendency. Similar decreasing was also recorded in the category of small

enterprises in Figure 4, because of regularly significant fall of costs of production in three year period.

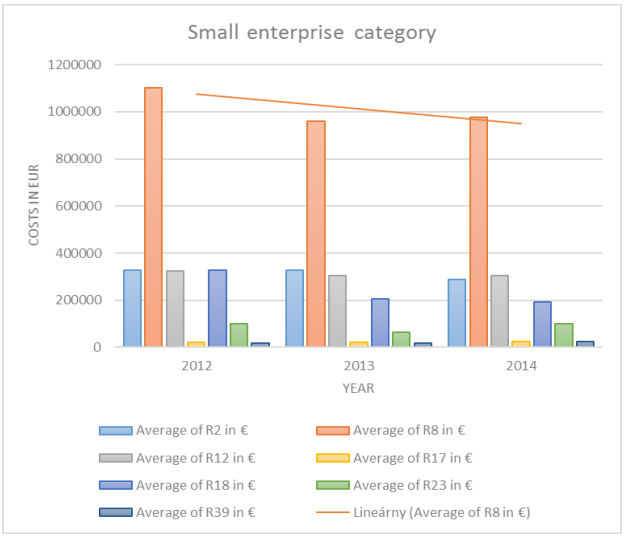

Figure 3 Summary results of structural analysis in small size category
Source: Authors

Despite the fact that category of SME is showing a decreasing trend as well as micro enterprises, based on the Figure 5 can be concluded, that critical costs in micro enterprises show only a very slight descent. In general it can be said that the costs of Production in category of small enterprises are stable.

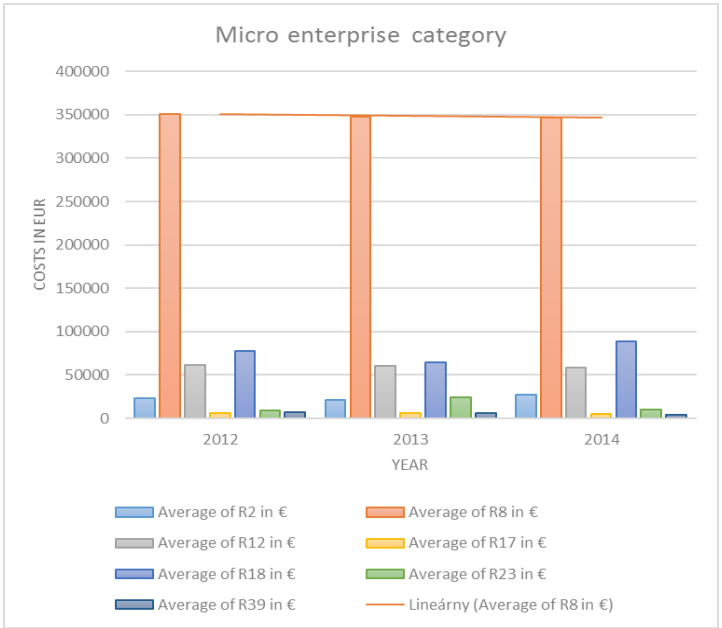

Figure 4 Summary results of structural analysis in micro size category
Source: Authors

Legend to Figure 2 – Figure 5: R2 - Cost of merchadise sold; R8 – Production; R12 – Personnel expenses; R17 – Taxes and fees; R18 - Amortitzation and value adjustments to non-current intangible assets and depreciation and value adjustments to property, plant and equipment; R23 - Other operating expenses; R39 – Interest income.

Figure 2 to Figure 5 shows in each item the average value of research data, which represent 28 tables (for each cost type and each size category) with details of cost items in 2012, 2013, 2014. This means that the Figure 2 to 5 is the result of the structural analysis. All values are expressed in EUR. Prepared data in this way (in the chosen form) was the quarantee of properly preparation for the purposes of drawing up the Regression model and the subsequent analysis of the results.

4 Regression model – dependence R8-Production costs from other cost types

Cost type labeled as R8 (Production) carries the meaning of cost of "production". Correlation of this cost type was compared with the second parameter R2 - Cost of merchadise sold, R12 – Personnel expenses, R17 – Taxes and fees, R18 - Amortitzation and value adjustments to non-current intangible assets and depreciation and value adjustments to property, plant and equipment, R23 - Other operating expenses R39 – Interests income. The values in the chart includes the values of all analyzed cost types, regardless of company size category. The aim therefore was not to explore dependence of the cost in each size category but to determine the relationship of two types of cost and monitoring of any extremes.

The following figures (Figure 6-11) and related tabular exports (Table 3-20) are displayed details of dependences of selected variables. Simultaneously next to each diagram there is a linear fit of relation, summary of fit, analysis of variance and parameter estimates given.

In the following section of dependence analysis (Figure 6) the critical cost type (R8 - Production) is compared to Cost of merchadise sold (R2). Linear Fit of R8 vs. R2 is as following: **R8 = 3555029,5 + 1,4605269*R2**.

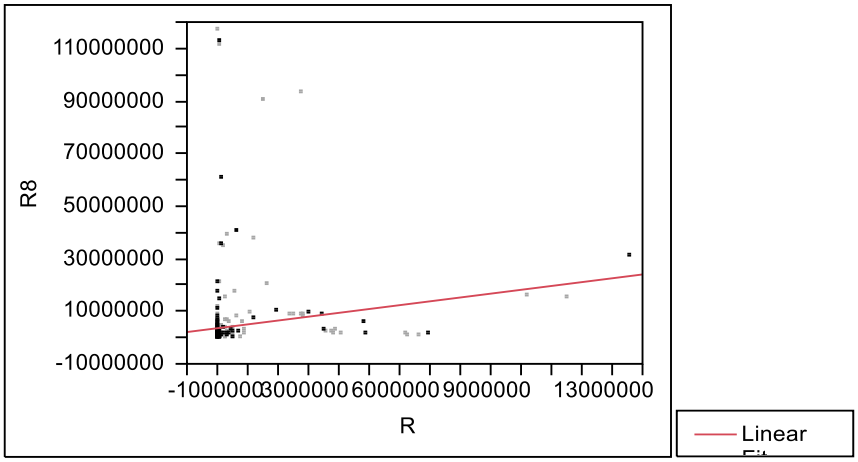

Figure 5 Bivariate Fit of Mean R8 – Production vs. R2 – Cost of 386erchandise sold
Source: Authors

Table 2 Summary of Fit R8 - Production vs. R2 - Cost of merchadise sold exported from JMP

RSquare	0.023584
RSquare Adj	0.020945
Root Mean Square Error	13,379,845
Mean of Response	4,109,051
Observations (or Sum Wgts)	372

Source: Own elaboration

Table 3 Analysis of Variance R8 – Production vs. R2 – Cost of 387erchandise sold exported from JMP

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	1.5999e+15	1,6e+15	8.9367
Error	370	6.6237e+16	1,79e+14	**Prob > F**
C. Total	371	6.7837e+16	-	0.0030*

Source: Own elaboration

Table 4 Parameter Estimates R8 - Production vs. R2 - Cost of merchadise sold exported from JMP

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	3555029,5	718041,2	4.95	<.0001*
R2	1.4605269	0.488563	2.99	0.0030*

Source: Own elaboration

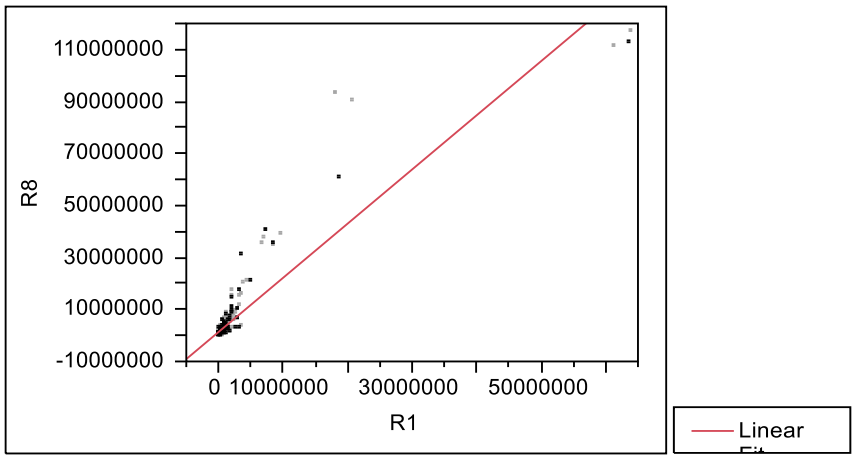

Figure 6 Bivariate Fit of Mean R8 - Production vs. R12 – Personnel expenses
Source: Own elaboration

Table 5 Summary of Fit R8 - Production vs. R12 – Personnel expenses exported from JMP

RSquare	0.836091
RSquare Adj	0.835648
Root Mean Square Error	5481953
Mean of Response	4109051
Observations (or Sum Wgts)	372

Source: Own elaboration

Table 6 Analysis of Variance R8 - Production vs. R12 – Personnel expenses exported from JMP

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	5.6718e+16	5.672e+16	1887.346
Error	370	1.1119e+16	3.005e+13	**Prob > F**
C. Total	371	6.7837e+16	-	<.0001*

Source: Own elaboration

Table 7 Parameter Estimates R8 - Production vs. R12 – Personnel expenses exported from JMP

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	1333988.8	291315.5	4.58	<.0001*
R12	2.0837308	0.047964	43.44	<.0001*

Source: Own elaboration

In the following section of dependence analysis (Figure 8) the critical cost type (R8 - Production) is compared to Taxes and fees (R17). Linear Fit of R8 vs. R17 is as following: **R8 = 2335434,1 + 17,912673*R17**.

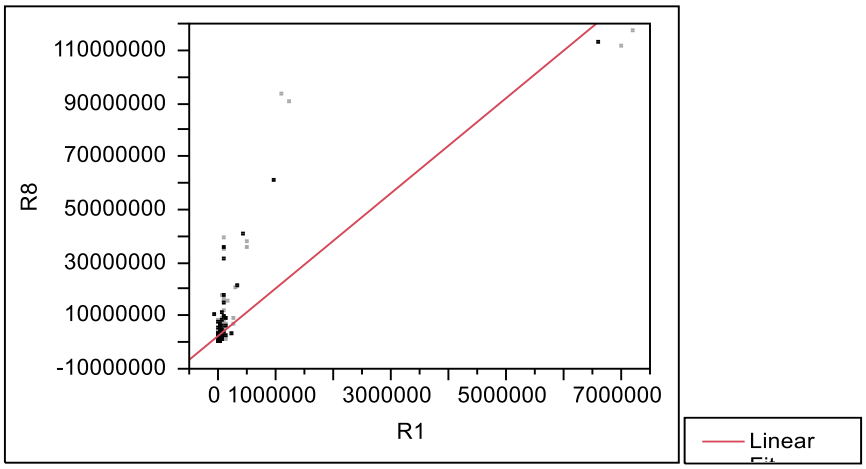

Figure 7 Bivariate Fit of Mean R8 - Production vs. R17 – Taxes and fees
Source: Own elaboration

Table 8 Summary of Fit R8 - Production vs. R17 – Taxes and fees exported from JMP

RSquare	0.691436
RSquare Adj	0.690602
Root Mean Square Error	7521534
Mean of Response	4109051
Observations (or Sum Wgts)	372

Source: Own elaboration

Table 9 Analysis of Variance R8 - Production vs. R17 – Taxes and fees exported from JMP

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	4.6905e+16	4.691e+16	829.1017
Error	370	2.0932e+16	5.657e+13	**Prob > F**
C. Total	371	6.7837e+16	-	<.0001*

Source: Own elaboration

Table 10 Parameter Estimates R8 - Production vs. R17 – Taxes and fees exported from JMP

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	2335434.1	394808	5.92	<.0001*
R17	17.912673	0.622095	28.79	<.0001*

Source: Own elaboration

In the following section of dependence analysis (Figure 9) the critical cost type (R8 - Production) is compared to Amortitzation and value adjustments to non-current intangible assets and depreciation and value adjustments to property, plant and equipment (R18). Linear Fit of R8 vs. R18 is as following: **R8 = 922599,43 + 4,8255497*R18**.

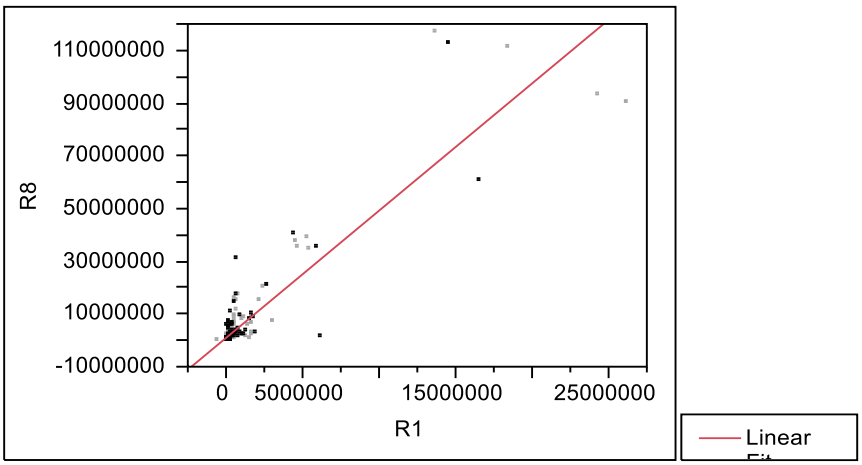

Figure 8 Bivariate Fit of Mean R8 – Production vs. R18 - Amortitzation and value adjustments to non-current intangible assets and depreciation and value adjustments to property, plant and equipment
Source: Own elaboration

Table 11 Summary of Fit R8 – Production vs. R18 - Amortitzation and value adjustments to non-current intangible assets and depreciation and value adjustments to property, plant and equipment exported from JMP

RSquare	0.826238
RSquare Adj	0.825768
Root Mean Square Error	5644318
Mean of Response	4109051
Observations (or Sum Wgts)	372

Source: Own elaboration

Table 12 Analysis of Variance R8 – Production vs. R18 - Amortitzation and value adjustments to non-current intangible assets and depreciation and value adjustments to property, plant and equipment exported from JMP

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	5.605e+16	5.605e+16	1759.344
Error	370	1.1788e+16	3.186e+13	**Prob > F**
C. Total	371	6.7837e+16	-	<.0001*

Table 13 Parameter Estimates R8 – Production vs. R18 - Amortitzation and value adjustments to non-current intangible assets and depreciation and value adjustments to property, plant and equipment exported from JMP

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	922599.43	302343.9	3.05	0.0024*
R18	4.8255497	0.115046	41.94	<.0001*

Source: Own elaboration

In the following section of dependence analysis (Figure 10) the critical cost type (R8 - Production) is compared to Other operating expenses (R23). Linear Fit of R8 vs. R23 is as following: **R8 = 977718,37 + 10,750271*R23**.

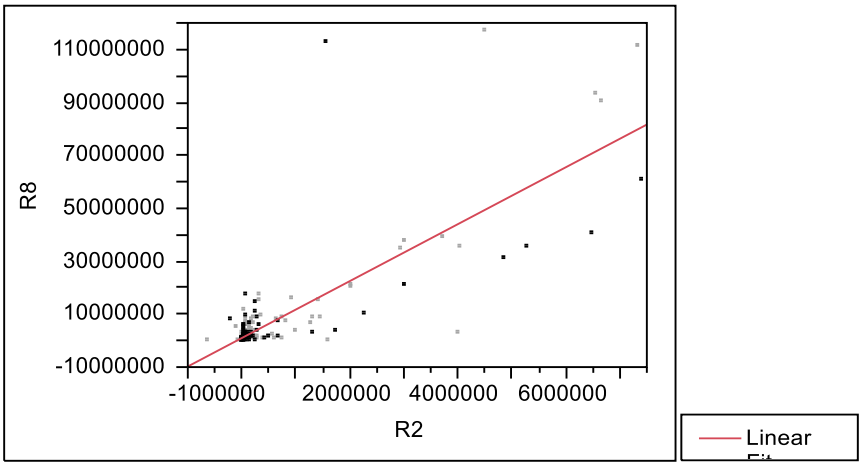

Figure 9 Bivariate Fit of Mean R8 - Production vs. R23 - Other operating expenses
Source: Own elaboration

Table 14 Summary of Fit R8 - Production vs. R23 - Other operating expenses exported from JMP

RSquare	0.661542
RSquare Adj	0.660627
Root Mean Square Error	7877459
Mean of Response	4109051
Observations (or Sum Wgts)	372

Source: Own elaboration

Table 15 Analysis of Variance R8 - Production vs. R23 - Other operating expenses exported from JMP

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	4.4877e+16	4.488e+16	723.1920
Error	370	2.296e+16	6.205e+13	**Prob > F**
C. Total	371	6.7837e+16	-	<.0001*

Source: Own elaboration

Table 16 Parameter Estimates R8 - Production vs. R23 - Other operating expenses exported from JMP

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	977718.37	424701.2	2.30	0.0219*
R23	10.750271	0.399754	26.89	<.0001*

Source: Own elaboration

In the following section of dependence analysis (Figure 11) the critical cost type (R8 - Production) is compared to Interest Income (R39). Linear Fit of R8 vs. R39 is as following: **R8 = 2958260,7 + 12,588943*R39**.

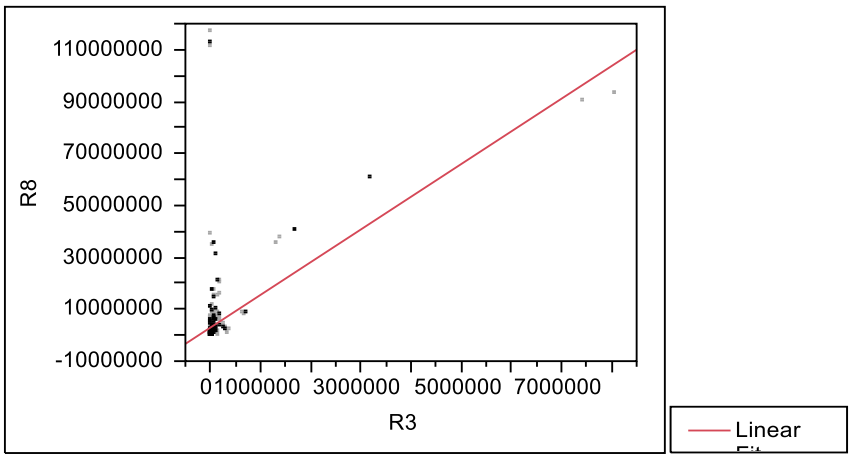

Figure 10 Bivariate Fit of Mean R8 - Production vs. R39 – Interest income
Source: Own elaboration

Table 17 Summary of Fit R8 - Production vs. R39 – Interest income exported from JMP

RSquare	0.317542
RSquare Adj	0.315697
Root Mean Square Error	11185916
Mean of Response	4109051
Observations (or Sum Wgts)	372

Source: Own elaboration

Table 18 Analysis of Variance R8 - Production vs. R39 – Interest income exported from JMP

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	2.1541e+16	2.154e+16	172.1578
Error	370	4.6296e+16	1.251e+14	**Prob > F**
C. Total	371	6.7837e+16		<.0001*

Source: Own elaboration

Table 19 Parameter Estimates R8 - Production vs. R39 – Interest income exported from JMP

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	2958260.7	586557.1	5.04	<.0001*
R39	12.588943	0.959458	13.12	<.0001*

Source: Own elaboration

As input to the regression models were used cost data extractive and mining companies from all over Slovakia. Specifically, the cost values of seven of cost types were collected for the years from 2012 to 2014. Data were homogenized for the purpose of statistical software JMP Pro, which conducted the analysis.

From the output referred to the Figure 6-11 it is apparent that residues around a linear line mainly concentrated up to values in average of 10 million. € on the Y axis, while there is dependence up to values of 500 000 € on the X axis. According to performed structural analysis that takes into account dividing enterprises into four categories according to the size by the EU recommendations, it is the range of values that are characteristic for the category of medium, small and micro enterprises. In the category of large enterprises over the border of above-mentioned values there is no significant dependence recorded. That finding is interesting, especially taking account the

results of the structural analysis which show on the increasing trend of the critical costs in large enterprises.

5 Conclusion

As far as we know, there is no similar research that analyzed the cost types of mining enterprises throughout the country. To a large extent this is surely due to the sensitivity of selected data, which are usually secret of most businesses, especially for conservative companies in Slovakia. The work can not therefore be compared with other detailed research or scientific references which took place in the world.

For this analysis it was crucial to determine, whether the critical cost type could affect the other cost types observed. Based on the models it can therefore be concluded that critical cost type of medium, small and micro mining companies influences the formation of other cost types and in the process of implementation of the key objectives of the strategic cost management it is necessary to focus on this category of extractive and mining enterprises. Critical cost type of large enterprises does not affect by this analyse. Generally said, the costs of large mining enterprises according to this analysis are not relevant with regard to interactions. Costs of Production as a critical cost type and other cost types observed do not significantly related together.

Low concentration of the values wearer of large enterprises may be observed on the diagram R8 - Production and R23 - Other operating expenses. This however does not reach sufficient frequency so it has been such a mild dependence evaluated as insignificant.

The subject of the research was not to determine how critical cost type affects other cost types but only to define the existence of possible dependence. This objective was certainly fullfiled and results have brought the importance to focus on optimizing the cost management especially in micro, small and medium sized mining enterprises.

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Commercial Bank Efficiency: Comparison between Different Systems

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Abstract

In this paper, we use rank-sum statistics to compare efficiencies of decision-making units (banks) from two different systems, Czech and Slovak banking systems, in 2016. The efficiencies are calculated using input-oriented DEA (Data Envelopment Analysis) model under the condition of constant and variable return to scale. The sample includes 19 domestic commercial banks, 8 banks from the Slovak Republic and 11 banks from the Czech Republic. To test the differences of efficiency scores between two different systems the Wilcoxon-Mann-Whitney test could be used. The results of our analysis suggest that the Czech banks have statistically the same distribution of efficiency scores as the Slovak ones, so these two groups can be considered as comparable. Therefore to evaluate banks from these two systems it is not necessary to evaluate them separately, but we can compare them within one evaluation set.

Keywords: Data Envelopment Analysis, Systems model, Bank.

JEL Classification: G21, C14

1 Introduction

A critical part of financial transactions is carried out through commercial banks. That´s why it is necessary to evaluate the efficiency of the process where funds transform from creditors to debtors. Conservative measures as financial ratios are nowadays still present when evaluating the banks´ efficiency. More sophisticated methods are trying to measure the overall efficiency, taking multiple inputs and multiple outputs into account. Data Envelopment Analysis (DEA) is one of them and allows to create a so called reference group of units with the best practice in terms of efficiency and to determine which of the units are inefficient compared to those in the reference group, as well as to provide a measurable scale of the inefficiencies present.

In the process of the commercial bank´s efficiency evaluation there exist very important questions, if the banks from different countries could be evaluated in one estimation set. This question, from a theoretical point of view, was discussed by Cooper et al. (2007). They try to compare efficiencies between two types of Decision-Making Units (DMU), e.g. department stores vs. supermarkets, or electric power industries in the U.S.A vs. those in Japan. They suggest that it is often necessary to test statistically the difference between two groups in terms of efficiency. Since the theoretical distribution of the efficiency score in DEA is usually unknown, they were forced to deal with nonparametric statistics for which the distributions of the DEA scores are statistically independent.

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For this purpose, the rank-sum-test developed by Wilcoxon-Mann-Whitney may be used to identify whether the differences between two groups are significant.

As the main aim of this paper is to compare the technical efficiency of commercial banks from two different banking systems, we try to use methodology suggested by Cooper et al. (2007). In this paper, we applied the input-oriented DEA systems model under the condition of constant and variable return to scale. We adopt the production approach which takes commercial banks as service producers aiming at minimizing operating costs. To fulfil the aim of the paper, the structure of the paper is as follow. The second chapter presents an empirical literature review, describes the methodology and presents the empirical analysis and results. In section 3 we conclude the paper with the suggestions for future research.

2 Comparison of the Slovak and Czech commercial banks efficiency

2.1 Literature review

The earliest techniques usually measure the efficiency of commercial banks through the financial ratios, examined financial statements of individual banks and compared them with a benchmark. Probably the best-known ratios are Return on assets, Return on equity, Capital adequacy ratio, Cost to income ratio, Non-performing loans ratio, Loan to deposit and so on. Application of classical ratios in the process of banks´ efficiency evaluation can be found in the work of Said and Tumin (2011), Bičo and Ganić (2012), Kaur et al. (2015), Srinivasan and Saminathan (2019) and so on.

More recent methods are labelled as methods of the multi-criteria decision, parametric methods and nonparametric methods. In our paper, the nonparametric method, Data Envelopment Analysis (DEA) will be used. There are many existing studies that use basic DEA models to measure technical efficiency, or some extension of basic models to measure cost, profit or revenue efficiency in the Czech and Slovak banking industry. Boďa and Zimková (2015) measured technical efficiency of eleven commercial banks in three sub-periods: 2000-2003, 2004-2008 and 2009-2011. The technical efficiency was also analyzed in the work of Palečková (2017), who found the increase in the average efficiency of the commercial banks within the Visegrad countries during the period 2009-2013. Iršová and Havránek (2011) used information about input and output prices and found a low average cost and profit efficiency in Slovakia during the years 1995–2006. Svitálková (2014), who measured and compared the technical efficiency of bank systems in selected countries in the European Union (Czech Republic, Slovakia, Austria, Poland, Hungary, Slovenia) during the period 2004-2011, concluded that Czech banking sector was among the best efficient countries and the banking sector in Slovakia had the worst performance within the analyzed countries. These findings were confirmed also by Kočišová (2014) who found that the Czech banks were more cost, revenue and profit efficient than Slovak ones during the period 2009-2013. The cost and revenue efficiency was analyzed by Pančurová and Lyócsa (2013), who estimated efficiencies and their determinants for a sample of 11 Central and Eastern European Countries over the 2005-2008 period.

As can be seen, many of mentioned authors used efficiency calculated by DEA and compared banks from different countries. In papers presented by those authors, the commercial banks from different countries were evaluated within the one estimation set. As was presented by Cooper et al. (2007), the efficiencies of commercial banks from different systems could have a different distribution of the efficiency scores. Therefore it is more suitable not to compare them in one

evaluation set but use DEA systems model. To fulfil the gap in the literature in our conditions, we decide to use systems model and rank-sum statistics to compare efficiencies of domestic commercial banks from two different systems, Czech and Slovak banking systems, in 2016.

2.2 Methodology and data

The DEA models assume that the production possibility set *P* is convex and, if two activities (x_1, y_1) and (x_2, y_2) belong to *P*, then every point on the line segment connecting these two points belongs to *P*. However, there exist situations where this assumption is not valid. We assume, that the DMUs under the consideration belong exclusively to one of two systems, i.e. System A and System B (we can consider also more systems).

DEA is used to establish a best practice group of units and to determine which units are inefficient compared to best practice groups as well as to show the magnitude of the inefficiencies present. In this study the units of analysis are banks. Consider *N* banks (DMU_k, $k=1,2,...,n$), each consumes *m* different inputs (x_{ik}, $i=1,2,...,m$) to produce *s* different outputs (y_{jk}, $j=1,2,...,r$). Cooper et al. (2007) proposed a method, named the systems model, in which the technology set consists of two systems. Under this approach the DMUs are divided into two systems: $A = \{a_k,\ k = 1, \dots, N_A\}$ and $B = \{b_k,\ k = 1, \dots, N_B\}$, where $N = N_A + N_B$. Let the DMU under evaluation be represented as DMU_o of which its *i*th input and *j*th output respectively denote x_{io} and y_{jo}. As was presented by Huang et al. (2012) the optimal objective value (θ^*) can be solved through a radial programming problem with z^A and z^B as binary variables. The mathematical expression of the input-oriented DEA model under the condition of constant return to scale is given in the following:

$$\min \quad \theta \qquad (1)$$

$$s.t. \quad \sum_{k \in N_A} \lambda_k^A x_{ik} + \sum_{k \in N_B} \lambda_k^B x_{ik} \le \theta \cdot x_i \qquad i = 1, \dots, m$$

$$\sum_{k \in N_A} \lambda_k^A y_{jk} + \sum_{k \in N_B} \lambda_k^B y_{jk} \ge y_j \qquad j = 1, \dots, r$$

$$\sum_{k \in N_A} \lambda_k^A = z^A \qquad \sum_{k \in N_B} \lambda_k^B = z^B \qquad \lambda_k^A, \lambda_k^B \ge 0$$

$$z^A + z^B = 1, \quad z^A, z^B = 0 \text{ or } 1$$

If the model assumes $z^A = 1$ and $z^B = 0$, then the optimal objective value (θ^A) can be computed. If the model assumes $z^A = 0$ and $z^B = 1$, then the optimal objective value (θ^B) can be computed. The input-oriented efficiency score (*E*) can then be obtained by following formula:

$$\theta^* = \min\{\theta^A, \theta^B\} \qquad (2)$$

When the efficiency is obtained as $\theta^* = \theta^A$, in order to achieve the best practice, the DMU_o should refer to system *A* as a benchmark. When the efficiency is obtained as $\theta^* = \theta^B$, the DMU_o should refer to system *B* as a benchmark to achieve the best practice.

When we would like to compare the efficiency of banks from two different banking systems, it is often useful to test the efficiency difference between two groups statistically. Since the theoretical distribution of the efficiency score in DEA is usually unknown, they were forced to deal with nonparametric statistics for which the distributions of the DEA scores are statistically independent.

For this purpose, the rank-sum-test developed by Wilcoxon-Mann-Whitney may be used to identify whether the differences between two groups are significant. This method is one of the nonparametric statistical tests based on the ranking of data. Given statistically independent data belonging to two groups, this test serves to test whether the hypothesis that two groups have the same distribution of efficiency scores or whether they differ significantly.

Let the data in two groups be represented by $A = \{a_k,\ k = 1, \dots, N_A\}$ and $B = \{b_k,\ k = 1, \dots, N_B\}$, where $N_A \geq N_B$. When then merge *A* and *B* to arrive at a sequence *C* in which the data are arranged in decreasing order. Then we rank *C* from 1 to *R* ($R = N_A + N_B$). If there is a tie, we use the average rank for the tied observation. Next, we sum the ranking of the *A* data and denote the sum by *S*. Then statistics, *S*, follows an approximately normal distribution with mean $N_A(N_A + N_B + 1)/2$ and variance $N_A N_B(N_A + N_B + 1)/12$ for $N_A, N_B \geq 10$. By normalizing *S*, we have:

$$T = \frac{S - N_A(N_A+N_B+1)/2}{\sqrt{N_A N_B(N_A+N_B+1)/12}} \qquad (3)$$

T has an approximately standard normal distribution. Using *T* we could check the null hypothesis that two groups have the same distribution of efficiency scores at the level of significance α. The null hypothesis will be rejected if $|T| \geq T_{1-\alpha/2}$, where $T_{1-\alpha/2}$ corresponds to the upper $\alpha/2$ percentile of the standard normal distribution (Banker et al., 2010).

If $N_A, N_B < 10$ the Mann-Whitney independent group test (U test) must be used. Let the data in two groups be represented by $A = \{a_k,\ k = 1, \dots, N_A\}$ and $B = \{b_k,\ k = 1, \dots, N_B\}$, where $N_A \geq N_B$. The data are again arranged in decreasing order and rank. The sum of the ranking of the *A* data is denoted by S_A and of the *B* data by S_B. To calculate the value of Mann-Whitney U test we use the following formula (Nachar, 2008):

$$U_A = N_A N_B + \frac{N_A(N_A+1)}{2} - S_A \qquad (4)$$

$$U_B = N_A N_B + \frac{N_B(N_B+1)}{2} - S_B$$

$$U = min\{U_A, U_B\}$$

Using *U* we could check the null hypothesis that two groups have the same distribution of efficiency scores at the level of significance α. The null hypothesis will be rejected if $U \leq U_{\alpha/2}$, where $U_{\alpha/2}$ corresponds to the critical value of U statistic at the level of significance α in line with Mann and Whitney tables for a two-tailed test.

In this paper, we try to test the differences of relative efficiency scores between two different banking systems using DEA systems model and rank-sum statistics. The aim is to verify if banks from different countries could be evaluated within one evaluation set, or they must be examined separately. To fulfil the objectives in the first part we analyze the relative efficiency of Czech and Slovak domestic commercial banks, which comprises more than 75% of total banking assets in both countries. We evaluated efficiency only of universal commercial banks; the specialized banks (e.g. central banks, mortgage banks or savings banks) are not involved in the dataset. The dataset consists of 19 banks (11 from the Czech Republic and 8 from Slovakia) in 2016. The term "relative" efficiency refers to the achieved efficiency of the evaluated bank within the group of evaluated banks and under the used criteria. For evaluation of relative efficiency production approach is used.

Under the production approach, the banks are viewed as service producers aiming at minimizing operating costs. After the survey of a number of similar studies, the following set of inputs and outputs for production approach is applied. As the input variable the value of operating costs is used, and as the output variables the values of two main banking products, loans and deposits, are used. The data were extracted from banks´ end-of-year unconsolidated balance sheets and income statements based on international accounting standards. All data were reported in EUR as the reference currency. The data in national currency (Česká koruna – CZK), were converted by using the official exchange rate of the National Bank of Slovakia from 31.12.2016. The calculation was done using DEA Solver-Pro software (http://www.saitech-inc.com/products/prod-dsp.asp) and MS Excel.

2.3 Results and discussion

We adopt input-oriented DEA systems model under the condition of constant (SYS_I_C) and variable (SYS_I_V) return to scale to calculate the relative technical efficiency of selected domestic commercial banks from Czech Republic (CR) and Slovakia (SR) in 2016. The reason for using both techniques (constant and variable return to scale) is the fact that assumption of a constant return to scale is accepted only if all production units are operating at optimum size. In practice, this assumption is impossible to fill, so in order to solve this problem, the efficiency under the assumption of a variable return to scale was also used. The results of the DEA systems efficiency scores are presented in Table 1.

Table 1 Efficiency of the individual banks in 2016

No.	State	Name	SYS_I_C		SYS_I_V	
			Score	Rank	Score	Rank
1	SR	Československá obchodná banka, a.s.	0.4592	7	0.7739	8
2	SR	OTP Banka Slovensko, a.s.	0.4997	6	0.6246	11
3	SR	Poštová banka, a.s.	0.2885	18	0.3531	19
4	SR	Prima banka Slovensko, a.s.	1.0000	1	1.0000	1
5	SR	Privatbanka, a.s.	0.3625	12	1.0000	1
6	SR	Slovenská sporiteľňa, a.s.	0.3343	14	0.5713	13
7	SR	Tatra banka, a.s.	0.4386	10	0.7166	9
8	SR	Všeobecná úverová banka, a.s.	0.2886	17	0.4591	16
9	CR	Česká spořitelna, a.s.	0.2945	15	1.0000	1
10	CR	Československá obchodní banka, a.s.	0.6568	3	1.0000	1
11	CR	Equa bank, a.s.	0.4467	9	0.5100	14
12	CR	Fio banka, a.s.	1.0000	1	1.0000	1
13	CR	J&T Banka, a.s.	0.2430	19	0.3753	18
14	CR	Komerční banka, a.s.	0.5517	5	1.0000	1
15	CR	Moneta Money Bank, a.s.	0.2924	16	0.5060	15
16	CR	PPF banka, a.s.	0.3545	13	0.4223	17
17	CR	Raiffeisenbank, a.s.	0.3974	11	0.6418	10
18	CR	Sberbank CZ, a.s.	0.4520	8	0.5991	12
19	CR	UniCredit Bank Czech Republic and Slovakia, a.s.	0.5612	4	0.8821	7

Source: Calculated by author

Table 1 shows information about the input-oriented efficiency scores and calculated by DEA systems models and ranking of individual banks from the Czech Republic and Slovakia in 2016. Based on the results we can say that process of service production aiming at minimizing operating costs was successfully achieved by two banks under the condition of constant return to scale, and by six banks under the assumption of a variable return to scale. The lowest level of efficiency

within the group and under the variables used was reached under the SYS_I_C by J&T Banka, a.s. (24.30 %) from the Czech Republic and under the SYS_I_V by Poštová banka, a.s. (35.31 %) from Slovakia. As can be seen in the case of Slovak banks under the SYS_I_V model, the largest banks attained lower values of efficiencies compared to smaller one. It means that within the evaluation set, these banks were inefficient due to their non-optimal size. We could see that these banks used a higher level of operating costs to produce the approximately the same level of services (loans and deposits) compared to smaller ones. This situation is no-evident in the case of Czech banks, therefore we can say that they had properly chosen the level of operating costs compared to other banks within the sample.

Table 2 Average efficiency scores in 2016

		SYS_I_C	SYS_I_V
Slovak Republic	Minimum	0.2885	0.3531
	Maximum	1.0000	1.0000
	Average	0.4589	0.6873
	St. deviation	0.2173	0.2194
	No. of banks	8	8
	No. of efficient banks	1	2
Czech Republic	Minimum	0.2430	0.3753
	Maximum	1.0000	1.0000
	Average	0.4773	0.7215
	St. deviation	0.2053	0.2445
	No. of banks	11	11
	No. of efficient banks	1	4
Total	Minimum	0.2430	0.3531
	Maximum	1.0000	1.0000
	Average	0.4696	0.7071
	St. deviation	0.2106	0.2349
	No. of banks	19	19
	No. of efficient banks	2	6

Source: Calculated by author

The “international” and “national” average efficiencies were calculated in both cases. The results are recorded in Table 2. Under the assumption of a constant return to scale, the technical efficiency in the whole sample reached values from 24.30 % to 100 %, the average score was 46.96 % and there were 2 efficient banks. When we look at the banking sectors separately, we can see that in the case of Slovak banks (45.89 %) the level of average efficiency was lower than in a case of Czech banks (47.73 %). Under the assumption of a variable return to scale, the average efficiency in the whole sample was 70.71 %, there were 6 efficient banks and the efficiency of individual banks move from 35.31 % to 100 %. Also in the case of Czech and Slovak banks, the level of average efficiencies in SYS_I_V model was higher. We can see that the level of average efficiency was higher in a model with a variable return to scale. This was caused by the elimination of this part of inefficiency that was caused by a lack of size (non-optimal size) of production units.

In order to find out whether two groups of banks have the same distribution of efficiency scores, we apply the rank-sum test. The null hypothesis is that the two groups have the same distribution of efficiency scores while the alternative hypothesis is that their distributions are different. As the number of the banks within the one group (Slovak banks) is lower than 10, the Mann-Whitney

independent group test (U test) must be used. Following the methodology described in previous the section, the U test was used. The results of the test are provided in Table 3.

Table 3 Rank-sum statistics for banks from different countries

Country (A, B)	No. of banks (N_A, N_B)	Sum of ranking (S_A, S_B)	U statistics (U_A, U_B)	Test statistics min{ U_A, U_B }	Critical two-tailed value of U at α=0.05	Result
DEA systems model under assumption of constant return to scale (SYS_I_C)						
A – Czech Republic	11	85.5	38.5	38.5	19	H0 accepted
B – Slovak Republic	8	104.5	49.5			
DEA systems model under assumption of variable return to scale (SYS_I_V)						
A – Czech Republic	11	83	41	41	19	H0 accepted
B – Slovak Republic	8	107	47			

Source: Calculated by author

The differences of input-oriented technical efficiency calculated via DEA systems model under the assumption of a constant and variable return to scale between the two groups of banks are not significant. The results suggest that the Czech banks have statistically the same distribution of efficiency scores as the Slovak ones, so these two groups can be considered as comparable. Therefore to compare banks from these two systems it is not necessary to evaluate them separately, but we can evaluate them within one estimation set. This could be due to the fact, that from the historical point of view, the Czech Republic and Slovakia formed one state for a long period of time. Therefore, these two states may be considered as very similar with the comparable banking systems.

3 Conclusion

In the paper, it was assessed the efficiency of the banks from the Czech Republic and Slovakia by DEA method. It was used the input-oriented DEA systems model. The production approach was used. We evaluated the efficiency of banks from two banking sectors in 2016. The banks were ranked according to model under the assumption of a constant and variable return to scale. Under the condition of constant return to scale (SYS_I_C), the average efficiency moved from 24.30 % to 100 % and there were 2 efficient banks. Under the condition of variable return to scale (SYS_I_V), the efficiency of individual banks reached values from 35.31 % to 100 % and there were 6 efficient banks. We found out that in the case of Slovak banks the level of average efficiencies in both models was lower than in a case of Czech banks. Also, the level of average efficiency in the model with the assumption of a variable return to scale was higher, as this model eliminated this part of inefficiency that was caused by a lack of size (non-optimal size) of banks.

In the second part of the paper, we examined whether the differences in estimated efficiencies are significant or not. By performing the nonparametric rank-sum-test developed by Wilcoxon-Mann-Whitney we fill the gap in the existing scientific literature by studying differences between the efficiencies of banking sectors measured by the nonparametric method, DEA. The results have shown that the selected banks from both countries have statistically the same distribution of efficiency scores. There is necessary to say, that efficiency calculated via the DEA models is only

relative, so our findings could not be generalized for whole banking sector and for different variables, but are valid only within the defined evaluation set (19 banks) and under the defined input and output variables (operating costs, loans and deposits). The aim of the paper was to point to the fact, that distributions of efficiency scores in different groups of banks could be different, therefore it is necessary to test the statistical significance of these differences using, for example, rank-sum tests. In our paper, the differences were not statistically significant which could be due to the historical development in both countries.

Acknowledgements

This study is a part of the research project VEGA 1/0446/15 financed by the Slovak Scientific Grant Agency.

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Value-added close-up of Slovak industries regarding the search of sustainability

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Abstract

Value-added is encompassed in input-output models. Data on value-added and export will be analysed in order to notice sources of sustainability. Identification of sectors in Slovak Republic can help to establish more sustainability measures in these industries where the value-added is presented the most. Measures were discussed and compared with measures in other countries. The measures were selected based on criteria that measure was fostered by input-output analysis. Application of concept of sustainability together with concept of ratio of value added to gross trade should be taken advantage of in this paper. Possible application of results of this paper are taking into account broader scale of Slovak economy with its linkage between sectors that is marked by the value-added of each. Key outcomes consist of value-added confrontation to sustainability issues in Slovak republic.

Keywords: Supply chains, Value-added, Sustainability, Region, Employment.

JEL Classification: C67, F18, E16

1 Introduction

Mankind is looking for a way to live on the planet and to live in abundant supplies for many generations. It should be natural and easy. However, change of generations and their lifestyles had brought about issue of sustainability of sources. Thus it is more difficult to achieve the life of abundant supplies for all consumers. Value-added is a factor that influences supplies, but does it also influence sustainability? If so, to what extant? Addressing of this issues has been already challenged in various ways such as in a perspective of consumer's theory.

Consumers theory mostly concentrates on their preferences – what they wish. In language perspective it has a positive meaning. The positive meaning can be also ascribed to negative wish – that is something we do not wish. To put it simple consumer wish is not to see any waste, garbage, not to posses something(Peters & Hertwich, 2008). Problems of waste in any production process and consumption was observed and studied for instance in terms of various footprints: emission, consumption-based (CBF), community-wide infrastructure footprint. Input-output (IO) models are being tested to develop CBF, Supply chain greenhouse gas emission footprint(Chavez), specifically it was downscaled IO data for smaller areas. Although the modelling shall be used with caution,the modeling can help governments to re-arrange policies for supply-chains infrastructure as well as

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consumption linked for instance with human health risks.*"CBF can promote sustainable local consumption behaviour..."*(Feng, Siu, Guan, & Hubacek, 2012; Lin, Hu, Zhao, Shi, & Kang, 2017) Both papers Chavez and coauthor and Lin and coauthors were using Multi-region input-output – MRIO model.

Nine authors of the first referred paper from four countries were tracking down the carbon footprints of cities and its settlement. Second referred paper in this paragraph having similar coauthors, were using IO analysis with result of influencing standardisation of footprints (Minx et al., 2013; Wiedmann, Minx, Barrett, & Wackernagel, 2006) and in this way also influencing sustainable behaviour of companies and industries as such. All quoted papers and also papers not cited here shed some light on the empirical relevance of this text and its goals.

Against this backdrop Slovak sectors and its supply chains are examined in this paper. "Supply chains can be described as a system of value-added sources and destinations."(Koopman, Wang, & Wei, 2014) Value-added is considered to be better gauge of trade among various geographical areas, be it regions or countries. While value-added itself does not have to provide total information, but combining it with other variables such as gross trade achieving ratio has a substantial differences (Brakman & Van Marrewijk, 2017). Other variables can be export or various footprints as it was mentioned. Sustainability is integrating those variables, i.e. economic variables and rather environmental variables. In other words; the World Business Council for Sustainable Development claims: *"Corporate Social Responsibility is the continuing commitment by business to behave ethically and contribute to economic development while improving the quality of life of the workforce and their families as well as of the local community and society at large"*(Development & Institute, 2001). This is how the paper understands sustainability in further text, while it is focused on Slovakia and its participation in global production chains.

The need to help them develop new patterns of production and consumption shall be evident. What is more difficult, it is which tools to use. This text tried to see value-added as a tool for searching sustainability. The goal of the paper is to present results for area of Slovak republic in year 2011. Each industry is evaluated by its contribution to exports. Outcomes of the value-added comparison to exports confirm the rise or a fall of some industries in Slovak Republic. For instance, stagnation in sector of Agriculture, fall in Textile sector, rise in Motor vehicles. Results were to enrich the perspective of use of the IO methods. Limitation is evident at the very beginning, there are more methods to be explored as well as time series of the data and so forth.

2 From value added to sustainability or vice versa

Value-added in the input-output analysis ranges from value-added inputs to industry from primary factors such as capital and labor to depreciation and rental payments as well as normal profits of business and taxes. (Miller & Blair, 1985; Perez-Batres, Miller & Pisani, 2010) Value-added enables creating Social Account Matrix that this text believes is providing a reflection on sustainability.

The fragmentation of production allows value-added to stand out as a marker of bilateral and multi-country production chains. This gives rise to the ratio of value added to gross trade (VS), which has a declining trend (Johnson & Noguera, 2012; Grancay, Grancay, Drutarovska, & Mura, 2015).

Coming out from IO framework, the value-added is found in organizing data according to the following equations(Hummels, Ishii, & Yi, 2001; Johnson & Noguera, 2012):

$$y_{it}(s) = \sum_{j} f_{ijt}(s) + \sum_{j}\sum_{s'} m_{ijt}(s, s`) \qquad (1)$$

where, $y_{it}(s)$ is the value of output in sector s of country i, $f_{ijt}(s)$ is the value of final goods shipped from sector s in country *i* to country *j*, and $m_{ijt}(s, s')$ is the value of intermediates from sector *s* in country *i* shipped to sector $s`$ in country *j*. After rearranging equation (1) one with Leontief inverse the second equation is a close-up on value added.

$$y_t = \sum_{j} (I - A_t)^{-1} \tilde{f}_{jt} \quad \text{with} \quad \tilde{f}_{jt} \equiv \begin{pmatrix} \\ f_{1jt} \\ f_{2jt} \\ \vdots \\ f_{Njt} \end{pmatrix} \qquad (2)$$

where $\tilde{f}_{jt}$ is the vector of final goods absorbed in county j, sectors - S by countries N assigning the destination of goods. This approach is building on the vertical specialization calculated as shown in equation 3, where VS means vertical specialization in country *i* and sector *s*.

$$VS_{is} = \left(\frac{imported \text{int} ermediates}{grossoutput} \right) \bullet \exp orts \qquad (3)$$

Next the text focused on Slovakia and its participation in global production chains. This aim was achieved by discussing data of OECD Inter-country I-O Database 2016 - ICIO. The industry classification of the database (2006 and 2002 editions) is based on the ISIC Rev.3 systems, meaning that it is compatible with the OECD and its structural analysis (STAN) industry database. The components of Value added were understood according to Yamano (Yamano & Ahmad, 2006).The research framework is based on combination of already described IO framework (part 2.1) and research of environmental issues (part 2.2) in order to capture sustainability within the sectors of higher or lower value-added.

2.1 Value-added close-up to Slovak sectors

Value-added data are in appendix shown in Table 1 as an example, while figure 1 (Team, 2013) compares this data with export data of each sector. Based on calculation of ratio of value-added on export the industries / sectors could be evaluated as follows: Agriculture, hunting, forestry and fishing–3.43%, once very active industry Textiles, textile products, leather and footwear in 2011 hardly reaches 0.91%, sector of Wood and products of wood and cork 1.17% Fabricated metal products 3.12%, Machinery and equipment 1,65%, Motor vehicles, trailers and semi-trailers3.25%, Electricity, gas and water supply 4.65%, Construction 8.60%, Wholesale and retail trade; repairs 14.41%, Hotels and restaurants 1.21%, Transport and storage 5.41%, Real estate activities 6.67%, R&D and other business activities 6.35%, Public admin. and defense; compulsory social security 7.31%.

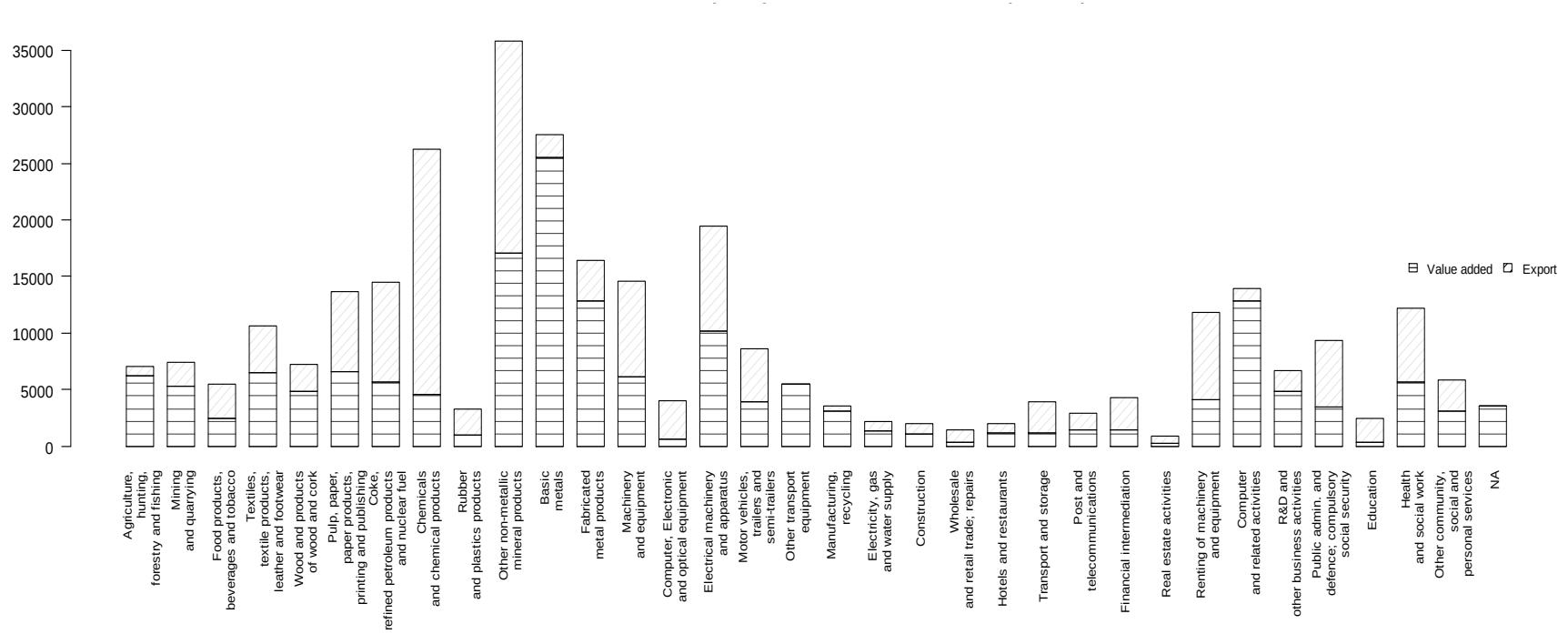

Figure 19 Value-added and export by sectors in Slovak republic in 2011 (Mill. USD)
Source: Adapted from http://oe.cd/icio/. Copyright 2016 by OECD, STAN database.

The most significant in this ratio was sector Wholesale and retail trade; repairs. The least significant was Other transport equipment with 0.31%. For instance, carbon intensive sector such as Mining and quarrying (evaluated for 0.54%) can be supported more with eco-labelling and thus gain better position in exporting.

2.2 Sustainability reflections on value-added in terms of selected sectors

Sectors with the highest ratio of value-added on export shall be the ones that are fostered the most for its sustainability potential. As illustration will serve two following industries.

Sector of Agriculture, hunting, forestry and fishing and sector of Wood and products of wood and cork: Novák and coauthors state that the recovery of countryside is rapid after the deforestation of pasture land (Novák, Pavlů, & Ludvíková, 2013; Grancay, Grancay, Drutarovska, & Mura, 2015). Contrary to this paper Haigh and coauthors state that Slovakia is a case, where the headwater deforestation has a chain reaction in declaiming agricultural effectiveness (Haigh, Jansky, & Hellin, 2004). Further use of IO models in this sectors can be found in several papers, such as provided by Dhubhain and coauthors and Wu and coauthors. First one upon IO models and analysis were able to have good insights on scenario analysis for forestry in England and Wales. The later made even deeper analysis for meteorological services and its dependency with other industries in Jiangxi province of China, again using IO models (Dhubhain, Flechard, Moloney, & O'Connor, 2009; Wu et al., 2014).

Sector of Motor vehicles, trailers and semi-trailers: In Slovakia it is a sector that attracts employees in last few years. To identify all suppliers in the automotive industry chain is not easy for the components are from diverged sectors (Helper & Kuan, 2017; Veloso & Kumar, 2002). Divergences were reported in Central Europe manufacturers such as misreporting of local content and local production (Humphrey & Memedovic, 2003; Woolliscroft, Caganova, Cambal, Holecek, & Pucikova, 2013). Nonetheless, the increasing trend of passenger cars exports is evident.

Further general implication can be found in paper by Hertwich and Peters, who include Slovakia into their research of OECD countries (Hertwich & Peters, 2009). This can be seen a prospect for future research.

3 Conclusion

The determinants of production fragmentation are specific to each country. So are consumers` behavior determinants and their attitudes to products. Connection of production processes stretches across several countries thus the sustainability is also stretching. An example of this are externalities usually negative ones, such as carbon dioxide emission. “Production-based accounts represent a single point in the value chain of fossil fuels, which may have been extracted elsewhere and may be used to provide goods or services to consumers elsewhere.” (Davis, Peters, & Caldeira, 2011) One exports also without intention to do so, e.g. externalities of carbon dioxide.

Some recommendations were suggested by pointing out the praxis of other countries, such as using scenarios supported by IO models. Scenarios for governments applying measures, e.g. to prevent deforestation directly or indirectly. The indirect measure would be imposing rules for sectors that have linkage on forestry. These linkages are proven by IO analysis. This offers a realm of future search for opportunities in finding ways to sustainable development. This text has limitation in

very small scale of analysis and its advantage is in acquiring one set of data for pure IO analysis. To combine this set of data with ones on environment would allow more insights and combinations of recommendations. Possible application of results of this paper are taking into account broader scale of Slovak economy with its linkage between sectors that is marked by the value-added of each.

Acknowledgements

This paper was written in connection with scientific project VEGA no. 1/0961/16. Financial support from this Ministry of Education's scheme is also gratefully acknowledged.

Appendix

Table 3 Value added in Slovakian manufacturing by sector, 2011 (Value added at basic prices + taxes less subsidies on intermediate products, in US Dollars Mill)

Agriculture, hunting, forestry and fishing	3056.9334
Mining and quarrying	483.1021
Food products, beverages and tobacco	1327.5583
Textiles, textile products, leather and footwear	810.7594
Wood and products of wood and cork	1042.5816
Pulp, paper, paper products, printing and publishing	977.8049
Coke, refined petroleum products and nuclear fuel	305.3930
Chemicals and chemical products	1152.7266
Rubber and plastics products	1167.9466
Other non-metallic mineral products	853.3520
Basic metals	1121.9503
Fabricated metal products	2776.3149
Machinery and equipment, nec	1468.4797
Computer, Electronic and optical equipment	1477.5276
Electrical machinery and apparatus, nec	1407.0679
Motor vehicles, trailers and semi-trailers	2896.9129
Other transport equipment	284.4062
Manufacturing nec; recycling	643.0227
Electricity, gas and water supply	4142.2093
Construction	7653.4442
Wholesale and retail trade; repairs	12828.0068
Hotels and restaurants	1079.5952
Transport and storage	4816.5691
Post and telecommunications	1899.7553
Financial intermediation	3411.6795
Real estate activities	5941.8414
Renting of machinery and equipment	334.6610
Computer and related activities	2079.2130
R&D and other business activities	5652.8049
Public admin. and defence; compulsory social security	6505.2731
Education	3078.1697
Health and social work	2749.0032
Other community, social and personal services	3552.8688
NA	0.0000

Source: Adapted from http://oe.cd/icio/. Copyright 2016 by OECD, STAN database.

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University technology commercialization: case study of the Pittsburgh University

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Abstract

Successful transfer of new technologies from research laboratories to the commercial sector brings with it several benefits, either in the form of increasing wealth, increasing new jobs, strengthening a university position, or by creating innovative solutions to socio-economic problems. Since the passage of the Bayh-Dole Act in 1980, universities across North America have proactively pursued initiatives aimed at the university technology commercialization activities. One of such university, the University of Pittsburgh, belongs to one of the nation's top research universities. With its programs aimed at supporting innovation and entrepreneurship, the University of Pittsburgh has received patents on more than 80 inventions. The aim of the paper is to present a model of how knowledge transfer is organized and how setting up spin-off companies is carried out at the University of Pittsburgh. The presented case study can serve as a best practice example for other universities that are in the process of establishing institutional framework for commercialization of university research.

Keywords: Commercialization, Patent, Bayh-Dole Act, Spin-off, Knowledge transfer.

JEL Classification: O31, O34

1 Introduction

A crucial part of the technological and financial growth of the U.S. is the transfer of technology from research laboratories in American universities to commercial market place. In the U.S., legislative initiatives such as the Bayh-Dole Act of 1980 helped accelerate the rate of diffusion of new technologies from universities and federal laboratories to firms (Lockett et al., 2005). Bayh-Dole Act, which came into law in 1981, enabled universities rather than federal funding agencies to claim the intellectual property generated by research funded by the U.S. government (DeVol, Lee & Ratnatunga, 2017). Prior to 1980, the federal government retained the licenses to all patents granted to universities using federal money to support their research (Rhines & Levenson, 2005). Therefore, the extant literature has focused on patenting activities (Nelson, 2001) and operations of university technology transfer as a university-specific response to the Bayh-Dole Act (Sharma, Kumar, & Lalande, 2006). The universities across North America try to supplement their basic research with more applied research and thus, translate university based research into commercializable results. They proactively pursuing university technology commercialization by setting up their own technology transfer offices (TTOs) that actively seeks, registers, and patents intellectual property, and manages the commercialization of their discoveries (Bozeman, 2000). In a commercialization survey conducted by the Association of University Technology Managers

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(AUTM), in 2015, United States academic institutions generated over 25,313 disclosures, obtained over 6,680 new patents, executed over 6,395 licensing agreements, formed over 1000 start-up companies and generated $2,52 billion in license income (AUTM, 2015). A number of researchers (Fisher 1998, Leute, 2005) point out how Stanford University has played a prominent role in the growth of the Silicon Valley while other researchers concern with the development of the Route 128 to the presence of MIT (Saxenian, 1996; Shane & Stuart, 2002). However, there exist other universities that are successful at technology transfer and commercialization. One of such university, the University of Pittsburgh, is among one of the nation's top research universities. It remains fully committed at the highest levels to supporting innovation commercialization as a part of its educational mission. The University belongs to the top 25 universities based on Technology Transfer and Commercial Index with an index score of 87.73. The University is 24th, up from 35th in 2006 (DeVol, Lee, & Ratnatunga, 2017). This Index serves as a metrics-based benchmark for assessing the relative position among peers and for recognizing best practices. This index is measured using four-year averages (2012-2015) for four key indicators of technology transfer success: patents issued, licenses issued, licensing income and start-ups formed. The paper aims to present a model of how knowledge transfer is organized and how setting up spin-off companies is carried out at the University of Pittsburgh. It can serve as a best practice example for other universities that are in the process of establishing institutional framework for commercialization of university research. The remainder of this paper is organized as follows. Section 2 describes the historical milestone of the University of Pittsburgh. Section 3 outlines the process of commercialization. The final section consists of preliminary conclusions.

2 History of the University of Pittsburgh

The University of Pittsburgh is a state-related research university, founded as the Pittsburgh Academy in 1787, February 28th. The University was one of the largest institutions of higher education in Pennsylvania. In 1908, the Western University of Pennsylvania changes its name to the University of Pittsburgh. There were a few reasons: the old name gave no hint as to the University´s location, the University´s acronym of WUP was thought to be undignified; shorter name was desirable and some people mistakenly believed the University was a western branch of the University of Pennsylvania. The University of Pittsburgh, as one of the nation´s research universities, is determined to continue with supporting innovation commercialization as part of its educational mission. The university´s mission includes providing of entrepreneurial education, patent protection, business opportunity development, innovation licensing, and the ongoing pursuit of start-up companies. Facilitating the broad range of this endeavour is the University´s Office of Technology Management (OTM), which serves as the hub of all innovation development and commercialization here at the University, and the Office of Enterprise Development, Health Sciences (OED), which provides business development services for the University´s technology commercialization efforts (OTM, 2010). These institutions collaborated with Pitt Innovators to explore and develop the commercial potential for their research and ideas, helping to transform them into products and processes for the innovators´ benefit and for the benefit of the University. The University is also a member of the Association of American Universities (AAU).

In developed urban area like Pittsburgh, a city previously dominated by manufacturing industries, the University of Pittsburgh Medical Center (UPMC) has become one of the city´s largest employers. Till 1960, Pittsburgh´s largest employers were US Steel, LTV Corp, Crucible Steel and Gulf Oil among others, but in the late 1980s, job growth in Pittsburgh came from health care,

professional services, financial services, and education. The city has also hosted over a dozen life science start-up companies. These companies benefit from the knowledge and research experience generated by the University of Pittsburgh (Gannon, 2008). University of Pittsburgh and its affiliate: The University of Pittsburgh Medical Center (UPMC), have been major contributors to that economic sector; the eds and meds sector now is responsible for more than one out of every five local jobs. The University's research has been a key source of economic growth, and since 1995, the University of Pittsburgh has attracted nearly $9,5 billions of sponsored research support into this region (TrippUmbach, 2014). The University's research operations make tangible and quantifiable economic contributions. The University's scientists are contributing to new product development and technology commercialization.

2.1 A historical milestone – the Bayh-Dole Act of 1980

Labor productivity growth was between 1960-1972 approximately three times lower in the U.S. than in Japan, which was the main trading partner for U.S. As a potential explanation of this situation, the authors emphasize the lack of technological innovation (Cullison 1989; Hornstein & Krusell, 1996). In spite of the fact that federal spending for supporting scientific university based research was significant (Britt, 2011), the most of federal expenditure was used to support primarily basic research, not being performed in the private sector. As a result only 5% of government owned patents were used in the private sector, albeit a portion of the intellectual property portfolio had a potential for further development (Schacht, 2012). That time the U.S. government had the rights to all inventions produced by universities using government funding. As many government agencies hesitate to relinquish ownership of the patents to universities or industry, the process of technology transfer slowed down (Rhines & Levenson, 2005). There was a need for the coherent patent policy supporting the process of technology transfer (Tseng & Raudensky, 2014). Therefore, the U.S. Congress in 1980 enacted the Patent and Trademark Law Amendments, more commonly known as the Bayh-Dole Act. This legislation shifted the rights to intellectual property generated using government funding from the funding agencies to the universities (Carlsson & Fridh, 2002). The university is also required to share a portion of the royalties from the invention with the inventors and must use a portion of the royalties for laboratory purposes. The Bayh-Dole Act decreased difficulties faced by universities and small businesses seeking to retain the ownership of the technology developed with federal research money (Sharma, Kumar, & Lalande, 2006).

Since this more and more universities have become actively involved in the transfer of technology. Before the Bayh-Dole Act, patenting business was connected with a high fixed cost thus, only a few universities considered worthwhile to get into this issue (Carlsson & Fridh, 2002). The Act opened up the possibilities for universities to explore their technology transfer to a larger extent. The ability of the University of Pittsburgh to retain title to and actively license these technologies serves as a tremendous incentive. In response to the U.S. Congress' Bayh-Dole Act the University of Pittsburgh developed its first technology transfer policies and established its technology transfer office in 1996 (OTM, 2010). The University's Office of Technology Management (OTM) serves as the hub of all innovation development and commercialization at the University. Besides this, the affiliated Office of Enterprise Development, Health Sciences (OED) also oversees commercialization of University intellectual property (Barlow, 2010). In 2013, the University launched the Innovation Institute bringing together OTM, OED and Institute for Entrepreneurial Excellence (IEE). The Innovation Institute continue to facilitate the translation of research into innovations and start-ups that change the world (Innovation Institute, 2014).

2.2 A historical milestone – setting up the Office of Technology Management (OTM)

The mission of the office is to facilitate the development of products and processes from University technology for the benefit of the University; its staff, and students; and community (OTM, 2010). The office has undergone many changes since its first release in 1996. OTM began with three licensing professionals and two support staff in 1996, when it was established. That year, the University received 46 invention disclosures from faculty members for patenting and licensing consideration and received patents on 10 inventions and executed six licenses for its technologies, including licenses to two start-up companies (OTM, 2010). The office employed several new licensing and support staff/professionals to support the growing number of sophisticated ideas being submitted to OTM for commercial purposes combined with a more business-oriented approach. In 2000, OTM underwent a major transition, implementing a more business-like commercialization endeavour, which meant seeking patents for innovations with the most commercial potential. The office also implemented strict licensing policy. The policy succeeded in reducing patenting expenses while increasing the number of stronger licensing deals with improved long-term potential, but on the other hand some faculty was reluctant to participate at all in the commercialization process. In 2005, OTM undertook another significant transition by adopting a more service-oriented approach to commercialization process with more faculty-friendly approach. This organisation employs intellectual property protection experts, specialized licensing managers, business development and technology marketing professionals, education and outreach teams, reporting and compliance personnel with the aim to manage the University´s fast-growing commercialization activities. Technology commercialization process at the University can be described by the following diagram (Figure1). The University prepared the document "The Pitt Innovator´s Guide to Technology Commercialization" for supporting this process.

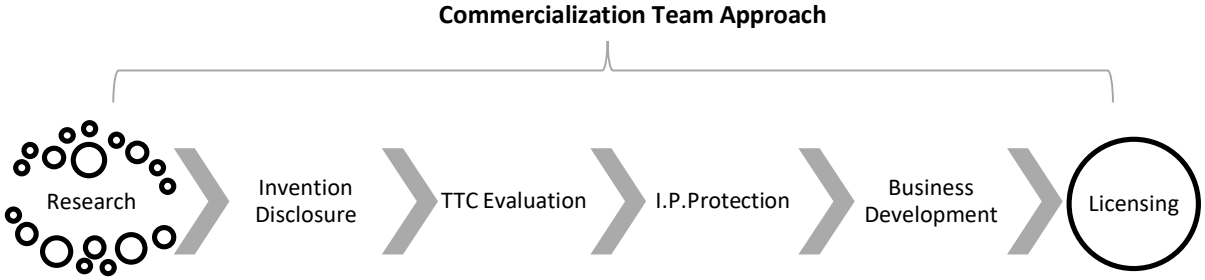

Figure1 Commercialization process at the University of Pittsburgh
Source: OTM (2014)

Every innovator before the publishing his data, present it at a conference, or otherwise share his ideas with outside parties, have to submit an invention disclosure to OTM for consideration. This invention disclosure simply allows innovator to share enough detailed information about his innovation with OTM to allow OTM and an independent committee of Pitt administrators and faculty peers, known as the Technology Transfer Committee (TTC), to evaluate its commercial potential[3]. The University's Technology Transfer Committee consists of University administrators and faculty members, meets monthly to determine the commercial merits of the submitted invention disclosures and decides in which innovations the University should invest its limited

[3] The University claims ownership and control of the worldwide patent rights that result from the research conducted by faculty, staff, and students – particularly if the federal government has funded the work wholly or in part.

time, money and others resources. The committee historically approves moving forward towards commercialization on approximately 55 percent of all those innovations submitted to OTM in a given year. TTC typically considers three main criteria in determining an innovation´s commercial merit: if idea is protectable, if the patent protection is on innovator´s idea enforceable and if the innovation is licensable. The committee considers also other considerations such as level of intellectual property protection, related industry research and development activity, innovator participation in the commercialization process, development status and projected time to market and innovation validation and performance. Innovator can protect his innovation from public disclosure by invention disclosure, which will ensure that innovation will be considered for patent protection at the earliest opportunity; confidentiality agreements signed by outside parties prior to discussion of inventions (the copy of agreement will be on the Innovation Institute Web site) or by material transfer agreements (this agreements will protect from misappropriation, misuse or infringement any material that innovator send to other research organizations for their own commercialization efforts using innovator´s materials).

The University, as determined by the Technology Transfer Committee and the Office of Technology Management, may choose to waive all rights to file a patent on a particular invention or to pursue licensing of such invention, electing instead to grant the inventor permission to proceed on his or her own in whatever manner the inventor deems appropriate. The policy of the patent rights and technology transfer is written at the document "University of Pittsburgh Policy 11-02-01, revised on year 2005". The university has Patent Rights Fund. This fund has been established to provide resources to obtain patents and maintain them and for filing and maintaining them in foreign countries. In general, the balance of proceeds from any license, sale or other amounts derived from the transfer of patent rights or unpatented intellectual property will be distributed as follows: 30 % to the inventor(s), 30 % to the above "Patent Rights Fund", 10 % to a "University Development Fund" to provide resources to enhance the academic enterprise of the University and/or to develop patentable material under the direction of the Provost and the Senior Vice chancellor for the Health Sciences; 15 % to the department of the inventor, 15 % to the OTM (OTM, 2014). The next step in the commercialization process is business development. The Innovation Institute provide business planning and strategy; market research; targeted innovation marketing; start-up development; industry/investor relationship development; and financial resources to facilitate proof-of-concept and prototype development and other business assistance. The goal of the University is to find an industry partner or start-up company willing to license the innovations and take them to market. The University does not sell its intellectual property. At the University of Pittsburgh, there are three most common paths of commercialization efforts: licensing the technology to an industry partner; licensing the technology to an existing startup company or creating a startup company to take the innovation to market (OTM, 2014).

2.3 A historical milestone – setting up the University of Pittsburgh Innovation Institute

Established in 2013, the University of Pittsburgh Innovation Institute is the University's hub for innovation and entrepreneurship. The Innovation Institute provides a comprehensive suite of services for university innovators, from protecting intellectual property to commercializing new discoveries. The institute also provides a wealth of educational programming, mentoring, and networking for university´s faculty, students, and regional small businesses. This institution is the umbrella organization also for the Institute for Entrepreneurial Excellence (IEE), which helps businesses to harness the power of innovation, collaboration, and knowledge to increase profit

margins; creates jobs etc. The Innovation Institute through Pitt Ventures has created a series of programs that take inventors and entrepreneurs through each step of the commercialization process to ensure a higher likelihood of commercial success.

In year 2014, OTM received 274 invention disclosures from Pitt Innovators for commercial consideration. Also, OTM executed 150 licenses / options for Pitt technologies, bringing the cumulative total since 1996 to 1,122 in year 2014. This includes six new startup companies launched by the University in the year 2014 as a result of OTM and OED´s efforts, boosting the startup total to 104 startups launched since 1996. The University experienced another record year in the number of new U.S. patents issued to Pitt for its innovations. The U.S. Patent and Trademark Office awarded the University 74 patents (45% increased from year 2013). Since 1996, the University has built up a portfolio of 615 patents based on Pitt innovations – 244 of them over the past five years alone. The Institute´s commercialization activities resulted ultimately in the generation of $41.8 million in revenue for the University in fiscal year 2014 (that figure does include a onetime payment to Pitt of $35.6 million as the result of a patent infringement settlement from Varian Medical Systems, Inc.; also included $4.2 million in other licensing revenue and $2 million in patent expense reimbursement). In fiscal year 2017 (till today), the University posted all-time highs for startups (15), patents (102) and invention disclosures (329). In total, Pitt innovators received more than $4.2 million in pre-commercialization funding from sources across the University including other programs and funds, such as Innovation Institute´s First Gear commercialization program etc. (Table 1).

Table 1 Activities of the University of Pittsburgh Innovation Institute

Fiscal Year 2014			
$697,6 Million in sponsored research funding received by Pitt researchers to support world-class discovery and innovation	**$41,8 Million** in total revenue from Pitt´s commercialization activities	**646 business owners** counseled about business growth issues for a total of 6294 hours	**$10,58 Capital** attained by local businesses with help from the Institute´s IEE
274 Invention disclosures received	**74 U.S. Patents** issued for Pitt innovations, a new record, boosting Pitt´s patent portfolio to 615 issued U.S. patents	**55 Local Entrepreneurs assisted in starting or buying new businesses**	**512 local jobs created/retained**
150 license/options completed for Pitt innovations to outside partners including startups	**104** cumulative Pitt-based **startups since 1996**	**Pitt spinout companies:** Western Oncolytics, Ltd. Diamand Kinetics, Inc. Nanovision Diagnostics, Inc. UbiCue, Inc. Sofregen Medial, Inc.	6 s startups companies launched around Pitt **innovations**
Fiscal Year 2017			
329 Invention disclosures	**146 license/options**	**102 U.S. Patents** issued	**$6,2 Million Revenue**
4 Number of UPMC alliance agreements	**29 Total number of startups formed**	**143 Startups since inception**	**253 Number of other agreements**

	(15 Startups formed Pitt licensed; 14 startups formed student-run)		
85 New companies formed or purchased	**932 businesses** served 9650 hours of business consulting	**729 jobs created or retained**	**$17306044 Sales increase $13572075 Amount of financing and equity secured**
$4238978 Total amount of pre-commercialization gap funding deployed	**1289 PITT** inventors served	**1959 PITT innovators served**	**2897 Number of people** who have participated in IEE business enhancing programs

Source: PITT Innovation Institute, 2014-2017

The University of Pittsburgh strives to spin-off new start-up companies each year around Pitt innovations. Sometimes, the innovators have left the University and they have participated in these new ventures actively. In the other hand, academic staff have a chance to stay at the University. The University of Pittsburgh maintains a list of rules aimed at protecting it from serious conflicts of interest. Innovators / academic staff cannot hold more than 20% equity in the start-up (collectively); he cannot serve as the principal investigator for sponsored research funded by the company; can´t hold a seat on the board of directors, which requires fiduciary responsibility and cannot serve in a management position at the company.

3 Conclusion

This article discusses the role of university in the commercialization process and the establishment of spin-off companies by the example of the University of Pittsburgh. Universities are a source of competitive advantage and create new jobs and opportunities for industry. It is therefore needed to develop research results that would be sufficient for industrial exploitation. The article presents how academic research can be transformed into economic value by the creation of new ventures. It identifies key milestones that have influenced the shape of commercialization process at the University of Pittsburgh and describes what policymakers and university authorities have to take into account during the process of developing an appropriate licensing policy. The paper thus, provides some guidelines for universities that are in the process of establishing institutional framework for commercialization of university research.

Acknowledgements

This paper is supported by the APVV-14-0512 project and the Slovak Research and Development Agency "Universities and economic development of regions – UNIREG"

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Income inequalities of pensioner households with a focus on old-age pensions in SR

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Abstract

The ageing of the Slovak population has become an obvious reality, with a response from several areas of economic policy, not excluding the pension system. An urgent problem in terms of the absolute and relative rise of pensioners (elderly people) is to ensure a decent old age for all income groups of elderly people through an adequate level of retirement pensions, compared not only to their previous wage levels (replacement rates problem) but also to the wage levels of people of productive age. That's why changes in the pension system, as well as in other social protection subsystems, which summarily contribute to the protection of older people from poverty, are and will be necessary under these new conditions. This paper analyses the development of differences between the individual incomes of pensioners and the incomes of pensioner households and describes some framework changes to the pension system, which should help to optimise income solidarity, in order to reduce poverty and material deprivation of elderly people.

Keywords: Income inequality, Consumption, Solidarity, Pension system, Pensions.

JEL Classification: H55, D63

1 Introduction

The examination of income differences has been given due attention in both world and domestic literature. From world literature, the work of Stiglitz (2012) cannot be omitted, in which he focused on the issues of income differences on a worldwide scale under the conditions of globalization. On the other hand, Atkinson's latest study (2015) is a guideline for shaping more specific economic and social policies of individual developed countries, not excluding the countries of the European Union, aimed at eliminating income inequalities. Domestic authors focusing on the issue of income differences in the long-term are Pauhofová (2016) and Želinský (2012). At present there is still relatively little attention given to the issue of income inequality of elderly people in Slovakia; authors address this in the paper of Dováľová and Košta (2016).

At the beginning of 2004, a new Social Insurance Act (Act No. 461/2003 Coll.) entered into force in Slovakia, which included a new point system for calculating old-age pensions in the first (pay as you go) pension pillar. In addition, a second, capitalization pension pillar based on the personal savings of the savers, was introduced into the pension system. It was assumed that a part of pensions from the second, capitalization pillar would be paid to individual savers only after a longer period. The first parts of pensions forming the second pillar were paid in 2015, i.e. after ten years of

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savings. The development of savers' annuity in 2015 and 2016 confirmed that financial institutions are too risk-avoiding and offer low old-age pensions from the second pillar. Therefore, the Ministry of Labour and Social Affairs and the Family of the Slovak Republic amended the rules for the payment of saved funds on personal accounts in the second pillar (called the annuity amendment) in the form of "programmed withdrawal".

A significant change in the first pension pillar compared to the past was an increase in the merit principle, which increased the replacement rate of productive age income, especially for people who earned higher wages during their working lives. In the first few years after the introduction of the new pension system, the differences in pensions and incomes of pensioner households started to deepen, and the Slovak governments have gradually responded to this by making several changes to the Social Insurance Act aimed at increasing solidarity between high-income and low-income groups. Higher solidarity in the income (pensions) of older people takes two basic forms. The first form of solidarity is higher bonuses for lower pensions when calculating old-age pensions. This first form of solidarity is projected into the development of the unadjusted and adjusted average personal wage point (APWP) for newly awarded (old-age retirement and early retirement) pensions. The second form of solidarity is a specific valorisation of pensions, where lower pensions are valorised more compared to higher pensions. This second form of solidarity was implemented via a fixed amount from 2013 to 2017. Due to the large differences in the calculation of the newly-awarded old-age pensions in the old (until December 31, 2003) and new (since January 1, 2004) pension system, the Ministry of Labour, Social Affairs and the Family of the Slovak Republic prepared legislation according to which the pensions awarded prior to January 1, 2004 should get an one-time average increase of 45 Euro and the pensions awarded prior to October 10, 1988 an increase of 25.50 Euro.

The development further confirmed that the share of contributions to the second capitalization pillar from total pension contributions was set relatively high and could swing the income differences between elderly people in the long run (because the principle of solidarity is excluded in the second pension pillar). The share of contributions to the second pillar has a significant impact not only on the rate of the deficit of the entire pension system (Pauhofová et al., 2017), but it also limits the potential resources for redistribution in the first pension pillar. The ratio of contributions into the first and the second pension pillar should be gradually changed from the original value of 9:9 (set from January 1, 2004) to 14:4, and it should gradually stabilize at the level of 12:6 by 2024. After adding a 4.75 % contribution into the solidarity reserve fund, the resources of which are also used to finance old-age pensions, the ratio of contributions to the first and second pillar should be stabilized at 16.75:6; this means that the 26.37 % share of the contributions (savings) of savers in the second capitalization pillar is not covered by the solidarity principle. The problem of solidarity, and thus of ensuring adequate income if not for all elderly people (pensioners) then for the vast majority of them, is only applied to the setting of the first pension pillar. Another solidarity component in securing the income of elderly people, but this time outside the old-age pension system, are further elements of the social protection system, namely the system of allowances for material need.

The aim of the paper is to analyse the differences in income of pensioner households (based on data from Household Budget Survey - HBS) and the differences in pensions (based on statistical data from the Social Insurance Agency in Slovakia on all pensions, which increases the informative value of the results of the analysis) after the implementation of the new pension system (for the

period 2005 - 2016). The aim was also to identify how these income differences were reflected in the synthetic indicator of the poverty rate or material deprivation of elderly people.

In the analysis of pension differences we methodologically used quintile values, as well as the values of decisive deciles characterizing the differences in pensions, which predetermine the development of the poverty risk rate.

Net disposable income per household member is considered to be one of the main factors influencing consumer behaviour. The micro-data for 2013 and 2014 were not analysed because the data were simulated for these years. Analysed were households with the current economic activity of the principal: non-working old-age pensioner. All data were calculated per one household member, with only those households included in the analysis that met the condition that every household member had to be an old-age pensioner.

The paper consists of two parts. The first part is analytical, in which quantitative data on old-age pensions and income of pensioner households were used to characterize changes in income inequalities of pensioners, or pensioner households in the period of 2005 - 2015 (2016). The second part of the paper deals with the problem of solidarity in newly-awarded pensions in the pension system, the monitoring of which is significant in terms of poverty and material deprivation of pensioners, or elderly people.

2 Analysis of income inequality of pensioner households focusing on inequality in pensions

The basic question is whether the Slovak pension system, together with the built-in solidarity mechanisms, i.e. the redistribution of financial resources in the pension fund between the high-income and low-income social groups for the total duration of the new pension system, contributed to reducing poverty and material deprivation of elderly people. Figure 1 shows that the fall in the risk of poverty or material deprivation of the elderly aged 65+ has been continuous since 2005, with the exception of 2012, and has been more intense than the average in EU countries as well as in Eurozone countries, indicating a positive trend in changes to the pension system in Slovakia.

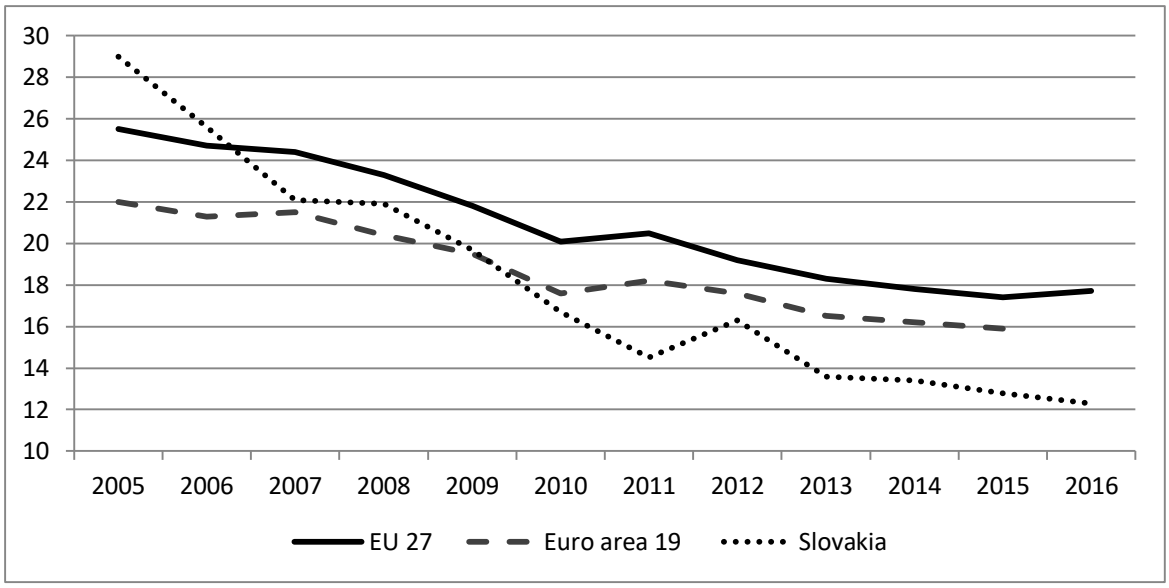


Figure 1 Development of the risk of poverty or material deprivation of elderly people (65 +), %
Source: Authors, based on Eurostat data

It is unquestionable that this fall in the share of elderly people in material deprivation was contributed to by the growth of the old-age pensions (income) of elderly people. The question remains, however, as to what the trend of development of differences in the income of elderly people was in the reference period.

Figure 2's data shows that in 2015 the Slovak Republic, together with the Czech Republic, was among the countries with the lowest income differences in the category of elderly people over 65 years of age. Differences in income inequalities of elderly people remain significant among the 28 EU member countries.

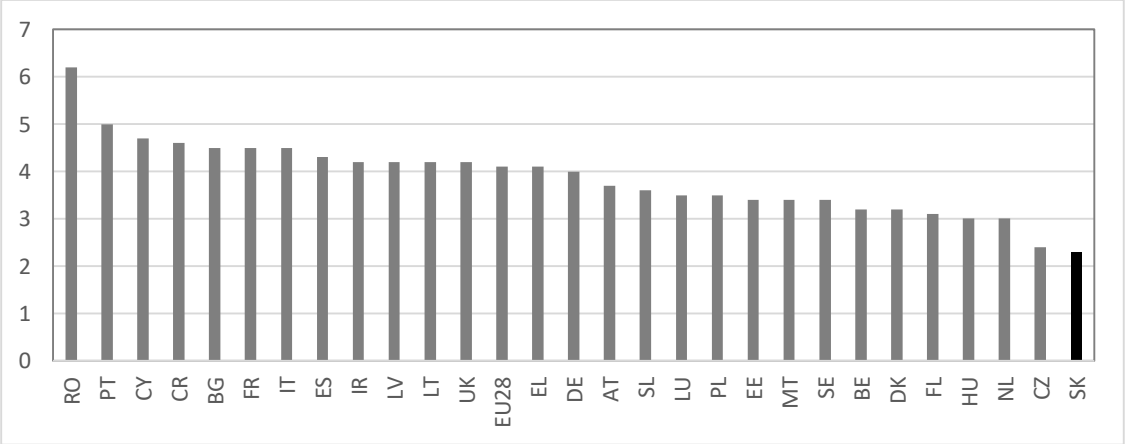


Figure 2 Income inequalities in the age category of over 65 years (share s80/s20)
Source: Authors, based on Eurostat data

The following part of the paper analyses in more detail the development trend of inequalities in net disposable income of households and consumption expenditures of households of pensioners in Slovakia between 2005 and 2015. As can be seen from Figure 3, the ratio indicator (of higher-

income to lower income households) has higher values in net disposable income of households than in consumption expenditures during the entire analysed period, with the exception of 2009. The higher value of this indicator also means a higher degree of inequality.

At the beginning of the analysed period, i.e. in 2005, the ratio indicator of income had a value of 1.7, i.e., the top 20% of the richest households of old-age pensioners had an average net disposable income per household member roughly equal to 1.7 times the net disposable income of the poorest households. The value of this ratio indicator has slightly increased to the value of 1.9 in 2008, and this indicator also reached approximately the same value in 2015. The value of the ratio indicator of consumption expenditures in the reference period between 2005 and 2009 slightly increased, from 1.5 to 1.9. As can be seen also from Figure 3, the crisis increased the values of the ratio indicator of consumption expenditures, because the lower-income households of old-age pensioners manifested a saving motif in consumption expenditures due to uncertainty. After 2009 the values of this indicator slightly decreased, but only until 2015 when they reached the pre-crisis level of 2005. Among the main factors affecting inequalities in the area of elderly people's consumption can be included, for example economic development and social policy measures, difference in propensity to save depending on income, development of prices, changes in consumer preferences, availability of substitutes and availability of credit products.

The pension system's stability and social protection play an important role in supporting the most vulnerable low-income households of old-age pensioners, as well as in preventing a decline in consumption expenditures, especially at a time of economic downturn. The fact that in the future there will be an increase in the number of people of retirement age and a decrease in the number of contributors to the system will pose a serious threat to the fiscal sustainability of the current pension system, and therefore a threat to purchasing power sustainability.

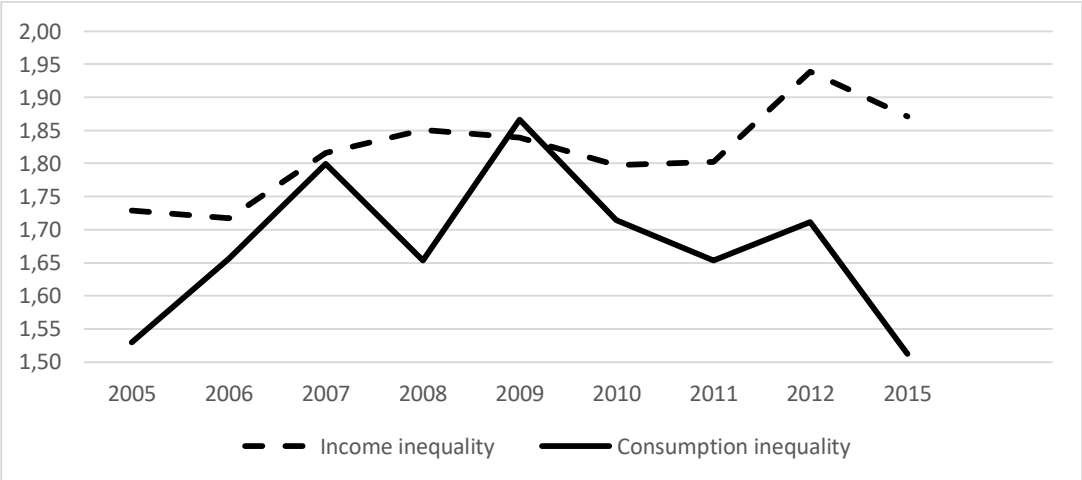
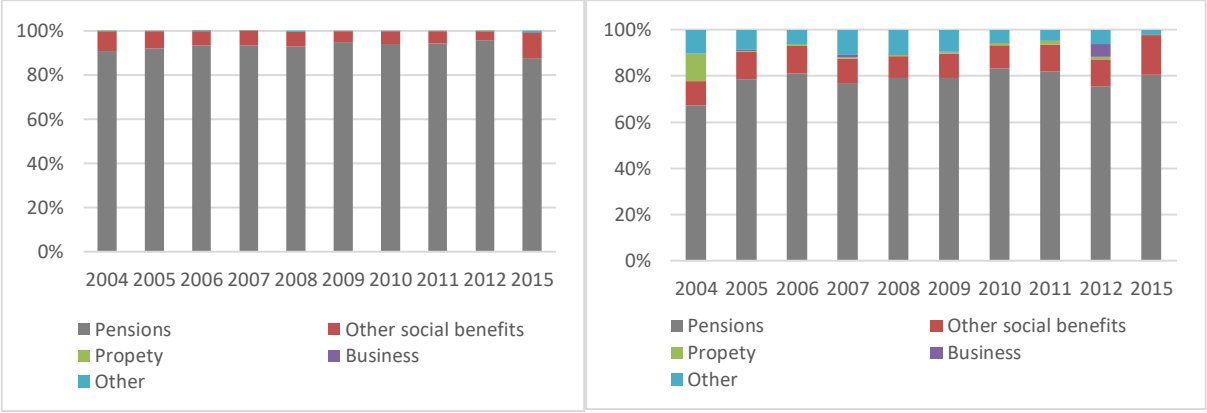


Figure 3 Trend of inequality in net disposable income of pensioner households and in consumption expenditures (s80/s20)
Source: Authors, based on HBSs

As can be seen from Figures 4a and Figure 4b, social income is the most important source of purchasing power not only for lower-income households but also for higher-income households of old-age pensioners. A more detailed analysis of the data shows that old-age pensions form as much as approximately 90% of net disposable income of low-income households. Another significant

source of income for these households is other social benefits. These two types of income accounted for nearly 100% of the total net disposable income of lower-income households.



a. Lower-income households b. Higher-income households

Figure 4 The structure of net disposable income of lower-income and higher-income households of pensioners

Source: Authors, based on HBSs

Old-age pensions also account for a very significant portion of net disposable income for higher-income households, with a share of this income in the range of about 80% in 2015 (Figure 4b). Here it is important to point out the relatively low share of property income also in the case of higher-income pensioner households. Regular income from other households, which is included in other income, is very low for both higher-income and lower-income households in the reference period. This type of income is only used to a very limited degree in Slovakia to balance consumption over time. Similar results were reached on the European level by, for example, Italian economists Christelis, Jappelli, Paccagnella and Weber (2009), who utilized the database "The Survey of Health, Ageing and Retirement in Europe" (SHARE) in their research. Slovakia has not yet participated in a single survey wave under SHARE.

Given the significance of pension income in the structure of the total income of pensioners (or pensioner households), we will continue to pay increased attention to them.

For the analysis of the development of income inequalities in the area of old-age pensions, we used the data for the years 2005, 2010 and 2015, as well as the data from the latest Statistical yearbook on pension insurance for 2016 (Social Insurance Agency in Slovakia, 2017). The development of quintiles, the old-age, early, disability, and widows' and widowers' together, as well as indexes of growth in the periods 2005 - 2010 and 2010 - 2015 is shown through data in Table 1. For the sake of comparison we included disability pensions in Table 1, in spite of the fact that this type of pension is financed from a separate type of contribution. This table shows that from 2005 to 2016 the absolute differences between the upper (4th) quintile and the lower (1st) quintile had deepened, as evidenced by the rising values of the S80/S20 coefficients between the analysed years for all types of pensions, with the exception of widow's and widower's pensions, where, in the case of a high proper (basic) old-age pension, the widow's or widower's pension is reduced for the pensioner. If the growth rate was relatively dynamic in the period from 2005 to 2010, between 2010 and 2015, or 2016, a slowdown can be observed in the growth of differences in all types of old-age pensions as well as disability pensions. Increased attention should be given to the data regarding relations

between the values of the lowest quintiles in old-age and early retirement pensions. If in 2005 (at the beginning of the analysed period) the values of not only the 1st but also the 2nd quintile were higher in early retirement pensions than the corresponding values in old-age pensions, the deepening of differences in favour of old-age pensions would gradually appear. It was confirmed that staying in the labour process until retirement age had a positive effect on the growth of low, or lower old-age pensions. A policy of stricter conditions for early retirement was possible only in the context of an improved labour market situation and declining unemployment.

Table 1 Quintiles (EUR), S80/S20 coefficients, selected years and growth indexes for 2005-2010 and 2010-2015

		2005	2010	2015	2016		2010/2005	2015/2010
Old-age pensions	1. Q	213.2	275.4	314.2	317.1		129.2	114.1
	2. Q	241.0	317.6	364.0	367.5		131.8	114.6
	3. Q	265.6	357.3	413.2	418.6		134.5	115.7
	4. Q	291.1	412.1	492.7	503.4		141.6	119.6
	S80/S20	1.37	1.50	1.57	1.59		.	.
Early retirement pensions	1. Q	217.8	274.0	288.4	283.4		125.8	105.3
	2. Q	244.8	319.2	336.8	330.5		130.4	105.5
	3. Q	283.9	370.7	395.7	388.4		130.6	106.7
	4. Q	339.7	446.6	486.3	481.7		131,5	108,9
	S80/S20	1.56	1.63	1.69	1.70		.	.
Disability pensions	1. Q	126.4	159.6	163.4	161.4		126.3	102.4
	2. Q	173.0	224.7	217.0	213.4		129.9	96.6
	3. Q	210.7	275.7	286.6	283.8		130.9	104.0
	4. Q	253.0	331.4	348.2	345.5		131.0	105.1
	S80/S20	2.00	2.08	2.13	2.14		.	.
Widow´s and widower´s	1. Q	213.4	305.6	363.7	367.6		143.2	119.0
	2. Q	261.2	359.0	418.6	422.6		137.4	116.6
	3. Q	285.7	389.2	453.7	459.3		136.2	116.6
	4. Q	312.1	430.0	505.9	513.1		137.8	117.7
	S80/S20	1.46	1.41	1.39	1.40		.	.

Source: Authors, based on data from the Social Insurance Agency in Slovakia.

A more detailed view of the development of the differences between the lowest and highest pensions has allowed the distribution of pensions into deciles (Table 2).

Table 2 Deciles (EUR), shares 9th decile/1st decile, selected years and growth indexes for 2005-2010 and 2010-2015

		2005	2010	2015	2016		2010/2005	2015/2010
Old-age pensions	1. decil	192.8	247.8	282.4	288.1		128.6	114.0
	2. decil	213.2	275.3	314.1	317.1		129.1	114.1
	9. decil	319.5	479.9	579.0	592.7		150.2	120.7
	9. decil/1. decil	1.66	1.94	2.05	2.06		.	.
Early retirement pensions	1. decil	205.9	252.2	263.6	260.1		122.5	104.5
	2. decil	217.8	273.9	288.3	283.4		125.8	105.3
	9. decil	386.7	515.2	563.9	565.3		133.2	109.5

	9. decil/1. decil	1.88	2.04	2.14	2.17		.	.
Disability pensions	1. decil	109.9	136.2	137.7	135.6		124.0	101.1
	2. decil	126.3	159.5	163.3	161.4		126.3	102.4
	9. decil	279.9	375.9	406.2	404.3		134.3	108.1
	9. decil/1. decil	2.55	2.76	2.95	2.98		.	.
Widow´s and widower´s p.	1. decil	162.3	232.3	277.9	280.5		143.2	119.6
	2. decil	213.4	305.6	363.7	367.6		143.2	119.0
	9. decil	336.1	468.2	552.7	562.9		139.3	118.0
	9. decil/1. decil	2.07	2.02	1.99	2.01		.	.

Source: Authors, based on data from the Social Insurance Agency in Slovakia.

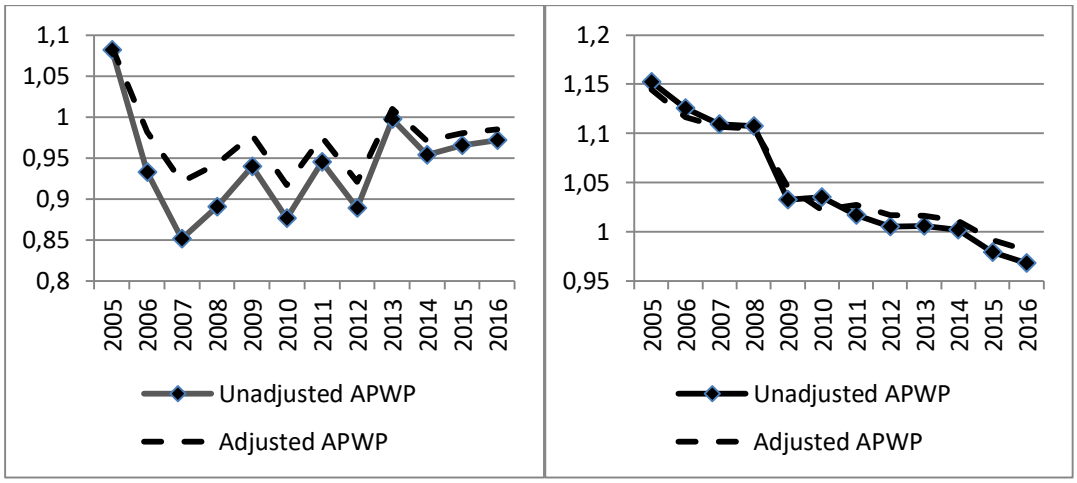
We included the values of both 1st and 2nd deciles in Table 2, which are significant for the distribution of income poverty. The trends of income disparities in pensions analysed by quintiles in Table 1 were also confirmed in the analysis of development by deciles, in particular the reduction in income disparities in the period after 2010 compared to the period of 2005 - 2010. The decisively significant element for the formation of pensioners' incomes (and pure pensioner households) and their differences is the development of old-age pensions: in 2016 they accounted for up to 74.53% of total pension expenditure (including state-funded pension benefits). In this decisive group there is a widening of the gap between incomes expressed by the highest and lowest decile. In the period of 2005 - 2016 the difference in the 9th decile/1st decile ratio represented 0.4 p.p. (at 2.06 in 2016), while for the same period the difference in the S80/S20 ratio was only 0.12 p.p. (at 1.59 in 2016). This means more intensive lagging of the old-age pensions below the lowest decile threshold. With a total number of 1048.84 thousand old-age pensions paid in 2016, this means that 104.9 thousand old-age pensions are paid below the value of the lowest decile. It is true that the socially, relatively well-set, system of widow's (and widower's) pensions, i.e. the widowhood pensions, contributes to the reduction of the income gap in Slovak society between the highest and lowest income of pensioners coming from pension insurance. It is evident that the mitigation of pension income differences was caused by the fixed-amount valorisation (the effect of this measure will continue in 2017 and 2018, but this method of valorisation is not acceptable in the long term), as well as by the system of redistribution of the pension fund in the calculation of newly-awarded old-age pensions. In the coming years, the gap between low and high pensions will be affected by the growth of "old" pensions granted before January 1, 2004 and October 1, 1988.

3 Development of solidarity in the first pension pillar

Solidarity in the first pension pillar is mainly applied to newly-awarded pensions, both for regular old-age pensions in the case of retirement upon reaching the statutory retirement age, as well as for early retirement pensions awarded prior to reaching the retirement age. The redistribution between the high-income and the low-income social groups is done through the adjustment of the average personal wage point (APWP). The APWP is the only parameter in the equation for the calculation of old-age pension for each old-age pension applicant, which can be used to redistribute funds for pensions. We emphasize that the level of APWP (for the whole set of pensions) and its development over time is influenced by a number of factors (e.g. wage levels of the persons retiring, periods of

unemployment, gender structure of these persons, etc.). Figure 5a captures the development of APWP in newly-awarded old-age pensions of pensioners who retired after reaching the statutory retirement age. This figure shows that the rate of redistribution of resources of the pension fund from high-income to low-income groups gradually increased after 2005, when the change in the Act on Social Insurance caused an increase of the adjusted wage point compared to the unadjusted in low-income groups. Another picture is provided by the development of APWP for newly-awarded early retirement pensions (Figure 5b).

It results from a comparison of Figures 5a and 5b that the redistribution for the newly-awarded early retirement pensions was generally lower than for the newly-awarded old-age pensions in every year. In addition, in the case of early retirement pensions there is an evident strong decline of the average personal wage point (adjusted and unadjusted) in the crisis years of 2008 and 2009. The trend towards the decrease of APWP for early retirement pensions is a testimony to unemployment (which forces people to go into early retirement to maintain income levels after losing unemployment benefits, or after a period of unemployment longer than 6 months when applicants for early retirement are already without unemployment benefits for a long time), as well as the widening of the gap between high and low wages. The decrease of APWP for early retirement pensions, under the logical assumption that people leaving for early retirement are generally people with lower qualifications and lower wages, does not mean an absolute decrease of wages, but only their relative lagging behind the higher and highest wages. In terms of assessing solidarity, the discovery that the adjusted APWP after 2010 is only slightly above the unadjusted APWP is significant.



a. Old-age pensions **b. Early retirement pensions**

Figure 5 Development of unadjusted and adjusted APWP for newly-awarded old-age and early retirement pensions (2005 – 2015)

Source: Authors, based on data from the Social Insurance Agency in Slovakia

The need to monitor and maintain solidarity in the pension system (in its first pillar) also results from the development of the level of old-age pensions according to age (Figure 6).

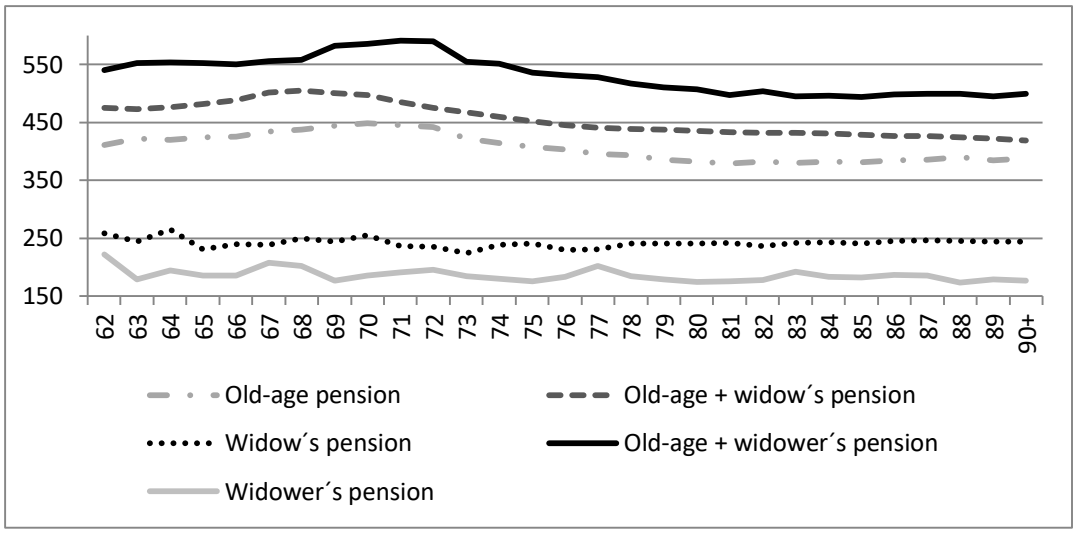


Figure 6 Distribution of selected types of old-age pensions according to age, EUR, 2016
Source: Authors, based on data from the Social Insurance Agency in Slovakia

The data for 2016 in Figure 6 shows, on the one hand, that in the three crucial types of pensions (the old-age pension and the old-age pension combined with the widow's or widower's pension) their level decreases approximately after the 70th to 72nd year of age. The decrease of pensions is a result of the change in calculation of old-age pensions after 2004, which is the focus of the already mentioned one-time increase of the "old" pensions planned for 2018. Of course, the drop in pensions after the 70th to 72nd year of age is also the result of valorisation in individual years in which, for most of the analysed period, the same percentage was used for valorisation. On the other hand, it is surprising that the level of old-age pensions continuously increases from the 62nd to the 70th year of age. This phenomenon can be explained by the higher early retirement of people due to higher unemployment rates (in recent years) and thus by reducing the pension by 6% per annum compared to the full pension in the case of retiring after reaching the retirement age. It can be expected in the future that, if the current wage growth is maintained, the unemployment rate will be reduced, and the conditions for calculating the old-age pension and valorisation by the so-called pensioner's inflation don't change, the average pension of pensioners aged 62 years (entering retirement) should be higher than the average pension of elderly people, even up to the age of 70. Therefore, it is reasonable to assume that preferential valorisation of old-age pensions of pensioners of higher age as a form of solidarity will have an increasing impact on the maintenance of pension differences within socially acceptable limits.

4 Conclusion

An international comparison of income inequities among elderly people has shown that there are significant differences between the 28 EU member countries. However, the fact that in 2015 the Slovak Republic and the Czech Republic were among the countries with the lowest income disparities in the category of elderly people over the age of 65 can be evaluated as positive. The analysis of net disposable incomes and consumption expenditures of higher-income and lower-income households showed that, if the inequalities in the net disposable income of these households increased slightly over the last five years, consumption inequalities decreased slightly. Among the main factors affecting inequalities in the area of elderly people's consumption can be included, for example, economic development and social policy measures, difference in propensity to save

depending on income, development of prices, changes in consumer preferences, availability of substitutes and the availability of credit products. Social policy measures are important in alleviating inequalities in the income of pensioner households, due to the fact that pensions and other social benefits accounted for almost 100% of the total net disposable income of lower-income households in the reference period. Old-age pensions also account for a very significant portion of the net disposable income for higher-income households, with a share of this income of about 80% in 2015 in the case of these households. The long-term relatively low share of property income has also been identified for higher-income pensioner households. Regular income from other households is almost not utilized by lower or higher households in Slovakia to balance consumption over time.

In conclusion, it can be said that, following the introduction of the new pension system in 2004, it was necessary to strengthen this system (first pension pillar) by solidarity elements, which had a positive impact on the overall reduction of the risk of poverty or material deprivation in the Slovak Republic.

Acknowledgements

This paper was supported by Grant Agency [nr. VEGA 2/0182/17, VEGA 2/0109/16].

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Problems of Health Protection in Great Previous Cities on the Example of Town

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Abstract

Health care in the post industrial cities is a complex problem. Especially in the mining and metallurgical centers, a significant part of the structures and staff of the health service was in the industry. The first decade in the history of Poland was practically building and transforming the structures of the health service as well. Zabrze was one of the leading players in this field. We have managed to model in a way, to build a preventive-healing model. Here she helped cooperate with Silesian Medical University. MOSiR's carriage was also modeled as well.

Keywords: Health care, Post-industrial cities, Zabrze.

JEL Classification: I10, I18, R10

1 Introduction

Zabrze is one of the typical post industrial cities in the Upper Silesian Industrial District. It was from the mid-nineteenth century, one of the great centers of heavy mining and metallurgical industry. There were five large coalmines and fours mall ermine sat the turn of the 19th and 20th centuries. Also two iron and steel plants and a number of other important industrial plants. It can be said with out any exaggeration that the city was a typical organism of iron and steel.[2] No matter what is particularly worth emphasizing for nationality as well as socio-economic formation.

2 Health Protection

This era of great industry last practically until the end of the 1980s. Although the eradication of this epoch did not take place automatically or, but since the early 1990s, industrial production has begun to shrink dramatically.[3] It manifest edit self as the closure and consolidation of coalmines, also the liquidation of steel works located in the city center. This ending of the industrial age was logical and justified. But it also produced a number of and great, in terms of scales, social problems.

Healthcare in industrial cities in Upper Silesia was closely linked to the great industry. Thanks to this, it was qualitatively higher on the scalethanpubliclyavailable, because the sponsorship of large industry was not overestimated.

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[2] E. Januła, *Silesia una nostra. Dziś.* Warszawa 2006, nr 5, s. 68 i nast.
[3] J. Kubica, *Zabrze. Powstanie i rozwój*. Cz. I, s. 17, *www.silesia-schlesien.com* (pobrano 4.10.2014 r.)

In a situation when the industry began to fail the normal it was that the mining o rmetallurgical health service began to be partially transformed and at the same time a number of health carefacilitieswereliquidated. Because the normal phenomenon was that the city did not have enough funds to take overall facilities as well as staff. So new structures of social health care have emerged.

Most importantly, as the Silesian Cardiology Center was take nover by the voivodship and after a crisis, it practically worked very well. It I snow the leading . Work is underway to build artificial hearts. At the same time, the technology of transplantation of heart, lung and other organs is being improved. This center is home to cardio surgeons from Germany, France, the Czech Republic, Hungary, Slovakia and a number of other countries. Zabrze center of cardiology cooperates with most reputable centers of similar type in USA and Canada.[4]

Next to the Cardiological Center in Zabrze, there is also a large part of the Silesian Medical University. Individual university clinics operate also for the benefit of the inhabitants of the city and of course the province.

Slightly different is the activity of open health care or medical clinics. Here the situation looks a bit worse. Because as mentioned above, a significant portion of industrial health care has been abolished.

The disproportionate spatial layout that prevails in the health care system is the consequence of these processes. As a result, in the city center, the saturation of medical clinics is sufficient, but in the post industrial periphery there are significant deficiencies. It is unfortunate that people from distant districts must, as a result, drive to the center, especially to specialist doctors. Considering that these are largely old people about the inferior health already, it can not be a cause for optimism.

Modern health policy implies primarily the development of active prevention and physical culture. These are obvious matters on one hand. But on the other hand, there are social awareness issues. Practically among the elderly, only few individuals devote to recreation and physical culture, enough attention.

In Zabrze itself, there was one more objective obstacle to mass sports and recreation for the general public. This obstacle in some way exists and continues to function. It is the functioning of a big sports club or more precisely its leading football section.

"Górnik Zabrze" with this slogan could include the knowledge of the average Pole, both about the city and about sport in the city. Because this club is a legend and above all the history of the city. The present has a different, slightly less pink dimension. Miner Zabrze is football, but this ball of the 1960s and 1970s, then Górnik was almost full-time champion of Poland, he also won Polish titles and trophies abroad, participating successfully in European and world high level. Practically and in Europe, maybe not all sport, but Polish football especially senior experts of this discipline of sport is associated primarily with the success of Górnik Zabrze. Because this club was also the

[4] M. Zębala, *Śląskie Centrum Kardiologii*. Gazeta Wyborcza. Warszawa, Nr 148/2013, s. 14

most export product of Polish marketing at this time, and the fans in Europe were looking at the maps of Silesia and Zabrze.[5]

The turn of the XIX and XX century is the entry of sport into a certain organizational framework. The first football teams were formed, the 11-man handball then developed on a wider scale of tennis, as well as some of the formerly autonomous competitions that are now part of the athletics structure. Some of the sports were also involved in military matters: cross-country running or marching, crossing obstacle courses, and even swimming, not to mention shooting in different formulas. These were the formulas in which the army advanced and in the vicinity of military units this competition was cultivated. In these competitions participated the neighboring Gliwice, which traditionally was a large garrison city, but some of the competition from military sports was naturally transferred to Zabrze. Certain groups of young men finishing military service wanted to continue to do sports.

In Zabrze's history this sport was of political importance. There were two nationalities operating in the city, not always according to each other. Rivalry naturally also moved to the platform of physical fitness and sport. In principle, football clubs practically none of them were pluralistic nationally. There were German clubs and Polish clubs functioning separately. Polish youth in the earliest period practiced sport, specifically gymnastics in the first gymnastics club founded in 1862 Alte Turin Verain. Shortly thereafter, SC Zabrze and SC Frisch Frei were formed.[6] Polish clubs had more problems because they were usually poor people. The municipal authorities were also not keen on looking at the development of the Polish sports movement. Therefore it was quite difficult to find, prepare and maintain a playground for soccer or some athletic competition. Nevertheless, apart from German, Polish sports sections and sports clubs were operating. The first decade of the 20th century is the time when organizations and sports clubs begin to function as normal players. German clubs usually had a lot in common with all kinds of militarized or militant organizations. Polish clubs, on the other hand, were generally associated with the left-wing political and trade unions. Practically speaking, the first Polish sports club operating in Zabrze was the Concordia Sports Association associated with the Professional Federation of Poland, which had been active since 1902 in Westerland. The UZP in Upper Silesia itself became a mass organization of about 20,000 members in the years 1910-1914. There were probably about 1,500 members in Zabrze itself. The Concordia Club had two or three football teams and probably had some athletic competition there as well.

Other sports structures were organizations associated with the Polish Socialist Party, which also operated in Germany. PPS patronized the Central Polish Trade Union. This trade union organization was weaker, but it also possessed enigmatically functioning sports structures. In 1904 a link was made in Zabrze (nest) "Falcon". The "Falcon" Society primarily carried out patriotic activities among young people, but apart from educational and reading campaigns, sport activities were also carried out. Polish sports movement also operated on the periphery of Polish singing societies, Polish amateur theaters, etc. Due to lack of sources, which only survived in modest passages, it is difficult to say something concrete today.[7]

[5] *Górnik Zabrze. Historia i współczesność*. Wydawnictwo UM. Zabrze 2004, s. 34-36

[6] A. Gaworowski, J. Waloszek, Górnik Zabrze. 50 lat prawdziwej tradycji, Wydawnictwo GiK, Katowice 1988, s. 11-17

[7] Zabrze. Monografia miasta i powiatu, Praca zbiorowa po red. H. Rechowicza, Katowice 1978, s. 167

The uprising in Upper Silesia was the beginning of an important process of national consciousness and a sense of national separateness of the Poles.

Without any illusions, however, one has to admit that the German sports movement in Zabrze during this period, for obvious reasons, was much stronger. It was supported both by the industrialists and the municipal authorities of the various municipalities, of which Zabrze was then. Some German sports organizations were practically hidden forms of armed militias.

During the plebiscite and insurrection of Silesia, both German and Polish sides developed the formal structures of defense sports in a fundamental way. German local Freikorps and Polish Sagittarius were essentially armed, but were usually registered under the formula of various sports structures. They were trained there to shoot, to throw grenades, so the idea was far from the brilliant idea of sports and leisure. But this pragmatic premise was fruitful during the uprising. Simply put, most of the insurgents were trained snipers.

After the division of Silesia and the granting of a larger part of the city to the German side, the sport movement naturally existed and even developed. The ethnic structure remained. The German clubs were larger, more resilient, with significant sports infrastructure and financial facilities, and practically amateur Polish clubs struggling with elementary problems such as: renting a pitch, permission to conduct sports competitions, etc. Physical education was also compulsory in schools. State and state-supervised. It must be said that the German authorities paid attention to the level of physical education in schools, albeit from purely pragmatic premises, since physical education was nothing more than preparation for military service.[8]

Polish sport was functioning in Zabrze, Poland, which was a national trade union organization. The team of the "Sokół" gymnastics team continued to operate, however, after the Nazi Party gained its power, the sport activity in Zabrze gradually ceased. This is because many sports activists were at the same time political activists and most often had to emigrate. Still, there were still working-class sports clubs. Tu Zabrze was a regional center, because here in the city was the seat of the Association of Polish Workers' Clubs in Upper Silesia. In the light of data from 1934, six of the 12 functioning clubs were located in Zabrze. In 1937, RKS was still active in Mikluczyce.[9]

The Association of Polish Workers' Clubs even had its own press body, namely "Sport and Culture". This periodical was published in Katowice, but it reached the area of both Zabrze and all of Opole Silesia. About some of the clubs from the RKS federation have retained more data. For example, RKS "Forward" in Zabrze - Zaborzu, had 42 members who had regular workouts every Wednesday on the field and every Thursday at the sports hall. Sundays were played on the pitch. The female division of this club has 28 members. Sports classes took place on the same days as the men's club. RKS Pawłów also had a male and female club. A total of 56 athletes were training on Thursdays on the court, and on Friday in the hall. In Zabrze, male and female RKS were also active. Apart from the RKS formula, there was also another association, perhaps slightly weaker, namely the Polish Sports Clubs under the federation operated the sports club "Piast", which grouped about 45 athletes. In Zaborz, the Union Sports Club was active in this federation, and there was also the

[8] E. Januła, Silesia, s. 92

[9]Zabrze. Monografia miasta i powiatu, Praca zbiorowa po red. H. Rechowicza, Katowice 1978, s. 151 i nast.

Polish Chess Club, which had about 30 members. This was obviously the case in the years 1933-1935, but later, as a result of Nazi terror, the activity of Polish sports clubs was weakened. Despite this, the operation in the mid 30s, as many as 7 sports clubs, was a great achievement.

After the liberation, the movement and sport structure in Zabrze continued the very rich traditions and experience of Polish sport activities in the city. These were just before World War I, operating during the plebiscite and developing even during the difficult period of German rule. It must be remembered that in the Polish sports clubs both the majority and the Christian Democrats working in the Polish youth community grew up of many excellent Polish activists and excellent organizers and educators of the youth. Some of them have returned to their hometowns in the first weeks after liberation. The efforts of these activists and the help of the Polish administration are due to the fact that on May 2, 1945, the first sports structure was established in Zabrze: Multifunctional Sports Club Zabrze.

In the first months after the liberation, apart from the KS "Zabrze" resumed the activities of the RKS federation, which was interrupted by the war. They were "Concordia", "Jadwiga", "Mikulczyce", "Skra" and the "Pogoń" and "Fight" Makoszowy and PawełsPiasts outside the RKS federation. Some of these clubs exist to date. Already at the end of 1945 there were 9 sports clubs in the city, which in the 22 sections were joined by almost 1 000 competitors. During this period, sports clubs and societies organized as many as 36 large sports hats, which watched over 100,000 spectators.

The sport movement in liberated Zabrze had a very good start, and the development of sport was much more intense than in many other areas of life. Hence, the city boasts a huge sporting field, the largest of which is in the fields of sports such as football, athletics and handball. The town also has a significant influence on the promotion of physical culture and tourism.[10]

At the apogee of the development of sports movement, as many as 117 organizational structures of sports, recreation and tourism were operating in the city. It was the end of the 1970s. At that time, these organizations also grouped nearly 24,000 members. Taking into consideration that statistically every nine inhabitants of the city practiced active sport or organized tourism Zabrze was at the forefront of physical culture on the map of Poland. However, it should be noted that in the 1980s and 1990s, as in the economic and social sphere, there was a rather deep regression in the field of sport. A number of clubs and sports sections have collapsed. The number of athletes in both the professional and recreational sectors has decreased significantly. Some reconstruction has been visible since about 2002. This involves the resumption of activity but only some sections because a number of sports clubs, especially those based on industry, have fallen.

Zabrze in comparison with other large cities of the region has a very extensive network of sports infrastructure. In general, there are 22 stadiums and sports fields, 21 playgrounds, 58 volleyball courts, 12 tennis courts, 22 gyms, 4 indoor swimming pools, 6 summer baths and 8 athletics tracks. Periodically, in winter, about 15 ice rinks are started depending on weather conditions. It is a powerful base, but with a very different technical condition. Maintaining, especially the stadium or sports field, as well as the bathing area, requires a lot of funds, and between the legend should be put in place postulates that sports facilities should earn on themselves. All sports facilities must

[10] Miejska Rada Narodowa/MRN/Zabrze, Komisja Sportu i Turystyki, Sprawozdanie roczne 1968, s. 12

be systematically repaired, and current operation costs a lot. The aforementioned sports facilities were in good shape, perhaps not in very good condition, also in the apogee of the development of physical culture, ie in the late 1970s. At present, about half of them are barely satisfactory and about 1/5 of them are in devastation. Practically two stadiums and one indoor pool and two summer pools are no longer rebuilt.[11] For statistics, it must be added that most sports facilities were built in the post-war period. The period of the most intensive construction and sports investments is the 1960s and the first half of the 70s.

Sports facilities should also be added to sports facilities. Here, the quantitative state is very large, as at 42 school buildings there are gymnasiums of various dimensions and equipment as well as 51 school sports grounds. These pitches usually have an asphalt surface. In general, school facilities are used primarily by schoolchildren, especially for some years, additional physical education classes have been introduced to school curricula. Only some of them are used in terms of sport for training and even less for recreation.

Sports performance is always in a sense a mountain of sports pyramid. A solid foundation is school sport and various forms of mass sport. As has already been mentioned, school-based sports are largely included in educational programs. On the other hand, in practically every school, kind of middle school and high school there are some specialized sections. The organizational structure is quite complex, partly because of the Student Sports Clubs (UKS), partly only sports school sections, and in some schools there are also sections of Intercollegiate Sports Clubs (MKS). MKS y are basically the highest form of organization and qualification of school sport. At this level, already advanced sport, high performance.[12]

Reaching into the story, school sport was relatively the least affected by the effects of the structural crisis and transformation. Some structural changes have taken place because today's UKSY are to some degree successors in the School Sports Clubs (SKS), but generally the crisis did not impose any kind of reduction on school sports.

Otherwise, perhaps even differently, today is the problem of mass sport based on industry. Because it has to be said that although mining generally caters for the sport of competition, it also included significant sums for mass sport. It was not the best and most successful formula because disposable spartaciads organized for example once a year were more festive than sports, and yet the principle of sport is to practice it in a systematic way. But despite this critique something was happening, something was organized, and certainly at least sports interest. There was also the other side of the coin, although sports facilities were basically mortgaged, industrial entities like mines, steelworks or other workplaces were generally administered by sports clubs that considered themselves de facto owners. Sports clubs, which in a sense are naturally oriented primarily on the sport of competition and it was very difficult to enter the premises that do some recreation. The demands of various sports associations organizing recreational sports had to be based on the directors of the mines and at the same time the presidents of the clubs. Here, the decision depended on the personality and horizons of the CEO. The Society for the Propagation of Physical Culture (TKKF) was the main subject of mass sport in Zabrze. This association had a bit of sports equipment but was not the owner of any sports facility. In general, the split was that TKKF organized adult sport

[11] Urząd Miejski/UM/Zabrze, Komisja Sportu i Turystyki, Sprawozdanie roczne 1976, s. 14 i nast.
[12] Urząd Miejski/UM/Zabrze, Komisja Sportu i Turystyki, Sprawozdanie roczne 1981, s. 8

leaving young people with school sports.[13] By the significant development of competitive sport as well as the school in Zabrze local TKKF in 1978, which we recognize as the aforementioned apogee group of about 2,500 people gathered in 22 different territorial and sectional fires. So it is clear from the fact that this structure did not play a major role in the big city. The main achievement of TKKF was the organization of company parachutes, less often neighborhoods or districts. Apart from both competitive and recreational sport, mass tourism is an important element of the whole of physical culture. Here the organizer was the Zabrzański branch of the Polish Tourist and Sightseeing Association (PTTK), but in fact the Tourist Board of the already mentioned Zabrze Charcoal Industry Association has been in many places for many years. These organizations generally did not compete with each other. In any case, the PTTK branch in Zabrze would not have the slightest chance. Rather, he worked for the mining industry and, to a lesser degree metallurgical, commissioned the type of rally organization, tours, etc. The tourist council referred to in 1959 referred to in 1959 was the first of its kind in the country and for a number of years. It was only after several years that some, and not all, coal industry unions followed in the footsteps of Zabrze. Another thing was that the tourist council of the ZPW had a powerful economic base, but its merits were undeniable. It had a dozen or so own holiday and holiday centers in the country, mostly by the sea and in the mountains, and also in Hungary by the beautiful Lake Balaton. However, the main forms of activity of this tourist institution were, however, the organization of various forms of qualified tourism, such as: hiking, motorcycling, skiing, watersports and sightseeing. Typical weekend trips were also organized. They were often combined with mining festivals and performances of artistic ensembles.[14]

The achievements of the Tourism Council are undeniable. Her achievements were visible in Zabrze and some other cities. Unfortunately, as well as the fall of the mining industry, the Tourism Council has also closed its activities. Only weaker and less mobile entities remained, primarily for financial reasons, namely PTTK.

In the 1980s and 1990s tourism was conducted on a much smaller scale. It just ran out of a sponsor, so far, the coal industry. The standard of living of most families in Zabrze has also decreased. Hence, this important aspect of physical culture and the whole of social policy has been pushed back into far-off positions. It is true that in the late 1990s, when the economic and social situation began to improve slightly, a certain number of residents of the city returned to some extent to tourism. But it was definitely a different model. Unlike the 1970s group tours of factory buses or even special trains, but simply on the basis of our own cars. The model was therefore clearly moving towards individual, partly family-oriented tourism, and the role of former tourism organizers has largely taken the place of commercial travel agencies and travel agencies.

This model of tourism and recreation, which is now practically common, is practically parallel to that used in other European countries. The family is also the main subject, who provides funds for tourism and recreation with the help of professional but paid assistance of various types of offices. Mass tourism, while the model from the 70s of the 20th century did not disappear completely because the aforementioned PTTK still organizes rallies, tours, etc., but also acts as a commercial entity trying to earn a living.

[13] Urząd Miejski/UM/Zabrze, Komisja Sportu i Turystyki, Sprawozdanie roczne 1998, s. 12-15
[14] Ibidem, s. 16

Traditional, while the remaining directions of tourist trips of the city residents. Especially the weekend ones. Most of the city's inhabitants traditionally go to remote mountain resorts in the Beskidy Mountains. These centers formerly belonged to the coal industry. In the 80s and 90s of the twentieth century, in the vast majority, they went private and are now working on commercial terms. Only a few of these facilities remain owned by more trade unions than the operators themselves. But in practical activity they do not differ from private property.
It is difficult to make a meaningful analysis of holiday and holiday vacations. For schoolchildren to a large extent they are still summer camps. On the other hand, in vacation insurance, foreign trips are mainly taken off in the south and west. Of course, offices and travel agencies must play a key role.

3 Conclusion

To sum up, the sport and recreation formula of social policy in Zabrze was highly dependent on the economic aspect of the political time. The model was transformed and evolved. It will be very difficult to comprehensively assess whether the currently developed model will be more optimal than the 1970s. There is no doubt, that model, which was based on the sponsorship of the coal industry, was able to make a much wider contribution to the benefits of social policy. Today, the possibilities for using and participating depend to a large extent on your financial capabilities. Of course, individualism in tourism as a form of social policy is desirable. However, from the point of view of social egalitarianism, it must be stated unequivocally that today and in the near future access to tourism is severely limited by financial barriers. It is good and positive in the case of schoolchildren here working, maybe not fully, but a system that provides conditions of equal start. This is a fundamental requirement of social policy in the field of health and physical culture.

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Institutional Factors of Start-up Ecosystem Development: The Story of Two Slovak Cities

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Abstract

In the recent years, start-ups and creative industries have experienced an amazing development. The location and placement of start-up and creative industries is frequently consistent with the factors of agglomeration externalities and networking of actors. The presence of talented people and an advanced managerial culture are similarly vital for both sectors. The Slovak government recognized the potential of start-ups and the creative economy only recently (2013), but the global trend has been anticipated by the private and non-profit sector a couple years earlier. Not surprisingly, the first major co-working spaces with a support to young innovative businesses emerged in the capital city of Bratislava in 2010. In the East Slovak city of Košice the first activities appeared only in 2013, in the premises of the Technical University. So far still young start-up ecosystems have emerged on different foundations. Therefore it is interesting to study their formation and growth, size, evolution and culture, influenced by distinct regional innovation systems. The assessment of young start-up and art scenes gives is based on the interviews of start-up owners, gurus, venture capitalists, enthusiasts and observers.

Keywords: Start-up Ecosystems, Location Determinants, Creative Industries.

JEL Classification: M13, R12, R58

1 Introduction: determinants of start-up location

The location determinants attracting start-up communities and the factors predicting success and performance of start-up companies have become studied only for the last 15 years. A significant role in determination of the environment for start-up businesses is played by the territorial and intellectual capital, infrastructure and other factors of a particular place where start-up companies are founded and operating. Some places, cities and/or countries have predispositions to develop sooner and much faster than the others having comparative advantages such as innovativeness, capital, specific knowledge, access to international markets, entrepreneurial culture, etc.

The essential question is why a particular place has become appropriate for the establishment of business entities or rather specific forms of business such as start-up projects. Positive influences such as economies of scale, localization and urbanization factors are confirmed to be the basic factors for establishment and movement of companies within regions (Gries & Naudé, 2009). They

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reflect the inherent features of the environment that stimulate the economic growth of new as well as existing companies through decrease of production and distribution costs, presence of high-quality work force. Furthermore, they influence the level and effects of the social capital present in relations between parties, which creates significant conditions for specific types of businesses (Birley, 1986) such as start-ups. In the case there is an infrastructure in a form of networks, relationships, knowledge base (technological universities, skilled labour), companies of similar specialization or industry, suitable conditions from the beginning of their existence, the potential of success for start-up companies is higher (Beise & Stahl, 1999). The business environment as well as capital in a form of specific financial sources suitable for financing start-up projects that are predisposed to be successful in the region (hardware projects require different approach and their financial demands are different than for example projects) represent a very significant factor, too (Wach, 2008). Another factor is represented by the nature of the place as such – creative ideas are not born anywhere and they require specific conditions. Moreover, innovators and creative people are attracted by conditions they cannot find anywhere else (Florida, 2002), especially in creative industries; this applies to creative start-ups as well. Generosity of the place and a tendency to accept new creative ideas are also substantial. Specific factors of the place comprise the inherent level of social capital on the given territory, density of existing relations and tendency to make new relationships and to enter into new cooperation (Davidsson & Honig, 2003).

Here we have to mention Silicon Valley as the symbol of start-up communities serving as a benchmark for other cities as well as for start-ups that come here in order to learn, discuss their ideas and raise funds. Silicon Valley is a great example of a functioning ecosystem where all aspects needed in order for new innovative ideas to be born and creative ideas of the graduates to be supported are employed. This synergy subsequently stimulates the investment activities in an extraordinary extent. Saxenian mentions porousness of the environment and companies' openness to innovations as two of the main reasons for the dynamic growth of Silicon Valley. Demand for innovations from the companies is met by the offer of professionally oriented universities and their graduates (Saxenian, 1994). Whether the new Silicon Valley may be imitated o even purposefully constructed is questionable. It is also hard to justify whether the local factors are transferable to different places in the world. There have been a lot of attempts to use the main ideas of Silicon Valley as a model for new activities all over the world with rather different outcomes.

On the basis of previous reasoning, many interesting questions may be raised. Are new start-up communities mostly established in big cities, benefiting from urbanization effects and higher availability of public resources, universities and wide range of companies looking for innovations? Do they occur in post-industrial urban landscapes similarly to creative industries? Are they founded in technologically pure, rich environment or in the basements? Is there an ideal size of a city for effective exchange of knowledge and effectiveness of networks, social capital in the networks or can start up communities be successful even in fragmented environment of several poorly interconnected communities? Size of the city has been highlighted for example in Pittsburgh, city that served as the deriving the main determinants of start-up project success:

- Strong universities, with a notable emphasis on working together—and on finding commercial applications for their research.
- A significant local financing base - local venture funds started to sprout up in the mid-1990s. Universities started to create technical infrastructure to support the city as a whole and one of the first steps was to open tech-transfer offices.

- Government involvement, in the right places and to the right extent. In Pittsburgh, one of the nation's longest-running technology-based economic development programs were founded.
- Being the right size - the city's small size, which makes it manageable, friendly, and appealing (Tierney, 2014).

Probably the most famous specific source of determining the factors of success of start-up ecosystem is The Boulder thesis (Feld, 2012) consisting of four key components:

1. Entrepreneurs must lead the start-up community. Universities, investors, government, companies and media are important when forming an ecosystem, but visionary entrepreneurs have the predispositions to lead the ecosystem.
2. The leaders must have a long-term commitment. They have to think far ahead into the future and set the pace and direction for the rest of the community.
3. Anyone with any kind of professional background can join the start-up community. People and ideas must be allowed to move freely within the community to generate interesting ideas for further development of the community in the future.
4. The main task of the start-up community is to create environment for its members to gather and network with businesses. It is critical to connect with enterpreners and develop connection for potential future cooperation or support of investors in the further development of their ideas. There is always a need for activities of any kind to maintain creative and connected ecosystem. All entrepreneur-focused events and activities, either formal or informal energize the whole community (Yining Wu, 2013).

2 Start-up ecosystem in Slovakia

Innovative ideas are spread and newly discovered start-up movements inspired by the models from the USA (e.g. Tel Aviv since 1993, Berlin since 1997, Spain since 2005, and Czech Republic since 2008) arise every year. Slovakia with the cities of Bratislava (2010) and Košice (2011) has entered the list of start-up countries relatively later. The overall level of the country innovativeness is considered as factor for the development of start-up innovation activities. The surveys comparing innovation performance and ecosystems across the world (Global Innovation Index 2016 and Word Economic Forum's Networked Readiness Index 2016) are good tools for assessing Slovakia on an international scale. The Global Innovation Index 2016 compares 128 countries in 82 different indicators (it consists of indicators such as business environment, R&D, Investment, ICT infrastructure, etc.). Slovak republic took was 37th place in the overall ranking for 2016, and its position in the ranking is unchanging over last 5 years. The Networked Readiness Index (NRI) is measured by the World Economic Forum, measuring the ability of a country to exploit the ICT opportunities. In 2016, out of 139 countries, Slovakia was ranked 47th (59th in 2015). The state of the country is to a large extent also determining the start-up activity, but larger cities may have their own characteristics for the development of an innovative business, different from the country. This will be the subject of further research in the article.

The term *start-up* is not used for any new project of innovative nature. Following Paul Graham (investor and co-founder of Y-combinator), despite the start-up project responds to a real problem in an innovative way, also an extreme growth, scalability and global ambitions are important (Graham, 2006). This definition is consistent with the approach of KPMG considering start-up as an Innovation Driven Entity (IDE), a company that uses innovative technology, disrupts existing

business models and has a global outlook (KPMG Slovakia 2015). For the purpose of this paper, the start-up company is defined as an organization formed to search for repeatable and scalable business model which provides extreme growth potential (Blank & Dorf, 2012). Several start-up projects met the IDE evaluation criteria before, but only in 2010 a programme of support has been set. Meetings of the civic association Start-up Camp in 2010 meant the first impulse and the beginning of support activities to innovative entrepreneurship and start-up projects in Bratislava. In Košice the first similar activities have been recorded in 2011, resulting in the start-up boom in the local media in 2013, when start-ups were incorporated also into public sector agenda.

According to the survey (KPMG Start-up Ecosystem Survey Slovakia 2016), the environment of start-ups in Slovakia is very energetic and strengthening its position by the engagement of the commercial sector, city administrations, supporting organizations and investors. In the past, notable global success has been achieved by older Slovak innovative companies ESET and Sygic which were not built on a basis of a functioning innovative ecosystem. However, the new wave of Slovak start-ups (Datamolino, Divano, Synopsi.tv, Nicereply.com, Galileo, OrderLord, CropTech, Sli.do, Infinario, etc.) can be considered a product of centrifugal force of the existing ecosystems. But still 85 % of start-ups surveyed were at the early revenue or an earlier stage of development. The level of education, professional nature and technological requirements of the focus of innovative ideas within Slovakia are interconnected with the presence and engagement of universities as the steady members of the ecosystem in the two largest cities of Slovakia, where the major universities are seated. However, each ecosystem has different historical, cultural, investment and technological predispositions. Bratislava as the capital of a small post-communist country may have been similar to Prague or Vienna or Ljubljana. Košice city may be compared more to Katowice, Bilbao or Glasgow due to their strong industrial background. In both Slovak cities a live environment and support activities for young entrepreneurs and start-ups can be found, such as co-working spaces, educational programmes or university engagement. According to the KPMG report (KPMG Startup Ecosystem survey 2016), the large amount of start-ups are operating in business services (23 %), Hardware (18 %) and Consumer services (12 %) (Figure 1).

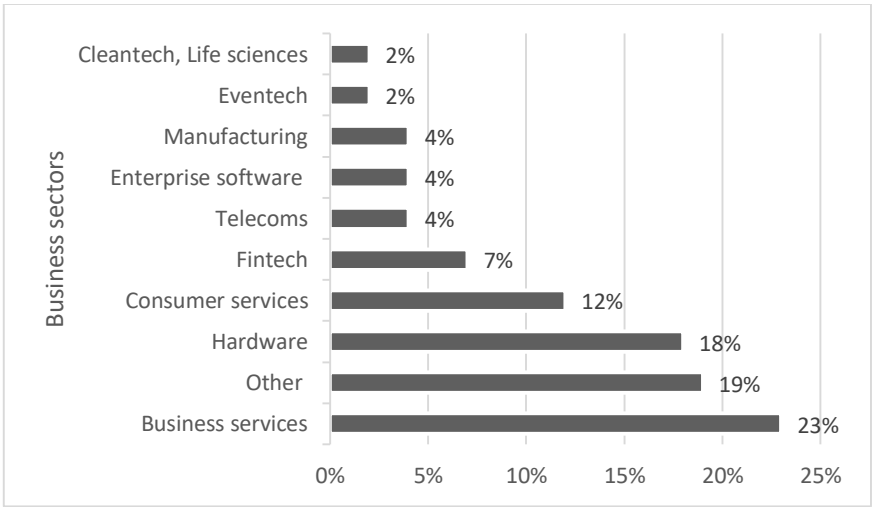

Figure 1 Sectors of start-up operation (KPMG Start-up Survey 2016)
Source: Own elaboration

The main aim of this study is to point out to the importance of specific types and strengths of

networks, structural qualities and size of the local start-up ecosystem and social capital in different cities. The term *ecosystem* is commonly used in the context of ecology. Ecosystem can be described as a system of small elements that are connected and cooperating with each other. In the economic context, elements are consider as businesses, organisations and other members of the system interacting with each other located within geographically limited economic environment (city or region).

3 Methodology

The qualitative survey of two cities (Bratislava and Košice) is based on the interviews with individuals who are close to start-up companies – founders, supporters, entrepreneurs, investors or university and local self-administration representatives. Determinants of start-up ecosystem formation are subject to comparative study of two cities. The main research question of the qualitative research is:

What local factors are the most important for successful formation and development of start-up companies?

In more detail, the nature of metropolis, and other factors such as population, economies of scale, size of the ecosystem, social capital, technological level of development, presence of universities, their nature and level of engagement in the local ecosystem and amenities (Florida 2005) would be expected to have influence on the local start-up community and its success To what extent are the ideal features of ecosystems in Pittsburgh or Boulder correct in Slovakia? Are the factors perhaps different for technological, creative and internet projects? Can the media supporting the topic, consultant companies, activists, evangelists constitute a significant aspect to the issue? How do incubators and accelerators support the community and new projects? Results are presented in form of two case studies based on the empirical research.

The main research method used for the purpose of this paper comprises interviews and questionnaires to prepare two cases. The study sample consists of 28 start-up supporters, incubator team members, accelerator team members, start-up entrepreneurs and freelancers, institutional investors and venture capitalists from Slovakia (Bratislava and Košice) and Czech Republic (Prague). The empirical research was carried out during the event – Start-up Weekend Košice 2015, which took a place in Košice in April 2015. All respondents are considered community leading personalities in their local ecosystems in order to ensure the relevance of their answers for the purposes of this paper. The information gathered by the interviews enabled to recognise the roots, evolution, mechanism, key elements and links of the start-up ecosystem. The methodology was applied to the ecosystems of the two largest Slovak cities, where a more advanced startup movement can be observed.

4 Case Study 1 – Bratislava

4.1 Overview

Bratislava (capital city) is unsurprisingly a location for local headquarters of the most significant international companies. However, in the recent years it has been shown that the start-up ecosystem of the capital is more viable than ever and considering the professional aspect, it offers various forms of support for small and start-up companies not only at the level of innovative business. Following only few years of its beginnings, there are several success stories in the start-up

ecosystem of Bratislava, which currently represent the main factor of motivation in establishing start-up companies not only in Bratislava, but also in the other parts of Slovakia.

4.2 Location

Bratislava is the capital and the largest town in Slovakia. It represents the seat of the Bratislava Self-Governing Region. With its 367 000 m^2, the town is spread on both shores of the Danube, 79 kilometres off Vienna.

4.3 History and key activities

For the last five years, Bratislava has been experiencing a rapid increase in the number of newly established organisations, creative spaces, support, educational and investment activities which are aimed at the positive stimulation of business and start-up environment. At the beginning, Start-up Camp meetings that had been held since 2010 were very popular. Enthusiasts, entrepreneurs, creative people, IT experts, investors and specialists from various fields used to meet here every month. They used to discuss and network in an informal and friendly environment. These meetings became greater considering the number of participants and the intensity of discussions, which led to the first official event called Start-up Weekend Bratislava in 2011. Few months later, in November 2012, the first Start-up Awards took place, the event that is called the Oscar for start-ups up to this date. As a result, the Slovak government sent eight teams for acceleration to the Silicon Valley.

Furthermore, in September 2012, the first co and start-ups – The Spot – was founded, followed by the centre Connect one month later. There are 11 co-working centres in Bratislava today, all of them organizing education for start-up companies and potential founders. The establishment of the first start-up venture fund – Neulogy Ventures fund – was announced in 2013. The Slovak government became involved in the efforts to support IT SMEs by establishing the FIT fund (Fund of Innovation and Technologies).

4.4 Key institutions and personalities of the ecosystem

Since the early beginnings of the stable local start-up environment in Bratislava region, the most important role has been played by corporations, their senior and middle management as well as successful entrepreneurs. The establishment of local start-up and co-working centres led to the centralisation of the support based on the specialization of individual centres. The most significant personalities of the community include Matej Ftáčnik, Ivan Debnár (founders of the co-working centre The Spot), Ivan Štefunko, Michaela Jacová a Jaroslav Ľupták (Neulogy Ventures and Start-upAwards), Michal Truban (Websupport), Michal Meško (Martinus.sk), Michal Pastier (Zaraguza Digital), and Rastislav Turek. These people take the active part in educational programs for start-up companies and some of them even carry out the investment activities as well. Cooperation with companies represents the specific phenomenon of Bratislava ecosystem. Individual key partners were naturally divided among the most significant start-up centres, where the most professional group of employees take part in educational activities focused on business development, marketing and sales strategies. The most significant partners include banks (Tatrabanka, ČSOB), IT giants – Slovak Telekom, Soitron, audit company KPMG and original co-working centres – The Spot, Connect, Impact HUB. Given the fact that the educational meetings are not so formal, the relationships among the company representatives, managing incubator teams and start-up entrepreneurs are informal, making the foundation of strong and active partnerships much easier.

Last but not least, specialized media focused on innovations, entrepreneurship and start-ups take part in formation and promotion of the start-up community, the most important being startitup.sk, startupers.sk and FORBES Slovakia. Owing also to the media, the interest in innovative business has increased (Figure 2).

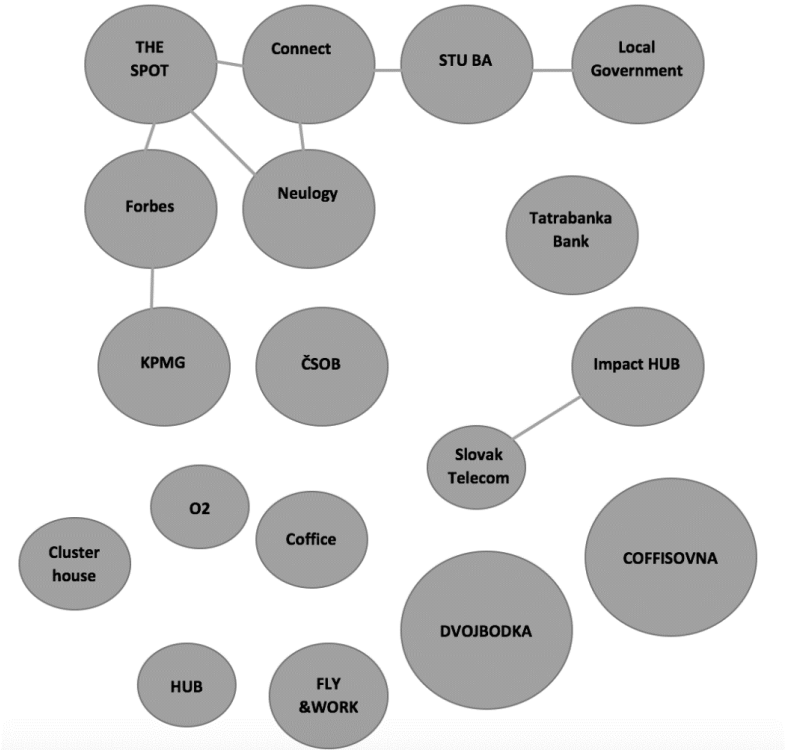

Figure 2 Relationships among the key partners of the ecosystem in Bratislava (size of the circles represents the extent of their involvement in the local community) based on the interviews
Source: Own elaboration

4.5 Environment and culture

The respondents attach highest importance to the so called „capital city syndrome" that is naturally associated with the fact that the capital city shall create the base for start-ups and 444 entrepreneurship in general. Bratislava as the capital city is associated with excellent transport and information infrastructure, interconnection with European metropolises such as Vienna, Budapest and Prague as well as the presence of the most significant Slovak companies and local headquarters of foreign companies. It obviously follows that the companies are involved in the investment activities into innovation. *The unique aspect regarding the growth of the number of start-up companies in the Bratislava Region is the possibility for establishing one's own start-up as the part of the "hipster culture"* (Matej, co-working office co-founder). Due to this phenomenon, the Bratislava community is relatively wide considering the size as well as variety of focus areas of the projects.

The start-up ecosystem shows the indicators of fragmented, broken or even competitive relations, common learning is not present or not in demand. *On the other hand, the approach to support of start-up projects, especially during their early stage, is influenced by some negative aspects –*

social network of Bratislava became closed to new members and projects. Owing to the size of the ecosystem and its commercialization, the support in Bratislava is fragmented and single parts are separated from each other, which is caused by the privilege approach (Tomáš – Business developer at private accelerator). *The fact that start-ups have become a part of culture and lifestyle is normal. However, regarding the number of mentors and potential partners as well as the size of our community, it is still more and more difficult to keep a track of what is going on and who is who. When you come to a co-working centre, you will find people with headphones in their ears who do not want to be disturbed* (Jaro – venture capitalist).

Bratislava is overloaded with start-ups and all the buzz around them. Community meetings have changed into commercial mainstream events where the audience is still more apathetic (Start-up weekend Bratislava organiser). *Once, after an event I wanted to talk to the speaker who subsequently refused to talk to me – I was no one for him...this can happen only in Bratislava* (Michal – start-upist). *The environment is highly commercial and there are only a few people who are willing to devote their free time to help others on their projects. The offer of information has become an issue of prestige. In order to get to quality sources is still more complicated not only for their full utilization, but also the commercial nature of support for start-ups* (Jaro – venture capitalist).

4.6 Challenges

According to the leading members of the start-up community in Bratislava, greater interconnection of the existing ecosystem with the universities (especially those with technical and engineering study programs) and foreign specialists from the field of distribution and sales management, business development and expansion to new markets should represent the possible way to professionalization, quality improvement and success of projects in general. The relationships mentioned above have the potential to stimulate technical aspect of new projects, motivate students to make use of research and professional capacities of the universities and therefore increase the professional aspect of the fields that are often ignored. Start-ups currently represent a very popular topic throughout the whole Slovakia, which draws even the attention of projects of lower quality, non-educated team members with low willingness to accept the advice of mentors. Involvement of universities, decrease in media pressure and greater interconnection with foreign communities are considered to be the most important areas of the development of the ecosystem in the Bratislava Region.

4.7 Number and overview of the local statuses

There are several companies in Bratislava that have managed to reach the international success even with no support – ESET, Websupport, Sygic, Martinus.sk, Synopsi.tv or Nicereply.com. The founders of these companies used to act as motivators and mentors from the early beginnings of the comprehensive ecosystem, which ensured the higher level of professionalism considering mostly entering the market and sales. Each of the companies mentioned above has minimum of 1 million customers around the world. Development of software and B2B solutions using the scalable business model from the concept phase is the new trend in the ecosystem of Bratislava start-up projects. Nowadays, there are 35 – 40 start-up projects with global ambitions in Bratislava and its surroundings.

5 Case Study 2 – Košice

5.1 Overview

For the last eight years, Košice as the centre of Eastern Slovakia has drawn a large number of IT companies, such as T-systems, Ness, Global Logic, AT&T, Siemens and Eset. Presence of relevant universities and support activities aiming at the increase of interest in entrepreneurship in young people and university graduates has resulted in the greater interest in creation of new projects that can be classified in the group of star-ups. Following the efforts and cooperation of various institutions, companies and individuals, the environment for innovative business has been developing even in the Eastern Slovakia.

5.2 Location

Košice with the population of 240 000 people represents the centre of the Eastern Slovakia. It is also the second largest city in Slovak Republic that is spread on the territory of 242 000 m^2 by the borders with Hungary and Ukraine.

5.3 History and key activities

Start-up projects and innovative business have been present in Košice for more than just the last few months. The community of innovative and creative people started to gather simultaneously with the emergence of Start-upCamp meetings in Bratislave and after few months, the official civic association Start-up Camp o.z. was established in 2011 in Košice as well. In the contrary to Bratislava, mostly enthusiasts and owners of small IT and programming companies who worked on their own projects with no connection with significant companies and investors of the region meet together in Košice. In the period of expansion of the companies such as T-Systems, RWE IT or Ness, these meetings focused on maintaining creativity in enthusiasts considering also the corporate environment of large companies with no significant support and conceptual education. The first official centre for support of start-up projects – Eastcubator – was founded in 2012. However, this centre was used only for evening sessions with no possibility to work there permanently. Furthermore, there was no professional educational program set in Eastcubator. Thanks to the cooperation with the members of Bratislava community, Start-up Weekend Košice was held in 2012. In comparison with Bratislava, the interest in this event in Košice was much lower. During the organizing course of the event, there were efforts to establish a functional interconnection with entrepreneurs and companies in the Košice Region, yet with no active participation and involvement of the companies.

The community broke up in 2012/2013 due to relocation of successful projects to Prague and Bratislava. The activities and gathering of start-up enthusiasts took a break for almost a year. Situation changed when the idea of incubator at the Technical University of Košice that was ought to be the part of university Science Park Technicon (project of three universities from Košice and Prešov) renewed. Student project AZU played an important role in this process. It included gathering of active students and educational programs regarding soft skills and project management, which aimed at creating the environment for active cooperation of students and companies of various fields during their studies at the university, which enabled students to gain experience for their further professional life. Following the decision of the government of the Slovak Republic, project AZU became a national development project in 2013 and expanded its scope to universities into all regional county seats of the SR. Agenda for the year 2014 included the support of innovative and business projects of students, some of which were of commercial

nature. Management of the project was covered by the Technical University of Košice. Founders of the project decided to take over the organization of Start-up Weekend, which brought this event to Košice again. After Start-up Weekend 2014, there were efforts to re-establish the start-up centre as the successor of the original Eastcubator. This time, it was supposed to be interconnected with the companies of the region which should take part in education of young entrepreneurs. By the end of 2014, two incubators were founded in Košice – one of them was established at the Technical University of Košice and the other one was founded as a result of the commercial activity of project AZU members. There are personal relations between the two centres and both of the managing teams have their origins here at TUKE. Formation of stable environment for start-up projects as well as creation of close relations with the companies and efforts to involve the investors in the start-up ecosystem in Košice is currently taking place. Start-ups are now experiencing the so called popularisation phase in the Eastern Slovakia.

5.4 Key institutions and personalities of the ecosystem

The idea of support for innovative business in the region of Košice was originally brought by Marek Kuzma (InnocentStore.com) and Jozef Kováč (7Segments), who join together a small group of enthusiasts and innovative people from their surrounding environment. This informal group took up the Start-up Camp meetings held in Bratislava and together with Michal Maxián (former freelancer, now the founder of BatSuit) it made up the core of organisation team of Start-up Weekend in Košice. When Jozef Kováč left for Bratislava in 2013, the fragile community in Košice was disrupted. In the meantime, the projects Technicom and Start-up centre TUKE started to be planned. Considering these projects, Anton Čižmár (rector of TUKE), and František Jakab (leader of the project Technicom and founder of idea of Start-up centre TUKE), played the most important role. Thanks to them, TUKE started a mutual relation with SAAB company that brought the know-how of the most successful Swedish incubator LEAD into Slovakia and national institutions FIT (Fund of innovations and Technologies) and SBA (Slovak Business agency), which are involved in the creation of comprehensive conceptual educational program.

Project AZU took over various activities essential for the community of start-ups in Košice. Its members, Peter Vrábel and Marek Lavčák, in cooperation with the Technical University of Košice managed to bring Start-up Weekend back into Košice and in cooperation with the city of Košice, they opened the new Eastcubator. The centre became a contact point for the community and companies such as KPMG, the managing partner of which takes, Kenneth Ryan, takes an active part in the educational program. They managed to start a mutual cooperation with companies such as T-Systems, Antik and GlobalLogic. Regular meetings with the start-up community in Košice are held also by Neulogy venture capital fund.

The strengths of the Košice ecosystem are considered to be the presence of TUKE and IT companies united in the consortium called IT Valley. According to the statements of relevant members of the community in Košice, these institutions create a sufficient background for establishment of high-quality start-ups and spin off projects with the potential commerce use. The local self-government provided a great support for events like Start-up Weekend. It was involved also in the opening of the new incubator Eastcubator that represents the centre of the start-up community in Košice. Therefore, we can say that the strength of the ecosystem is represented by the synergetic relationship among the University, IT companies, self-government, members of the

community and potential investors. The relationships within the ecosystem are pretty informal with the tendency to form mutual cooperation among its members (Figure 33).

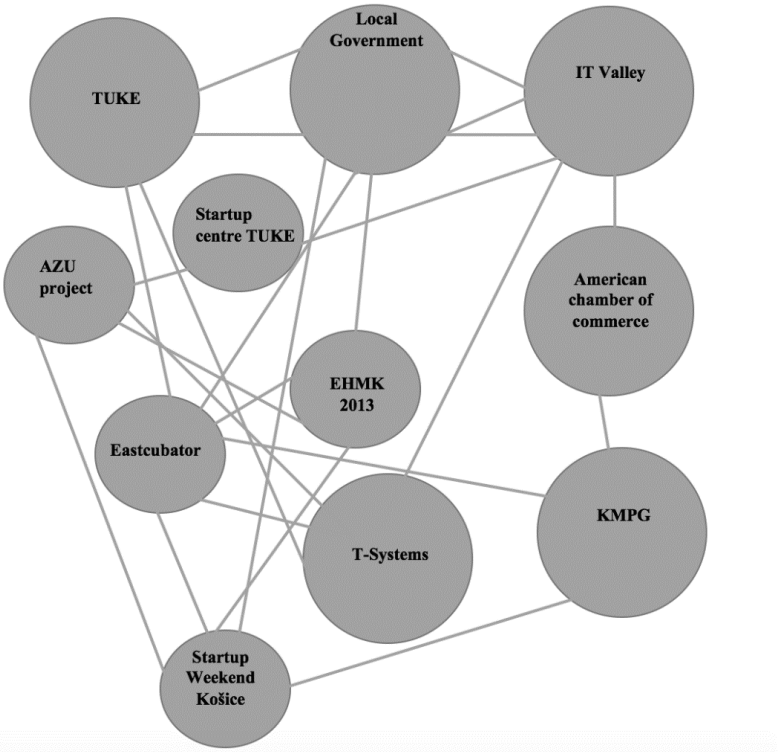

Figure 3 Relationships among the key partners of the ecosystem in Košice (size of the circles represents the extent of their involvement in the local community)
Source: Own elaboration

5.5 Environment and culture

Social capital as strength of Kosice is visible also for members of community. „*Košice is a small town where everyone knows everyone. If you need help with something, you usually know somebody who can help you or someone who knows the right people to help you. It does not matter whether you want to open a restaurant or found a start-up, people help each other, they are friendly and sincere"* (Marek – start-upist – hardware developer). *Košice has a character of a village. People trade with services among each other and the availability of new contcts in the community which create strong relationships. There are a lot of skilful people and it is relatively easy to get to them* (Peter – entrepreneur – marketing).

Peculiar about the start-up ecosystem in Košice is the high number of hardware projects which are riskier and expensive than the software projects, mostly because of the scalability of their business plans and complex production and distribution process. One of the reasons why there is the imbalance of hardware and software projects may be the partial deformation of the environment. Large IT companies brought above-average wages to the labour market in Košice which resulted in the lower interest in establishing one's own business. Despite the involvement of IT companies in the support of start-up projects, there is no active engagement of companies' managements in the educational processes, which is considered to be a great negative aspect of the start-up environment in Košice. This results in inadequate integrity of business plans of the new projects,

common failures in the field of resources and processes management as well as weak determination to get on the global markets. When compared to Bratislava, the fact that none of the new projects in Košice has reached the international success is also negative. The reason might be the absence of local leaders and promotion of their successful stories to the audience.

5.6 Challenges

Predispositions to business activities are lower in the East of the country, which makes the expansion of start-ups and innovative business harder. This situation may be solved by education and promotion at secondary schools, building positive models and education in the field of business skills. Technical level of young entrepreneurs may be increased by the combination of education and practise during the university studies. This is the starting point for significant companies from various fields from which they may work with the community and thus improve the professional skills of young people. Up to this date, a lot of companies, mostly from the IT sector, are inactive, which slows down the increase of the standard level, quality and commercial potential of projects in the Košice region. This may be solved by more open communication between the community and large companies. The Lack of positive cases and success stories in the region, or rather the inadequate popularization of successful people, has a negative impact on the situation, too. Some of the most interesting start-up companies are looking for their place on the market, potential success and maintenance of the contact with the local ecosystem may serve as a significant motivating factor.

5.7 Number and overview of the local statuses

Lack of business and commercial approach to education of start-ups and individuals in Košice resulted in lower number of active projects. In spite of this fact, companies such as InnocentStore, Anovative, 7segments, or Adsulting succeeded and still produce innovative and scalable products. The company golden fish lighting that may have been the successor of the start-up ecosystem in Košice with global success unfortunately ended its activities due to the lack of capital and displeasure of its founders to continue in their work. Recently, several technically oriented projects that, owing to the support of university incubator, managed to be successful even in the significant international competitions. Companies such as CropTech and Petrinec Technology gain larger amounts of investments and work on product prototypes and strategic plan to emerge the foreign markets. Projects EFEOS, Dynamica Graphics and Chargebrella are still looking for application of their knowledge and skills on foreign markets. All of the projects mentioned here (except for EFEOS) are hardware orientated. Summing up, 30 promising projects can be observed in Košice up to this date. However, only four of them have the ambition so far to enter the international market.

6 Factors and cities

A factor of a suitable (technology) environment for start-up projects has been highlighted on the example of the town of Pittsburgh. Both case studies of the Slovak cities of Bratislava and Košice confirm the presence of significant technology-oriented universities with the predispositions to generate high-quality human capital in technology. An identified problem is low technology and knowledge transfer between the technical universities and co-located industries, living in two different worlds. The interviews, however, confirm higher engagement of the Technical University of Košice in the formation of the environment for start-ups by supporting young innovative people during studies. The majority of new projects in Košice has its roots at Technical University of

Košice. On the other hand, the universities in Bratislava are not involved to the same extent as the University in Košice. Insufficient professional background in Bratislava is compensated by the corporate sector. On the contrary, companies in Košice still refuse to get more involved.

Considering the support by the government, Košice and Bratislava are at the same level since government institutions make no differences in regions regarding the systematic and methodological support for start-ups. They have different approaches regarding the support for formation of the community and its development. While the local self-administration in Bratislava plays no significant role, the support by the municipality and its management in is of great importance.

Considering the amount and positive impact of the social capital, Košice has much stronger, denser and active linkages, leading representatives of the community state that it is much easier to make new relationships and enter into new cooperation as well as search for new team members than in Bratislava while the ecosystem in Bratislava is becoming denser and personal capacities are not able to cover all demands for support activities. However, the interest in the topic in general is not sufficient considering the public as well as the media, with the exception of specialized e-magazines.

The ecosystems in Bratislava and Košice have been also compared on the basis of the Boulder thesis. The first factor deals with the community led by entrepreneurs and points out to the huge differences between the two cities. Bratislava ecosystem has its own local heroes, role models and leaders with clear visions, several achievements have been reached, giving back the impulses for motivation and confirming the importance of local community leaders. In this sense, Košice seem to be less professional and the community is still looking for its role models, goals and leaders. We consider this aspect to be the greatest deficiency of Košice ecosystem. Although the porousness of borders among companies and the tendency to enter cooperation in Košice are on a higher level, the city is smaller and the communication and making new relations much easier, the community in Bratislava is much stronger and more developed despite of the fact that the two cities have the same approach to the capital and continuity of community meetings. This is confirmed also by the double number of projects and scope of global ambitions of the existing companies.

The factors of formation of ideal environment for the start-ups present in two cities of Bratislava and Košice can be presented. The following Table 1 is focusing on professionalization of the community and reinforcement of the ecosystem mainly by the synergy of companies, universities, the government and successful entrepreneurs in the function of local leaders to be the most appropriate.

Table 1 Comparison of start-up environment in Bratislava and Košice

Feature	Kosice	Bratislava
Origin of support activities start-up	*2011*	*2010*
Level of university involvement in local ecosystem	*Strong university engagement*	*Low university engagement*
Level of corporate involvement in local ecosystem	*Low corp. involvement*	*Strong corp. involvement*
Government involvement in local ecosystem	*Strong city engagement*	*Low city engagement*
Involvement of the other parties (fans, citizens, media)	*Not enough*	*Not enough*

Competitiveness & cooperation	*More cooperative, common learning*	*Competitive, low willingness to cooperate*
Openness of the environment, inclusiveness,	*High, critical mass is still missing*	*High level of openness*
Porous boundaries between companies	*Porous boundaries*	*Thicker boundaries*
Leaders, long-term commitment	*Still not defined*	*Strictly followed and well defined*
Continual activities	*presented*	*presented*
City size	*Suitable for communication, generation of social capital*	*More on side of fragmentation of the activities*
Venture finance availability	*sufficient*	*sufficient*
Number of all local start-ups/those with international potential	*30/4*	*55/30*
Field of most of projects	*Hardware*	*Software*
Character of founder skills	*Professional (university education)*	*Non-professional (working experience)*
Number of places with professional meeting concept and content	*1-2*	*11*

Source: Own elaboration

On the picture (Figure 4) we can observe common and distinct features of two cities and their start-up environments. Even though both cities exist in the same country culture, there are several distinct features.

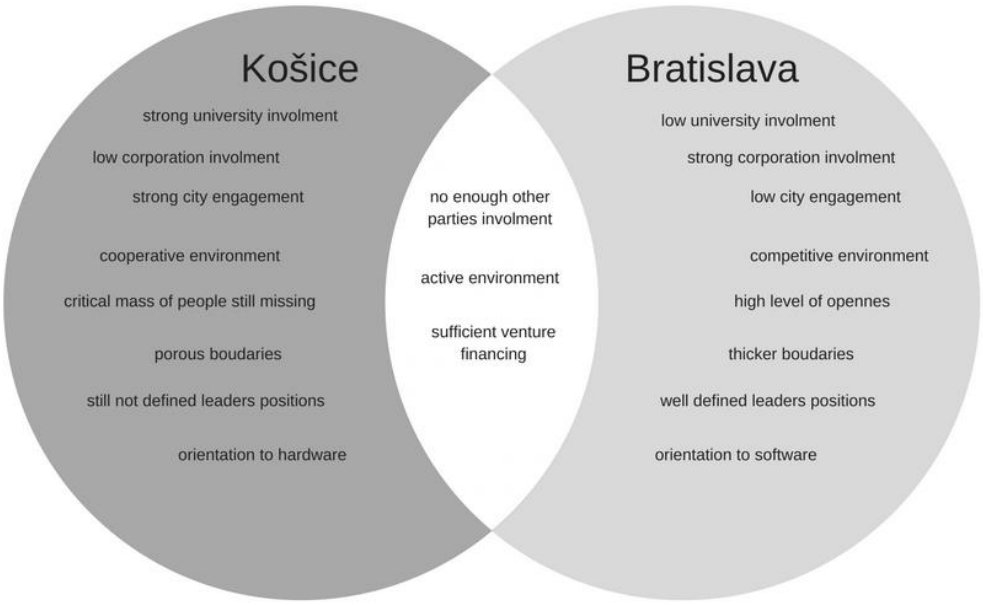

Figure 4 Common and distinct features of start-up environments in Košice and Bratislava
Source: Own elaboration

7 Conclusion and discussion

The empirical studies support the importance of or local government and universities as a key factor for successful start of new company but also in the meaning of social capital and synergies originated in connections and networks between these parts of the system. Network of contacts,

possibility to communicate and to meet the right people and potential partners is very different in cities of different sizes.

The study has shown how the size of the ecosystem could influence its dynamics, process of education and also character of nascent projects in specific area. As can be seen, both cities started their supportive activities for innovative companies almost at the same time, with only a few-month difference. The environment in Kosice has been created based on the impulse from Bratislava, therefore, there is a strong connection line between the two communities in both personal and institutional way. During 2011 – 2013, the support in both cities was of absolutely different nature. In Bratislava, successful entrepreneurs, corporates and higher management became a part of system. Therefore, the co-working spaces with complex system of education have quite strong business background here.

However, each of these centres now operates separately in relation to the other parts of the ecosystem. These centres have their own separate – often not interconnected – portfolios of their company partners who support the operation and the content of programs in the centres financially or in form of mentoring. Synergic effects and positive externalities are not caused by the closeness of individual parts of the ecosystem. In the environment with high level of dynamics of new project creation and great number of existing activities, is very difficult to start mutual cooperation in the fields of technical development and product design. Individual centres protect their know-how of education and despite of the informal nature of relationships, finding new partnerships is very complicated.

On the other hand, the environment/ecosystem in Košice, which is based on the knowledge base of the Technical University of Košice, is more dynamical and flexible when creating new synergic partnerships owing to the lower number of projects and lower interest in entrepreneurship, which is characteristic of the region of eastern Slovakia. “Rural environment effect” creates the predispositions for greater interconnection of the members of the ecosystem who depend on each other in a positive way. High level of human capital which is present in the region of eastern Slovakia owing to the campaigns of IT companies for the return of quality people that together with the natural level of social capital in the Košice region has a favourable effect on the formation and technical development of new projects. The positive effect of the smaller size of start-up ecosystem in the East is proved by a great number of partnerships and strong interconnection of individual parts of the ecosystem.

Acknowledgment

This work was supported by the project of the Slovak Research and Development Agency APVV-14-0512 "Universities and economic development of regions – UNIREG"

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Main weaknesses of SBA´s implementation in small and medium enterprises in Slovakia

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Abstract

Problems concerning entrepreneurial activity, entrepreneurial environment and especially the small and medium enterprises (SMEs) come to the front nowadays in all European countries. The stated problems were projected into several strategic initiatives that define policies of the EU in concrete spheres. For the SMEs sector there is the key initiative "Small Business Act for Europe". Implementing Small Business Act for Europe (SBA) represents the key appeal for the European Union and its member countries within the support of small and medium entrepreneurial activity. Small Business Act for Europe consists of a set of ten principles that lay down the measures for the support of small and medium enterprises in varied fields. These principles have to be respected when suggesting the measures of complex character aimed at the support of small and medium enterprises development in the EU member countries. The aim of the paper is to identify the policy areas (principles) in which main weaknesses in implementing the SBA´s initiative is evident, to assess the results of implementing SBA´s initiative in these policy areas (principles) and to formulate the main measures to be taken to improve the state in the problematic areas. Following the aim of the paper two research questions will be formulated. To fulfil the settled aim several scientific methods of examination, namely the method of analysis, synthesis, induction and deduction will be used.

Keywords: Small Business Act, Small and medium enterprises, Principles, Weaknesses, Slovak Republic.

JEL Classification: L53

1 Introduction

Implementing Small Business Act for Europe (SBA) represents the key appeal for the European Union and its member countries within the support of small and medium entrepreneurial activity and creation of suitable entrepreneurial environment, as well for the smallest enterprises (Kressel & Lento, 2012).

SBA creates new political framework that includes political and economic tools in the field of support of entrepreneurial activity. It consists of a set of ten principles that lay down the measures for the support of SMEs in varied fields (Small Business Act for Europe, 2008):

Principle 1: to create an environment in which entrepreneurs and family businesses can thrive and entrepreneurship is rewarded.
Principle 2: to ensure that honest entrepreneurs who have faced bankruptcy quickly get a second chance.

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Principle 3: to design rules according to the principle "think small first".
Principle 4: make public administration responsible to SMEs needs.
Principle 5: to adapt public policy tools to SMEs needs: to facilitate SMEs participation in public procurement and better use State Aid possibilities for SMEs.
Principle 6: to facilitate SMEs access to finance and develop a legal and business environment supportive to timely payments in commercial transaction.
Principle 7: to help SMEs to benefit more from the opportunities offered by the Single market.
Principle 8: to promote the upgrading of skills in SMEs and all forms of innovation.
Principle 9: to enable SMEs to turn environmental challenges into opportunities.
Principle 10: to encourage and support SMEs to benefit from the growth of international markets.

These principles have to be respected when suggesting the measures of complex character aimed at the support of SMEs development in the EU member countries. Implementation of measures of the Small Business Act is inevitable for reaching progress in the relation to ensure favorable and motivating entrepreneurial environment.

One of the main tools the European Commission uses to monitor and assess countries' progress in implementing the SBA is the SMEs Performance Review. The review brings comprehensive information on the performance of SMEs in EU countries. It consists of two parts: an annual report on European SMEs and SBA country fact sheet.

2 SBA initiative in SMEs in Slovakia – research questions and methodology of research

The government of the Slovak Republic (SR) promised to implement the European principles for the development of small and medium entrepreneurship by means of the initiative of SBA in Slovakia (Prehľad základných skutočností o iniciatíve SBA for Europe, 2012). Exhaustive implementation of EU strategic initiative for the support of the development of SMEs in Slovakia is in charge of the Ministry of Economy of the SR and of the Small Business Agency of the SR, which is also the body responsible for the monitoring of SBA implementation.

In 2013 a dedicated SBA working group was set up to ensure that the SBA is implemented properly. The activities of the working group include a preparation and implementation of significant measures and policies in the area of SMEs development, consultations on recommendations and tasks of the EU and preparation of measures supporting SMEs growth with aim to maintain sustainable SMEs growth. The group is made up of representatives of the Slovak Business Agency and 10 ministries with responsibilities relating to SMEs.

The Slovak government intends to implement the SBA under its SMEs development strategy, which is due to run until 2020. At this time the strategy is still in preparation. The strategy is intended to be the document focused directly on SMEs. It will include the Slovak authorities' response to the SBA, the Europe 2020 strategy and the Entrepreneurship 2020 action plan. At present, the SBA is integrated into various support programs, measures and initiatives developed by the Slovak ministries and agencies, mainly into the Research and Innovation Strategy for Smart Specialization of the Slovak Republic.

The aim of the paper is to identify the policy areas (principles) in which main weaknesses in implementing the SBA´s initiative is evident, to assess the results of implementing SBA´s initiative in these policy areas (principles) and to formulate the main measures to be taken to improve the state in the problematic areas. To fulfil the settled aim several scientific methods of examination, namely the method of analysis, synthesis, induction and deduction will be used.

Following the aim of the paper we have formulated two research questions:
1. What are the policy areas (principles) in which main weaknesses in implementing the SBA initiative in Slovak SMEs are evident?
2. What are the results of assessment in implementing SBA´s initiative in these policy areas and what are the main measures to be taken to improve the state in the problematic areas?

To evaluate the state in implementing the SBA initiative in Slovak SMEs we will comment on main indicators representing the individual principles given in the SBA Fact Sheet 2016 – Slovakia. The evaluation is based on data showing performance in individual indicators according to the EU average. The stress will be given to the evaluation of the state in implementing the SBA´s initiative in individual principles and in the formulation of main measures to be implemented to improve the state in most problematic policy areas (principles).

3 Main weaknesses of SBA´s implementation in Slovak SMEs – the findings and discussion

Slovakia´s SBA profile has more weaknesses than strengths. According to SBA Fact Sheet 2016 – Slovakia has achieved an-above EU average performance only in one policy area (principle) "Environment" and partly in "Access to finance" and "Single market". Average scores were achieved for "Entrepreneurship", and "State aid and public procurement". Low performance (major weaknesses) was achieved in "Responsive administration", "Skills and innovation" and "Internationalization". "Second chance" is the fourth area where Slovakia is an-above EU average performance. With the exception of "Second chance" Slovakia has not managed to improve its performance in any of these areas since 2008.

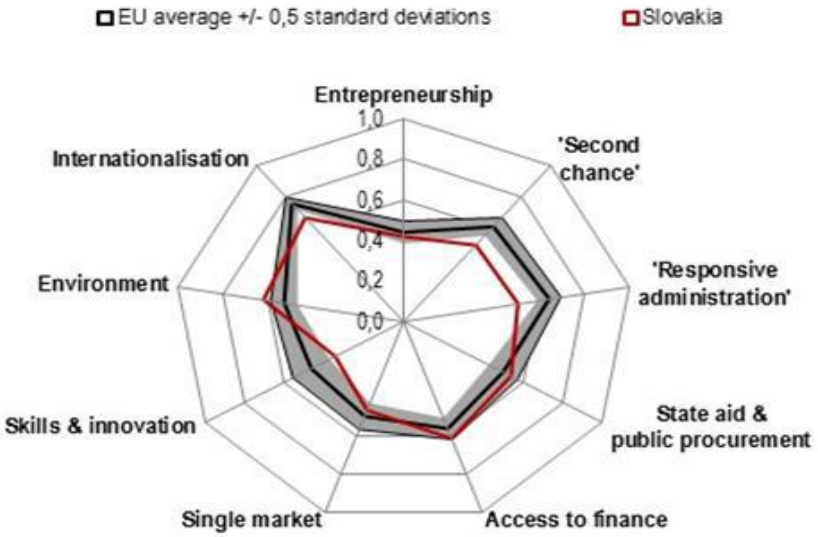

Figure 1 Slovakia´s SBA profile in 2016
Source: SBA Fact Sheet 2016 – Slovakia, European Commission

As the worst evaluated principle appears to be **"Responsive administration"**. Responsive administration refers to public administration being responsive to the needs of SMEs. As far as "Responsive administration" most of the indicators achieved lower value to the EU average. It can be stated that none of the indicators significantly moved from last year's level. The progress in this area since 2008 is still limited with one exception, namely that Slovakia made some progress on simplifying its tax administration, especially VAT administration. As a result, the number of tax payments has decreased from 20 to 10.

The time to start a business (SBA Fact Sheet 2016 – Slovakia) was almost three times longer than the EU average (10 days compared with 3.35 days). In 2013 Slovakia has put in place measures to lower the length of the procedure to start the business down to two days, but it was not achieved. The frequent changes in legislation, the pure complexity of administrative procedures as well as the requirements imposed by government regulations were perceived by Slovak SMEs as a burden.

In 2013 the government started with the special measure based on implementing the effective, reliable and open public administration programme (known in Slovakia as ESO reform). Its ambition is to make the operations of local public administration more efficient and to provide high quality, transparent and available services to the public. The reform will take place in several stages up until 2020. The reform provides for opening client centres which will not only bring local public administration closer to the public and businesses but helps to achieve substantial cost savings thanks to the increased use of e-solutions.

Since the adoption of the SBA in 2008 Slovakia has made some progress in making administrative procedures to set up a firm SME-friendly. It has also put in place some e-government solutions. However, there is still much for improvements in several areas related to "Responsive administration". Firstly, the single point of contact for start-up procedures needs to work more efficiently. Secondly, dealing with government services should be made faster and more effective. Thirdly, it is essential to connect different databases for the successful application of the once-only principle. It is also necessary to establish a one-stop shop where SMEs can have any administrative procedure or to obtain guidance on different areas of their activity, such as access to finance or fiscal advice. The last issue should change with the new National Business Centre originally announced in 2015, which is to provide comprehensive support to entrepreneurship and SMEs, including acceleration, incubation and growth programmes. The National Business Centre will operate under the supervision of the Slovak Business Agency, which in turn operates under the Ministry of Economy.

As far as the principle **"Skills & Innovation"** concerns, Slovakia' performance in this area is much below the EU average in most indicators. Since the adoption of the SBA in 2008 Slovakia has made limited progress on skills & innovation policy. Thought some measures supporting SME's research and development were implemented, many of SBA recommendations remain unaddressed (Lendel & Varmus, 2014). These include measures to support skills and professional competences and those promoting research, development and innovation in SMEs. Financial support on innovation is inadequate or completely lacking in the areas of proof-of-concept and commercialisation of innovation.

Almost all innovation-related indicators have deteriorated since last year (SBA Fact Sheet 2016 – Slovakia). Two main indicators decreased significantly. Percentage of SMEs introducing product

or process innovation achieved in Slovak SMEs only 17.67 % to 30.6 % of EU average and the percentage of SMEs introducing marketing or organisational innovations was in Slovakia 26.23 % to 36.19 % of EU average. It is not quite clear why in this predominantly unfavourable innovation landscape sales of new-to-market and new-to-firm solutions significantly outperformed the average. Positive is viewed that during the reference period for this fact sheet the government introduced a special measure - a tax deduction for research and development expenses. It is a tax deduction for research and development expenses, which will cover a broad selection of eligible costs, including 25 % of research costs, 25 % of the wages of all newly hired employees in the first year of employment and 25 % of the yearly increases in R&D costs. During the reference period the regional innovation offices were established. The implementing body for this measure is the Slovak Innovation and Energy Agency. The main aim of these offices is to provide professional consulting services to several target groups (mostly SMEs) in the area of research, development and innovation and to encourage more strategic thinking within overall company planning. The government also continued to implement its innovation voucher scheme (but the amount of financial means is still low).

Starting January 2013 the Ministry of Economy has adopted a State aid scheme to support the introduction of innovative and advanced technologies in industry and services. Moreover, a programme to support clusters was implemented by the Slovak Innovation and Energy Agency. It aims at connecting the business with scientific and research institutions, to facilitate the subsequent development of new manufacturing processes and materials.

Slovakia has not yet addressed persistent problems on skills development. There is a lack of an effective network of training providers, which should be available across the entire country to support skills enhancement in all sectors. Slovakia still has no mechanisms to assess the labour market´s needs in order to better shape the vocational training framework and match public demand requirements.

As the third worst evaluated principle appears to be **"Internationalisation".** Slovakia is performing below the EU average. The main reason is the extra-EU trading performance of slovak SMEs. The proportion of slovak SMEs exporting to extra-EU countries is one of the lowest in the EU. The same holds for the SMEs importing from extra-EU countries.

Thought since 2008 some of the SBA recommendations in this area have been implemented (measures stimulating trade and export, financial support for internationalisation of SMEs, support for clusters, accelerators and trade organisations) the available figures point to the need for improvements in their effectiveness and efficiency.

As a positive example of export promotion can be mentioned the measure - project "MISIA14 – Made in Slovakia". The project was launched in September 2013 and aims to increase exports from SMEs and increase the share of SMEs exports in total export of Slovakia.

The newly adopted "Act on administration, operation and use of the central electronic file information system in the import, export and transit of goods" is the measure to allow international traders, forwarders and carriers to perform the paperwork for the movement of goods more quickly, cheaply and in one place. This could help to reduce the number of required business documents and accelerate their handling (thanks to e-services) (Wagner & Hollenbeck, 2012). In addition, it

should bring also more efficiency and easier exchange of information between state administration bodies.

Research and Innovation Strategy for Smart Specialisation of the Slovak Republic (2013) aims to stimulate the international expansion of local companies and provide financial support. The strategy also plans to introduce networking events to boost new market entry for SMEs in other countries.

The National Business Centre launched in mid-2016 will serve as an umbrella organisation providing different forms of institutional support (strategic, operational, legal and financial) to all entrepreneurs interested in expanding their business abroad.

For the future special addressed measures should be aimed at a) the support of counselling and education in the field of developing the business in third countries and b) the improving the level of management of exporting SMEs.

Slovakia's performance in the **"Second chance"** is significantly below the EU average, mainly driven by the time (twice higher than the EU average) and cost (80% higher that the EU average) of resolving insolvency (SBA Fact Sheet 2016 – Slovakia). Second chance refers to ensuring that honest entrepreneurs who have gone bankrupt get a second chance quickly.

Closing up (winding up) an insolvent business took in Slovakia a long time (four years) and generated a high cost for the liquidated businesses (18 % of the debtor's estate). Despite several amendments to the bankruptcy law (the Insolvency Act was amended to facilitate reorganisation of businesses at risk of bankruptcy), since 2008 the progress is very limited. No specific measures supporting a second start for bankrupt entrepreneurs have been put in place and no rules were laid down for re-starting. No new measures were introduced in this area during the last years.

Slovakia is still lacking procedures that would enable entrepreneurs to move more quickly through the bankruptcy processes. The main problem is the lack of legislative requirements that would allow bankruptcy procedures to be completed within 1 year.

It is urgent to propose measures which will lead to quick action associated with closing (winding up) an insolvent enterprise and with the settlement of financial and property relationships in accordance with the recommendation given in the SBA initiative for promoting a "second chance" for entrepreneurs.

4 Conclusion

To improve the state in implementing SBA initiatives in Slovakia needs to create suitable entrepreneurial environment for small and medium businesses (Belás et al., 2015). This should be achieved through a broader application of the "think small first" principle, in particular through regulatory impact assessment, appropriate stakeholder consultation mechanism and the SMEs test. Public administration needs to be more transparent and address widely perceived corruption. It should also better respond to SMEs needs by providing higher quality services. E-government solutions, currently in an early phase, may play an important role in this process. Slovakia needs

to continue to boost skills and innovation in SMEs and enable them to achieve their international potential.

It is primarily a business friendly environment in which both start-ups and experienced entrepreneurs could benefit from a wide range of instruments to support their business ideas. Such an environment could also provide an opportunity for entrepreneurship of identified marginalized groups (women, seniors, youth, handicapped) to participate in entrepreneurial activity. Failure in business should be perceived as an opportunity for repeated market entry and not automatically understood as a failure.

Moreover, entrepreneurship should be accepted as a relevant career choice and receive support in the educational process. Building entrepreneurial competencies at a young age might be utilized by both entrepreneurs as well as employees at a later stage.

Finally, efficient introduction of electronic communication between the public and private sectors would help lower the cost of sharing mandatory information for private businesses and also for the public sector when providing services to its customers.

The new EU multiannual financial framework for 2014-2020 offers for Slovakia a chance to support SMEs via a number of financial and non-financial instruments (loans, equity funding, regulatory impact assessment system implementation, mentoring services, incentives for marginalized groups, start-up promotion, one-stop-shop solutions, etc.) as defined in the national Operational Programs (Letovanec, 2014). This might be the time to formulate a clear SME strategy, a special Act on SMEs, utilizing the best EU and international practices in a long-term framework that would also accelerate the fulfilment of key SBA recommendations.

Acknowledgements

The paper is an output of the science project VEGA 1/0494/15 “The research of factors influencing the successfulness of innovative small and medium enterprises in the Slovak Republic”.

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Impact of lifelong learning on innovative processes in EU countries

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Abstract

The paper is devoted to the research of the state of lifelong learning in contex of conditions of formation of innovative-oriented model of economy. The introduction outlines the importance of knowledge and innovation, the role of high-tech technologies in the processes of working activities of employees in formating of human capital of the country. The next stage was the research of scientific papers by the issue of lifelong learning. The aim of the paper is to continue the previous researches about the importance of lifelong learning for the employees, enterprises and countries in general and to put forward the hypothesis about the impact of lifelong learning on the innovative processses in current conditions of economy's development. In the paper a descriptive method is used - to disclose the existing information about lifelong learning, a graphical method - to demonstrate the constituent elements of the system of lifelong learning in conditions of development of innovative integrated structures and economic and mathematical modeling - to establish the relationship between lifelong learning, the clobal innovation index and indicator of state of cluster development of countries. In the paper the above-mentioned indicators of European countries of 2016 were analyzed, the source of which were the statistical information of international materials, in particular: Eurostat, Global Competitiveness Report and Global Innovation Report.

Key words: Knowledge, Modern innovative oriented economy, Lifelong education, Lifelong learning, Education innovation clusters, EU.

JEL Classification: A23, I25, J11, M00, P46

1 Introduction

According to the current conditions the development of country's economy without the stimulation of innovative orientation is impossible. The basis of innovative economy is high-tech production, which stipulates the increasing of the requirements for the professional qualification level of employees, in particular, the value of the intellectual component of employees. In addition, the intensive ascertainment in the production's process the knowledge-intensive technologies creates the need in regularly improvement of knowledge, skills and abilities of employees, which necessitate the creation of an effective system of lifelong learning and strengthening the factors which improving motivation for professional development.

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Thus, the aim of our scientific research is analysis of importance of lifelong learning under the conditions of innovative model of economy and relationship between lifelong learning and innovative-integrated structures on the example of EU's countries.. For the solving of this aim we consider that it's necessary to analyze the next goals. For the solving of this aim we consider that it's necessary to analyze the next goals: analysis the Global Innovation Index, the Indicator of state of cluster development and the Indicator of Lifelong Learning among the 30 EU's countries and the grouping the countries by these indexes. We put forward the following hypothesis that there is a statistically significant correlation between Global innovation index, the Indicator of state of cluster development and the Indicator of Lifelong Learning.

2 Methods

From standpoint of the methodology of our research in first phase of implementation, which are based on the research of foreign and Ukrainian literatures and the analysis of the results of one's own research. In our own research, we used the method of analysis and synthesis. The relationship between Global innovation index, the subindex of state of cluster development and Lifelong learning. These indicators have been selected from Eurostat Database, for the year 2016, the Global Competitiveness Report 2016, the Global Innovation Report 2016. The analysis has been carried out using Statistica Package.

3 Lifelong learning in innovative model of economy

Lifelong learning is a scope of researches of many scientists in differents countries. Various forms of adult education and contents are analyzed by Rabušicová and Rabušic (2008), then professional adult education for example by Mužík (1999), Plamínek (2010), Veteška (2013) and Rabušicová (2013). Lifelong learning has been linked to a variety of benefits, for the individual, the economy and wider society (Field, 2009). Besides, the model of lifelong learning can help to the education systems have trouble finding ways of adapting to the need for innovation and including creativity in current teaching and learning processes (Sahlberg, 2009).

Knowledge and innovation are the main sources of progress in modern innovative oriented economy. Indeed, knowledge plays a key role in increasing human capital, which is one of the main drivers of economic progress and sustainable development in knowledge societies. It is not primarily what individuals know or do not know, but their skills in acquiring, utilizing, diffusing and creating knowledge that are important for the future.

Innovation is the extraction of economic and social value from knowledge. It involves putting ideas, knowledge and technology to work in a manner that brings about a significant improvement in performance. It is not just an idea but rather an idea that has been made to work. This means that innovation and entrepreneurship are required. Therefore, living in and working for a world of innovations requires fundamentally different attitudes, knowledge and skills from the citizens.

One of the traditional advantages associated with clusters of firms has been their capacity to engender greater innovation and to transform this innovation into economic growth. These "education innovation clusters" tend to draw people and resources from at least four regional sectors including education, the private sector, higher education and philanthropy.

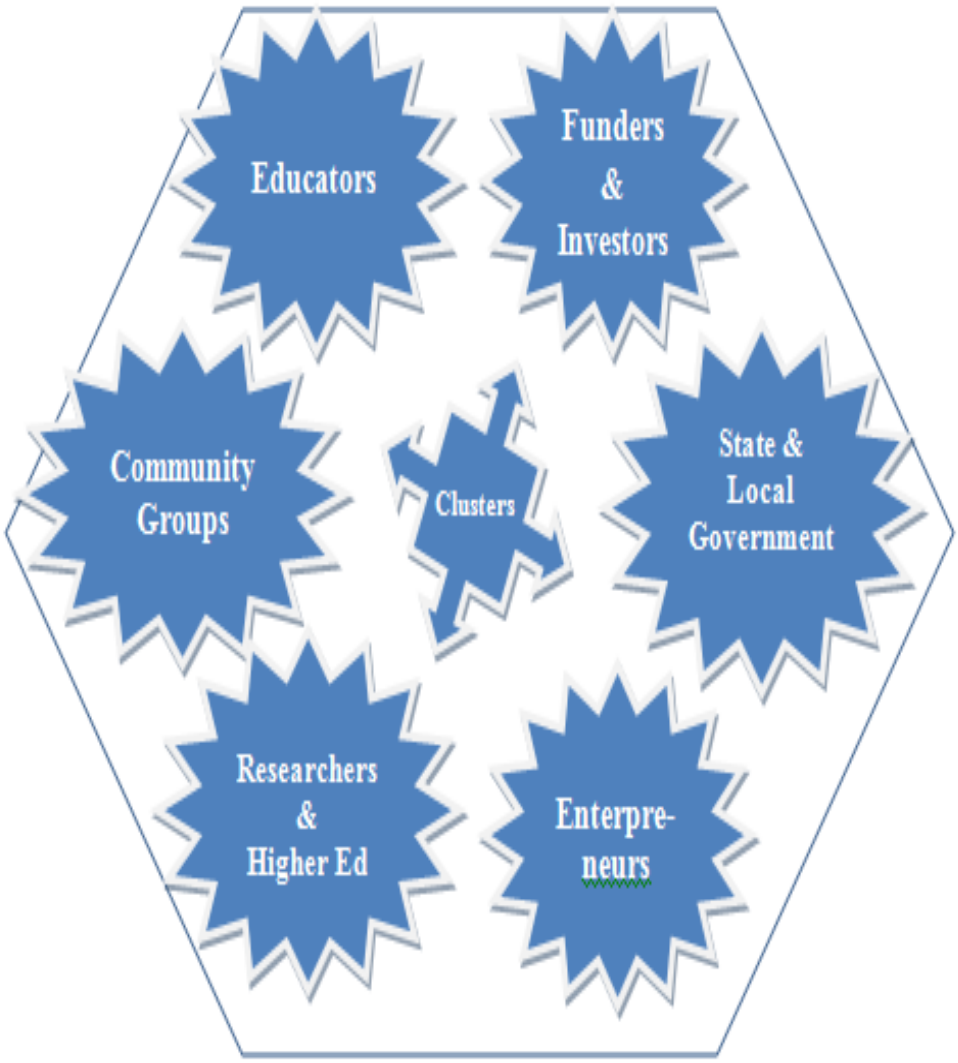

Figure 1 Stakeholders of clusterization
Source: Authors' own elaboration

In order to be able to contribute successfully to the development of innovation in the sustainable knowledge economy, education systems need to include working with and learning from innovations as a part of education policies. Innovations linked to future development and changes have three characteristics that are also relevant to lifelong learning.

The aim of many knowledge society strategies is an innovative society that provides security, happiness and prosperity to all citizens in ecologically sustainable ways.

The introduction of the high technologies into the production process creates the need to improve the knowledge and skills of the employees, the implementation of the continuous lifelong learning and appropriate incentives for the professional development. Lifelong learning is becoming more and more important for the countries that want to be competitive in the global knowledge economy. So the era of the 21st century is not only a new landmark development but, above all, a

transformational shift to the intellectualization as the process of the saturation of the information environment by the intellectual assets (Levchenko et al., 2017).

Lifelong education and learning are essential for achieving that dream. Nations' dreams and visions differ in detail but the main idea is the same. For example, Himanen (2007) has suggested that for Finland this dream would be a genuinely caring and creative Finland. All modern national and multi-national strategies include the idea of creativity and innovation. Economic policies, especially at the time of fiscal disorder, count on strengthening investments in innovation and technology. Ecological sustainability will only be achieved through further creative solutions to emerging global problems. In fact, as Sachs (2008) eloquently asserts in his book Common Wealth, the global challenges of over-population, energy shortages and climate change can only be solved by new collaborative and creative actions of all nations. How can global education policies promote better mutual trust among nations, companies and individuals that is the conditional basis for risk-taking and creativity? Both trust and creativity are needed to fulfill the global dream of a secure, safe and ecologically sustainable world for all.

Over the last few years, educators, entrepreneurs, funders, and researchers have been joining forces to spur learning innovation in specific regions of the country and equip young people with the skills they need in a changing economy.

Analyzing the research, was conducted by Levchenko (Levchenko et al., 2017), we can observe a positive tendency of increasing the indicator of lifelong learning during the analyzed period. Under the influence of the 4th Industrial Revolution, the authors identified the interdependence between the global competitiveness index and lifelong learning, therefore, we are putting the next hypothesis about interrelation between the global innovation index, lifelong learning and the indicator of state cluster development in conditions of innovative-oriented economy.

The correlation analysis was conducted with using the programme Statistica 12.0, the achieved results are shown in Table 1.

Table 1 The Pearson's correlation coefficient between the global innovation index, lifelong learning and indicator of state cluster development in 2016

	Global innovation index	Global cluster index	Lifelong learning
Global innovation index	1	0,9053	0,8249
Global cluster index	0,9053	1	0,7789
Lifelong learning	0,8249	0,7789	1

Source: Authors' own elaboration

As we can see from Table 1, the value of the pair correlation is more than 0.5, which is evidence of a linear correlation between variables, namely: the strongest relationship is observed between the Global innovation index and the State of cluster development (0.905), that is, in the conditions of innovation-oriented economy the unification of countries not only on the territorial basis, but on the innovative vector which is chosen by the countries has a key role. An important factor for lifelong learning is countries' ability to introduce the new technologies, to take into account the experience of leading countries, and cooperate with them in the direction of innovation development, like as confirmation of this view, we can observe a value of correlation between Lifelong learning and Global innovation index (0,8249), more less interrelation, but notable, in

correlation's coefficient between indicator of state of cluster development and Lifelong learning (0.7789).

Next, we consider to model 3D surface Plot of Lifelong learning against Global innovation index and State of cluster development, which is shown in Figure 2.

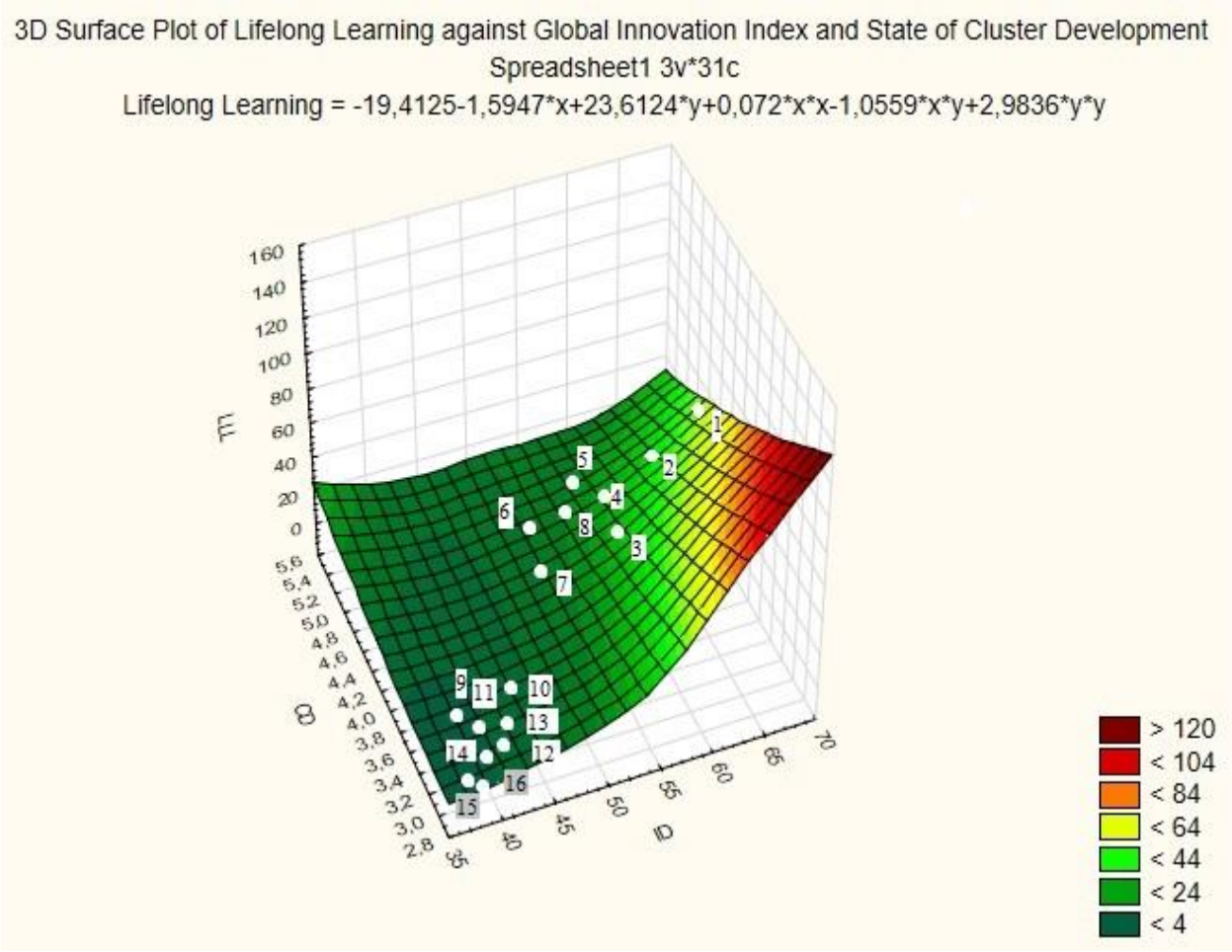

Figure 2 3D surface Plot of Lifelong learning against Global innovation index and State of cluster development

Source: Authors' own elaboration [date of release: 2016 EU, The Global Competitiveness Report 2016, Global Innovation Report 2016]

Note: LLL- Lifelong learning, ID- Global innovation index, CD- State of cluster development
1 - Switzerland, 2 - Sweden, 3 - Denmark, 4 - Finland, 5 - Netherlands, 6 - Norway, 7 - France, 8 - Luxemburg, 9 - Poland, 10 - Cyprus, 11 - Bulgaria, 12 - Latvia, 13 - Hungary, 14 - Lithuania, 15 - Romania, 16 - Croatia

Also, we guess that grouping of EU countries in different blocks for the indicators lifelong learning, global innovation index and state of cluster development, where the lifelong learning (from Figure 2) is the main can be found the common characteristics of the country strategy of such instrument as lifelong learning, the results of which are shown in Table 2.

Table 2 The grouping of EU countries for the indicators of Lifelong learning, Global innovation index and state of cluster development

The blocks of indicator of lifelong learning	Countries with coordinates of points according to the 3D surface Plot (LLL, ID, CD) (figure)	Characteristics of the main features of lifelong learning of countries
Highest 24,7>	Switzerland (32,9; 66,3; 5,1) Sweden (29,5; 63,6; 5,0) Denmark (28,9; 58,5; 4,6) Finland (26,1; 59,9; 4,9)	Lifelong learning for all is an important priority for Nordic cooperation on education. It covers all types of education, learning and lifelong skills enhancement in the traditional education system, in adult and continuing education, in ongoing vocational training as part of working life, and in a variety of other contexts in which people learn and develop their knowledge, skills and competencies.
High 24,7-16,5	Netherlands (18,8; 58,3; 5,3) Norway (19,5; 52,0; 5,2) France (19; 54,0; 4,6) Luxemburg (17,6; 57,1; 5,2)	The professional training is carried out both in the workplace and directly at the enterprise, financing for retraining goes centrally, as well as from the taxes of employers. The professors involved in training, in-service training and retraining are the ultimate goal that affects to the social and production state. The state is interested to share and to develop the lifelong learning to provide the increasing of productivity
Average 16,5-8,3	Austria (14,8; 52,6; 4,8) Estonia (14,8; 51,7; 3,8) United Kingdom (14,7; 61,9; 5,3) Slovenia (11,9; 46,0; 3,5) Spain (9,5; 49,2; 4,3); Portugal (9,6; 46,4; 4,2) Cheque Republic (8,6; 49,4; 3,8) Germany (8,4; 57,9; 5,4)	The model of lifelong learning is being implemented to the state's programs, but hasn't the permanent character, as result the involving of lifelong learning is not very popular among the employees
Lowest <8,3	Ireland (6,5; 59,0; 4,9) Belgium (7; 52,0; 4,6) Italy (7,9; 47,2; 5,4) Malta (7,5; 50,4; 4,2) Slovakia (3; 41,7; 3,9) Turkey (5,7; 39,0; 3,8) Poland (3,7; 40,2; 3,7) Cyprus (7,1; 46,3; 3,8) Bulgaria (2,1; 41,4; 3,6) Latvia (6,8; 44,3; 3,5) Hungary (5,9; 44,7; 3,4) Lithuania (5,8; 41,8; 3,3) Romania (1,4; 37,9; 3,2) Croatia (3,2; 38,3; 3,0)	Unlike previous groups, the model of lifelong learning in these countries is starting to develop, but despite on its importance - employees are not interested to start of involving, because there are lack of interest in this model employers and state in general. And in this conditions, these countries can not effective operate in innovative model of economy and be involved in creation process a new type of collaboration - clusters

Source: Authors' own elaboration

So, from Table 1, we can see, that the countries (Switzerland (32,9; 66,3; 5,1), Sweden (29,5; 63,6; 5,0), Denmark (28,9; 58,5; 4,6), Finland (26,1; 59,9; 4,9), Netherlands (18,8; 58,3; 5,3), Norway (19,5; 52,0; 5,2), France (19; 54,0; 4,6), Luxemburg (17,6; 57,1; 5,2), placed in the first quadrant with a value of lifelong learning from 17,6 to 32.9 - are characterized of high level of involvement of employees in lifelong learning, where an alternative form of professional training is used, which is considered like as the most effective form of training of qualified personnel, since the gradual and parallel increasing of the complexity of training and work accelerates the development of

modern processes, besides, for this group a high level of innovation activities, which, in turn, promotes the development of innovative-oriented structures is characterized too.

4 Discussion

We are agree with a view, that education and training are necessary for future innovations, but innovations are also needed to improve education systems according to the Slovenian EU Presidency in the field of education and training (Slovenian Presidency of the EU2008).

The obtained results of our research are confirmed our hypothesis about strong relationship between such indicators as Lifelong learning, Global innovation index and state of cluster development, besides the results are shown that the lifelong learning influences on the innovative processes in economy of EU countries, the correlation coefficients are evidence of this aspect, particulary correlation coefficient between Global innovation index and state of cluster development is 0,905, Lifelong learning and Global innovation index is 0,825, which indicate about "direct" connection between these indicators (if one of them will increase, the value of other will increase too). As a result, we compared the countries by these indicators, first of all, for the leading-countries (Switzerland, Sweden, Denmark, Finland). Where we see that the countries which pay more close attention and implement the effective models of lifelong learning have more intensive pace of innovation development of their economy. Furthermore, in such countries educational policy covers all types of education, learning and lifelong skills enhancement in the traditional education system, in adult and continuing education, in ongoing vocational training as part of working life, and in a variety of other contexts in which people learn and develop their knowledge, skills and competencies.

5 Conclusion

Thus, summarizing the above, we have to conclude about the following: the main components of the development in the context of modern innovative economy are knowledge and innovation, which are in close interaction with each other. During our research, we analyzed the level of impact of lifelong learning and clusterization on the innovative component of the country's economy. The value of the correlation coefficients between these indicators are a quite high, this indicates about the direct dependence of these indicators and high impact on each other. The countries are grouped by the level of lifelong learning, the level of innovation in the country and the level of state of cluster development, and the peculiarities for each groups of countries are revealed. Therefore we consider, in current conditions, one of the effective instruments for the ensuring processes which are needed for innovative-oriented model of economy is the cluster sctructers, which allow the introduction of innovative technologies, using the experience of developed countries. Exactly, cluster structures are most innovative oriented and effective, and that's why the increasing of their quantity leads to the increasing of innovation activity of enterprises in country's economy and as result - sustainable development and national security.

Acknowledgements

The presented work and results is part of state thematic theme as part of grant supported by Ministry of Education and Science, and financed from the Ukrainian budget resources in the years 2017-2019 as the research project 0117U001101 "The development of innovative and integrated structures as a factor of national security of country in terms of socio-economic instability".

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The Role of Universities in Cluster development of Countries' Economy

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Abstract

The paper deals with the issue of cluster development. We analyze and asses the linear relation between cluster development and independent variables such as university ranking, according to the Global Talent Competitiveness Index. The aim of this paper is to highlight the relationship between university ranking as an indicator of the evaluation of level of higher education of country and cluster development. For the purposes of this paper, the analysis of these indicators of 75 countries of the world. With regard to the aim, we have set the following hypothesis: we assume that there is a statistically significant correlation between the impact of university ranking and cluster development of country. We provide mentioned analysis by multidimensional regression analysis for the year 2017 of 75 countries of the world. The analysis confirmed that the cluster development has notable relationship with university ranking of country.

Keywords: Knowledge-based economy, University, Economic development, Cluster development, Regional development, Innovative model of economy.

JEL Classification: O1, O3, O52, P46

1 Introduction

During the first decades of the 21st century, the developing countries have achieved the certain results and now are making more and more their efforts of reducing the economic gap that exists between them and the developed countries. The Asian countries demonstrate a success in these directions too, first of all, Singapore, China and Korea. A number of European countries, such as Sweden and Denmark, are already achieving consistently the high economic indicators in due to the targeted state programs, which are oriented on the formation of knowledge based economy, which is actual at the current stage in dimension of innovation model of economies. That's why, the continuing of modernization of their economies on the basis of innovative technologies remains a key aim of the state policy of these countries, that is one of the challenge at the current stage. And to help to meet the challenges of globalization, pressure on limited resources and an aging population, the EU has launched the Europe 2020 strategy for smart, sustainable and inclusive growth, where one of the three priorities is to develop an economy based on knowledge and innovation, this involves improving the quality of education, strengthening research performance,

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and promoting innovation and technology transfer throughout the EU (European Commission Communication, 2014).

The researches of leading scientists allow us to conclude that in the issue of formatting of a knowledge-based economy, a key role belongs to the regional development of the national economy, which is based of innovative-integrated structure, in particularity on clustered structures. In these conditions, the educational institutions become more influential as a center of generating a new knowledge and idea. In addition, according to the survey in The Economist suggests the conception of the knowledge-based economy "portray(s) the university not just as a creator of knowledge, a trainer of young minds and a transmitter of culture, but also as a major agent of economic growth: the knowledge factory, as it were, at the center of the knowledge economy" (David, 1997). Closely related to this is the idea that universities can also jump start the emergence of dynamic regional clusters of firms and thus act as crucial contributors to regional economic development (Wolfe, 2005).

According to most cluster theories, businesses are at the core of competitive clusters, with universities and other institutions forming a critical support infrastructure for continued industrial innovation and productivity growth (Feser, 2009; Mura, & Machová, 2015).

According to Cooke et al. (2007), knowledge organizations such as universities and research institutes, as well as businesses involved in innovative activities are usually concentrated in a few specific regions or urban areas, and are not evenly spread across geographical space. However, the contribution of universities to regional development, in general, and to innovative regional cluster set-ups, in particular, is very difficult to measure.

Universities are one such "regional factor" that impacts all of the dimensions of cluster competitiveness. On the one hand, universities are an asset that increases the quality of inputs and producers, by upgrading human capital and disseminating knowledge. Universities also promote economic diversity. In fact, the key role of the university is not so much to grow the economy, as it is to diversify it by generating new opportunities out of the old. The university is the creative side of economic destruction (Gradeck, 2004).

System of higher education institutions is becoming not only a producer of educational services and a new knowledge to its customers (which has the own centers, powerful scientific centers and laboratories, where able to attract students of such universities), but also as their consumers through the creation the powerful research centers in such universities that are actively involved to the introduction of innovation in different spheres of economy and innovation activities (Levchenko et al., 2017). Thus, universities are not just generators of commercializable knowledge or even highly qualified research scientists; they provide other equally critical mechanisms of knowledge transfer (Bramwell, 2008).

Universities generate and attract talent, which contributes both to the stock of tacit knowledge in the local economy, as well as to the 'thickness' of the local labour market (Florida, 2002; Betts & Lee, 2005). Besides, in addition to the conduct of basic research, universities provide both formal and informal technical support, as well as specialized expertise and facilities for on-going, firm based R&D activities (Grossman et al., 2001; National Academy of Engineering, 2003; Mowery et al., 2004). Also, universities act as a conduit enabling firms to access knowledge from the 'global

pipelines' of international academic research networks (Bathelt et al., 2004; Lawton Smith, 2003a; OECD, 1999). Finally, rather than acting as 'ivory towers' insulated from their community, they can function as 'good community players' that support firm formation and growth by facilitating tacit knowledge exchange among networks of innovative firms and acting as 'anchors of creativity' that sustain the virtuous cycle of talent attraction and retention (Wolfe, 2005a; Henton et al., 1997; Gertler & Vinodrai, 2005; Betts & Lee, 2005; Hajdu, Andrejkovič, & Mura, 2014).

The aim of this paper is to highlight the relationship between university ranking as an indicator of the evaluation of level of higher education of country and cluster development. For the purposes of this paper, the analysis of these indicators of 75 countries of the world. With regard to the aim, we have set the following hypothesis: we assume that there is a statistically significant correlation between university ranking and cluster development of country.

2 Methods

The research's methods comprise mainly descriptive statistic tools. The relationship between cluster development of country and selected variable – University ranking (as indicator of quality of higher education of country) – representing the resources were analysed using Pearson correlation coefficient. The significance of correlations was tested with T-student's-test. Indicators have been selected from INSEAD Database, for the year 2017. The analysis has been carried out using Statistica Package and R.

3 Cluster development and University ranking: statistical analysis

To quantify the strength of the relationship, we can calculate the correlation coefficient. In algebraic notation, if we have two variables x and y, and the data take the form of n pairs, then the correlation coefficient is given by the following equation:

$$r = \frac{\sum_{i=1}^{n} (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^{n} (x_i - \bar{x})^2 \sum_{i=1}^{n} (y_i - \bar{y})^2}} \qquad (1)$$

where $\bar{x}$ is the mean of the x values, and $\bar{y}$ is the mean of the y values.

This is the product moment correlation coefficient (or Pearson correlation coefficient). The value of r always lies between -1 and +1. A value of the correlation coefficient close to +1 indicates a strong positive linear relationship (i.e. one variable increases with the other). Further, according to our hypothesis, calculate the degree of relationship between Cluster Development and University Ranking, taking into account the indicators of countries of the world according to the annual report of Global Talent Competitiveness Index.

A correlation coefficient shows the degree of linear dependence of x and y. In other words, the coefficient shows how close two variables lie along a line. In our occasion, y (Cluster Development) is dependent variable and x (University Ranking) - independent variable.

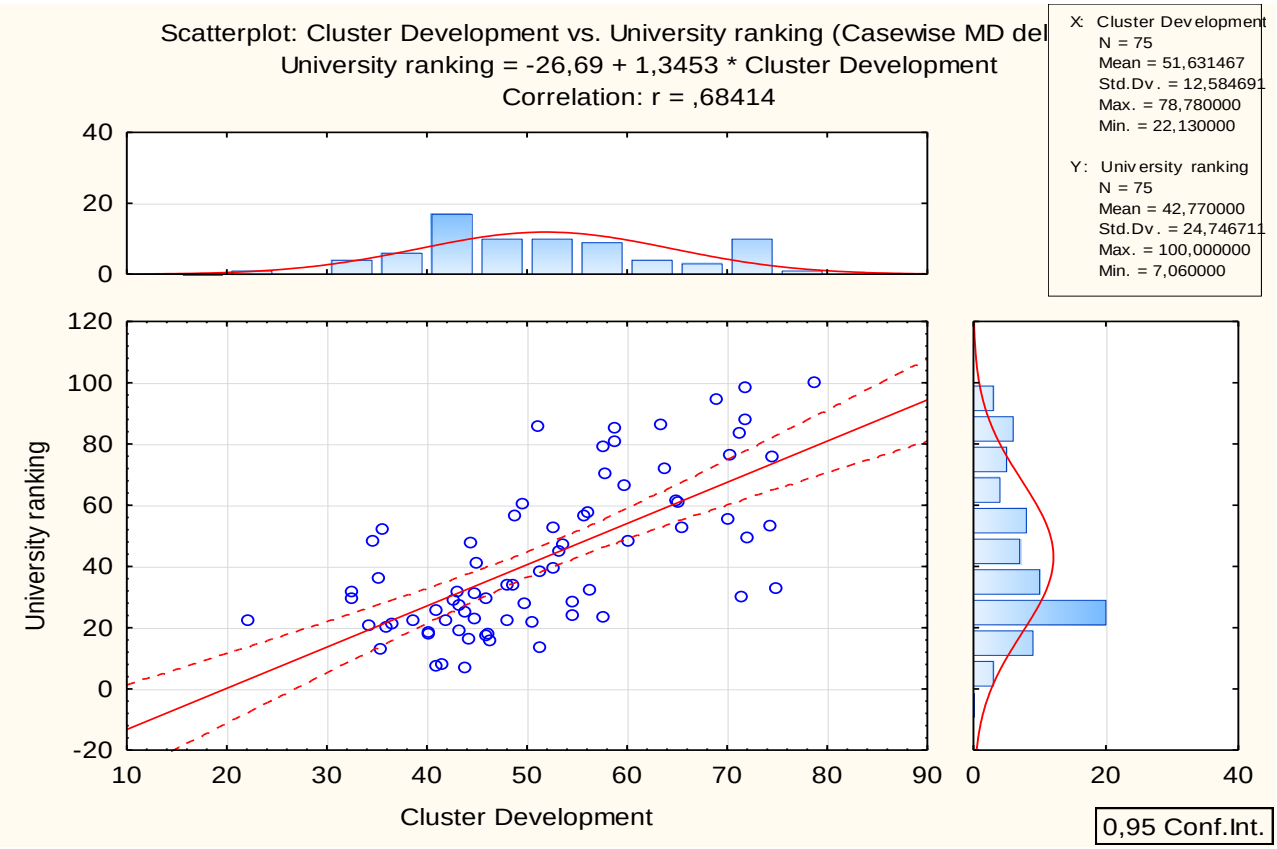

Figure 1 The ratio of correlation between Cluster Development and University Ranking
Source: Authors' own elaboration

The relationship between cluster development and university ranking depicted in Figure 1 has a notable correlation of 0.68. Besides, we can see, that mean value of cluster development is 51.63. The lowest value of cluster development among the countries is 22.13 score (minimum), the highest is 78.78 score (maximum). The highest value is on 56.65 score higher than the lowest value (dimension). The standard deviation is 12.58. Consequently, the variance, the square of the standard deviation, is (12.58) * 2 = 25.16. The asymmetry and the coefficient of variation are given with the corresponding standard errors. The mean value of university ranking is 42.77. The lowest value of university ranking among the countries is 7.06 score (minimum), the highest is 100.00 score (maximum). The highest value is on 92.94 score higher than the lowest value (dimension). The standard deviation is 24.75.

Besides, we consider, that the modeling of regression model can be useful in process of our analysis. The purpose of regression analysis is to analyze relationships among variables (in our analysis - cluster development and university ranking), where the results serve the following two purposes: a) answer the question of how much y changes with changes in each of the x's (x1, x2,...,xk), and b) Forecast or predict the value of y based on the values of the X's.

Table 1 Regression analysis results

Call:				
lm(formula = form, data = data)				
Residuals:				
Min	1Q	Median	3Q	Max
-22.3795	-5.3636	-0.2053	4.9153	26.6815
Coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	36.75130	2.14150	17.161	< 2e-16 ***
University Ranking	0.34790	0.04341	8.014	1.32e-11 ***
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				
Residual standard error: 9.241 on 73 degrees of freedom				
Multiple R-squared: 0.468, Adjusted R-squared: 0.4608				
F-statistic: 64.23 on 1 and 73 DF, p-value: 1.324e-11				

Source: Authors' own elaboration

Statistic significance of the model:
H0: model is not statistically significant
H1: model is statistically significant
p-value: 1.324e-11 < 0.05 we reject null hypothesis and we approve alternative hypothesis that model is significant

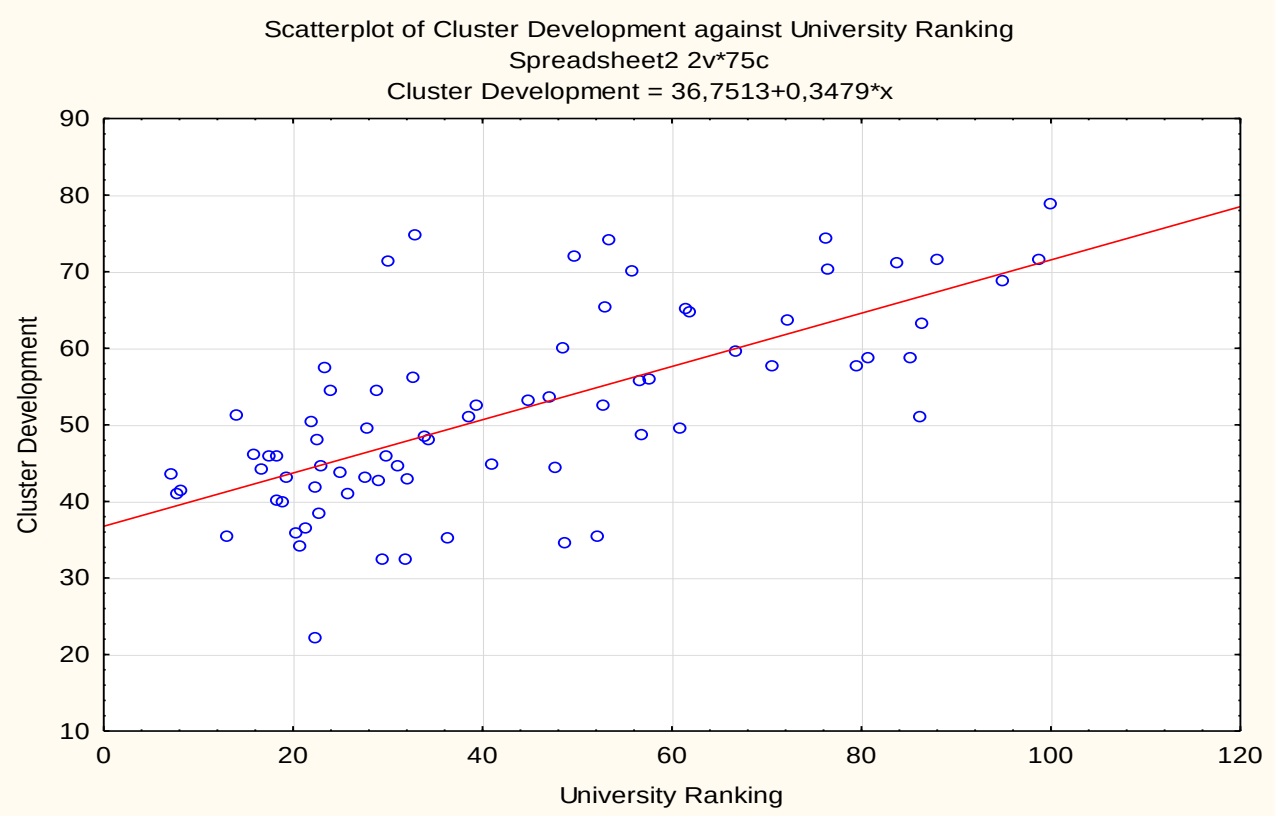

Figure 2 Linear regression model
Source: Authors' own elaboration

This model describes that 21.2 % of variability of dependent variable (Cluster development), which is due to the differences in our independent variable – University Ranking, while the rest 78.8% are other factors that were not taken into account in this case.

Statistic significance of the variable:
H0: variable is not statistically significant
H1: variable is statistically significant
p-values: 1.32e-11 < 0.05 (University Ranking) we reject null hypothesis for both variables and we approve alternative hypothesis that variable University Ranking is significant.

Interpretation the results:
Ceteris paribus: if University Ranking will increase by one score Cluster Development will increase by 0,34 score.

Thus we received the regression linear model (Figure 2):
Cluster development = 36.751 + 0.3479 * University Ranking.

The greatest positive deviation of the true value of the model is 26.6815 score, the largest negative - -22.3795 score. Almost half of the balances are in the range from the first quartile (1Q = -5.3636 score) to the third (3Q = 4.9153 score).

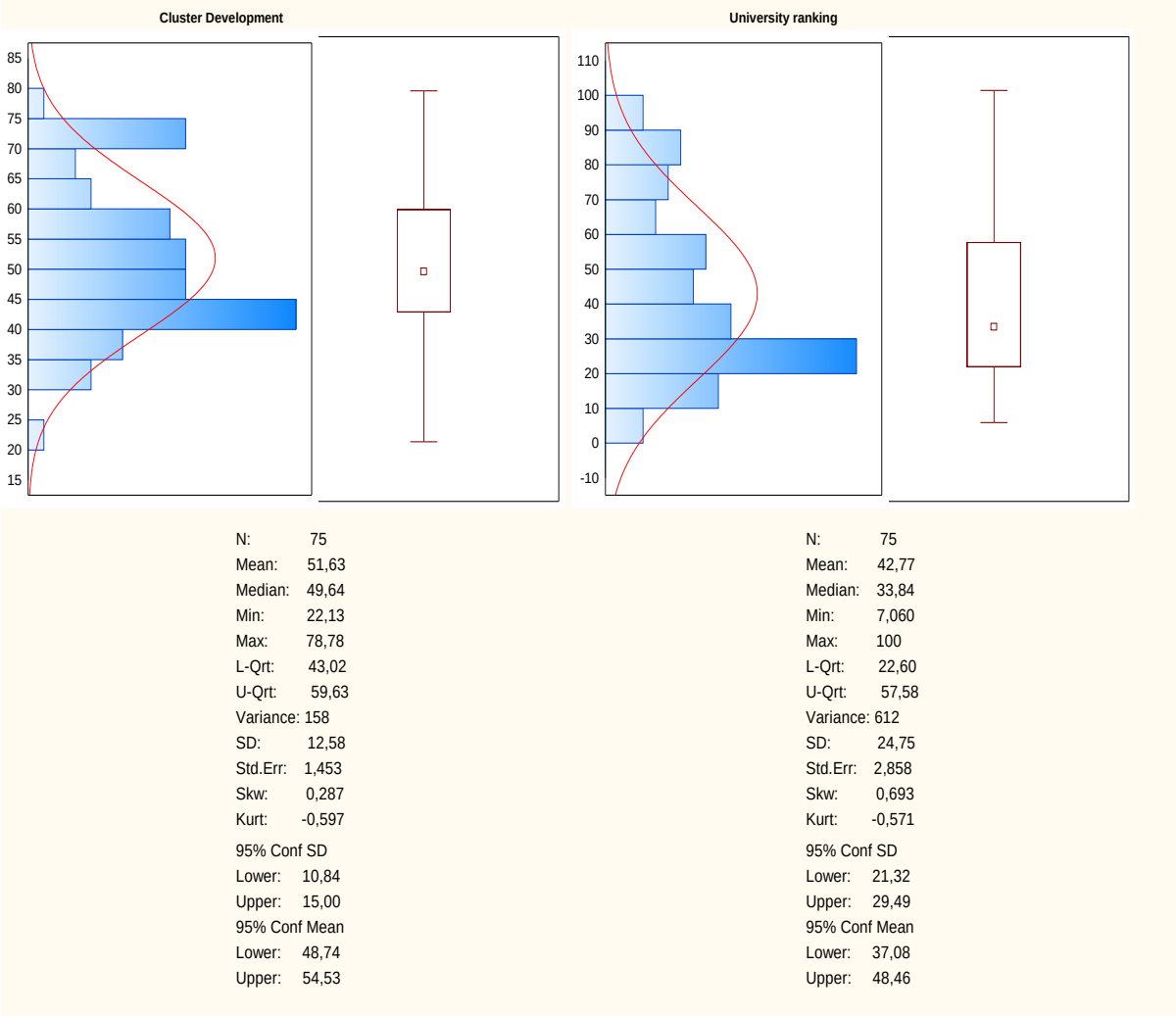

Figure 3 Descriptive statistics of such indicators as Cluster Development and University Ranking
Source: Authors' own elaboration

According to the Figure 3, we can see the numbest of countries with a University Ranking level in the range of 40-45 score, the lowest is 75-80, the mean University Ranking - 51.63, the median - 49.54. Accordingly, the level of cluster development: the numbest of countries are in the range of 20-30 scores, the lowest are in 0-10. On the one hand, the median of the indicator of cluster development is 49.64. This means that the level of cluster development in some countries does not exceed 49.64, while in others - exceed it. It is necessary to admit, that the median, equal to 49.64, is slightly less than the mean value of 51.63. On the other hand, the median of the indicator of university ranking is 33.84. This means that the level of university ranking in some countries does not exceed 33.84, while in others - exceed it. It is necessary to add, that the median, equal to 33.84, is significant less than the mean value of 42.77.

Thus, the obtained calculated results of our research indicate about influence the universities on the state of cluster development and could be used by stakeholders as an instrument for developing the clusters. First of all, by governments of countries as one of the element of mechanism of regulation of clusterization's process, because if the state will implement an effective policy for improving the competitiveness of higher education, in result - will increase Universities' Ranking,

that as a whole will lead to activation of cluster development (1 point of University Ranking to 0,34 point of Cluster Development). Therefore, we think, that our results can be used by the state in elaboration a mechanism for the development of clustering of the economy. Furthermore, the received results strengthen the role of universities and the necessity of realization an effective state policy in the field of education.

4 Conclusion

The challenges of the economical present of a globalized economy, which are oriented on knowledge create the need to strengthen the aspects of innovation development, development of innovation infrastructure, the functioning of which would be aimed on the activating the innovation processes, which will be ensuring the high rates of economic growth. In these conditions the significant role in the development of research and innovation infrastructure is played by the system of higher education and the universities, in particular. The aims of increasing the effectiveness of socio-economic and scientific and technical policy involve the using of clusterization in development, based on the links of scientific institutions and operating enterprises in the network structure for the production of goods, services and innovations. Thus, the correlation-regression analysis showed a notable relationship between cluster development and university ranking, which indicate on the impact of universities and the state of higher education on the cluster development of the country. Nowadays the process of clustering is an effective tool for ensuring the sustainable development of the country's regions. In general, both the cluster structers and the regional research and scientific structures with the participation of universities are focused on solving the problems which related to cooperation between science and production, increasing the efficiency of using the potential of the region and the country according to the triple helix.

Acknowledgements

The presented work and results is part of state thematic theme as part of grant supported by Ministry of Education and Science, and financed from the Ukrainian budget resources in the years 2017-2019 as the research project 0117U001101 "The development of innovative and integrated structures as a factor of national security of country in terms of socio-economic instability".

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Selected quality of life indicators

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Abstract

The paper deals with the highly attractive and yet contemporary area of investigation in EU. Quality of life indicators help adjust the commonly used indicator as GDP to further classifications that help understand the complexity of the quality of life and bring essential background for the government decision making. Quality of life indicators define nine different groups of indicators: material living conditions, productive or other main activity, health, education, leisure and social interactions, economic security and personal safety, governance and basic rights, natural and living environment (pollution, access to green and recreational spaces and landscape and built environment) and overall experience of life. We will further focus on pollution and its main characteristics for the EU and for the individual states as well. The aim of the paper is to introduce the quality of life indicators according to EU and to analyze one of their components: pollution.

Keywords: Quality of life, Well-being, Indicators, Pollution, Health.

JEL Classification: E01, I15, I31.

1 Introduction

Quality of well-being has always been one of the main topics for the EU politicians and economists. It is known that GDP per capita is no longer suitable for the comparison of the real life perception because of the limited information that lies in the final production of the market. There was a need to come with the solid indicator that would help to identify the regions with the low and high quality of life. There are several approaches how to measure well-being. Knabe et.al. (2016) use to measure well-being the multidimensional well-being by using data from the OECD Regional Well-Being Index. In their work they analyzed the extent to which the choice of five alternative aggregation methods affects the well-being ranking of regions which could lead to the alteration of EU regional funds allocation.

On the other hand, Decancq and Schokkaert (2015) proposed that focusing on income growth might lead to a narrow-sighted measure of changes in well-being. They stressed that people care about other dimensions of life, such as their health, employment, social interactions and personal safety.

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In EU the mutual goal of all the member states was to create a complex indicator that would be able to identify the real quality of well-being of its inhabitants. Several meeting were needed and the consensus of various groups was necessary to come with the final set of the quality of life indicators.

So as a result, in September 2010 The DGINS Conference in Sofia reconfirmed the commitment of the members of the ESS to the Group and in November 2011, the European Statistical System Committee endorsed the final report of the Sponsorship Group.
The key recommendations of the Sponsorship Group in the quality of life area were the following:

- strengthen the household perspective and distributional aspects of income, consumption and wealth,
- improve multi-dimensional measures of quality of life, develop a scoreboard of indicators on the basis of existing data, covering as much as possible all the dimensions,
- as part of the scoreboard, investigate the possible development and relevance of synthetic indicators (not to be mistaken with composite indicators),
- further develop the statistical coverage of quality of life, develop EU-Statistics of Income and Living Conditions (EU-SILC) as a core instrument complemented by other data sources, use ESS data source whenever available.

The Directors of Social Statistics, at their meeting on 21 March 2012, approved a mandate of the Quality of Life Expert Group (EG). The Expert Group met eight times over the years 2012-2015 and the work of the Expert Group consisted of:

- finalizing the list of indicators on quality of life,
- identifying the data gaps and making recommendations on the possible future data collections to complete the information.

Quality of life is a broader concept than economic production and living standards. It includes the full range of fac**t**ors that influences what we value in living, reaching beyond its material side.

The Stiglitz, Sen and Fitoussi Commission (2009) highlighted that well-being and quality of life are inherently multidimensional concepts. Building on this vision, the Sponsorship Group endorsed a framework encompassing 9 dimensions:

1. Material living conditions
2. Productive or other main activity
3. Health
4. Education
5. Leisure and social interactions
6. Economic security and personal safety
7. Governance and basic rights
8. Natural and living environment
9. Overall experience of life

To implement the framework, the Quality of Life Expert Group chose a set of indicators on the basis of existing data, covering as much as possible all the dimensions. For each dimension one or two headline indicators were selected. Several criteria for selecting indicators, and in particular the headline indicators, were used.

General criteria - In order to assess the quality of an indicator, several general criteria are to be taken into account, as the Eurostat code of practice underlines: relevance; accuracy and reliability; timeliness; comparability (level of harmonization between Member States) and clarity.

Specific criteria - Furthermore, a few additional criteria can be added as specific to the Quality of life indicators framework, in line with the recommendations of the Stiglitz, Sen and Fitoussi Report (2009) and of the Sponsorship Group:

- both subjective and objective indicators should be included;
- association with well-being, i.e. if it is a strong predictor or not. However, it was confirmed that that the subjective well-being is one of the dimensions of the framework and should not be treated as an output;
- univocal, clear meaning of the interpretation (does a higher value imply a positive situation and how is a change in the indicators' value to be interpreted);
- responsiveness (whether or not the indicator is sensitive to policy change);
- consistency with other frameworks related to the quality of life and progress of the society (e.g. EU-2020 strategy, Sustainable Development Indicators);
- coverage: if an indicator can show information about the whole dimension, or even on several dimensions at once;
- breakdowns according to specific (and possibly harmonized) sub-populations should be available, in order to have information about distributions;
- the possibility for the grouping of values into the categories 'high', 'medium' and 'low' is desirable, as it would allow a synthetic overview of the whole population, without a focus on the deprivation side;
- 'aggregability': in order to potentially proceed at a later stage with the construction of an aggregated indicator(s), the headline indicators should be chosen as coming from the same dataset (the kind of information they provide is relatively easy to derive from information coming from that specific micro dataset);
- continuity — if the variable(s) used to calculate the indicator are planned to continue to be collected in the future.

In our paper we will focus at natural and living environment dimension and its main characteristics for the EU and for the individual states as well. The aim of the paper isis to introduce the quality of life indicators according to EU and to analyze one of their components: pollution.

The paper deals with the secondary data based on the data reported in national emission inventories for air pollutants under the United Nations Economic Commission for Europe. The principles and methodology to estimate air pollutant inventories are laid down in the EMEP/EEA air pollutant emission inventory guidebook.

In the paper in order to fulfill its main objective standard methods as analogy, comparison, deduction and synthesis are used.

2 Natural and living environment dimension

This dimension covers three topics: Pollution, Access to green and recreational spaces and Landscape and built environment.

Due to their importance in other contexts, environmental indicators are relatively abundant. However, they are often too specific or focused on the natural environment to be of much use in a quality of life perspective. Nevertheless, some provide valuable information, especially when combined with self- reported quality of one's household environment. There is undisputed proof that environmental problems and pollution are associated with both adverse health effects and lower subjective well- being.

Air pollution can affect people's health in a number of ways. Short term effects include upper respiratory infections such as pneumonia and bronchitis, and aggravation of existing conditions such as asthma and emphysema. Air pollution can impact life expectancy, as long-term effects include lung and heart diseases.

Air pollution also has direct and indirect costs on the economy. Prescription charges and healthcare services are direct costs, whereas lower productivity resulting from absenteeism is an indirect cost. Moreover, reduction in life expectancy resulting from air pollution is a loss in human capital. For example, in the UK, it has been estimated that air pollution reduces life expectancy by an average of six months with an estimated equivalent health cost of up to £19 billion a year. It also has a detrimental effect on the ecosystems and vegetation, and is one of the major components of smog.

Noise pollution is formally defined as exposure to ambient sound levels beyond comfort levels. It can have serious direct as well as indirect health effects — hypertension, high stress levels, sleeping disturbances and, in extreme cases, even hearing loss. Stress and hypertension have been reported as the leading causes of a host of health problems. Since levels of ambient noise fluctuate, depending on the specific local conditions and time, self-reporting of perceived disturbance from noise in the living environment (i.e. from neighbours or from the street) provides a representative picture of the impact of noise on the quality of life.

To be more specific we will introduce the most important air pollutants in the European Union which are: sulphur oxides (SOx), nitrogen oxides (NOx), ammonia (NH3), non-methane volatile organic compounds (NMVOC) and fine particulate matter (PM2.5). In the next part of the paper we would like to introduce the emission levels of those pollutants. Air pollution harms human health and the environment. Nitrogen dioxide and particulate matter pollution pose serious health risks while Europe's sensitive ecosystem areas are affected by acid deposition of excess sulphur and nitrogen compounds (SOx, NOx, NH3).

Air pollutants are emitted from human activities, mainly the combustion of fuels. Thanks to a wide range of environmental policy measures, emissions of air pollutants in Europe decreased significantly over the last 26 years.
Further we are going to introduce the development in the environment pollution by showing the measurement for the mentions major pollutants.

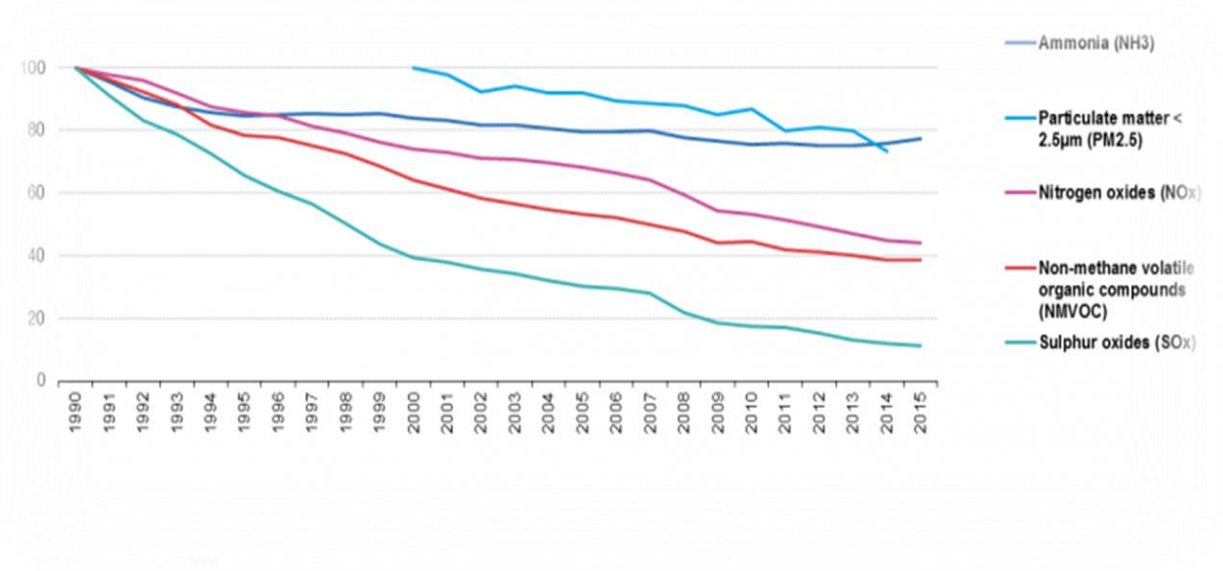

Figure 1 Emissions of air pollutants

Source: Emissions of air pollutants, EU-28, 1990-2015 (Index 1990=100), (2017, August 30). Retrieved from http://ec.europa.eu/eurostat/statisticsexplained/index.php/File:Emissions_of_air_pollutants,_U-28,_1990-2015_(Index_1990%3D100)_update.png

The figure 1 shows the impact of the main pollutants at the environment. The major decrease in sulphur oxides.

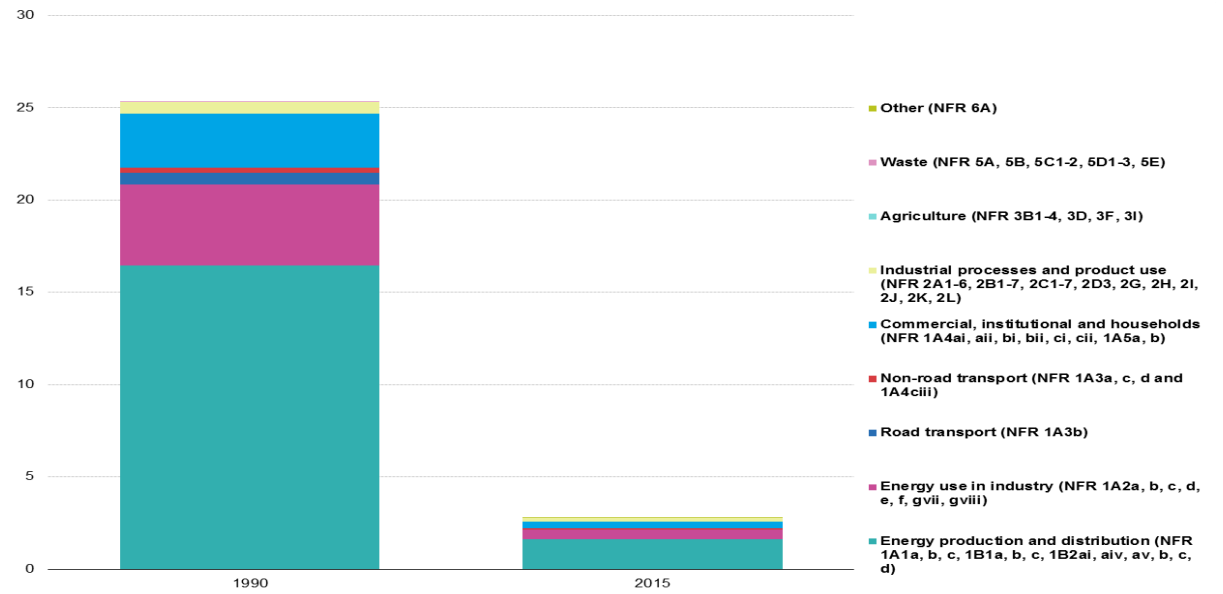

Figure 2 Emissions of sulphur oxides by source sector

Source: Emissions of sulphur oxides by source sector, in million tonnes, EU-28, 1990 and 2015 (2017, August 30). Retrieved fromhttp://ec.europa.eu/eurostat/statisticsexplained/index.php/File:Emissions_of_sulphur_oxides_by_source_sector,_in_million_tonnes,_EU-28,_1990_and_2015_update.png#filelinks

Sox has been the pollutant with the greatest reduction in emissions across the EU-28. Emissions of SOx in 2015 stood at 2.8 million tons compared to 25.3 million tons in 1990. The majority of SOx emissions were reduced in the energy production and distribution sector (14.9 million tons less). SOx reductions have been a result of a combination of policy measures:

- fuel switching in energy-related sectors, away from solid and liquid fuels with high sulphur content to low-sulphur fuels such as natural gas;
- applying flue-gas desulphurisation (FGD) techniques in industrial facilities;
- EU directives relating to the sulphur content of certain liquid fuels.

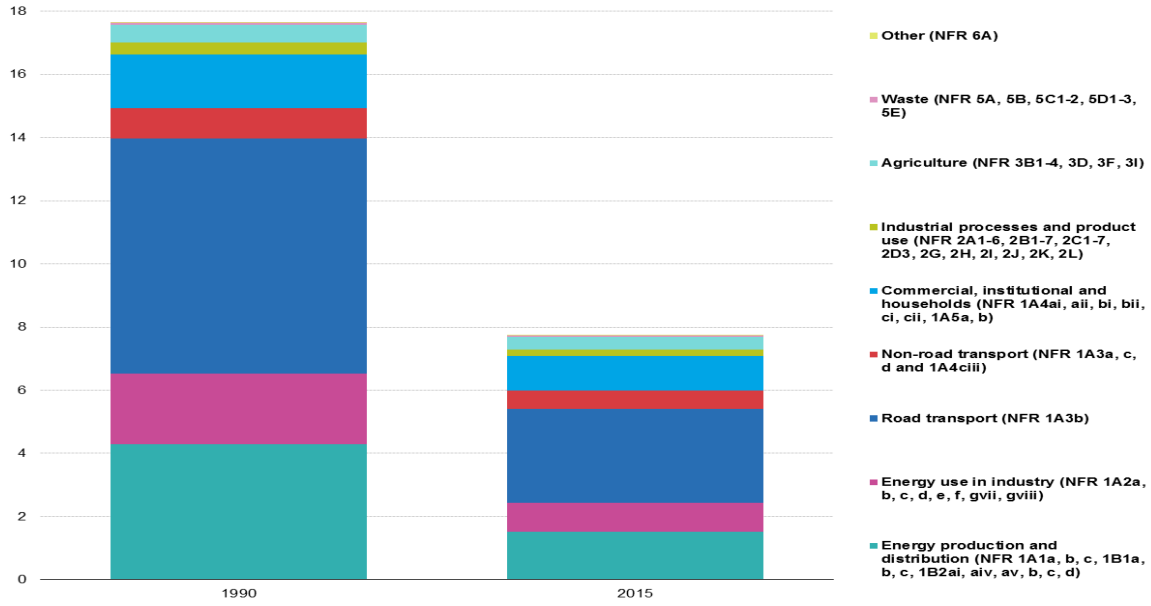

Figure 3 Emissions of nitrogen oxides by source sector
Source: Emissions of nitrogen oxides by source sector, in million tonnes, EU-28, 1990 and 2015 (2017, August 30). Retrieved fromhttp://ec.europa.eu/eurostat/statisticsexplained/index.php/File:Emissions_of_nitrogen_oxides_by_source_sector,_in_million_tonnes,_EU-28,_1990_and_2015_update.png

EU-wide emissions of NOx more than halved from 17.6 to 7.8 million tons. The largest reduction took place in road transport (4.5 million tons less) which is the main contributing sector to total NOx emissions. Emission reductions from the road transport sector are primarily a result of fitting catalysts to vehicles.

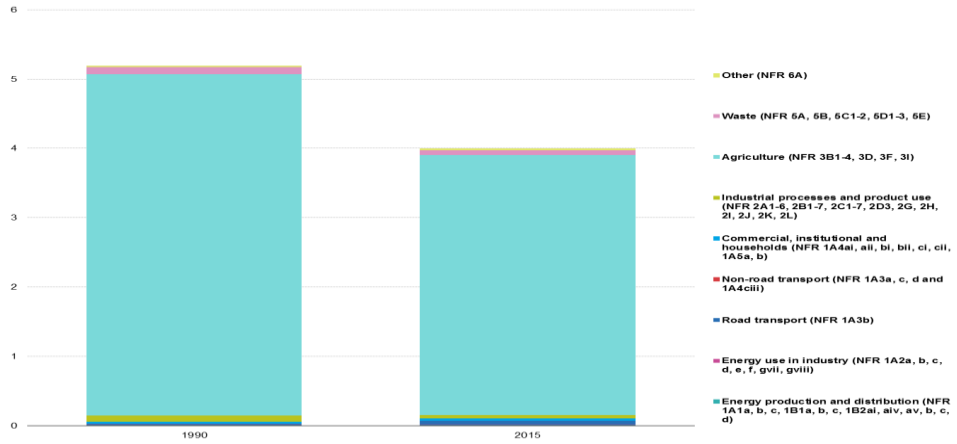

Figure 4 Emissions of ammonia by source sector

Source: Emissions of ammonia by source sector, in million tonnes, EU-28, 1990 and 2015 (2017, August 30). Retrieved from http://ec.europa.eu/eurostat/statisticsexplained/index.php/File:Emissions_of_ammonia_by_source_sector,_in_million_tonnes,_EU-28,_1990_and_2015_update.png

Emissions of NH_3 almost entirely derive from agriculture. Compared to other pollutants, reductions in NH3 emissions were moderate. In EU-28 over the past 26 years the emissions of NH3 decreased only by roughly one fourth from 5.2 to 4.0 million tons. Main reductions were achieved through better manure management. Nowadays, ammonia is likely to be the most important acidifying gas emitted in Europe.

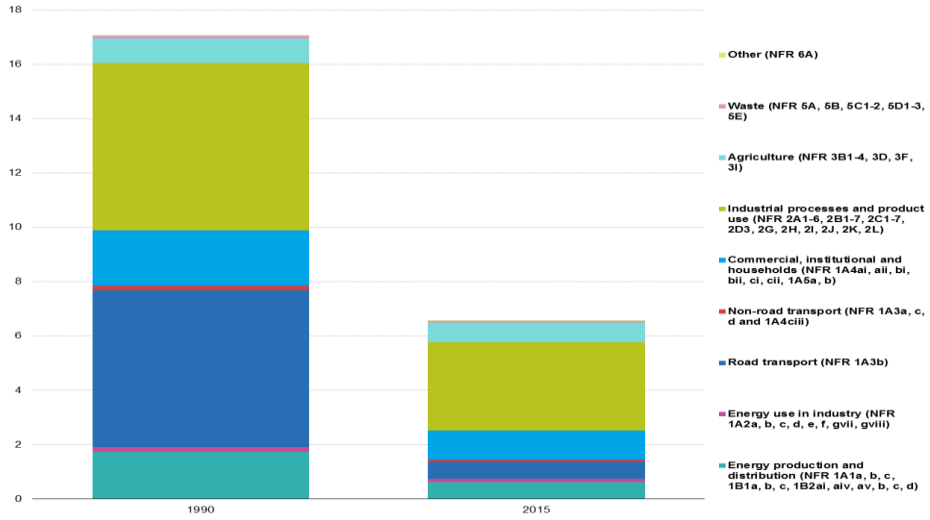

Figure 5 Emissions of non-methane volatile organic compounds by source sector

Source: Emissions of non-methane volatile organic compounds by source sector, in million tonnes, EU-28, 1990 and 2015 (2017, August 30). Retrieved from http://ec.europa.eu/eurostat/statistics-explained/index.php/File:Emissions_of_non-methane_volatile_organic_compounds_by_source_sector,_in_million_tonnes,_EU-28,_1990_and_2015_update.png

Between 1990 and 2015, EU-wide emissions of NMVOC have been reduced by roughly 60% from 17.1 to 6.6 million tons (see Figure 5). Major reduction took place in the road transport sector (5.1 million tons less) and in industrial processes and product use (2.9 million tons less).

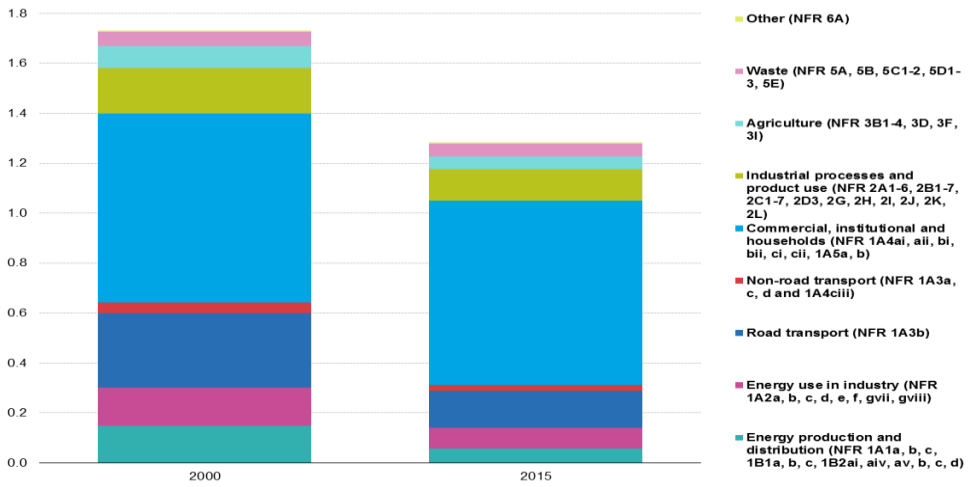

Figure 6 Emissions of fine particulate matters by source sector

Source: Emissions of fine particulate matters by source sector, million tonnes, EU-28, 2000 and 2015(2017, August 30). Retrieved fromhttp://ec.europa.eu/eurostat/statisticsexplained/index.php/File:Emissions_of_fine_particulate_matters_by_source_sector,_million_tonnes,_EU-28,_2000_and_2015.png

EU-wide emissions of particular matters by source sector dropped by roughly one fourth between 2000 and 2015. Most significant reductions took place in the energy production and distribution sector as well as in road transport. There have been only marginal reductions in the commercial, institutional and household sector which nowadays contributes to more than half of the total particular matters by sourced sector emissions in EU-28 .

3 Conclusion

Air pollution has been one of Europe's main environmental policy concerns since the late 1970s. The control of emissions from mobile sources, improving fuel quality and promoting and integrating environmental protection requirements into the transport and energy sector are part of these aims.

The paper was dealing with the contemporary topic: the measurement of quality of life. Various set of indicators are used by different organizations (OECD etc.) In EU the quality of life indicators is represented by nine different indicator groups. There is no one better than other. Only complex approach to them could lead to identification of regions with the high or low quality of life.

The paper aimed its attention at the pollution and its possible influence at the world's climate change. Its main contribution is the complex analysys of the quality of life indicators and precise look at the one of the most harming the human body - pollution. Paper stresses the need to further analyze the well-being of EU inhabitants.

EU is actively trying to decrease the levels of all the dangerous compounds in the air and in the soil as well. To be able to do it the European Commission has adopted a Clean Air Policy Package in December 2013, consisting of A new Clean Air Programme for Europe with new air quality objectives for the period up to 2030, a revised National Emission Ceilings Directive with stricter national emission ceilings for the six main pollutants, and a proposal for a new Directive to reduce pollution from medium-sized combustion installations. Internationally, the emissions of acidifying

substances that result in acid rain are to a large extent regulated by the Gothenburg Protocol under the UNECE Convention on long-range transboundary air pollution, signed in 1979.

Pollution is a worldwide problem affecting the mankind in various ways. There has been significant development in perceiving the pollution as a crucial element causing the global warming. Yet not all the countries in the world are being involved in the process of global pollution decrease. European Union plays an important role in this process. Beside the protecting the living environment for its inhabitants it has also added the pollution and environment protection to the quality of life measurement which places this at the highest level of attention for the European organizations.

Acknowledgements

This paper was supported by Grant Agency "VEGA". This contribution is the result of the projects implementation VEGA No. 1/0936/15– *Economics and Environmental Studies and experimental verification of the possibility of reclaiming tailings ash mixture in SE-EVO Vojany* and VEGA No. 1/0376/17 – *Marketing as a tool of the health policy support.*

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Moral Hazard as Factor of Banking Crises

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Abstract

Financial crisis is a specific form of financial crisis, expressed by an important deadlock in banking system functioning. It can be provoked by growth of financial bankruptcies, mass withdrawal of deposits, effect of "dominoes" and other factors, between which is moral hazard. Moral hazard in the financial market can be characterized as an irresponsible attitude or behavior of entities which pose their interests above those of society, other market participants, as well as other parts of the contracts. Recently moral hazard problem was related only corporate contractual relationships, and the irresponsible behavior of insured persons. But at the moment it becomes obvious that moral hazard has a broader impact. It is the irresponsible behavior of the representatives' supervisors that go far liberal policies, abusive practices of banks which are considered too big to fail and can afford taking excessive risks in pursuit of profits and lack of prudence depositors of these banks the conditions in which legal guarantees of repayment of deposits. The impact of moral hazard on banking activity is multidimensional. On the one hand, he can come from the regulatory and supervisory system, the administration and staff of commercial banks, as well as their clients. On the other hand, moral hazard in banking sphere is manifested by deficiencies in regulation of banks' activity (especially in the innovation field), conduct of corporate governance, promotion of "too big to fail" doctrine and implementation of deposit guarantee programs. Also, moral hazard was an important factor of banking supervision substantial reducing efficiency, bankruptcy of four commercial banks and, as a consequence, beginning of banking crisis in Moldova in 2014-2015. This article aims to demonstrate moral hazard as banking crises premise.

Keywords: Moral hazard, Banking crisis, Securitization, Too big to fail, Innovative process regulating.

JEL Classification: G01, G18, G21, G28

1 Introduction

Moral hazard is the assumption of responsibility by a person by ignoring the interests of another when there is an incentive to put own interests first. (Dowd, 2009) Also, moral hazard is defined as a situation in which there is a tendency for undue risk to be assumed on basis of costs incurred by a third party that takes up all or part of the risk. (Hazardul, n.d.)

In the view of experts, main conditions for emergence of moral hazard within a financial institution is the existence of protection of its employees from consequences of incorrect or abusive decisions making as well as incorrect behavior resulting from the following (Moral, n.d.), (Моральный, n.d.):

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- Moral hazard may be the result of created informational asymmetry or limited control of beneficiary (owner) over the activity of bailiff (employed person) or information held by bailiff is much higher than of beneficiary.
- Managers (or executors) have a safe position and can not be resigned or effectively removed.
- Interests of responsible bailiff from bank and customer (beneficiary) do not correspond, the first promoting their own interests to detriment of the customer's (beneficiary's) interests.
- Client is not able to exercise complete control and to resort to coercive mechanisms.
- Management representative is hired by a person with a superior hierarchical position, including by kinship or protectionism.
- Manager can easily blame an innocent subordinate.
- Existence of a lack of clarity regarding determination of responsibility of personnel involved for activities carried out on behalf of bank.
- Management has its remuneration and independent decision-making motivation, regardless of level of customer interest.

2 Moral hazard and banking crisis

Banking crisis is the failure of the banking system, which means the bank's inability to comply with terms of entered into contract with investors, due to defaults of bank's borrowers, of contract with bank or as a result of impairment of bank assets. (Rudy, 2003)

After studying various bibliographic sources, the impact of moral hazard can be traced as a factor of financial destabilization. Often, however, only some of its manifestations are mentioned in the context of particular cases of banking crises.

For example, experts Dowd and Toaca are the view that moral hazard was one of the triggers of the global financial crisis in the U.S. in 2007-2009 (Dowd, 2009; Toacă & Toacă, 2010). They believe that the behavior of economic agents in the banking field, who have maximized revenue assuming the risk that they shared with the state, that is, policy makers expansionary monetary policy (very low real interest rates on interbank markets, loan guarantees and deposits, etc.) resulted in moral hazard among bankers.

Table 1 presents some visions regarding the manifestation of moral hazard on the banking market in developed industrialized countries and Republic of Moldova.

Table 1 Comparative analysis of moral hazard manifestation as a factor financial crises triggering in industrialized countries and Republic of Moldova

Industrialized countries	Republic of Moldova
Problems of corporate governance of financial institutions of systemic importance can generate major adverse effects on economy in event of a deterioration in their financial position. (Isarescu, 2009), (Popescu)	Ignoring and large extensions in time of penalties for offenses committed in the financial sector.
"Too big to fail" doctrine promoting is about giving financial assistance to a failing business or economy to save it from collapse by governments, central banks or other institutions. Moral hazard can lead to financial crisis thanks to financial institutions' expectations that regulating authorities would not allow them to fail, avoiding the spread of systemic risk to the rest of the economy. (Bernanke, 2010)	Protection of servants from public and private sectors from penalizing coming out of relations with clients holding political power or major shareholders.
Deliberative supervision policy of regulators and moral hazard of market operators wishing to maximize their profits led the emergence of	Admitting the capture of important commercial bank shares for purpose of

destructive innovations that have contributed to trigger of financial crisis. (Baicu, 2011)	using these financial institutions in money laundering schemes and embezzlement of bank assets.

Table 1 Comparative analysis of moral hazard manifestation as a factor financial crises triggering in industrialized countries and Republic of Moldova (continuation)

Industrialized countries	Republic of Moldova
Deposits guarantee program implementing can cause situations in which credit institutions participating in guarantee deposits programs are engaged in high risk operations using guaranteed deposits as a source of low cost funds. Also depositors in many cases, knowing that their deposits are guaranteed, tend to be less prudent in banks selecting. (McCoy, 2006)	Guaranteeing bank deposits of individuals outside of the official Deposit Guarantee Scheme.
Securitization process due to securitization as the process of pooling financial assets, packaging and converting them into securities and then selling them in the form of prioritized capital structure of claims to dispersed investors. (Malecan, 2015), (Paun, 2010)	Tolerance of abusive behavior of bankers by customers.

Source: Developed by authors

Table 1 shows the difference in moral hazard manifestation in industrialized countries and Republic of Moldova, which is explained by the level of development of the financial market, financial culture of society, quality of corporate governance and quality of financial legislation.

3 Moral hazard and banking crisis in Republic of Moldova

The year 2009 as the Governor of the National Bank of Moldova (NBM) was named Dorin Dragutanu, a person with little competence in the field of monetary and banking supervision. The basic principle of this Governor's he expressed it in a TV show after his resignation: "I was a **simple** Governor. I knew and saw everything, but I could not do anything." (Emisiunea, n.d.)

The immediate consequence of the change of NBM leader was the promotion of evasion policy from fulfilling legal obligations of this institution regarding protection of clients from the abusive behavior of commercial banks.

Also, NBM obviously started to ignore manipulative operations of commercial banks on the financial market, being prohibited by legislation.

In 2009 the gradual degradation of the banking supervision system in the Republic of Moldova started, whose first sign was the bankruptcy of Investprivatbank.

On June 19, 2009, the NBM withdrew its license from Investprivatbank, as in supervised activity of Investprivatbank on the basis of financial reports NBM detected breaches of prudential rules, leading to a complex control in March-May 2009.

Consequently, inappropriate management of Investprivatbank led to the bank's insolvency. NBM explained the bankruptcy of Investprivatbank in that bank's administration presented erroneous reports about its liquidity status. One of the biggest mistakes of Investprivatbank was the focus on lending to real estate projects and non-diversification of loan portfolio, though real estate market has declined as a result of global crisis. Thus, as a result of NBM control, it was found that real estate loans accounted for about 75% of portfolio, while the admitted limit was no more than 30%.

Another violation was that bank attracted short-term deposits on market but granted long-term loans. (Falimentul, n.d.)

On the other hand, over 2006-2009, NBM applied 7 fines to Investprivatbank, issued a warning to bank's management of compliance with legislation and internal control system improving, as well as requesting a new action plan to redress financial situation. (Unde, n.d.)

In essence, NBM pushed the bank to attract massive deposits at exaggerated interest rates. Besides, knowing acute financial problems of Invesprivatbank, NBM administration did not inform the public about it, while allowing spread of unfavorable rumors about this bank.

Similarly, accusations of incompetence and even clientelism appeared in society of supervisory and control bodies, especially NBM, in connection with bankruptcy of Savings Bank, Social Bank and Unibank.

From 2012, the authorities of the Republic of Moldova of different level have been informed about the maladministration in Banca de Economii si Banca Sociala manifested by massive theft of money means predominantly through credits not reimbursed.

Instead of intervening efficiently, the Moldovan authorities have organized the transmission of a significant stake of Savings Bank's shares in the hands of a dubious person who continued the financial degradation of this financial institution. Similarly, by 2014, dubious people with the tacit protection of NBM seized Social Bank, causing enormous losses to these banks.

This problem was aggravated by the fact that in 2013 mentioned banks had only one external auditor - the Grant Thornton Company, who did not warn about irregularities in these financial institutions.

Broadly speaking, actions of supervisory and decision-making institutions have been reduced to reciprocal correspondence in the form of letters and inquiries, notification of three banks' management of the risks associated with transactions, as well as discussions within National Commission for Financial Security or Security Council.

Similarly, toleration of Unibank's adventure in high-risk activities on compliance with legislation has occurred.

Further were deepened financial problems, which began to manifest in 2012, embezzlement of nominated banks' funds, involvement in money laundering schemes and, as a result, bankruptcy of these banks.

During the above-mentioned period raider attacks on other important systemic banks were undertaken, some of them being successful. The measures taken by the NBM were very passive and weak, with some of them being canceled by court decisions.

In 2009-2014 the moral hazard contributed to creation of a new financial instability factor in Republic of Moldova expressed by attracting banking system to international money laundering schemes.

In 2013, information was published on the involvement of Moldova-Agroindbank in money laundering schemes, which was penalized insignificantly by the authorities.

In 2012-2014 Moldovan banking system has become a kind of transit area of cash flows from the Commonwealth of Independent States to other countries, especially of EU. According to the NBM data, during nominated period of CIS, have entered 35 times more money than they have left. (Anul, n.d.)

Thus, if in 2013 money inflows into the Moldovan banking system reached the record level of 65.5 billion USD and were in parity with outflows, then in 2014 they decreased by almost 10% and in 2016 were almost twice, to only 30.4 billion USD.

The sharp decline was mainly due to significant decrease in financial flows from the CIS. Thus, in 2013, CIS states would have accounted for 32.05 billion USD, or almost half of total volume, then only 3.2 billion USD (10 times less) in 2015, and in 2016 2.4 billion USD, or 13.35 times less.

The passive attitude of central authorities, the existence of administrative uncertainties in anti-money laundering legislation enforcement as well as corruption in judicial sphere enabled Moldovan banking system to be transformed into a money laundering machine.

It is eloquent that one of the most important international money-laundering schemes has been called "Laundromat", through which 21 billion USD from Russia were washed through loans between ghost companies legalized by court orders signed by judges from Moldova. According to detected scheme, considered to be quite simple, phantom "debtor" refuses to repay the loan of "ghost creditor". As a result, off-shore fictitious companies sued each other for fictitious debts, and Moldovan judges legalized the existence of these debts, and ordered their acquittal by court orders. One of the main bankers in this scheme was Moldindconbank - a top bank in the Moldovan banking system. (Moldova..., n.d.)

This scheme ran from 2011 to 2014, involving 732 banks in 96 countries, and money being received by about 5,000 companies. (Восемь, n.d.)

The period between 2014-2015 was manifested by triggering two financial crises: currency and banking.
As shelter currencies have been used US Dollar, Euro, British Pound and Swiss Franc. Their purchase in December 2014 and January 2015 created favorable opportunities for their selling with high yields during financial crisis.

The graph shown in Figure 1 features to give notice deployment of a currency crisis in Moldova evidenced by the sharp depreciation of MDL, which began due to several circumstances in miijlocul January 2015 ending in mid-February of the same year.

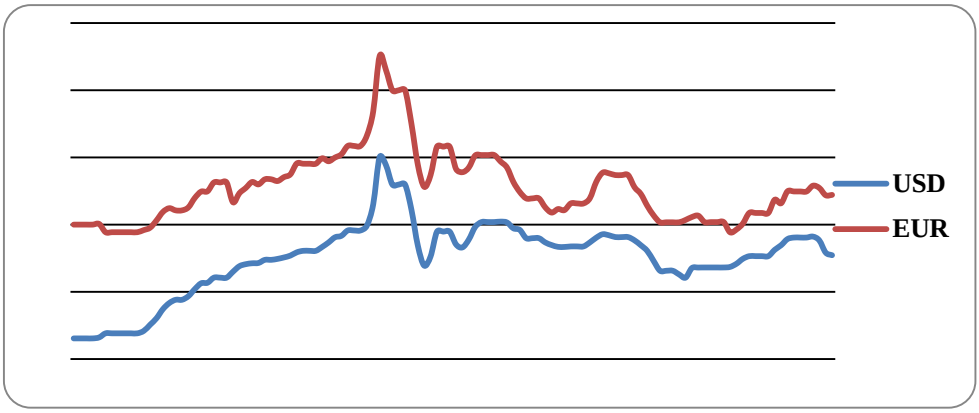

Figure 1 Evolution of exchange rate of MDL against US dollar and Euro for the period: 01.01.2015-30.04.2015
Source: Evoluţia (n.d.)

As a result, from early 2015 until February 18 (day of maximum depreciation), MDL depreciated significantly against major currencies reference: 34% against the US dollar and 26% against Euro. In addition, it has weakened against Ruble by 22%. (Expert..., n.d.)

It is interesting that during the mentioned period, taking advantage of the need of banks to buy currency for the transfer abroad, NBM promoted a speculative game that to a certain extent contradicted its legal functions.

As result of a number of suspicious transactions, financial sector has created a huge hole capital, which largely was due to bankruptcy Savings Bank, Social Bank and Unibank.
According to several sources, in 2014 the hole in capital of these banks was estimated at 9-15 billion lei, which is equivalent to about 13% of GDP or 58% of the 2014 state budget revenues. (Banca, n.d.)

The establishment of special administration at Savings Bank, Social Bank and Unibank, crediting these banks and the work of parliamentary commission were delayed actions and only had the role of mitigating effects of fraudulent transactions.

Interestingly, being aware of Savings Bank's issues since 2012, many clients did not close their deposit accounts, but on the contrary some of them opened new accounts, possibly until August 2015, because they were convinced that repayment of deposits is guaranteed by the central authorities. They were also totally indifferent to the fact that this money would be refunded, in the final instance, not by means of the liquidated banks, but by public money.

During November-December 2014, NBM ignored the rapid sale of about 50% of Unibank's assets and only on December 30, 2014 instituted special administration in this bank

In February 2015 compared to November 2014 the interest rates on credits in MDL increased by 2.1 pp. The drawback of liquidity in domestic banks has caused increased interest rates on deposits (Figure 2).

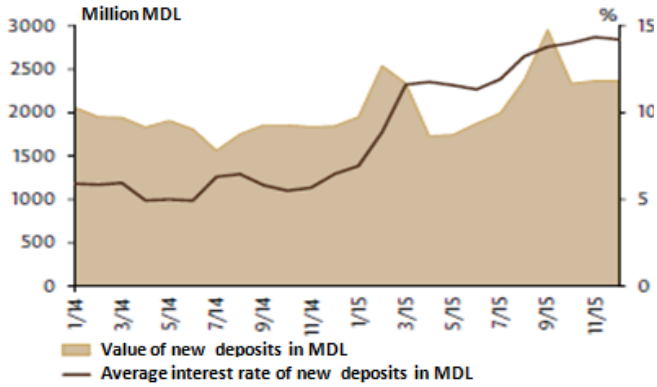

Figure 2 Dynamics volume and average rates on term deposits in MDL

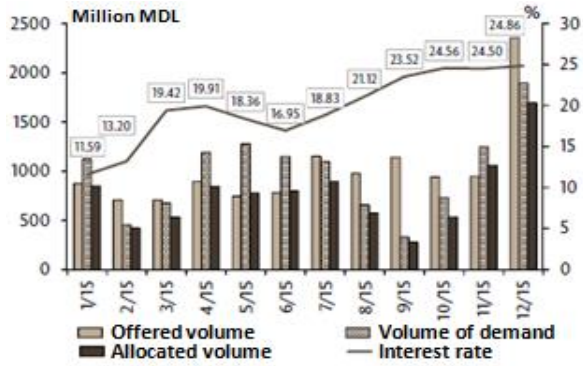

Figure 3 Monthly dynamics of SS primary market indicators

Source: Raportul (n.d.)

Thus, average interest rate on deposits in national currency rose to a peak of 14.6 percent (November 2015), higher than in December 2014 by 2.2 times. Weighted average rate of deposits in national currency in 2015 accounted for 12.1 percent annually, higher than in 2014 by 2.1 times.

Similarly, should be noted SS market development in 2015 (Figures 3).

Since July 2015, growth of rate has accelerated and has reduced in intensity until later when growth returns was less pronounced. The maximum rate of 24.9 percent annually was reached in December, when the amplification of necessary resources led Ministry of Finance to issue one of the highest volumes of SS in this year.

As a consequence of banking crisis were losses in banking system in the volume of about 20 billion MDL, which the central authorities have transformed into public debt and are to be restituted over a long period of time. This has led to a radical loss of public confidence in the government of Republic of Moldova and has compromised European path of country.

It is also important that until now central authorities did not acknowledge their contribution to financial crisis and, moreover, no one was penalized except for three managers from NBM who were arrested in 2016 but to date the information on bringing a case to court was not published.

4 Solutions

For solving principal-agent problem specialists propose (Моральный, n.d.):

- *Control over the agent's activity*. Perhaps stricter oversight of the agent, increasing the amount of resources spent for these purposes. All measures to tighten oversight, usually costly, and often control costs may exceed the benefit, which is achieved in this way.
- *The search for additional sources of information about the agent*, his efforts, his honesty and diligence.
- *Creating competition between agents* who have opposite interests, and thus be willing to disclose relative merits of their activities, highlighting shortcomings of their competitors' activities.
- *Control through the stock market mechanism and the market of mergers and acquisitions* thus mitigating the moral hazard problem in the relationship between shareholders and salaried managers.

- *Principal's and agent's interests combining*, using incentive contracts or participates in the performance of the agent.
- *Incentives creation for the agent* to perform well at the same time it provision with insurance against adverse outcome - it is a mixed contract.
- *Establishing a fee at a higher level when the agent achieves a good result*, an agent's incentive to perform well is created. Paying to agent a fee in the poor results, he obtain an insurance from bad luck. Since the agent receives a certain amount at a bad result, he probably will not require too much money, with good result.
- *Voluntary adoption of more stringent conditions by agent (bonding)*. Agents can voluntarily put themselves in tougher conditions, constraining freedom of its future actions. They seem to make a pledge, which is lost if it is found that their behavior deviates from the interests of the principal. Principal receives assurances of agent's integrity, as sees that the agent's hands are tied and shirking his advantage or he will not get a higher reward.
- *Changes in the structure of ownership and organizational restructuring*. Moral hazard in an agency relationship can be overcome if agent's services are abandoned and principal will do everything himself, but this is not always possible or benefits of specialization of labor will be lost. The fight against moral hazard may be changing ownership structure. In this case, vertical integration will solve the problem of moral hazard in the relationship with the agent.

For the "too big to fail" issue solving are proposed controversial solutions (Too big, n.d.):

- *Break-up the largest banks*. Reduce risk-taking through regulation. For example, The United States passed the Dodd-Frank Act in July 2010 to help strengthen regulation of the financial system that requires banks to reduce their risk taking, by requiring greater financial cushions (i.e., lower leverage ratios or higher capital ratios), among other steps. Banks are required to maintain a ratio of high-quality, easily sold assets, in the event of financial difficulty either at the bank or in the financial system. Further, since the 2008 crisis, regulators have worked with banks to reduce leverage ratios. The Dodd-Frank Act includes a proposal to ban proprietary trading by commercial banks. Proprietary trading refers to using customer deposits to speculate in risky assets for the benefit of the bank rather than customers. The Dodd-Frank Act as enacted into law includes several loopholes to the ban, allowing proprietary trading in certain circumstances. However, the regulations required to enforce these elements of the law were not implemented during 2013 and were under attack by bank lobbying efforts.
- *Too big to fail tax* - Willem Buiter, proposed a tax to internalize the massive costs inflicted by "too big to fail" institution.
- *Monitoring***,** released a number of banks worldwide that they considered systemically important financial institutions-financial organizations whose size and role meant that any failure could cause serious systemic problems.

In order to solve the problem of moral hazard within the banking system of the Republic of Moldova, can be proposed following measures:

- *Revision of concept of real independence of the National Bank of Moldova, that needs to address in a multidimensional way*. First, it is necessary to change the plunge of NBM as a "state in the state" ", i.e. as a public institution outside constraint of society by increasing transparency of its activity. Secondly, it is about eliminating possibilities of certain circles of political or private interests to put pressure on central bank. Thirdly, it is necessary to limit the possibility for courts of any level to block decisions of NBM. Fourth, it is necessary for NBM to be accountable for the annual performance evaluation of an institution by an independent entity, possibly outside the

country. Fifth, it is necessary to tighten the accountability of NBM administrators for avoiding fulfillment of their service obligations, especially in field of consumer rights protection on banking market.

- *Continuously strengthening of banking supervision monitoring.* In this context, will be welcomed to streamline communication and coordination between institutions directly or indirectly responsible for financial stability. It is necessary to take complex measures to strengthen the professional integrity of NBM workers, to diminish the human factor in monitoring and regulation process by implementing IT solutions, and to increase the capacity of NBM to identify and counteract concerted activities. It would also be useful to tight criminal sanctions for market abuse, manipulation and other commercial bank infringements.
- *The completion of investigation into theft of banking sector, attracting and involving specialized experts and international companies*. It is also necessary to continue to investigate the involvement of decision-makers in state institutions and regulators (National Bank of Moldova and National Commission for Financial Market) in the devaluation of state (lack of reaction, delayed reaction, illegal and inappropriate legal, economic and financial decisions) on theft of assets in banking system. It is also necessary to ensure the maximum transparency of this process, as well as resignation and accountability of decision-makers responsible for banking sector supervision.
- *Increasing transparency of shareholders in banking system.* It is necessary to improve mechanisms for checking and investigating shareholder structure in banking sector starting with 1% of the shares held. It is also appropriate to identify all final beneficiaries and eliminate risks of concentration of bank capital in the hands of one or more groups of final beneficiaries. Similarly, it is necessary to establish a clear mechanism for assessing the "quality" of shareholders in order not to allow the holding of bank shares by persons with a dubious integrity profile. In this respect, the actions should aim at implementing and institutionalizing the fit-and-proper test (minimum standards of integrity and transparency) and facilitating the exchange of information with the resident countries of final shareholders of banks.
- *Improving corporate governance in banks.* It is necessary to encourage commercial banks' administration to set up a corporate culture based on international banking values. Both motivational measures, including the development and promotion of a Corporate Governance Code, the elaboration and publication of annual reports on transparency of risk management and the promotion of ethical and professional standards for bank officials, such as tightening sanctions for improper government, are needed.
- *Make responsible bank managers.* This is the implementation of bail-in mechanism, in which shareholders are under the obligation to cover from their sources losses and any other consequences of maladministration. It is necessary ti increase the independence of members of Boards, which verify the activity of bank managers, tightening sanctions for improper bank management.

5 Conclusion

Resulting from the above we can conclude that moral hazard is a concept as complex and multi-dimensional essence as source. It is an expression of moral and/or social irresponsibility when an individual or organization has an amoral or reckless behavior being protected from the consequences.

The study demonstrates the existence of three directions of the occurrence of this phenomenon. The first comes from loopholes of regulation area on financial market ignored by government

representatives as well as excessively liberal attitude to new tools and activities developing on concerned market. The second direction is related to the irresponsible behavior of financial institutions with excessive risk taking in pursuit of profit, there is some protection by transferring these risks and/or guarantee of bankruptcy protection. The third is based on irresponsible behavior of depositors and/or investors in terms of legal guaranteeing of investments security.

Also the study demonstrates the dependence of the moral hazard on a series of factors. First of all, it is about the level of legal and financial culture of society. Secondly, there is dependence on level of development of the financial market. In the third line, it is the society's tolerance towards the irresponsible behavior of servants in public and private sector. Fourthly, corporate culture and quality of corporate governance in financial institutions are important.

Once moral hazard manifestation on financial market is amplified, it can contribute substantially to downgrading of banking crisis. The dangers awareness of this phenomenon requires action to prevent and mitigate it.

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Review of Municipal Own Revenue in the SR

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Abstract

Own revenues of municipalities in the SR consist mainly on tax revenues with tax base and tax rate assigned to municipalities and user charges. Unfortunately, their share on total municipal revenues is low. In this paper the position of municipal own revenues in the municipal budget is compared to other revenue budget items. The evolution of municipal budget items in question is influenced by several factors. The implementation of fiscal decentralization (in two phases with beginnings in 2001 and 2005) as the most accentuated factor is accompanied and mainly affected by the financial crisis coming in 2009. The financial crisis tested the robustness of the sub-national financial system and it is obvious that the low financial autonomy of municipal government units observed in the period of 2000 – 2016 persists. Results show, that the main part of tax revenues is consisting in the revenues from shared tax. The share of own tax revenues on total municipal revenues is low despite of total tax revenues create in average 40% of total municipal revenues. Non tax-revenues of municipalities in the SR create in average 17% of total municipal revenues in monitored period from 2000 to 2016. The composition of municipal non-tax revenues is unstable in time. Positively could be evaluated the increase of the share of revenues from entrepreneurship and administration fees on total municipal non-tax revenues.

Keywords: Fiscal decentralization, Municipality, Town revenue, Tax revenue, Non-tax revenue.

JEL Classification: H77

1 Introduction

Closeness of local governments to citizens predetermines them to provide public goods with respect on local preferences and needs. According to Brown and Jackson (1994), the geographic factor is important regarding the area of reaching the public good benefits. Thus, the provisioning of local public goods may appertain to local government units. However, the theory of fiscal federalism clearly promotes economic gains of fiscal decentralization (see Musgrave 1959 or Oates 1972, for the evolution of fiscal federalism see Oates 2008). Contrary, the empirical literature gives ambiguous answers about its real influence on economic performance. Revision of research studies in this field points to unequal historical and socio-economic conditions and development in different countries. These factors limit the local public sector importance, role and its possibilities. They also determine the scope (degree) of fiscal decentralization.

Many authors accentuate the need of direct connection between responsibility to provide a certain volume of public goods and possibility to seek financial resources (Ebel & Yilmaz, 2002 or Rodríguez – Pose & Gill, 2003). If this proposition is not fully accepted, the success of the fiscal decentralization implementation may be threatened. And this is the case of some post-communist

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countries, where the reforming processes were arranged in divided steps. In the Slovak Republic (SR) the development of the public sector and public finance reforms emulates the scenario mentioned above. The fiscal decentralization was implemented in two separated phases (Horváthová, 2009; Maličká, 2012; Martinková & Bánociová, 2016). First the responsibilities (competences) were shifted to sub-national government in 2001 – 2004. Second, the revenue seeking powers (tax power) were shifted to sub-national government. The question remains on the adequacy or proportion of the shifted responsibilities and powers. Municipalities in the SR, as basic local self-government units, permanently struggle with financial problems.

In this paper the revenue side of the municipal budgets in the SR is investigated with accent on own revenue balance. Next chapter covers a brief review of key aspects of the fiscal decentralization implementation in the SR. It is followed by chapter describing methods and data used in the analysis. The body of the paper is created by the research results. A review of municipal own revenue in period from 2000 to 2016 is given in this chapter. Conclusion, acknowledgement and references close the paper.

2 A brief review of key aspects of the fiscal decentralization process in the SR

According to Nižňanský, Cibáková and Hamalová (2014, p.44) during the 80´s and 90´s of the 20th century the avalanche of decentralization was launched, when autocratic centralistic regime of governance was amended by free elected government. In the SR this trend entered the political and economic scene after 1989.

Decentralization and modernization of the public administration get real contours in the early beginnings of the 21th century and proceeded in following steps:

- In 2001 higher territorial self-government units (self-government regions) were established by law as a new element in the public administration structure.
- From 2001 to 2004 the decentralization of competences was realized. Based on legal framework a wide scope responsibility was shifted from central government to regional and municipal governments.
- In 2005 the shift of power to seek financial resources was realized and supported by legal framework, what represent the systematic change of financing the sub-national sector.

Monitored period was turbulent and was influenced by important factors:

- Economic expansion influenced the adoption of the tax reform, tax revenues of sub-national governments raised since 2005.
- Financial crisis (in 2009) replaced the period of economic expansion and tested the financial robustness of public sector (Šuliková et al., 2015; Raisová et al., 2016).
- Reviving the economic development in the SR (in 2014, see Morvay et al., 2014) brought the raise of tax revenues.

After the 2005, the financial situation of municipalities in the SR was affected by several parallel events. Tax reform (in 2004, see Bánociová, 2013) assessing the uniform tax rate for income taxes (19 %) was implemented in the period of economic expansion. This together resulted in the increase of tax revenues. Next legislative changes in the field of multi - government finance defined systematic income tax sharing among all levels of government (Act no.564/2004 Coll.) and objective criteria of the tax revenue sharing among particular self-government units (Regulation

668/2004). Act no. 582/2004 Coll. on local taxes and Act no. 583/2004 Coll. on budgetary principles of local self - government completed the sub-national budget arrangement. According to this, tax revenues from shared individual income tax and tax revenues from immovable property tax increased (municipalities in the SR boosted the immovable property tax rates about 100 % in average comparing the year 2004 and 2005, as mentions Business Alliance of Slovakia, 2006).

Despite of the dramatic increase observed in the field of immovable property tax rates set by municipalities, the sensitivity of municipal financial autonomy on the individual income tax revenues deviation presented a menace, which got real face in the period of financial crisis coming in 2009. Unfortunately, the drop out of income tax revenues damaged the revenue side of public budgets at all government levels. As the Table 1 shows, in 2012 the central government reduced the sub-national government´s share on the individual income tax revenue. Many municipalities had to make cuts in public expenditures. In municipalities with extremely high dependence on share from individual income taxes, its impact was felt by the citizens – turning out the public lighting, not cutting the grass.

Table 1 Changes in the income tax sharing ratios

	Central government	Sub - national government	
		Local government	Regional government
2010	6.2	70.3	23.5
2011	6.2	70.3	23.5
2012	12.7	65.4	21.9
2013	12.7	65.4	21.9
2014	11.1	67.0	21.9
2015	2.3	65.8	29.2
2016	0.0	70.0	30.0

Source: based on Act no. 564/2004 Coll. and the Evaluation of the budget results of municipalities and higher territorial units in the SR, Ministry of Finance, 2012, 2013, 2014.

The situation turns in 2014. The reviving of the economy led the central government to release its share on individual income tax revenues in favour of sub-national government. However, it seems, that the situation of regional self – government ameliorated more markedly in 2015 (see Table 1, row for year 2015, last column) and 2016, central government revoked regions´ power to tax in the case of road tax (early assessed to regions by Act no. 582/2004 Coll. on local taxes) and compensated it by increasing the regions´ share on individual income tax revenue. In case of municipalities, currently, the situation did not take the form before 2012 and brought to 70 % share on individual income tax revenue.

3 Research methods and data

Data are collected on annual basis from the database of Datacentrum established by the Ministry of Finance of the SR. The period from 2000 to 2016 is covered. Data are on disposal according to Act no. 211/2000 Coll. on free access to information respecting the economic budget classification of revenues and expenditures. Analysis of own municipal revenues during the period of 2000 – 2016 is provided in this paper. It includes the partial analysis of the development and structure of tax revenues (labeled as category 100) and non-tax revenues (labeled as category 200). Each category is further divided into subcategories according to the revenue source. The recapitulation of analysed own revenue items is presented in Table 2.

Table 2 Recapitulation of the SR municipal own revenue items

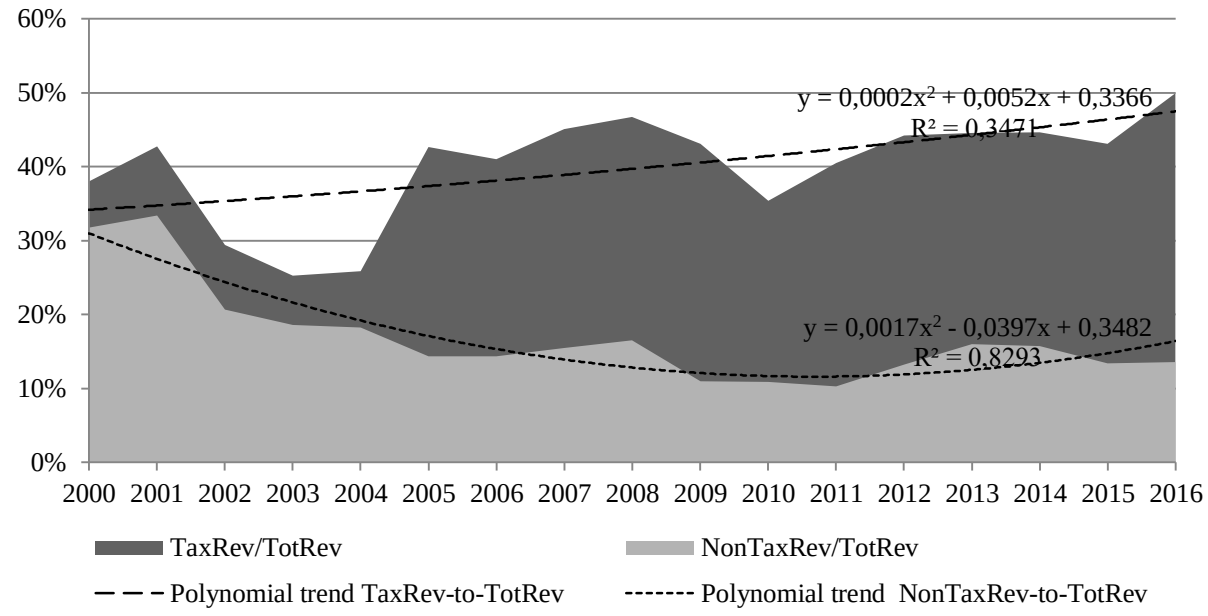
100 TAX REVENUES		
110	Taxes on income, profits and capital gains	
	111	Individual income taxes
	112	Corporate income taxes
	113	Income tax withholdings
120	Property taxes	
	121	Taxes on immovable property
	129	Other taxes on property
130	Taxes on goods and services	
	131	Value Added Tax
	133	Taxes on specific services
	134	Taxes on use of goods, or on permission to use goods or perform activities
	139	Other taxes on goods and services
160	Penalties imposed in tax action	
190	Other taxes	
200 NON-TAX REVENUES		
210	Revenues from entrepreneurship and own property	
	211	Revenues from nonfinancial organizations
	212	Revenues from financial institutions
	219	Revenues from other institutions
220	Administrative fees, fines and penalties	
	221	Administrative fees
	222	Fines and penalties
	223	Fees and payments from occasional service sale
	229	Other administrative payments and fees
230	Capital Revenues	
	231	Revenues from sale of basic capital assets
	232	Revenues from sale of tangible and mobilization reserves
	233	Revenues from sale of plots and intangible assets
	234	Revenues from financial property
	239	Other capital revenues
240	Interest payments from domestic loans, borrowings and deposits	
	241	Interest payments from domestic loans and borrowings
	242	Interest payments from deposits
	243	Interest payments from financial management accounts
	244	Interest payments from term deposits
	245	Interest payments from returnable financial aid
	246	Other interest payments
250	Interest payments from foreign loans, borrowings and deposits	
	251	Interest payments from foreign loans and borrowings
	252	Interest payments from foreign deposits
290	Other non-tax revenues	
	291	Refunded unjustifiably used or retained resources
	292	Other revenues
	293	Payback for discharged liability

Source: based on economic budget classification of public revenues introduced by Ministry of Finance of the SR

4 Review of municipal own revenues in period of 2000 - 2016

4.1 Evolution of municipal tax and non-tax revenues and their share on total municipal revenues

Before the fiscal decentralization implementation started, the share of tax revenues on total municipal revenues in the SR created approximately 40 % (in 2000 – 2001, see Figure 1). The share of non-tax revenues on total municipal revenue created approximately 30 %. Since 2002, these two revenue groups follow two different ways. Tax revenues as % of total municipal tax revenues dramatically decreased in the period of 2002 – 2004 (1st phase of fiscal decentralization implementation, municipal responsibilities were financed through the decentralization transfer), after dramatically increased and reached their precedent level (in 2005 – 2nd phase of fiscal decentralization implementation). In 2008 they reached the notional peek (47 % of total municipal revenue). In the period of financial crisis, they fell down to 35%. In the next period the share of tax revenue on total municipal revenue predominantly increases due to two factors – the unstable evolution of total municipal revenue and economy recovery. The share of non-tax revenue on total municipal revenue decreases after 2002 (with certain derogation) reaching its bottom in the period of financial crisis (minimum in 2011 at level of 10 %). In 2012 its unsystematic increase is observable.



Note: the polynomial trend turns the highest R^2 values for all variables in the question

Figure 1 Evolution of the SR Municipal Tax Revenue and Non-Tax Revenue as % of Total Municipal Revenue in the Period of 2000 - 2016

Source: Own calculations

4.2 Evolution and composition of SR municipal tax revenues

In the (monitored) period of 2000 – 2004 individual income tax and corporate income tax are assigned as shared tax in the SR. In this period their share on municipal total tax revenue creates approximately 60 % in the 2000 and decreases in the 1st phase of fiscal decentralization implementation to 53-54 % (see Figure 210 dark shaded area DPPO+DPFO/DP). Dramatic increase of the ratio of shared tax to total municipal tax revenues is observable in the period of

2005 – 2008. This period is influenced by the economic expansion which positively supported the implementation of the 2nd phase of fiscal decentralization and its deemed impact of the sub-national budgets. In the period of financial crisis (2009 – 2010), the deceleration of the economy caused drop-out of the income taxes receipts and the central government had to legally increase the share of income tax revenues assessed to sub-national governments to maintain the desired level of public goods provided by municipal governments. After it crisis period the situation has stabilized, the economy revived and the shared tax revenue to total municipal tax revenue increased to 76 % in the 2016, the state is comparable to this in 2007-2008.

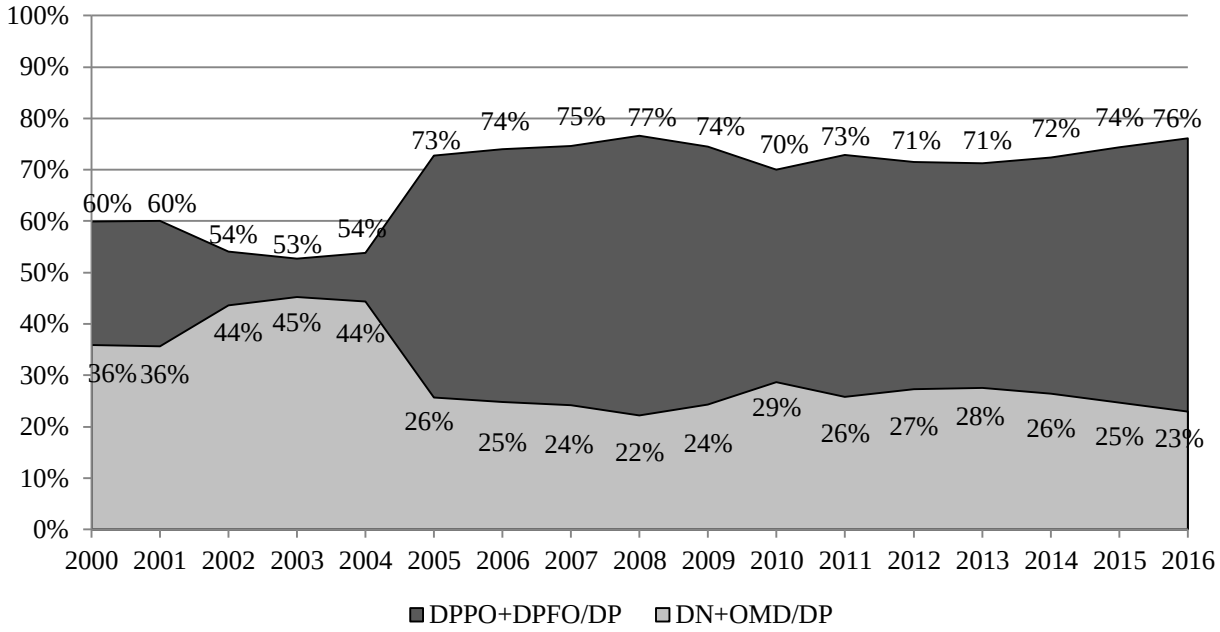


Figure 210 Evolution of the SR Municipal Tax Revenue Composition in the Period of 2000 - 2016
Source: Own calculations

Municipal own tax revenues include receipts from immovable property tax and other local taxes (as accommodation tax, tax for dog, tax for using the public area etc. specified in Act no. 583/2004 on Municipal Taxes). The share of own tax revenues on total municipal revenues increased in the period of 2002 – 2004 (see Figure 2102, light shaded area DN+OMD/DP). It may be explained by the change of financing local needs. In this period (1st phase of fiscal decentralization implementation) the municipal activities were financed through decentralization transfer from the central level of government. After the 2005 their participation on total municipal tax revenues decreased by 20% in average. The situation partially differs in the 2010. The dropout in shared tax receipts caused by the financial crisis allowed the increase of the ratio of own tax revenues on total municipal tax revenues. In the next period its moderate decrease is observable.

In general, in all the regions the composition of municipal tax revenue is similar. The highest ratio to total tax revenue in the period of 2000 – 2016 is observed in case of shared tax. Own tax revenues to total tax revenues of Slovak municipalities create a minor part of the total tax revenues, what is obvious in all regions. Summary of the tax revenue composition for the all SR municipalities is presented in Figure 3.

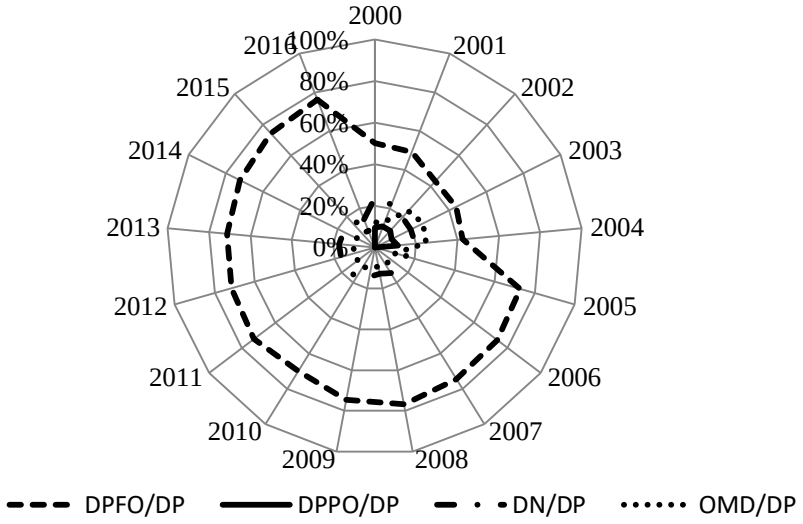


Figure 3 Municipal Tax Revenue Composition in the SR
Source: Own calculations

4.3 Evolution and composition of SR municipal non-tax revenues

Municipal non-tax revenues consist from revenues from entrepreneurship, administrative fees, capital revenues, interest payments received and other non-tax revenues un-classified elsewhere. The impression of wrong administrated agenda is invited by the high volume of other municipal non-tax revenue in comparison with other form of municipal non-tax revenue in the period of 2000 – 2001 (see Figure 4). After it, the situation has changed. From 2002 its share on total municipal non-tax revenue decreases and other non-tax revenue items develop inversely to it. The increase of revenues from entrepreneurship and administrative fees is observable in the next period. Capital revenues increase more markedly since 2005 and are reduced with the financial crisis arrival in the 2009. Received interest payments create an omissible part of municipal non-tax revenues.

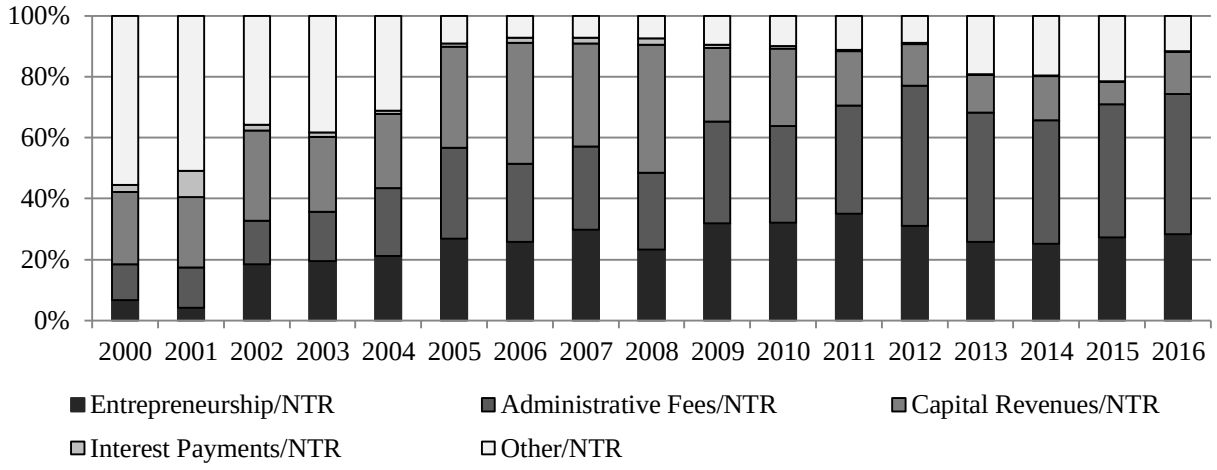


Figure 4 Municipal Non-Tax Revenue (NTR) Composition in the SR
Source: Own calculations

5 Conclusion

Municipal own revenues in the SR are created by municipal tax revenues and municipal non-tax revenues. Municipal tax revenues include share on individual income tax revenue (before 2004 it includes also a share on corporate income tax revenue), immovable property tax revenue and revenues from other local taxes. Municipal non-tax revenues include revenues from entrepreneurship, revenues from administrative fees, interest payments, capital revenues and other non tax revenues other unclassified.

The share of municipal tax revenue on total municipal revenue in the SR decreased dramatically from 40 % in 2000-2001 to 30 % in the 1st phase of the fiscal decentralization implementation (2001 – 2004), when the tax reform was prepared and run in 2004. In the 2nd phase it increased, reached the level before 2001 and in 2008 reached the notional peek at 47 % of total municipal revenues. In the period of financial crisis, it fell down to 35 %. In the next period the share of tax revenue on total municipal revenue predominantly increases due to two factors – the unstable evolution of total municipal revenue and economy recovery. The analysis results show the predominant position of the shared individual income tax revenues in total municipal tax revenues over the all monitored period from 2000 to 2016, what indicates high sensitivity of municipal budgets on economic situation in the country. It means, that in the period of financial crisis, covered by the monitored period, municipalities felt the insufficiency of financial resources because of the observable dropout of revenues from mentioned shared tax. Other municipal tax revenues create a minor part of municipal revenues, despite of their promotion through the fiscal decentralization implementation in 2005. Especially the immovable property tax creates just a fifth of municipal tax revenues.

The share of non-tax revenue on total municipal revenue decreased after 2002 from 30 % of total municipal revenue (with certain derogation) reaching its bottom in the period of financial crisis (minimum in 2011 at level of 10 %). In 2012 its unsystematic increase is observable. The body of municipal non-tax revenues is created since 2002 (more obviously since 2005) by the revenues from municipal entrepreneurship, revenues from administrative fees and capital revenues.

Acknowledgements

The paper is published within the project VEGA no. 1/0559/16 Indebtedness of local municipalities of Slovakia, the Czech Republic and Hungary and its impact on financing of public services.

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Impact of Business Intelligence technology on selected indicators of business performance in construction industry

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Abstract

Business performance depends on several factors. First of all, they are human resources, managers and workers. On the other hand, they have to make demanding decisions and need support tools. Digital time brings a number of options that can have a positive effect on the routing process and thus on business performance. Business Intelligence technology is a tool that provides support for managerial decision-making. The assumption that Business Intelligence has a positive impact is the basis for exploring relationships and dependencies. This research analyses the relationship between Business Intelligence and business performance. Main aim of research is to analyse and quantify the impact of BI on enterprise performance. The business performance of construction companies in the context of this research is primarily perceived through revenue, turnover and customer retention. These parameters are often crucial when comparing business performance. This research explores the issue in the Slovak construction industry. Research sample includes Slovak construction enterprises, all direct participant of construction. There are main contractors, sub-contractors, designers and investors.

Keywords: Business intelligence, Business performance, Impact, Construction industry.

JEL Classification: M15, M21

1 Introduction

Innovation and technology are engines of the economy (Kršák & Kyšeľa, 2016). Successful enterprises in market implement the latest technologies in the production process but also in management process. Progressive building management technologies make it easier to collect and work with information (Kolarić & Vukomanović, 2017). This is true in every sector. On the other hand, their impact is not known. In general, the assumption is that the implementation of new

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management support technology has a positive impact. But is that really the case? How can the impact of new technologies be quantified? These are the basic issues needed before implementing any information and communication technology into the enterprise (Mesároš, Mandičák, Mesárošová & Behún, 2016). Improving business performance is the state of the art after the implementation of new technologies (Radziszewska-Zielina, 2016; Kozlovská, Spišaková & Mačková, 2016). Business Intelligence is one of them. Business Intelligence (BI) represents a set of processes and technologies that allow access to data and analysis for managers and its main impact is increase of corporate efficiency a drive business more effectively (Howson, 2008). BI is a main term that includes technologies and skills used in the collection of data concerning business (Jones, 2010). Eckerson said some advantages about BI. According him, BI increases customer satisfaction, and return of investment (Eckerson, 2010). Howson claims that the increase of business performance represents the most significant impact from the exploitation of BI (Howson, 2008). According to many resources and literature review it was set assumption, that Business intelligence increasing business performance. On the other side, this assumption is needed to analysing and quantifying it impact. Business performance represents some indicators. Revenues and turnover are among these basic indicators. Another indicator is customer retention. This research should be answer to these questions:

- What is impact of Business Intelligence technology on business performance?
- What is impact on revenues in construction industry?
- What is impact on turnover in construction industry?
- What is impact of BI on customer retention?

2 Review of publication about Business Intelligence and business performance

The issue of BI is a broad topic. This area has been devoted to many researchers and experts in the past and present. This topic can be considered as being overwhelmed. Despite the large number of studies and views on the issue, however, it cannot be fully endorsed. Table 1 gives an overview of contributions and research that is devoted this issue of BI. The most of researches and contributions discuss issue of key success factors of BI. These studies are in more countries. Based on this knowledge, it was set a lot of guides for successful implementation of Bi in enterprises. Next often discussed issue it was BI implementation and strategy. A lot of researches try to find the best environment for implementation of BI. More contributions discussed about BI strategy and architecture. However, only few researches discussed impact of BI, especially with connection between impact of BI and business performance. Some researches were in some countries, for example research by Richards et al. (Richards, et al., 2014). Especially, any research was not done in construction industry in Slovakia. Based on this facts, it is necessary explore connection between BI and business performance. Based on this is assumption, that BI has a positive impact on business performance. Next table shown overview of business performance publications and researches (Table 2). Business performance is broad term and every research in this issue must include more specification. Wider term, corporate performance management (CPM) includes a lot of activities and processes for increasing productivity, revenues, profits and so on. CPM, or business performance is possible to measure by so called key performance indicators. There are usually revenue, turnover, customer retention and other.

Table 1 Overview of contributions and researches in BI topic

Researches	Year	Research or contribution	Topic
Atre	2003	The Top 10 Critical Challenges for Business Intelligence Success.	Success factors of BI
Eckerson	2003	Smart Companies in the 21st Century: The Secrets of Creating Successful Business Intelligence Solutions	Success factors of BI
Loshin	2003	Business Intelligence - The Savvy Manager's Guide.	Success factors of BI
Moss, Atre	2003	Business Intelligence Roadmap	Success factors of BI
Biere	2003	Business Intelligence for the Enterprise	BI generally
Negash	2004	Business Intelligence. Communications of the Association for Information Systems	BI generally
Pour, Slanský	2004	Efekty a rizika Business Intelligence	Success factors of BI
Eckerson	2004	Best Practices in Business Performance Management: Business and Technical Strategies	BI strategy
Novotný, et al.	2005	Business Intelligence	Success factors of BI
Eckerson	2005	The Keys to Enterprise Business Intelligence: Critical Success Factors	Success factors of BI
Čarnický	2006	Business Intelligence v riadení podnikov a prístupy k jeho riešeniu	BI generally
Ko, Abdullaev,	2007	A study on the aspects of successful business intelligence system development.	Impact of BI
Baars, Kemper	2008	Management support with structured and unstructured data: an integrated business intelligence framework	BI generally
Elbashir, Collier, Davern	2008	Measuring the effects of business intelligence systems: The relationship between business process and organizational performance	Impact of BI on performance
Sahay, Ranjan	2008	Real time business intelligence in supply chain analytics	BI generally
Howson	2008	Successful Business Intelligence: Secrets to Making BI the Killer App	Success factors of BI
Arnott	2008	Successful Business Intelligence: Secrets to Making BI the Killer App	Success factors of BI
Hwang	2008	Success Factors for Business Intelligence: Perceptions of Business Professionals	Success factors of BI
Eckerson	2008	Pervasive Business Intelligence	BI generally
Panta	2009	Business Intelligence - How to Build Successful Business Intelligence	Success factors of BI
Müller, Linders, Pires	2010	Business Intelligence and service-oriented architecture: A Delphi study.	BI generally
Hawking, Sellitto	2010	Business Intelligence Critical Success Factors	Success factors of BI
Škanta	2010	Kritické faktory úspěšnosti Business Intelligence	Success factors of BI
Yaeh, Koronios	2010	Critical Success Factors for Business Intelligence Systems	Success factors of BI
Biere	2010	The New Era of Enterprise Business Intelligence: Using Analytics to Achieve a Global Competitive Advantage	BI generally
Boyer, et al.	2010	Business Intelligence Strategy: A Practical Guide for Achieving Business Intelligence Excellence	Success factors of BI
Clarry	2010	Five Dysfunctions of a Business Intelligence Team	BI generally
Eckerson	2010	Seven Strategies for Creating High-Performance Business Intelligence Teams	BI strategy

Lahrmann, Marx, Winter, Wortmann	2011	Business Intelligence maturity: Development and evaluation of a theoretical model.	BI generally
Turban, Sharda, Delen	2011	Decision Support and Business Intelligence System	BI generally
Lachlan	2011	Top 14 Benefits of Business Intelligence	Success factors of BI
Čarnický, Mesároš	2011	Business Intelligence and Knowledge Management: A Business Perspective.	BI generally
Čarnický	2011	Business Intelligence: Theory and practice	BI generally
García	2011	Business Intelligence Software Implementation Success: The Human Factor	BI implementation
La Grouw	2011	Strategy Guide: Proven Pathways to Success with Business Intelligence	Success factors of BI
Chen, Chiang, Storey	2012	Business intelligence and Analytics: From big data to big impact	BI generally
Chen, Siau	2012	Effect of Business Intelligence and IT infrastructure flexibility on organizational agility.	Impact of BI on agility
Ramakrishnan, Jones, Sidorova	2012	Factors influencing business intelligence data collection strategies: an empirical investigation.	Success factors of BI
Adelman, Schrader	2012	Practical Tips to Overcome Barriers to Pervasive BI	Success factors of BI
Brijs	2012	Business Analysis for Business Intelligence	BI generally
Vukšić, Bach, Popovič	2013	Supporting performance management with business process management and business intelligence: A case analysis of integration and orchestration.	BI and BPM

Source: Own processing according to literatures

Similarly, there are frequent uses of other indicators such as cash flow indicator, and profit of course. According to Gartner, corporate performance management id broad term of metrics (for example KPIs indicators) methodologies, processes and other solutions for checking and management of performance. Business performance must be supported by analytical applications that provide the functionality to support these processes. One of them is Business Intelligence (Richards, 2014).

According to Ulmann, business performance includes two pillars (Ulmann, 1985). It is social performance and financial performance. Financial performance is more widespread. It discussed more researchers. Financial indicators are more often used to compare and measure business performance. Some researches use term financial indicators, it also known as direct indicators. Financial indicators are often indicators of profitability (return on equity - ROE, return on investment - ROI) and earnings before interest and taxes (Eldenburg at al., 2010; Orlitzky, 2011; Zahra, 1995). In ICT area, is often used financial indicator too.

3 Methodology of research

3.1 Aim of research and research hypotheses

Based on theoretical analysis it was set main aim of research. It is to analyse and quantify the impact of BI on enterprise performance. Partial aims of research was answer to the basic of research questions:

- What is impact of Business Intelligence technology on business performance?
- What is impact on revenues in construction industry?
- What is impact on turnover in construction industry?
- What is impact of BI on customer retention?

Based on research questions were set research hypotheses. These hypotheses were divided on one main hypothesis that is supported by partial three hypotheses.

H: Use of BI technology has a significant impact on business performance.

This main hypotheses is divided into 3 hypotheses:

H1: Use of BI technology has a significant impact on revenues in construction industry.

H2: Use of BI technology has a significant impact on turnover in construction industry.

H3: Use of BI technology has a significant impact on customer retention in construction industry.

3.2 Data collection, data processing and research sample

Data collection was based on on-line questionnaire. Questionnaire was divided into some parts. It includes general information about respondent and research questions in topic of BI. The list of respondents was a random choice. Respondents were managers of enterprises in construction industry in Slovakia. These managers responded to business performance questions. In particular, three basic indicators such as level of revenues, return and customer retention. This information was before and after implementation of BI.

All achieved data were processing in STATISTICA software, version 12. Research data incudes information about level of indictors before and after implementation of BI. Based on period of level in this indicators, it was determined level of impact. For every company was taken value before and after implementation. To eliminate the effect of another factor has also provided information on other changes in the company that could affect the performance of the company. Data on the impact of these other factors were also provided. This has ensured the purification of the parasites from other influences. It was set 5 levels of impact (Likert scale, where 1 - minimal impact and 5 - maximal impact). Achieved results were verification by Kruskal-Wallis test (statistical significance). After comparison of these results was confirm or reject hypotheses.

As a significant impact it can be possible accept value more than 3.5. According to Kyakula, valuation of hypotheses was based on impact level as (Kyakula, 2011):

- Significant (level of impact > 3.5) or
- Not significant (level of impact ≤ 3.5)

Research sample includes enterprises in construction industry. Divided research sample by enterprise size is in Figure 1. 32.94 % of respondents represented microenterprises, 31.76 % represented small enterprises. Large companies were represented by 8.24% and medium sized enterprises represented 27.06%.

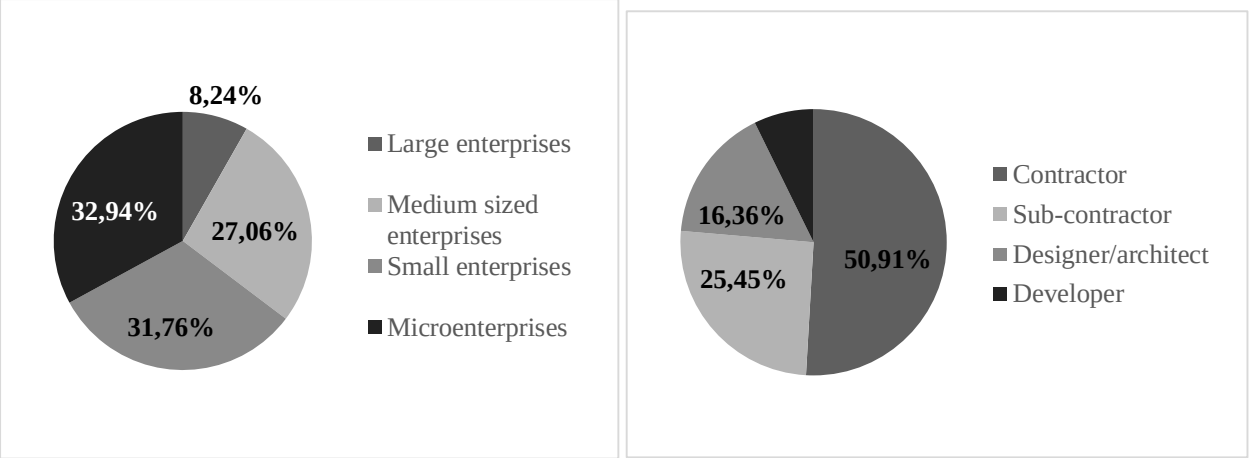

Figure 1 and 2 Research sample by enterprise size (Figure 1) and by enterprise size (Figure 2)
Source: Own processing

As already mentioned, research sample consisted from participants of construction projects in Slovakia (Figure 2). 50.91 % of respondents were contractors, 25.45 % were sub-contractors. Research sample includes 16.36 % of designers and 7.27 % investors or developers.

4 Results and discussion

As a main hypothesis of research was hypotheses about BI impact on business performance generally. It is "Use of BI technology has a significant impact on business performance". It is very general hypothesis, and this hypothesis was divided in other 3 parts. There are follow:
After analysing of partial results can be confirm or not main hypothesis.

H1: Use of BI technology has a significant impact on revenues in construction industry.
Revenues of construction enterprises depends on more factors. One of them is economic situation on market. From this reason all respondents answer more information about their economic situation. These enterprises also mentioned other factors that could affect their results and indicate the percentage of their impact. These results have been cleared and the graph shows the impact of BI only on revenue. Enterprises not using BI achieved level of revenues at 2.12 and enterprise before implementation of BI achieved value 2.05 (Figure 3). There are very similar level and it represents relatively low level of revenues. In comparison with enterprises after implementation of BI, this results were different. Enterprise after implementation of BI achieved higher level of revenues.

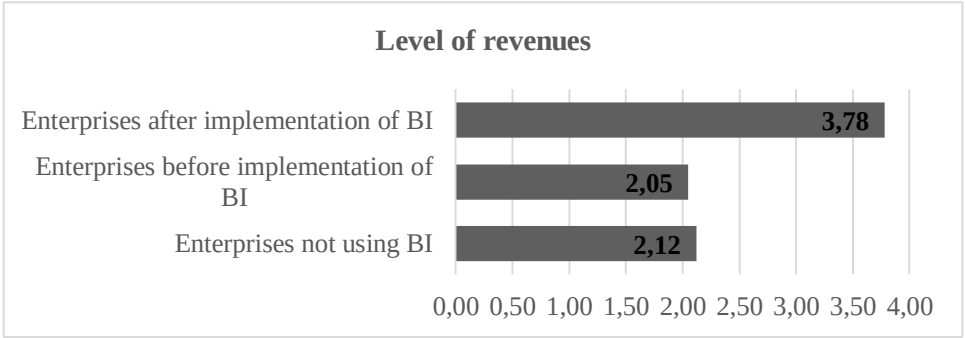

Figure 2 Level of revenues in construction industry
Source: Own processing according to research data

Based on these results we can say that the BI has a significant impact on revenues in construction industry is confirm. This statement is confirmed by Kruskal-Wallis test (see Table 2). Hypotheses 1 was accepted at the significance level $\alpha = 0.05$. Kruskal-Wallis test was value p=0,0311.

Table 2 Kruskal_wallis test of statistical significance (revenues)

	Kruskal-Wallis ANOVA based on ranking, Variable – revenues p=0,0311	
Group of enterprises	Code	Level of revenues
Eneterprises not using BI	1	2.12
Enterprises before implementation of BI	2	2.05
Enterprises after implementation BI	3	3.78

Source: Own processing according to processing in STATISTICA software

H2: Use of BI technology has a significant impact on turnover in construction industry.
Enterprises not using BI achieved level of turnover at 1.89 and enterprise before implementation of BI achieved value 1.96 (Figure 4). Enterprise after implementation of BI achieved higher level of turnover. This value achieved level at 3.96 what means a significant impact level. It was confirmed by Kruskal-Wallis test (Table 3).

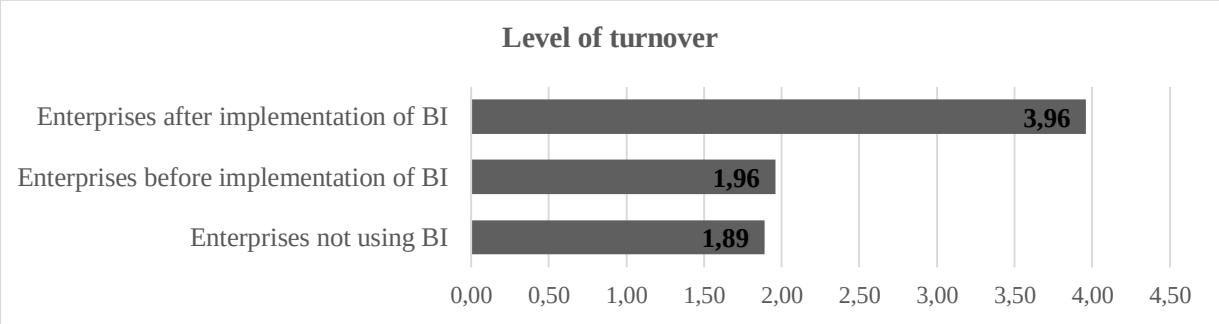

Figure 4 Level of turnover in construction industry
Source: Own processing according to research data

Table 3 Kruskal_wallis test of statistical significance (turnover)

	Kruskal-Wallis ANOVA based on ranking, Variable – turnover p=0,0287	
Group of enterprises	Code	Level of revenues
Eneterprises not using BI	1	2.12
Enterprises before implementation of BI	2	2.05
Enterprises after implementation BI	3	3.78

Source: Own processing according to processing in STATISTICA software

H3: Use of BI technology has a significant impact on customer retention in construction industry.
Enterprises not using BI achieved level of customer retention at 2.17 and enterprise before implementation of BI achieved value 2.39. Enterprise after implementation of BI achieved higher level of customer retention. This value achieved level at 3.24. In spite of higher level of customer retention it can be not possible say, it is confirmed. Kruskal-Wallis test not confirmed at statistical significance $\alpha = 0.05$ this hypotheses (Figure 5, Table 4).

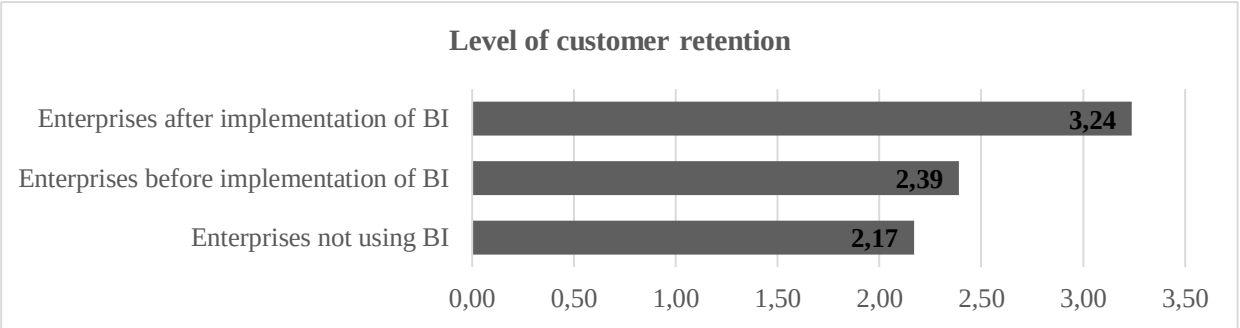

Figure 5 Level of customer retention in construction industry
Source: Own processing according to research data

Table 4 Kruskal_wallis test of statistical significance (customer retention)

	Kruskal-Wallis ANOVA based on ranking, Variable – customer retention p=0,1538	
Group of enterprises	Code	Level of revenues
Eneterprises not using BI	1	2.12
Enterprises before implementation of BI	2	2.05
Enterprises after implementation BI	3	3.78

Source: Own processing according to processing in STATISTICA software

Generally, Business Intelligence has a significant impact on business performance in construction industry, because 2 of 3 hypotheses were confirmed (Table 5). On the other hand, it´s not possible take on all key performance indicators.

Table 5 Kruskal_wallis test – final results

	Final results of hypotheses		
	Hypotheses	**p**	**Result**
Hypothesis 1	Use of BI technology has a significant impact on revenues in construction industry.	**0.0311**	accepted
Hypothesis 2	Use of BI technology has a significant impact on turnover in construction industry.	**0.0287**	accepted
Hypothesis 3	Use of BI technology has a significant impact on customer retention in construction industry.	**0.1538**	rejected
Hypothesis	Use of BI technology has a significant impact on business performance		

Source: Own processing

5 Conclusion

BI technology is a useful tool for decision making. According research sample, BI has impact on business performance in construction industry. Some key performance indicators clearly shown this impact, other a less, for example customer retention. In spite of this facts, final results shown justness of BI using. Research results are recorded in construction industry. These results can nto be taken as a general for every field. In any case, BI has a positive impact on business performance.

Acknowledgements

The paper presents a partial research results of project VEGA 1/0828/17 "Research and application of knowledge-based systems for modeling cost and economic parameters in Building Information Modeling".

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A brief overview on ground handling charges and some costs reduction

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Abstract

This article identifies some ground handling charges and their impact on airlines´ provisions to reduce turnaround costs. Also we have demonstrated a few precautions utilised by carriers in order to reduce ground handling costs. Lastly, we have mentioned how cost reduction can influence quality of the services provided from a ground handling service provider.

Keywords: Airline, Carrier, Airport, Airport operator, Ground handling service provider, Handling charges, Turnaround.

JEL Classification: L93

1 Introduction

An aircraft turnaround consists of plenty of different services and operational processes with exactly described procedures required by international and local legislation and carrier requirements. Followed by a ground handling contract with agreed operational procedures, involves a complex of activities that must be completed in a specific time range, in favour customer experience and always safe while on ground or in-flight.

This complex issue is performed by numbers of ground handling teams using specific ground handling equipment. Manpower, new equipment acquision and existing ground handling devices maintenance surely absorb a huge financial portion from carriers´ and handling companies´ budget (Tobisová, Seňová, & Vajdová, 2015; Kolesár, 2016).

Airlines have been trending to shake off own passenger handling, aircraft handling and technical equipment and transfer as much as possible of those procedures on airport operators or handling

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companies. Ground handling service outsourcing grands massive savings for airlines. Although the outsourcing represents economization for airlines but still handling charges for services agreed in bilateral agreements must be paid.

Let us have look at a few types of charges and technological and service improvements which could reduce carriers´ and operators´ costs (Gajdoš, Socha, & Mihalčová, 2014).

2 Airline costs on ground handling services

Airlines can subcontract ground handling to airports, handling agents or other airlines as well. Airlines outsource more then 50 per cent of the ground handling from airports and handling companies. Ground handling we can define as a time between an aircraft arrival at a terminal gate and a time it departs on its next flight. A carrier requires a fast, efficient and quality services from a handling company. Safety and security is carrier´s prime interest. Turnaround times must be as short as possible. Minimizing turnaround times correlate better profits.

Carriers´ commercial interest is finding different ways for a reduction of direct operational costs. Apart from the standard operational costs, carriers must calculate with costs of fuel, maintenance, crew costs, passenger irregularity costs, landing fees, terminal and en-route navigation costs as well. Also we must mention carrier costs on own ground handling staff at an airport, costs on an operation of Airport Ticketing Office, Lost and Found Office, Weight and Balance Office in case these services are handled by an airline itself (Hulínská & Kraus, 2016; Petruf, Korba, & Kolesár, 2015).

Each airline can decide which ground handling company to choose in case more than one provide services at an airport. There are many airports in the world where only one handling company available and no competition exists. The competition in providing ground handling services is needful and determined according local needs and market orientation. In case, there is no competitive provider to be contracted then meaningful and sensitive consultation must be held.

A monopoly position of a ground handling provider can result in excessive charges but quality level of the services provided remains unchanged even worse. Ground handling charges should reflect real handling company costs plus added revenue value. But never maximize their revenue from unreasoning charges.

Ground operation services include a number of administrative and operational functions from a moment of aircraft touch-down till its take-off. Ground handling services provided to a carrier are usually described in an agreement called Standard Ground Handling Agreement. The document is designed to give clear specifications of all functions a carrier requires plus quote costs of services used (Socha, 2016).

IATA AHM 810 SGHA 2013 presents official wordings for a bilateral agreement between an airline and a handling company. The document gives a perfect negation room about charges and fees to the both participant parties. *IATA AHM 810 SGHA has* basic layout:

- *MAIN AGREEMENT*
- *ANNEX A* contains description of services
- *ANNEX B* contains location, agreed services and charges

Main Agreement and Annex A are standards and cannot be altered. Annex B can be amended and adapted to local conditions and needs of the both participants. Carrier brings whole lists of services required and negotiate some best price for. The negotiations and resulting price will have a crucial influence on a future airline profitability and budget planning. Airline requests and agrees only service which are not avoidable and for lowest possible charge.

Transparency during charges negotiations is ultimate. Open and honest discussions must be founded on real cost-related and non-discrimination basis (Pitas, Nemec, & Sousek, 2014).

2.1 A few cost reduction improvements and handling procedures

Carriers must develop new procedures in ground handling operations which will consider handling costs as main factor for a definition of their business model. Airport infrastructure, technical progress and handling procedures simplification allow carriers to negotiate more attractive handling charges. For example:

- Parking on an apron that eliminates a use of pushback vehicles. This reduce costs on equipment and manpower.
  (a carrier can decide whether parking at gates or no-pushback position)
- Remote passengers boarding and deboarding by stairs. No costs on boarding bridge. Some aircraft are equipped with own passengers stairs (F70, DH4, etc…..).
- 2 or more passenger door boarding and deboarding. (decrease boarding time and minimum turnaround time, aircraft stays parked shorter)
- Aircraft parking at a walking distance. No passenger ramp bus needed.
- On request service like cleaning and lavatory service, potable water and fuelling services.

Named just few. The above mentioned costs reduction on services purchased are achieved by a self-sufficiency of a carrier. Also we can include here (Novák, Hospodka, & Endrizalová, 2016):

– Auxiliary Power Unit (APU)
– Large fuel and water capacity
– Ground level baggage handling
– On-board stairs

There are many other technological improvements which can make ground handling more effective and cheaper. For example, a baggage and cargo loading and offloading. Manufactures developed in-built sliding carpets in aircraft baggage compartments (e.g. on A320).
The functional principle of all these devices is a roller or conveyor belt that moves the baggage in and out of the baggage compartment. The advantages and savings are in

– Avoidance of injuries from manual handling
– Reduction of required handling staff
– Faster loading/unloading process
– Less damage on aircraft door

Certainly, however the loading system is affective, the safety issue must go first.

A simultaneous loading and unloading would lead to an important reduction in turnaround time. But not in manpower. Also we have to mind loading and offloading aircraft specifications like a

tail heavy aircraft (100, F70) where a negligence of offloading/loading procedures would lead to an aircraft tail tipping and make a huge and expensive aircraft damage (repair costs increase).The aircraft is off - operation and produces consecutive company loss.

Handling fees might be reduced not only on airside services but also passenger services (´´departure hall passenger services´´) that could be planned and operated in a way of cost savings. Current technological progress has a significant impact on handling charges. One of those improvements for a cheaper and faster air travel is self- service check-in kiosk. Apart from an airport self-service check-in kiosk, customers are allowed to use home check-in and mobile check-in as well.

These new technologies are beneficial for the both – passengers, who receive fast and reliable registration for a flight and also for carriers that will save on handling fees (Petruf, Korba, & Kolesár, 2015).

Also an airport can reduce costs on standard or special check-in desk maintenance and staff costs. Labour costs account typically for 80% of overall costs. Latest passenger surveys prove a very high number of passengers who prefers the use of any kind of self -service device at an airport. The self-service aspect not only gives the customers control but allows the airlines/handling companies to reduce operating cost by utilizing the "free labour" of passengers that self-service check-in provides.

Another trend how to reduce airline operational costs are Remote Ticketing Offices. Years ago, carriers were represented by Airport Ticketing Office almost at every airport where a service was operated. E-ticket and electronic form of other air travel charges like rebooking fee or excess baggage ticket have contributed to the office operation costs, material costs, office rental costs and own staff costs savings. Instead of a standard airport office, a carrier preferred remote ticketing services by his own department or outsource the service from other commercial entity.

Off-airport services have been implemented for aircraft Weight and Balance processes as well. Ground handling services provided by an airport operator or handling company during an aircraft turnaround has been reduced and very specific and qualified service like a weight and balance were finally ceased and transferred elsewhere. Instead, an airline agrees a Centralized Load Control Contract with an external company. Again here implements a form of outsourcing. Airline costs on staff special training, salary costs, hardware and software are reduced and increases carrier ´s profit. But definitely this remote service is not beneficial for an airport operator or a handling company. This new form of outsourced service is technically possible thanks to an online connection between a weight and balance service provider and check-in facilities at an airport.

Landing, parking and passenger and aircraft handling charges are usually based on aircraft maximum take-off weight (MTOW). Depends on aircraft size. For example, a different handling charge is paid for DH4 and other for A321. This fee is a subject of Annex B negotiations and can be adapted to some best practice (Soušek, Rozová, Němec, & Šustr, 2017).

3 Conclusion

In general we can say that handling costs vary depending on aircraft size, particular services needed and any non-standard services, and services required outside of normal operating hours.
It is operator´s wish at which airport will land (if selection of more airports available in an area) and which handling company some airline will contract (certainly, if more handling company exists at the airport, not a monopoly one).Each carrier must decide which way to go in terms of provided passenger services. So called low- cost airlines have brought us absolutely new model for turnaround handling that saves millions of Euros. Savings on direct operational costs result in cheaper air tickets, increased demand on air travel and that brings some huge revenue profit for carriers. Classic, full service airlines, have already started to follow the low cost model but still preserve standard features of full cost carrier.

The future of the airline industry has been anticipated in technological innovations and automatization which will reduce a number of current ground handling devices and manpower used. Changes in technical progress must be reflected in ground handling agreements which will define new handling procedures and new charges. Carriers will become more self-sufficient on their turnarounds and require less service and shorter minimum turnaround times. Less services purchased from an airport will push airports to find other business activities like providing leisure facilities, dinning, shopping and much more. This will compensate their revenue loss from the handling charges. On the other hand ground handling company has always an opportunity to attract new carriers or operating carriers frequencies increase by means of negotiated charges or some other different incentives.

Current task to provide the same high quality at lower and lower prices is very difficult to execute. Carriers and handling companies have a different opinion on this issue. Ground handling companies and airports are under a constant pressure from all different corners. Either these are operators, government, local institutions, international organization and force majeure situations.
The relationship between an airline and ground handler can best be described as a ‘master servant relationship’ and we can only guess which one is the servant.

Carriers push ground handling companies to minimize turnaround times and provide constantly updated services. Minimizing turnaround times, understaffed ground handling teams and fatigue lead to risks of safety negligence. Aircraft safety when down on the ground or in- flight is a goal of complex ground handling pre-departure activities. From aircraft technical check upon arrival, through passenger and baggage offloading and loading, aircraft trimming, fuelling, de-icing, named just few. But all ground handling services must be performed by a qualified and trained staff who is able to take a full responsibility for lives on board. Trainings and professional qualification development always cost handling companies serious part of their budget. Without adequate high airport charges, no handling agent would be able to guarantee IATA and other world airline organizations procedures and airline required qualification standards.

It is a dangerous spiral and one that may end up inflicting severe damage to all concerned. This ground handling service should not be degraded to only money earning factory but must be seen as a service – customer service. Instead of putting more and more demands on handling companies, restrictions and penalties we should recognize what services we wish to receive for published or private charge. And what service level is a handling company able to provide.

Certainly, any service provided by a handling company or airport must always be in compliance with all safety and security standards. This is the major concern for all carriers, handling companies, governments and the whole world. The safety comes first!

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Short-term Fiscal Imbalance in PIIGS Countries

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Abstract

The latest development of the EU fiscal deficits reflects the fact that the current world economy is still confronted with a deterioration in public finances since the global recession. This is due to a decline in state budget revenues or an increase of one-off and automatic measures increasing public spending that are aimed at mitigating the existing deficits in fiscal management. Interests in assessment of fiscal reforms, that lead to a reduction of fiscal deficits, is in this contribution supported by the analysis of comparison of the primary balance indicator, the analysis of the assessment of fiscal measures in consolidation episodes and the analysis of mutual correlations of fiscal development by using the dynamic conditional correlation approach in selected period 1999-2016. On the examples of the most problematic economies of EU member states, known as PIIGS countries (Portugal, Italy, Ireland, Greece, and Spain), is the aim of the contribution to analyse and compare the fiscal management during the fiscal consolidation episodes (1999-2016) and to assess whether among selected countries there is an interdependence in the development of the primary deficit that could lead to implementation of similar fiscal consolidation strategies in the context of a uniform type of fiscal consolidation. However, the results suggest that there are significant differences between the PIIGS countries and based on that it cannot be unambiguously confirmed or rebut the presumption of the conditionality of fiscal developments in these countries.

Keywords: Fiscal Indicator, Primary Balance, Dynamic Conditional Correlation Approach, PIIGS Countries, Consolidation Policy, Consolidation Adjustments.

JEL Classification: H12, H20, H50, H62

1 Introduction

Recurring disruptions in public finances have led to the emergence of fiscal imbalances, which especially in recent years, significantly affected by the last global recession, and led to uncertainty in the EU's consistent development. For the academic and economic communities, the challenges of fiscal policy in the context of influencing the development of short-term fiscal imbalance are focused on the identification, analyses and explanation of the fundamental determinants and ways of creation of an uniform type of strategy for fiscal consolidation that could be applied both in the Euro Area as a whole, but also in individual EU countries (EC, 2015). To meet these goals, it is important to be aware of the fact that the real development of fiscal consolidation among the countries can considerably vary.

Under the impact of a number of factors that affect significant macroeconomic imbalances, mainly the imbalances of current accounts and net capital flows, in the form of increasing imports of goods

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and services, increasing capital imports, excessive financialisation, in the period 1999-2016 most EU countries, especially PIIGS countries, has accumulated a huge volume of government deficits, mainly observed through debt accumulation episodes (Whyte, 2010; Blanchard, 2012; Arcand, Berkes, & Panizza, 2012). In particular, the situation and level of financing of the current account of the European periphery can be characterized as an internal crisis of payment balance within the whole Eurozone where private equity is offset by public funds (Barrios, Langedijkan, & Pench, 2010; Lesay & Auxt, 2014).

The adoption of austerity measures in the form of strategies creation to minimize deficits that respond to the growing indebtedness of countries with the consequent limitation of debt accumulation is by the literature referred to as fiscal consolidation. The crisis periods highlighted an interdependence between individual economies and a conditionality of economic and fiscal development between the European countries. Globalisation and openness have become one of the main channels for crisis impact transmission and stimulation for common consolidation efforts in countries. At present, there are no unified views on the adoption of consolidation measures at both transnational, national and local levels. The results are influenced by another set of determinants in the form of "fiscal illusion" effects (Wyplosz, 2012; Bagaria, Holland, & Van Reenen, 2012; Bauger, 2014). However, in the development of the fiscal management are common development tendencies visible that arise the question, if the fiscal development, fiscal indebtedness and preferred fiscal policy of EU countries from the empirical point of view can be considered as interdepending. Based on that the possibility to implement a "similar" or "uniform" type of consolidation in countries (or cluster of countries) has to be considered.

2 Research Objective and Methodology

The objective of the paper is through the fiscal management analysis of the PIIGS countries and their intercorrelations, to assess the possibilities for common fiscal consolidation model adoption. The analysis objective is by using the estimates of dynamic conditional correlation to verify if an interdependency in the primary deficit of the PIIGS countries exists and so to verify the possibility for similar fiscal consolidation strategies implementation.

The empirical assessment of the research objective was from the methodological point of view divided into five phases: *(1) analysis, comparison and assessment* of the fiscal development within fiscal consolidation episodes using *"traditional approach"*: i) calculation of annual primary deficit indicator (ΔPB_i) (Mihóková, Martinková, & Dráb, 2017); ii) analysis of trend and interdependence of primary balance within countries; *(2) identification of fiscal consolidation episodes* (Mihóková, Harčariková, & Martinková, 2016); *(3) analysis and overview of fiscal consolidation adjustments* within countries; *(4) analysis, comparison and assessment* of the fiscal development within fiscal consolidation episodes using "*specific approach*": i) performance of seasonal adjustment of time series; ii) calculation of quarterly primary deficit indicator (ΔPB_i) (Mihóková, Martinková, & Dráb, 2017); iii) calculation of quarterly primary deficit indicator (ΔPB_i) (Mihóková, Martinková, & Dráb, 2017); iv) application of the dynamic conditional correlation approach *(5) analysis and assessment of the research results*. As a part of these approaches specific indicators, general methods and statistical methods (tests) were used (Table1).

Table 1 Data and Methods

	Approach	
	"traditional"	*"specific"*
Variables	Net lending/net borrowing and interest payable (sector: general government) (accounting framework: ESA 2010)	Net lending/net borrowing and interest payable (sector: general government) (accounting framework: ESA 2010)
Computed Indicator	year-on-year change of primary deficit (computed based on (2))	quartal-on-quartal change of primary deficit (computed based on (2))
Methods	Quantitative research: time series analysis Qualitative research: observation, text and documents	Quantitative research: content analysis Qualitative research: text and documents
	General methods: analysis, comparison, induction, synthesis, Statistical methods: descriptive statistics, correlation methods (Pearson CC), seasonal adjustment (X-13ARIMA-SEATS method), stationary test (ADF test), DCC	
Processing	graphical and numerical description of data	
Data and Source	annual data: 1999 – 2016 Eurostat	quarterly data: 1999 – 2016 Eurostat
Unit of measure	Million euro (excessive deficit procedure)	Million euro (excessive deficit procedure)

Source: Authors, own elaboration

The main research method used in the paper is an analytic-synthetic method. In line with the mentioned methodology following methods were used. The first quantitative method, described as "*traditional approach*" is a time series analysis of the cyclically adjusted primary balance. The indicator enabled to assess and compare year-on-year changes in fiscal management and fiscal policy without the impact of past interest payments. To investigate the conditionality of implemented fiscal consolidation types was the analysis in the period 1999-2016 focused on the periods in which the consolidation took place and measures that have the countries applied.

The second quantitative method, described as "*specific approach*" represent a method of dynamic conditional correlations (hereinafter "DCC approach"). DCC's method verified whether the fiscal developments and fiscal consolidation strategies in the PIIGS countries are interdependent. After the elimination of the seasonal component, the variables are mainly influenced by changes in the components of the revenue and expenditure side of the budget, political decisions and exogenous factors. From the results of the correlations between the development of primary deficits (ΔPB_i) over the whole observed period, a weak correlation dependence in the development of individual countries is observed, so it is worthwhile to follow the development of DCC for further investigation(Table 2). The application of DCC approach in 1999Q1-2016Q3 allowed to analyse the development of quartal-on-quartal changes in primary balance in PIIGS countries, their convergence and oscillation, while the method has erased the time series of short-term memory.

Table 2 Pearson Correlation of calculation of quarterly primary deficit indicator in PIIGS countries

	PT	IE	IT	EL	ES
PT	1.000000000				
IE	-0.026597591	1.000000000			
IT	-0.061663770	0.018285073	1.000000000		
EL	0.029368530	0.011015540	0.009452418	1.000000000	
ES	-0.019012298	-0.008563988	-0.033552380	0.047788690	1.000000000

Note: Negative trend Positive trend

Source: Authors, own elaboration

3 Research Results and Discussion

3.1 Assessment of fiscal development within PIIGS countries using the "traditional" approach

The traditional approach was based on the analysis of cyclically adjusted primary balance that allows to compare and assess the fiscal management and implemented fiscal policy without the impact of past interest rates. To investigate the conditionality of implemented fiscal consolidation types was the analysis during the period 1999-2016 focused on the periods in which the consolidation took place and measures that have the countries applied.

The development of primary deficits in individual countries confirmed the fact that the primary deficit was always lower than the real government deficit. If the primary budget balance was a surplus, and the real budget balance was deficient, it meant that the real balance of government finances was caused by interest on public debt.

Table 3 Trend of primary balance development in PIIGS countries

	1999-2002	2003-2007	2008-2011	2012-2016
PT				
IE				
IT				
EL				
ES				

Note: Negative trend Positive trend

Source: Authors, own elaboration

In the development of the primary balance in the PIIGS countries, similar development trends during the four time-bound periods have been observed (Table 3), indicating the mutual conditionality of fiscal developments. The negative trends of primary balance development dominated significantly during the period 1992-2002 and crisis period 2008-2011. The negative trend during the pre-crisis period (decrease of positive values of primary balance) was influenced by many factors, e.g., introduction of EURO currency, debt covering by issuing new loans, the pro-cyclical liberalization of fiscal policy, the operation of automatic stabilizers through payment support. (Dellepiane & Hardiman, 2012). As EC (2001) states, budgetary positions showed no improvements and the fiscal effort fell short of what was planned for the stability. Many countries including PIIGS countries (e.g., EL and PT) failed to keep the deficit at the required level in most years since their entry into the Eurozone. The crisis period was characterized by the sharp deterioration in the general government balances, to reach a larger deficit of 7.5 % of GDP in the EU27 as a whole. Many EU countries including the IE, EL, and ES faced the big challenge in public finance. The EU Member countries were not prepared for crisis. The sharp economic decline

and huge imbalances in private sector have created a pressure on a partial change in the structure of public sector liabilities and led to a dramatic increase in the country's debt ratio of about 30 pp. and the need to tighten fiscal policy. As EC (2011) stated, factors that can explain the marked deterioration in the public finances were: the role of the automatic stabilisers, the introduction of discretionary measures and the fall in revenues due to the bursting of housing and/or credit bubbles in some countries. PIIGS countries (except IT) have recorded a negative growth and during the crisis period deteriorated the level of primary balance significantly and countries such as EL, IE or PT had to use a financial support within the new financial mechanism and facility: the European Financial Stability Mechanism (EFSM). The exception was the situation in ES, in where a positive development can be observed. The reason of positive development was the fiscal consolidation performed since the mid-1990s. The expenditure-based fiscal adjustments in ES led to reduction of the general government deficit from 6.6 % of GDP in 1995 to 0.3 % in 2000 (EC, 2002) and despite the weakening of its growth, positive results continued because of ES fiscal stability programme in the next period.

In the context of the mutual conditionality of the development, a negatively or positively correlated relationship between all pairs of countries was identified in the development of the primary balance. Ten groups and four time-bound periods have been identified (Table4).

Table 4 Relations between primary balances in PIIGS countries

	1999-2002	2003-2007	2008-2011	2012-2016
PT-IE				
PT-IT				
PT-EL				
PT-ES				
IE-IT				
IE-EL				
IE-ES				
IT-EL				
IT-ES				
EL-ES				

Note: Negative trend Positive trend
Source: Authors, own elaboration

Based on the performed analysis can be concluded that in the interdependence between primary balance development both negative and positive relation were identified. Positive correlations dominated during the crisis period (2008-2011), while in the previous period (1999-2007) it was only in five cases. Results are in line with previous analysis within individual countries as well as with European Commission studies confirming that the negative effects of the crisis period have spread into all European countries and revealed a strong interconnection of individual economies and their economic and fiscal interdependence. On the other hand, negative correlations were visible during the pre-crisis period (1999-2007) and post-crisis and consolidation period (2012-2016). This results within the "traditional approach" pointed out that the development of the primary balance trends was similar, but only with a weak dynamic correlation between individual countries. Despite the similar intercorrelations in primary balance development results showed differences between PIIGS countries, based on which a clear confirmation or refusal of a interdependence of PIIGS countries development cannot be accepted.

3.2 Fiscal episodes and consolidation strategy in PIIGS countries

By identifying consolidation episodes, it is observed that consolidation has been present in selected countries from 1999 to the present (Table 5). Consolidation efforts in the form of "gradual consolidation" are present in in the pre-crisis period (2004-2006). The current deficit trend of public finances have prompted the need to maintain fiscal condition even in the crisis (2007-2010) but also after the crisis (2011-2016), especially in the form of "cold shower" consolidation.

Table 5 Fiscal consolidation episodes within PIIGS countries

Country	Year of consolidation	
	CD (cold shower) consolidation	GC (gradual consolidation)
PT		
IE	2000, 2003, 2007, 2011, 2012, 2013	
IT	2012	
EL	2005, 2010, 2011, 2014, 2016	
ES	2010, 2013	2004, 2005, 2006

Source: Mihóková, Harčariková, & Martinková (2016)

Considering the significance of the crisis period from the perspective of the realized consolidation strategy, the analysis was focused on the measures implemented in these years (Table 6). The timing of fiscal episodes encouraged the selection of the analysed period also within the dynamic conditional correlation approach and provided the basis for examining the similarity and conditionality of the adopted consolidation measures. Based on a detailed analysis of the consolidation measures an overview of the major consolidation measures of the PIIGS countries in the context of fiscal consolidation was compiled. PIIGS countries´ measures´ implemented on both the revenue and the expenditure side during the pre-crisis as well as crisis period, and therefore it is not clear in some cases, what type of consolidation have countries applied.

Within the pre-crisis period (1999-2007), PIIGS countries implemented measures on the revenue side such as measures in direct and indirect taxes, changes in social security contributions as well as adjustments focused on increasing the tax collection, control and effectiveness of tax system. Countries implemented their consolidation measures in this area in line with the recommendations of the EC (2011) that determined the framework boundaries in which the countries could adjust their tax system structure and implement their proposed changes. On the other hand, expenditure based measures were concentrated on austerity measures in the form of spending cuts in essential areas such as: spending changes in wages of the public sector staff, expenditure on intermediate goods, capital expenditures, and social transfers.

During the crisis period 2008-2011 could be the PIIGS countries included into a group of countries which OECD (2011) marked as "countries that announced substantial consolidation in response to market concerns about public finances". For these countries (EL, IE, PT, and ES) the magnitude of required fiscal consolidation both on revenue and expenditure side was substantial. Among the consolidation measures used by PIIGS countries dominated measures in direct and indirect taxes (e.g., reduction in direct tax rates, income tax reforms, widening of the standard rate band in direct taxes, introduction or increase in excise duties, VAT reforms, etc.) and social security contributions (e.g., decrease/increase of social contributions rate, social security bonus and rebates to promote employment, etc.) and spending changes in current expenditure similarly as in the previous period.

During the next fiscal period (2012-2016) the European Union tried to consolidate the public finance especially through the increased revenue side. In countries that were not members of Eurozone, including PIIGS countries a mixed fiscal consolidation policy was applied (fiscal measure both on revenue and expenditure side).

Table 6 Overview of the selected fiscal consolidation adjustments within PIIGS countries

	1999-2002	2003-2007	2008-2011	2012-2016
Revenue measures				
(1) Introduction new direct taxes and changes in tax rate or tax base in direct taxes	EL, ES, IE, IT, PT	EL, ES, IE, IT, PT	ES, IT, IE, EL	IT, ES, PT,
(2) Introduction new indirect taxes and changes in tax rate or tax base in indirect taxes	EL, ES, IE, IT, PT	EL, ES, IE, PT	EL, PT, IE, ES	IE, ES, PT
(3) Abolishing or introducing exceptions, tightening the rules or restricting deductions in taxes	ES, PT	EL, IT, PT	IE,IT, EL	IE, EL, ES
(4) Changes in social security contributions (healthcare, pension or another type of insurance)	EL, IT, PT	ES, IT, PT	PT, IE, IT	ES,
(5) Tax incentives		EL, IT		
(6) Abolishing exceptions, tightening the rules or restricting deductions social security contributions		ES	IE	
(6) Changes in tax collection, control, effectiveness or tax administration	IT, PT	EL, IT	IT	IE, ES,
(7) Reform of the pension system (private or state pension funds)	ES, IE, IT	EL	IE	
Expenditure measures				
(1) Decrease in wage and salaries of the public sector, staff remuneration	EL, ES, IE	EL, IT, PT	EL, PT, IE	IE, ES, EL
(2) Increase/Decrease in capital investments, public investment expenditures	ES, IE, PT	EL, IE, IT	ES, IE	IE, EL
(3) Decrease in operational costs of public sector (expenditures on goods and services or consumption expenditures)	EL, ES, IT, PT	EL, ES, IT, PT	IT	IE
(4) Increase/Decrease of the social security contributions and social transfers or social insurance	ES, IT, PT	EL, ES, IE, IT	EL, IT, PT, ES	ES
(5) Changes in subsidies capital subsidies or capital injections to municipalities or other subjects (farmers, Agencies, etc.)		ES, IT, PT	ES	EL, ES, PT
(6) Changes in pension program		EL, ES	ES	ES, PT
(7) Implementation of the measures focus on labour market	ES, IE		IE, IT	PT, EL, ES, IT
(8) Introduction new rules for various social benefits, exceptions or conditions of transferring expenditures		IE, IT	IE, EL	PT, EL, IE

Source: Authors, own elaboration

3.3 Assessment of fiscal development within PIIGS countries using a "special" approach

Classical correlation approach, based on the literature review has identified several pairs of countries that form the basis for the implementation of DCC model GARCH (1,1) to monitor the correlation relationship between countries in time. Because of the number of monitored pairs and the range of paper, the analysis presents graphical interpretation of DCC results only for selected pairs of countries (Figure 1). At the same time can be concluded, that from the Pearson's coefficients values, a more significant relation could be derived for three pairs of countries: ES-EL, EL-IE (positive coefficient), and ES-IT (negative coefficient). In the remaining cases the values were very close to zero, indicating a neutral independent relation. According to this fact, the analysis was therefore focused mainly on the three mentioned pairs.

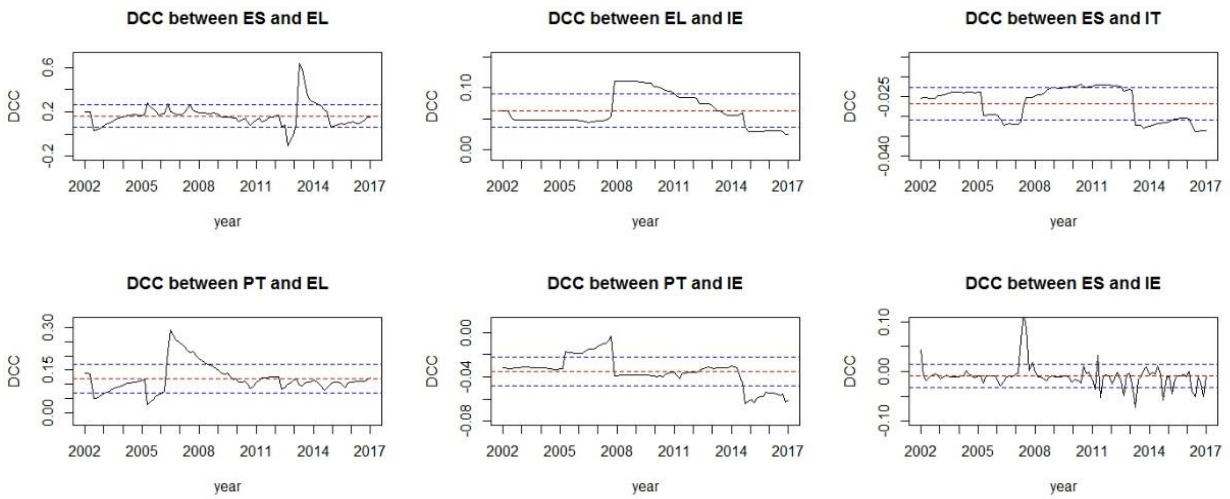

Figure 1 Results of DCC approach

Source: Authors, own elaboration according to Eurostat

Note: DCC average is highlighted in red dashed line; the blue dashed lines show increased and decreased average values of the standard deviation.

By analysing the long-term positive correlation relation of fiscal developments between the ES and EL, the Pearson's coefficients has recorded values above 0.047, which indicate a positive correlation (Table 2). Although the relationships between primary balances in these countries was mostly negative in the monitored period, the correlation matrix analysis for individual periods shows a positive correlation trend especially during the crisis period 2005-2009 (DCC average above 0.2) and later during the period 2013-2015 (DCC average above 0.6). A similar trend during crisis period was visible also within the "traditional approach" and could be determined by the application of similar consolidation efforts (Table 4). For these countries (EL and ES) the magnitude of required fiscal consolidation both on revenue and expenditure side was substantial (OECD, 2011). Both countries used similar revenue (No. 1., 2.; Table 6) and expenditure (No. 4., 6.; Table 6) based measures. The Spanish Government submitted its 2015-2018 Stability Programme Update. To achieve goals, Spanish fiscal strategy in terms of revenues and expenditures for public administrations consists of keeping the revenue to GDP ratio 38% of GDP and reducing the ratio of spending to GDP by 5p.p, from 43.5 % in 2014 to 38.4 % of GDP in 2018. The focus of Greek fiscal consolidation has been on expenditure measures, and this has increased up to 70 % of fiscal consolidation in 2015. There are three categories of measures: reduction in operating costs, addressing specific areas in expenditure, and structural measures as increasing the competitiveness and eliminate rigidities in the long run.

A similar development in the form of a positive correlation relation between fiscal developments between EL and IE show the Pearson's coefficient values above 0.011 (Table 2). Relations between primary balances in these countries were positive during the reference period 1999-2002 and 2008-2011 and in 2003-2007 and 2012-2016 were mostly negative. When analysing correlation matrices from Fig. 1 the same positive correlation trend is mainly during the 2008-2011 (DCC rising) and later during the period 2012-2016 (DCC declining). For these countries (EL and IE) the magnitude of required fiscal consolidation both on revenue and expenditure side was substantial (OECD, 2011). Both countries have used similar revenue (No. 1., 2., 3.; Table 6) and expenditure (No. 4., 8.; Table 6) based measures Despite the positive correlation coefficient, based on DCC we observe,

that, particularly the latest 2015 and 2016 periods are different in fiscal strategies. While Greece is mainly focused on expenditure measures, fiscal policy in Ireland show strong revenue growth and low interest costs should be used for more rapid reduction of still-high public debt. The Irish Government's over-arching priority in fiscal policy has been to correct the excessive deficit and thereafter move towards achieving the medium-term objective of structural balanced budget.

The long-term relationship analysis between ES-IT based on DCC showed a negative correlation of -0.033 thus indicating negatively correlated relation of the fiscal development. Similar trend between countries is visible based on "traditional approach" only in the crises period 2008-2011 (Table 4) and this development is also supported by the development of the DCC indicator, which is only growing during the crisis period 2008-2013 (DCC rising). The result is in line with the previous results according which the primary balance was negatively influenced by negative crisis trend including the deterioration in economic growth. The negative correlation can be conditioned by many factors including the different consolidation strategy (Table 6) during the different consolidation period. ES performed a cold shower as well as gradual consolidation, but IT only a cold shower consolidation. The Stability Law of Italy includes measures such as increase VAT rates in 2016 and 2017, an increase to excise duties on fuels from 2018. The main process for designing.

3.4 Discussion

The analysis helped to identify time frames where in the PIIGS countries a visible dominant trend of primary balance development was present. Negative trend dominated during the 1999-2002 and 2008-2011 (Table 3). In the context of interdependence can be stated that a positively correlated development dominated during the crisis period (2008-2011) between all analysed countries. Empirical proves confirm that the crisis consequences have hit all the European countries and so have demonstrated an interdependence of individual countries´ economic systems in the context of fiscal development (e.g. Reinhart & Rogoff, 2009).Despite the results within the “traditional” approach and despite the similar intercorrelation in primary balance development of the analysed countries, the analysis showed certain differences between them. Based on the differences a definitive confirmation or neglection of an interdependent fiscal development among the PIIGS countries cannot be introduced. These results were supported by the analysis using the Pearsons coefficients. Differences can be due to influence of several determinants (such as GDP growth, inflation, employment, government effectiveness and political stability, debt servicing cost or interest rate etc.), that determine the fiscal imbalance development (e.g. Maltritz & Wüste, 2015 or Saraç & Basar, 2014; etc.).

The consolidation measures analysis during the consolidation episodes in the PIIGS countries showed that countries have implemented revenue based, expenditure based as well as mixed consolidation measures. The most preferred consolidation measure was mostly supported by the advises of European Commission (2011) as well as by the original fiscal condition of the country, including the macroeconomic environment and political economy settings. Empirical findings have poited to a certain degree of dependence in the context of fiscal management and confirmed that a contradiction in theory and current research about preferred consolidation measures is present (e.g. Molnar, 2012; EC, 2011; etc.). Although countries have achieved a considerable results in fiscal consolidation, there is still a significant gap left to attain a long-term fiscal sustainability.

Therefore, additional fiscal consolidation within the PIIGS should be introduced, most especially for countries with a very high consolidation needs.

The results of the "traditional" approach suggest that from the long-term view can be the fiscal development interdependent among countries probably due to their local specificity. Due to the fact that the results could be biased by the nature of the data a "special" approach in the form of DCC was applied. Results show that between the years 1999Q1-2016Q3 a weak to very weak correlation between the countries is present. A positive correlation was present only between countries ES-EL, EL-IE, EL-IT, IT-IE and EL-PT and exclusively in periods 2008-2011 and later in 2012-2015. Shorter time intervals of a positive or negative correlation during the analysed period showed that from the long-term period no significant interdependence between countries exists. The results from the DCC approach have just confirmed the partial analyses results. Based on these findings can be stated that from the long-term point of view no positive interdependence among the PIIGS countries´ primary balance development exists and so the fiscal policy responses adopted by PIIGS countries have not been and will not be uniform.

4 Conclusion

The objective of the paper was through the fiscal management analysis of the PIIGS countries and their intercorrelation, to assess the possibilities for common fiscal consolidation model adoption. The results showed inconsistency in intercorrelations of primary balance development and showed certain differences between PIIGS countries, based on which a definitive confirmation or neglection of an interdependent fiscal development among the PIIGS countries cannot be introduced. Shorter time intervals of a positive or negative correlation during the analysed period showed that from the longterm period no significant interdependence between countries exists. In line with the analysis results and the specifics of the initial fiscal conditions, different economic performance, preferences in consolidation measures application and other determinants a uniform fiscal consolidation in the PIIGS countries cannot be introduced.

Acknowledgements

This paper was supported by the Scientific Grant Agency of Ministry of Education, Science, Research and Sport of the Slovak Republic and the Slovak Academy of Sciences under the grant No. VEGA 1/0967/15: *Approaches for fiscal imbalance solution in terms of the EU and in the context of the systemic crisis.*

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Current Accounts and Competitiveness Issues in the New Euro Area Member Countries

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Abstract

Economic crisis and its redistributive effects intensified cross-country expenditure shifting among the Euro Area member countries. As a result, the patterns of intra-Euro Area current account imbalances have changed. However, possible drivers and implications of a reduction in the external (both current and capital accounts) imbalances, especially between North and South of the Euro Area, are still subject of academic as well as policy discussions. New Euro Area member from the past Eastern bloc of countries experienced episodes of persistent current account imbalances during the most of the pre-crisis period (since the beginning of the 1990s).Euro adoption and crisis related effects have changed the main trends in their current account imbalances that followed a different scenario that the rest of the Euro Area since the beginning of 2000. In the paper we examine a relative contribution of the real exchange rate and demand shocks to the current accounts determination in the new Euro Area member countries by employing VAR methodology. The issue is whether examined patterns of current account imbalances are driven by unexpected shifts in the real exchange rate (ULV based) or aggregate demand. Our results indicate that shifts in current account balances were more significantly driven by demand drivers and less by real exchange rate (ULC based) drivers.

Keywords: Current account, Real exchange rate, Economic crisis, Vector autoregression, Impulse-response function.

JEL Classification: C32, F32, F41

1 Introduction

Origins and implications of current account imbalances in a large number of countries seem to be a center of rigorous empirical as well as theoretical investigation for decades. Persisting current account deficits became obvious in many advanced as well as advancing, emerging and low-income countries seemingly without a direct association with the phase of business cycle or trends in key fundamental indicators. However, flows of capital resulted from excessive external imbalances followed by the periods of large current account deficits obviously strengthened intention of policy makers as well as academics to investigate the contribution of internal and external sources of current account imbalances to associated foreign debt accumulation.

Fast convergence of central European countries toward western European countries during the pre-crisis period associated with high real output growth rates implied increased intention to external imbalances (current account deficit) to preserve fast and sustainable economic growth. Despite

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relatively high rates of growth in export performance, all countries from the group experienced current account deficits during the most of the pre-crisis period.

Fast economic growth, EU membership as well as euro adoption perspectives strengthened appreciation pressures on nominal exchange rates in new Euro Area member countries (Stavarek, 2012). At the same time, real exchange rates in all countries from the group appreciated steadily regardless of adopted exchange rate arrangement while having relatively low negative interference with their export performance (Mirdala, 2013b). As a result, exchange rates leading path seems to have just negligible negative effects on the current account determination in the new Euro Area member countries during nearly last two decades.

Crises period affected current accounts pre-crisis levels and related trends in the balance of payments in all four economies. Economic crisis intensified redistributive effects (cross-country expenditure shifting) that provided rather diverse and spurious effects on current account adjustments. Immediately after the beginning of the crisis the current accounts in all four countries temporary deteriorated (with quite differing intensity in each particular economy). However, we have soon observed a positive trend (either improvement or stable outlook) in almost all countries reflecting intensified redistributive effects of the crisis on the cross-country expenditure shifting.

In the paper we examine competitiveness issues associated with current account development in the new Euro Area member countries. Our main objective is to examine effects of the unexpected shifts in real effective exchange rates (REER) and overall demand and associated current account adjustments in the group of countries. We employ VAR methodology to analyze responsiveness of current account to the real exchange rate (REER calculated on CPI and ULC base) and demand shocks as well as the relative contribution of both shocks in explaining adjustments in current accounts. Possible implications of the crisis period will be considered by the comparison of estimated results for two models estimated for each individual country for two subsequent periods 2000-2007 (pre-crisis period) and 2000-2016 (extended period). In both models for each country we alternate both CPI and ULC based REER. We suggest that a comparison of the results for models with different time period is crucial to understand redistributive effects and competitiveness issues associated with real exchange rates shifts (induced by different dynamics in the consumer prices and unit labor costs movements) and overall demand shifts.

Following the introduction, we provide brief overview of the empirical literature about current account imbalances in section 2. While the recent empirical literature provides lot of evidence about the effects of real exchange rates shifts on current accounts, conclusion are quite different according to the relative importance of changes in competitiveness and its role in triggering current account imbalances in the new Euro Area member countries. In Section 3 we provide a brief overview of the VAR model (recursive Cholesky decomposition is employed to identify structural shocks) that was employed to examine responsiveness of current accounts to the positive one standard deviation real exchange rate and demand shocks in the new Euro Area member countries as well as the relative importance of both shocks in explaining adjustments in current accounts. In Section 4 we discuss the main results.

2 Overview of the Literature

Bussiere, Fratzscher and Muller (2004) analyzed the current account determination in 33 countries employing an intertemporal approach via regression analysis considering effects of fiscal stance of government as well as real exchange rate deviations. Authors suggest that current account balances of countries included in the model are close to their structural current account positions confirming a validity of the intertemporal approach. Arghyrou and Chortareas (2008) investigated dynamics of current account adjustments and the role of real exchange rates in the current account determination in the EMU. Despite a limited evidence of most theoretical models in explaining causal relationship between real exchange rates and the current account, authors confirmed above relationship with significant validity and subject to non-linear effects. Lee a Chinn (Lee & Chinn, 2006) analyzed implications of real exchange rate fluctuations on the current account development in 7 most developed industrial countries. Authors suggest that while the variation in the current account is mostly determined by temporary shocks, permanent shocks seem to be much more crucial in explaining the variation in the real exchange rate. At the same time, their results confirmed validity of the intertemporal opened economy model. Sek and Chuah (Sek & Chuah, 2011) explored causality between the exchange rate changes and the current account adjustments in 6 Asian countries. Authors surprisingly conclude that the current account did not change much expected after the crisis. They suggest it is due to adjustments that authorities made in countries' financial policies to reduce the excessive exchange rates volatility. Obstfeld and Rogoff (Obstfeld & Rogoff, 2005) focused their investigation on estimation of effects of global current account imbalances reduction on exchange rates (USD, EUR and Asian currencies) equilibrium path in the model with alternative scenarios. Gruber and Kamin (2005) estimated panel regression models employing data for 61 countries to observe the current account determination. However, their results did not provide supportive evidence for large U.S. deficits nor large Asian surpluses.

3 Econometric Model

We employ a VAR methodology to analyze effects of real exchange rate shifts on current account adjustments in the selected Euro Area member countries. Cholesky decomposition of variance-covariance matrix of reduced-form VAR residuals is implemented to estimate effects of real exchange rate appreciation on the current accounts deterioration.

True model is represented by the following infinite moving average representation:

$$X_t = A_0\varepsilon_t + A_1\varepsilon_{t-1} + A_2\varepsilon_{t-2} + \ldots = \sum_{i=0}^{\infty} A_i\varepsilon_{t-i} = \sum_{i=0}^{\infty} A_i L^i\varepsilon_t = A(L)\varepsilon_t \qquad (1)$$

where X_t represents n x 1 a vector including endogenous variables of the model, $A(L)$ is a n x n polynomial consisting of the matrices of coefficients to be estimated in the lag operator L representing the relationship among variables on the lagged values, ε_t is n x 1 vector of identically normally distributed, serially uncorrelated and mutually orthogonal errors (white noise disturbances that represent the unexplained movements in the variables, reflecting the influence of exogenous shocks):

$$E(\varepsilon_t)=0, \quad E(\varepsilon_t\varepsilon_t')=\Sigma_\varepsilon=\mathrm{I}, \quad E(\varepsilon_t\varepsilon_s') = [0] \quad \forall t \neq s \qquad (2)$$

Vector X_t consists of six endogenous variables - real output $(y_{r,t})$, money supply (m_t), core inflation (p_t), short-term nominal interest rates $(ir_{n,t})$, real exchange rate $(er_{r,t})$ and current account (cu_t). In the six-variable VAR model $\left(X_t = \left[y_{r,t}, m_t, p_t, ir_{n,t}, er_{r,t}, cu_t,\right]\right)$ we assume six exogenous shocks that contemporaneously affects endogenous variables - demand shock $(\varepsilon_{y,t})$, nominal shock $(\varepsilon_{m,t})$, inflation shock $(\varepsilon_{p,t})$, monetary policy shock $(\varepsilon_{ir_n,t})$, exchange rate shock $(\varepsilon_{er_r,t})$ and current account shock $(\varepsilon_{cu_n,t})$.

Structural exogenous shocks from equation (1) are not directly recoverable due to the complexity of information included in true form VAR residuals. As a result, structural shocks cannot by correctly identified. It is then necessary to transform true model into following reduced form:

$$X_t = C(L)Y_{t-1} + e_t \qquad (3)$$

where $C(L)$ is the polynomial of matrices with coefficients representing the relationship among variables on lagged values and e_t is a n x 1 vector of normally distributed errors (shocks in reduced form) that are serially uncorrelated but not necessarily orthogonal:

$$E(e_t)=0, \quad \Sigma_u = E(e_te_t') = A_0E(e_te_t')A_0' = A_0A_0', \quad E(e_te_s') = [0] \quad \forall t \neq s \qquad (4)$$

Relationship between reduced-form VAR residuals (e_t) and structural shocks (ε_t) can be expressed as follows:

$$e_t = A_0\varepsilon_t \qquad (5)$$

As we have already noted at the beginning of the section we implement a Cholesky identification scheme to correctly identify structural shocks. In order to identify our model there must be exactly $n^2 - \left[\left(n^2-n\right)/2\right]$ relationships among endogenous variables of the model, where n represents a number of variables. We have to impose $\left(n^2-n\right)/2$ restrictions on the matrix A_0 based on the Cholesky decomposition of the reduced-form VAR residual matrix that define matrix A_0 as a lower triangular matrix. The lower triangularity of A_0 (all elements above the diagonal are zero) implies a recursive scheme (structural shocks are identified through reduced-form VAR residuals) among variables (the Wald chain scheme) that has clear economic implications and has to be empirically tested as any other relationship. Identification scheme of the matrix A_0 implies that particular contemporaneous interactions between some exogenous shocks and some endogenous variables are restricted reflecting causal (distribution) chain of interaction transmission. It is clear that the Wald causal chain is incorporated via convenient ordering of variables.

Considering lower triangularity of a matrix A_0 the equation (5) can be rewritten:

$$\begin{bmatrix} e_{y_r,t} \\ e_{m,t} \\ e_{p,t} \\ e_{ir_n,t} \\ e_{er_r,t} \\ e_{cu,t} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ a_{21} & 1 & 0 & 0 & 0 & 0 \\ a_{31} & a_{32} & 1 & 0 & 0 & 0 \\ a_{41} & a_{42} & a_{43} & 1 & 0 & 0 \\ a_{51} & a_{52} & a_{53} & a_{54} & 1 & 0 \\ a_{61} & a_{62} & a_{63} & a_{64} & a_{65} & 1 \end{bmatrix} \begin{bmatrix} \varepsilon_{y_r,t} \\ \varepsilon_{m,t} \\ \varepsilon_{p,t} \\ \varepsilon_{ir,t} \\ \varepsilon_{er_r,t} \\ \varepsilon_{cu,t} \end{bmatrix} \quad (6)$$

Correct identification of exogenous structural shocks reflecting Cholesky ordering of variables denotes following assumptions:

a) Real output doesn't contemporaneously respond to the shock from any other endogenous variable of the model.
b) Money supply doesn't contemporaneously respond to inflation, interest rates, exchange rate and current account shocks, while it is contemporaneously affected only by the real output shock.
c) Inflation doesn't contemporaneously respond to interest rates, exchange rate and current account shocks, while it is contemporaneously affected by real output and money supply shocks.
d) Interest rates don't contemporaneously respond to exchange rate and current account shocks, while it is contemporaneously affected by real output, money supply and inflation shocks.
e) Exchange rate doesn't contemporaneously respond to the current account shock, while it is contemporaneously affected by real output, money supply, inflation and interest rates shocks.
f) Current account is contemporaneously affected by shocks from all of endogenous variables of the model.

After initial period variables may interact freely without any restrictions. Estimated VAR model is used to compute impulse response functions to analyze responses of the current account to the positive one standard deviation real exchange rate shock in the selected Euro Area member countries. To check the robustness of empirical results we estimate the model considering different ordering of the endogenous variables in models with time series for two different periods (pre-crisis period - model A (2000Q1-2007Q4) and extended period - model B (2000Q1-2016Q2)).

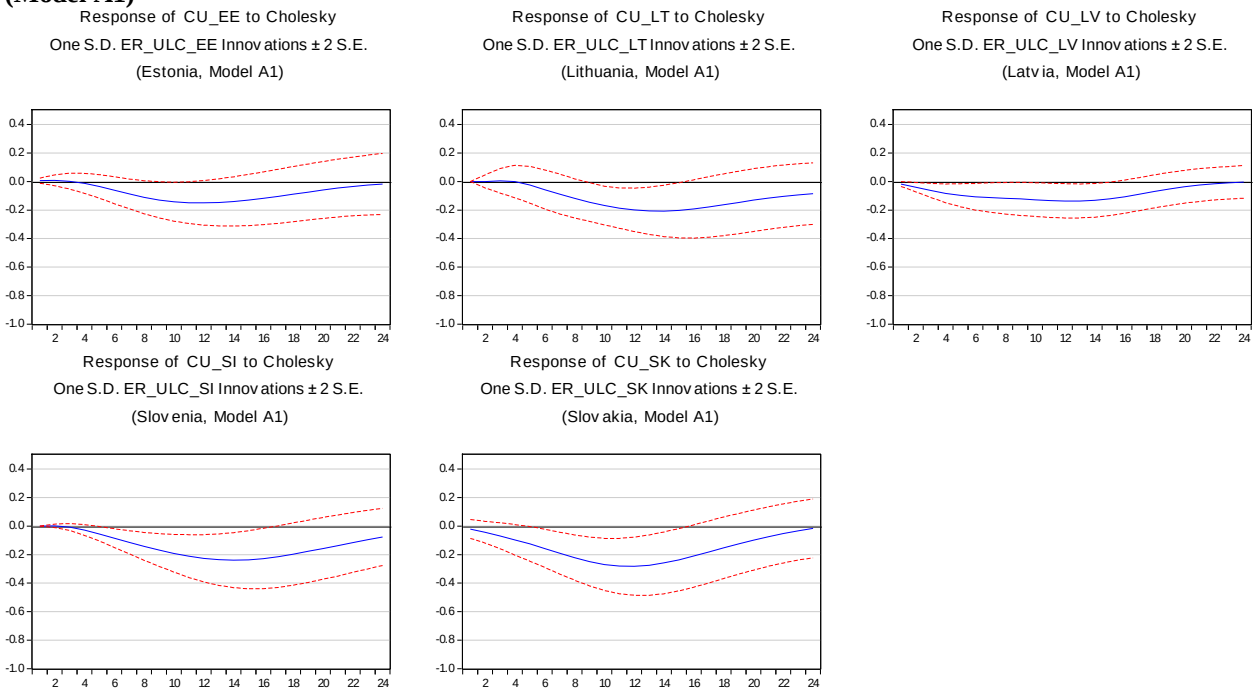
4 Data and Results

To estimate effects of real exchange rates shifts on current accounts in the new Euro Area member countries we employ monthly data for two periods – 2000M1-2007M12 (model A) consisting of 96 observations and 2000M1-2016M6 (model B) consisting of 198 observations for six endogenous variables - real output (nominal industrial production deflated by GDP deflator), money supply (monetary aggregate M2), inflation (core inflation), long-term interest rates (long-term interest rates of government bonds with ten years maturity), real exchange rate (ULC deflated nominal effective exchange rate) and current account of the balance of payment.

Effects of real exchange rate shifts on current account adjustments in the new Euro Area member countries are examined from estimated responsiveness of current accounts to the positive (appreciation) one standard deviation real exchange rate shock employing monthly data for two subsequent periods 2000-2007 (model A) and 2000-2016 (model B). Results seem to be sensitive to the exchange rate arrangement that countries has employed during the stage before the euro adoption. While current accounts in the Baltic countries seems to be more responsive to the demand shocks (especially during the pre-crisis period), adjustments in current accounts in Slovakia and Slovenia were more vulnerable the exchange rate shocks (especially during the crisis period).

In the Figure 1 we summarize results of impulse-response functions of current accounts to positive (appreciation) real effective exchange rate (ULC based) shocks in the model with time series for the pre-crisis period (Model A1) and extended period (Model B1) in the selected Euro Area member countries.

(Model A1)



(Model B1)

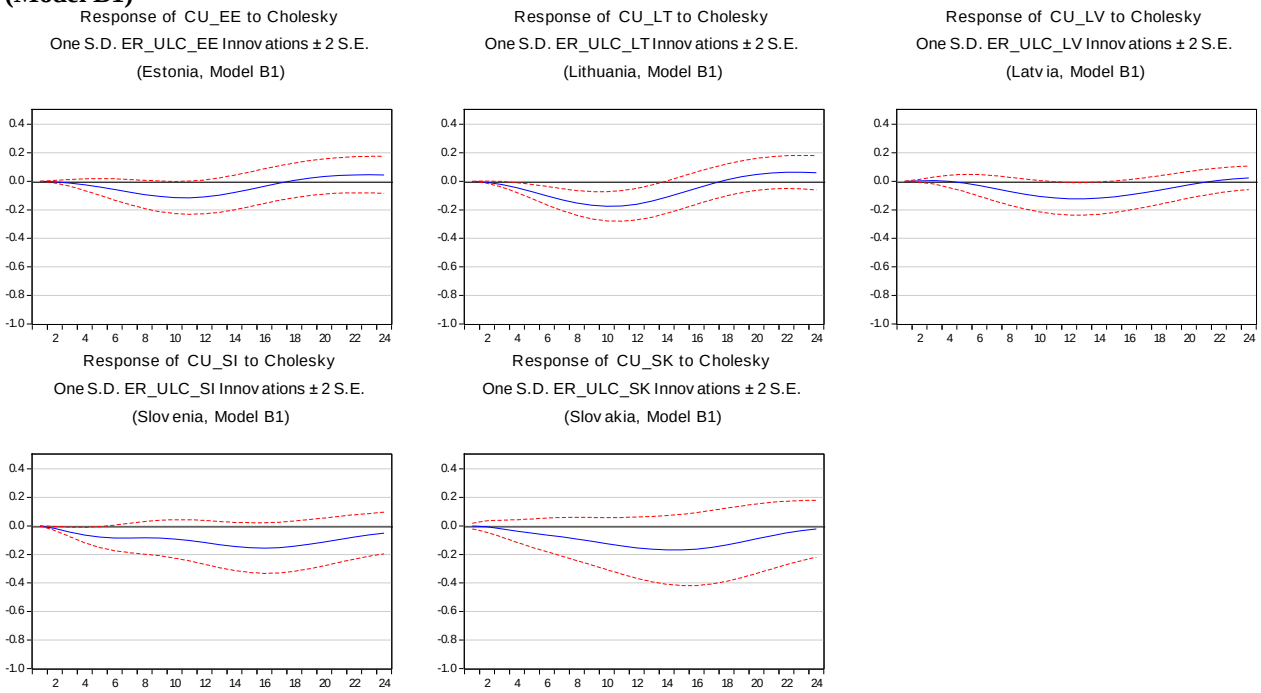


Figure 1 Responses of Current Account to REER (ULC based) Shocks

Source: Author's calculation

Note: Curves represent responses of current account (CU) to the positive (appreciation) one standard deviation real effective exchange rate (ULC based) shock in the new Euro Area member countries.

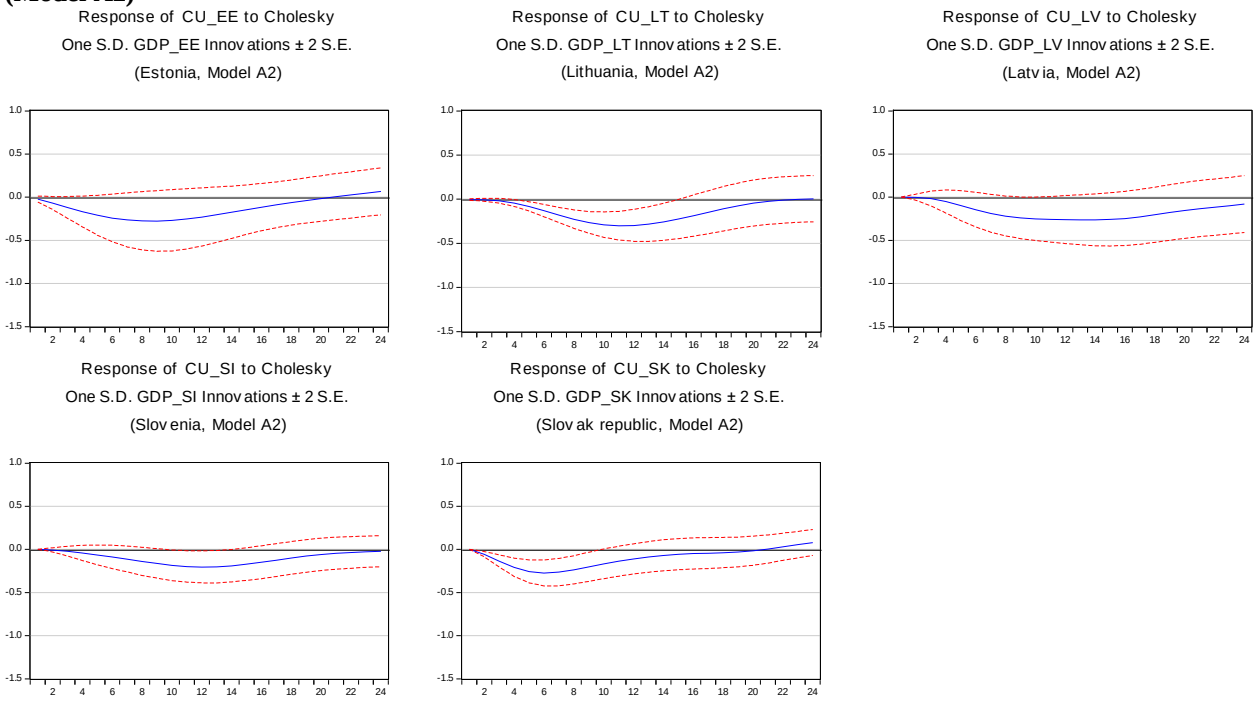
Estimated responsiveness of current accounts in the new Euro Area member countries to the Cholesky positive one standard deviation REER shock (appreciation of the ULC based real exchange rate) revealed interesting implications of a reduced labor costs-related competitiveness during the pre-crisis period. Unexpected shift (increase) of REER was followed by the current

account deterioration in all five countries. However, our results indicate moderate differences in the current account response patterns between the Baltic countries and Slovakia and Slovenia. While the negative effect of the shock culminated within one year since the shock in all five economies, current accounts in Slovakia and Slovenia deteriorated more significantly.

Crisis period affected responsiveness of current accounts to the positive exchange rate (ULC based) shock in both groups of countries. While the overall deterioration of current accounts in in all five countries was less intensive, current accounts in the Baltic countries returned to their pre-shock levels within shorter period of time while deteriorating effect of the exchange rate shock in Slovakia and Slovenia was more durable. Generally, the overall vulnerability of current accounts to the drop in labor costs-determined competitiveness decreased mainly in the Baltic countries. Reduced dynamics and durability of the current account deterioration in the Baltic countries indicate less important role of the labor costs related determinants of competitiveness especially in countries that experienced significant improvement in their external imbalances. On the other hand, only slight reduction and increased durability of the exchange rate shock on current accounts in Slovakia and Slovenia reveals still important role of the labor cost based competitiveness in determining their external competitiveness.

In the Figure 2 we summarize results of impulse-response functions of current accounts to positive demand shocks in the model with time series for the pre-crisis period (model A2) and extended period (Model B2) in the new Euro Area member countries.

(Model A2)



(Model B2)

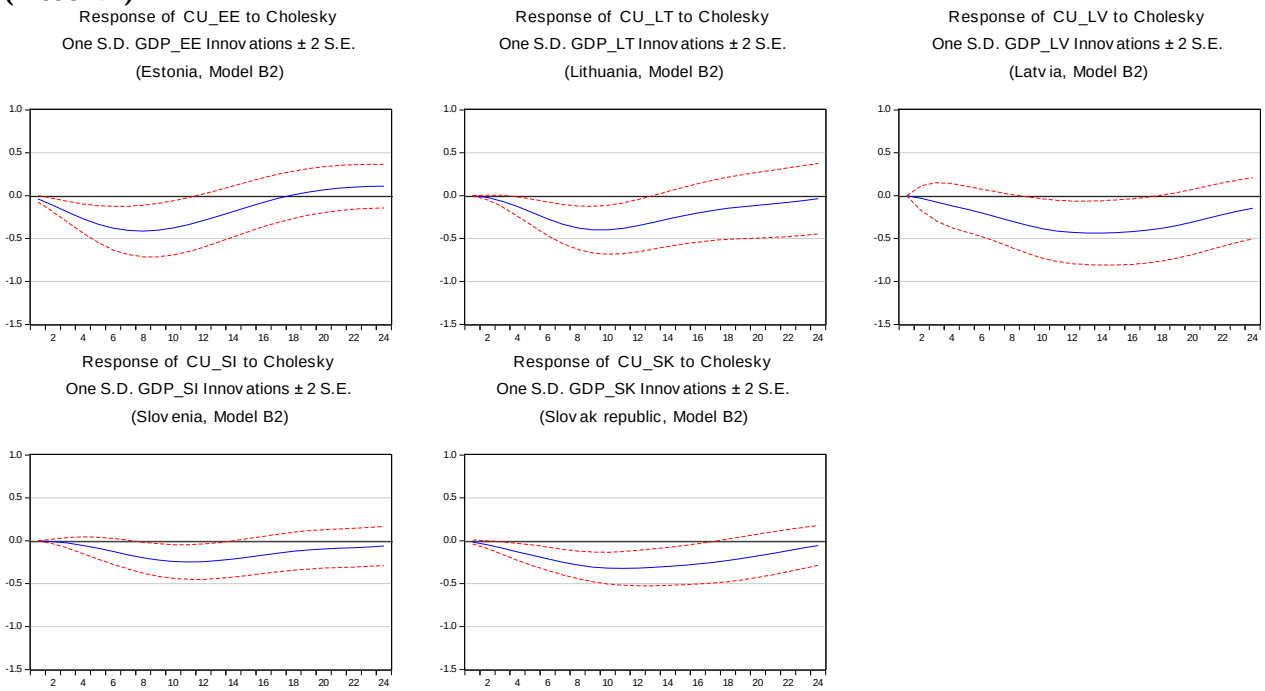


Figure 2 Responses of Current Account to Demand Shocks

Source: Author's calculation

Note: Curves represent responses of current account (CU) to the positive (appreciation) one standard deviation demand shock in the new Euro Area member countries.

Positive one standard deviation demand shock was followed by deterioration in current accounts in all five countries in model with pre-crisis data. However, our results indicate some differences in the current account response patterns between the Baltic countries and Slovakia and Slovenia. Together with different dynamics in the initial current account deterioration (generally higher in the Baltic countries) we have also examined higher duration of the deteriorating effect of the shock. Demand shock seems to be neutral in the long run and its effect on the current account was just temporary in all countries.

Crisis period affected responsiveness of current accounts to the positive demand shock in both Baltic countries and Slovakia and Slovenia. Contrary to our results for real exchange rates (ULC based), current account responsiveness to the unexpected demand shock increased in both groups of countries during the crisis period though we have observed more dynamic and durable current account deterioration in the Baltic countries.

We suggest that crisis period intensified demand driven redistributive effects that seems to have more important role on the current account determination that changes in price and cost related competitiveness. Significant reduction in demand during the initial stage of the crisis period contributed to general improvement in the current account imbalances especially in the Baltic countries.

5 Conclusion

Large current account deficits fueled by real exchange rate appreciation and strong domestic demand indicated a significant loss of competitiveness in the new Euro Area member countries

since 2000 till the beginning of crisis period. While all countries from the group experienced real exchange rate appreciation during the whole pre-crisis period, this trend is clearly the strongest in the Baltic countries. Large current consumption and associated accumulation of private and public debt even emphasize generally expected implications of intertemporal choice in countries represented weaker part of the common currency area. As a result, significant trend in consumer prices and unit labor costs based real exchange rates discrepancies in the most countries indicates asynchronous effects of processes that determine internally caused changes in the relative external competitiveness.

Examination of the effects associated with changes in costs-determined competitiveness on current account deficits in the new Euro Area member countries revealed interesting implications of existing fundamental differences in growth patterns and its sustainability between Baltic countries and Slovakia and Slovenia. Overall vulnerability of current accounts to the drop in labor costs-determined competitiveness during the crisis period decreased mainly in the Baltic countries that indicates less important role of the labor costs related determinants of competitiveness especially in countries that experienced significant improvement in their external imbalances. On the other hand, current account responsiveness to the unexpected demand shock during the crisis period increased in both groups of countries, though we have observed more dynamic and durable current account deterioration in the Baltic countries. Finally, decreased vulnerability of current accounts to the real exchange rate shocks during the crisis period in all five economies reduced applicability of internal devaluation as a convenient vehicle for a reduction in external imbalances in these countries.

Acknowledgements

This paper was written in connection with scientific project VEGA no. 1/0994/15. Financial support from this Ministry of Education's scheme is also gratefully acknowledged.

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Health Information System - Medical Devices Nomenclature System

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Abstract

The subject of the article is to evaluate the current systems of internationally agreed generic descriptors for the identification of medical devices. The aim of this article is to assess the strengths and weaknesses of the Global Medical Device Nomenclature (GMDN), officially recognized within the European Economic Area (EEA), as compared to Unique Device Identity (UDI) valid in the United States. The methods used include a literature review of available professional sources, PEST analysis and guided structured interviews with experts from the Czech Association of Manufacturers of Medical Devices (CzechMed). Comparison of both systems was also performed. The introductory part of the article defines the basic concepts and obligations that international regulations set for MD manufacturers. It also describes the current situation in information systems associated with MDs. The comparison focuses on two transnational systems - Global Medical Devices Nomenclature (GMND) and Unique Device Identity (UDI). The synthesis of knowledge highlights the strengths and weaknesses of both systems. The conclusion of the article deals with the overall evaluation and recommendations on the given issue.

Keywords: GMDN system, UDI system, PEST analysis, Comparison, Medical device

JEL Classification: I180

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1 Introduction

According to the Food and Drug Administration (FDA), “A medical device is "an instrument, apparatus, implement, machine, contrivance, implant, in vitro reagent, or other similar or related article, including a component part, or accessory which is (U.S. Food and Drug Administration, 2017):

- recognized in the official National Formulary, or the United States Pharmacopoeia, or any supplement to them,
- intended for use in the diagnosis of disease or other conditions, or in the cure, mitigation, treatment, or prevention of disease, in man or other animals, or
- intended to affect the structure or any function of the body of man or other animals, and which does not achieve any of its primary intended purposes through chemical action within or on the body of man or other animals and which is not dependent upon being metabolized for the achievement of any of its primary intended purposes."

The development, manufacture and distribution of medical devices are regulated in the European Union by the European Community directives, i.e., directives and regulations. The regulations are directly applicable, while directives need to be transposed into national legislation. The following basic documents concerning medical devices in general, active implantable medical devices (the active use of some form of energy) and in vitro diagnostic medical devices are listed in the relatively large number of directives, laws, government orders and decrees of the Ministry of Health of the Czech Republic, 2017:

- Council Directive 93/42 / EEC on medical devices;
- Directive 2007/47 / EC of the European Parliament and of the Council on active implantable medical devices;
- Directive 98/79 / EC of the European Parliament and of the Council on in vitro diagnostic medical devices; these directives are transposed into the Czech legislation in the form of the following government orders or laws:
- Government Regulation No. 336/2004 Coll., laying down technical requirements for medical devices;
- Act 123/2000 Coll. on medical devices, last amended - Act No. 196/2010 Coll .;
- Government Regulation No. 453/2004 Coll. as amended, laying down technical requirements for in vitro diagnostic medical devices.

Another important element influencing the development of the medical device are the standards:

- international (ISO);
- European (EN);
- national (Czech - ČSN, American - ASTM etc.)

Many national standards exceed their European standards, such as the Czech ISO 13485 standard, which prescribes the general principles of the development process (Pohl, 2011).

2 Literature Review

2.1 PEST analysis - Political, legal, and regulatory environment

According to the valid EU legislation, the medical products must be approved by the adequate bodies. Conditions can be dissimilar due to different types of devices. In order to sell the device in EU, the CE mark is generally required. The process of acquiring the CE mark is the objective of

the legal, regulatory, quality affairs and business development department. Even though this process is not a matter of the marketing department, it has to be implemented in their plan because of its very long time (from months to years) and limitations, since without the CE mark there is no possibility to sell given devices. For the successful launch of the medical device, it must be taken into consideration the following regulations (Coufalova, 2011):

- EU legislation;
- National legislation of the EU members;
- Medical Device Regulations (by World Health Organization) (Who.int, 2003);
- The Medical Device Directive (Council Directive 93/42/EEC) amended by the 2007/47/EC (Council Directive 93/42/EEC, 2003);
- CE marking (CE Marketing Medical Devices, 2009).

Because the process of acquiring the CE mark is not a matter of the marketing department, we will suppose that both EU and the national notified bodies have approved the product as it also has the CE mark.

2.2 PEST analysis - Economic/Demographic environment

We can divide the member states of the EU in two groups. First group would be countries of the Euro zone (Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, Netherlands, Portugal, Slovakia, Slovenia and Spain), while in the second group we consider countries outside the Euro zone (Bulgaria, Czech Republic, Denmark, Hungary, Latvia, Lithuania, Poland, Romania, Sweden) and United Kingdom is after Brexit. Generally, business is easier with countries that have adopted Euro as their currency. However, three indebted countries (Czech National Bank, 2017) (Greece, Ireland and Portugal) of the Euro zone have been recently undergoing a crisis and crisis naturally higher the risks on their markets.

2.3 PEST analysis - Social and Cultural environment

The way medical devices are sold is different in the fact that customers are not the end users, but doctors and the management of the hospital. The end users, patients more precisely, do not care about the medical devices. Only matter is how they cure them, patients focus on healing independently on the brand of the medical device used (Gavurova & Vagasova, 2016). Because of this serious reality, the values or beliefs of the final users are for the marketing managers not as applicable as the physicians opinions. Thus, there is a requirement to be in the contact with the management of the hospital and the physicians themselves and this task should the sales representatives in each country try to accomplish. To impress physicians with the offering, their values have to be known and considered (Cheng, 2003).

2.4 PEST analysis - Technological, Competitive and Infrastructure Environment

Medical devices market is a very competitive market and contains only a few strong players. All medical devices producers are investing large amounts of money in research, development and innovations. According to Mohelska and Sokolova (2016), in this market the company which brings the innovative technology the first, usually wins or has a considerable competitive advantage (Mohelska & Sokolova, 2016).

Medical device systems have become increasingly complex, interconnected and interoperating. With this comes a major problem of how to provide and improve the safety, security and reliability

of medical devices (Gavurova et al., 2017). Overall improvement of the quality of medical treatment depends on efficient human reliability analysis and assessment for medical devices. It is necessary to realize that medical devices are directly related to patients' health and lives (Chang, Ip, & Zhang, 2012; Lin et al., 2014; Martin et al., 2012). Medical device development (MDD) is expensive and high risk undertaking. Successful developing strongly depends on the implementation of rigorous processes (Pietzsch et al., 2009). Normally, developers try to limit the risk horizon to device design but intense competition requires to observe sources of risks during MDD processes. This can however endanger the MDD process pursuant to higher costs, time need and lower quality.
These processes are usually unstructured, in the contrary of business or manufacturing processes. They also have high amount of interactions and are driven by potential risks because of different sources at each stage of development. Performing an effective MDD process is fundamental from the business perspective, because the device itself is a risky investment opportunity with high chance to fail. Even more owing to stringent regulatory processes and potential litigations (Medina, Kremer, & Wysk, 2013).

3 Methodology and Data

The methods used include a literature review of available professional sources, PEST analysis and guided structured interviews with experts from the Czech Association of Manufacturers of Medical Devices (CzechMed, 2013).

The C1 - C6 qualitative criteria are aggregated with a broader scope according to IHTSDO, 2017. The scale used to measure the criteria is the Ordinal Scale (VP), Positive (P), Neutral (N), Negative (NG), Significantly Negative (VN). The Ordinal Scale allows to determine the order of the two options.

1. Transparency and honesty
Source Provider Transparency - name and physical and electronic address of the person or organization responsible for the information source.
Transparency of the Purpose and Purpose of the Source (including any business intent). A clearly defined target group.
Transparency of financial resources (grants, sponsors, advertising, ...)
Authorization (authority)
All information clearly identifies the sources and dates of their publication.
The name and credentials of all information providers (persons and institutions) are listed in the source, including the date when these credentials were obtained.

2. Privacy
A clear identification of policies and systems for privacy, security and confidentiality, including the necessary opt-in * access when storing any personal data.

3. Present time
Clear and regular updating of the information source, with an update date clearly displayed on each page and / or item where it is significant.

4. Responsibility
Responsibility - user feedback and responsible supervisor (such as the person responsible for maintaining quality on the site)
Responsible partnerships - efforts should be made to ensure that partners or referenced websites are in the hands of trusted persons and organizations that themselves comply with the relevant code of good practice.
Publishing process - a clear description of the description of the procedures used for content selection.

5. Availability
The partial results obtained were processed and a comparison of both systems was then performed.

4 Discussion and Results

An overview of the results from the guided structured interviews with E1 – E3 experts (consult Table 1).

Table 1 Results of the evaluation of both systems

GMDN system	Expert1	Expert2	Expert3	UDI system	Expert1	Expert2	Expert3
Criterion1	VP	VP	VP	C1	VP	VP	P
C2	NG	N	NG	C2	P	P	N
C3	VP	VP	P	C3	P	VP	VP
C4	P	P	N	C4	VP	VP	P
C5	VP	VP	P	C5	VP	VP	VP
C6	P	N	N	C6	P	P	P

Source: Own elaboration

4.1 Global medical devices nomenclature database

It is a system of internationally agreed generic descriptors to identify all MDs. Global Medical Devices Nomenclature (GMDN Agency, 2017). The code is a 5-digit numeric code that is cross-linked to Term Name and Definition of MD. It is the only officially recognized system within the European Economic Area (EEA) to identify the MD within the European Databank for MD (EUDAMED). The system now has about 20,000 generic MDs and more than 500,000 MD types (EUDAMED, 2017).

The GMDN fulfills requirements to identify medical devices at the global level, as identified in the Global Harmonization Task Force (GHTF) (IMDRF UDI Working Group, 2013) that have disbanded since (2012).

GMDN Agency is a non-profit organization and Registered Charity which reports to its Board of Trustees, that represent medical device regulators and industry. GMDN Agency is also responsible for running the GMDN, which is used in the European Databank on Medical Devices (EUDAMED, 2017), that has been established by the European Commission to strengthen market surveillance and vigilance (GMDN Agency, 2017).

The GMDN has been identified as part of the 'minimum data set' for the proposed US FDA Unique Device Identification regulation for the registration of new MD intended for use in the United States. This follows the international consensus established by the International Medical Device Regulatory Forum (IMDRF UDI Working Group, 2013).

The GMDN Agency has recently agreed on a finished version of the business principles that will form the basis of a long term cooperation with the IHTSDO, 2017. The Cooperation Agreement shall result in the use of the GMDN as the medical device component of SNOMED CT (Snomed International, 2017). This Agreement is consistent with the objectives of both organisations to minimise duplication and to support harmonisation. The following objectives were agreed:

- A more comprehensive and harmonised clinical terminology;
- Greater utility and access to both terminologies;
- Opportunities to improve organisational efficiencies.

The Agreement will benefit patients across the world and all users of SNOMED CT and the GMDN in promoting comprehensive terminology based medical records, covering the needs of regulators, the medical device industry and healthcare professionals. The arrangement will enhance the application of care to individual patients for medical device, patient risk and safety use cases.

4.2 Global medical devices nomenclature system (GMDNS)

The GMDN is a list of generic names used to identify all medical device products. Such products include those used in the diagnosis, prevention, monitoring, treatment or alleviation of disease or injury in humans.

Its purpose is to provide health authorities and regulators, health care providers, manufacturers and others with a naming system that helps and simplyfies exchanging medical device information and support patient safety.
The GMDN is used for:

- Data exchange between manufacturers, regulators and healthcare authorities
- Exchange of post-market vigilance information
- Supporting inventory control in hospitals
- Purchasing and supply chain management

Medical device experts from around the world (manufacturers, healthcare authorities and regulators) compiled the GMDN according to the international standard ISO 15225.

The GMDN is recommended by the International Medical Device Regulators Forum (IMDRF) and is now used by over 70 national medical device regulators to support their activity. The GMDN is managed by the GMDN Agency, a registered charity, which has a Board of Trustees, which represent regulators and industry (IMDRF UDI Working Group, 2013).

The GMDN is updated by member change requests. New and updated GMDN terms are published on the member website, the GMDN Database. Information in the form of a 5 digit numeric GMDN Code is cross-referenced to a precisely defined Term Name and Definition, as seen in this example:

- GMDN Term Name: Scalpel, single-use
- GMDN Code: 47569

- GMDN Definition: A sterile, hand-held, manual surgical instrument constructed as a one-piece handle and scalpel blade (not an exchangeable component) used by the operator to manually cut or dissect tissue. The blade is typically made of high-grade stainless steel alloy or carbon steel and the handle is often made of plastic. This is a single-use device (GMDN Agency, 2017).

4.3 Unique Device Identification (UDI)

In 2013, the Food and Drug Administration (FDA) released a final rule establishing a unique device identification system designed to adequately identify devices through distribution and use. The final rule requires device labelers to include a unique device identifier (UDI) on device labels and packages, except where the rule provides for an exception or alternative. Each UDI must be provided in a plain-text version and in a form that uses automatic identification and data capture (AIDC) technology. It will be also required that the UDI must be marked directly on a device that is intended for more than one use and needs to be reprocessed before each use. Dates on device labels and packages are to be presented in a standard format that is appropriate to international standards and international practice. A UDI is a unique numeric or alphanumeric code that consists of two parts (U.S. Department of Health and Human Services, 2017):

1. a device identifier (DI), a mandatory, fixed portion of a UDI that identifies the labeler and the specific version or model of a device, and
2. a production identifier (PI), a conditional, variable portion of a UDI that identifies one or more of the following when included on the label of a device:
    - the lot or batch number within which a device was manufactured;
    - the serial number of a specific device;
    - the expiration date of a specific device;
    - the date a specific device was manufactured;
    - the distinct identification code required by §1271.290(c) for a human cell, tissue, or cellular and tissue-based product (HCT/P) regulated as a device.

All UDIs are to be issued under a system operated by an FDA-accredited issuing agency. Whole process starts as an applicant seeks FDA accreditation, then specifies the information that the applicant must provide to FDA, and the criteria FDA will apply in evaluating applications (IMDRF UDI Working Group, 2013).

In the final rule, there are outlined certain exceptions and alternatives, ensuring that the costs and burdens are kept to a minimum. In order to ensure a smooth implementation the UDI system will go into effect in stages, over a period of seven years. This also helps to spread the costs and burdens of implementation over time, rather than having to be absorbed all at once (U.S. Food and Drug Administration, 2017).

As part of the system, the device labelers are required to submit information to the FDA-administered Global Unique Device Identification Database (GUDID) (European Comission, 2017). The GUDID will include a standard set of basic identifying elements for each device with a UDI, and contain ONLY the DI, which would serve as the key to obtain device information in the database. PIs are not part of the GUDID. Using a partnership with the National Library of Medicine, FDA is making most of this information available to the public at AccessGUDID. Users of medical devices can use AccessGUDID to search or download information about devices. The

UDI does not indicate, and the GUDID database will not contain, any information about a user of a device, including personal privacy information (U.S. Department of Health and Human Services, 2017).

A "labeler" is any person who causes a label to be applied to a device, or who causes the label of a device to be modified, with the intent that the device will be commercially distributed without any subsequent replacement or modification of the label. The addition of the name of, and contact information for, a person who distributes the device, without making any other changes to the label is not a modification for the purposes of determining whether a person is a labeler. In most instances, the labeler would be the device manufacturer, but the labeler may be a specification developer, a single-use device reprocessor, a convenience kit assembler, a repackager, or a relabeler (U.S. Department of Health and Human Services, 2017).

Automatic identification and data capture (AIDC) means any technology that conveys the UDI or the device identifier of a device in a form that can be entered into an electronic patient record or other computer system via an automated process.

5 Conclusion

The results of the survey show that MD manufacturers must be oriented across a range of health systems that are European, global and national. Possible examples of healthcare systems are: Classificazione Nazionale dei Dispositivi doctors (CND) (Ministry of Health Italy, 2017), the Italian multi-level national classification of medical devices, Global Medical Device Nomenclature System (GMDN), internationally, respectively, a globally recognized sorting system for medical devices, Global Unique Device Indentification Database (Access GUDID), a database containing a standard set of master data for all previously identified medical tools and devices within the UDI system, NHS-eClass SEARCHABLE DATABASE, a multi-level classification system for resources in the United Kingdom, Systematized Nomenclature of Medicine (Snomed CT) (Snomed International, 2017), a detailed clinical reference terminology based on coding, Unique Device Identification (UDI), a system for uniquely identifying healthcare tools, devices and devices throughout the logistics chain. The US Food and Drug Administration (FDA) requires labeling of all medical equipment intended for the US market, Universal Medical Device Nomenclature System (UMDNS), universal nomenclature of medical devices, in the EU Member States is the second most commonly used system of classification of medical devices.

The investigation also showed that the GMDN system compared to UDI is rated 7 x VP, 5 x VP, 4 x N a 2 x NG. The UDI system acquired 9 x VP, 8 x P a 1 x N. This means that the american UDI system has been perceived by experts as overall well conceived and user friendly.

Acknowledgments

This study was supported by the research project The Czech Science Foundation (GACR) 2017 No. 15330/16/AGR Investment evaluation of medical device development run at the Faculty of Informatics and Management, University of Hradec Kralove, Czech Republic.

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Empirical evidence on measurement of intangible assets in European companies

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Abstract

This paper empirically investigates applied approaches for estimating the value of intangible assets published in recent years. Firms compete with each other and their business ideas are no more based only on ownership of tangible assets but on applying knowledge that helps them to generate above the average profits. Intangible assets rise in their importance, contribute to economic growth and became a significant factor in increasing firm's profitability. For the reason of their intangibility, we have no satisfactory data, which allow us to manage these assets effectively. Therefore, a lot of methods for estimating the value of intangible assets have been developed. The objective of our paper is to compare three main approaches, which were used as intangible intensity indicators in last five years. We apply them on a sample of data of European companies from database Amadeus. We show that for European firms with increasing ROTA rank measure, the value of R&D expenses and disclosed intangible assets increase as well.

Keywords: Intangible assets, Intangible-intensive firms, R&D expenses, Intangible fixed assets, ROTA rank measure.

JEL Classification: M21

1 Introduction

The aim of Europe 2020 strategy proposed by European Commission is smart, sustainable, and inclusive growth. Knowledge is the main determinant of innovation that helps to strengthen economic growth and sustainable development, employment, and competitiveness in the European Union. Importance of knowledge or intangible assets increased also in private sector, mainly due to the development of information technology. Globalisation, deregulation of key economic sectors, and exponential growth in the area of technology changes move new information and communication technologies forward and allow global access to information and knowledge. These trends stand for the birth of economy of intangible assets that is also known as the knowledge-based economy. Increasingly more businesses invest its sources into the management of intangible assets, which allow them to reach sustainable economic growth and became more competitive in comparison with other businesses. According to Peter Drucker (1969), "If you can't measure it, you can't manage it". This reason led academicians, researchers, and practitioners towards developing new quantitative and qualitative methods, which can determine or estimate the value of intangible assets.

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Intangible assets include all identifiable assets without physical substance that dispose of monetary value – e.g. computer software, patents, copyrights, licenses, customers' and suppliers' relationships or marketing rights. OECD (2004) differentiates between intangible fixed assets that are *non-financial produced fixed assets that mainly consist of mineral exploration, computer software, entertainment, literary or artistic originals intended to be used for more than one year*, and intangible non-produced assets that *are assets that entitle their owners to engage in certain specific activities or to produce certain specific goods or services and to exclude other institutional units from doing so except with the permission of the owner (e.g. patented entities or purchased goodwill)*. In original papers of OECD are intangible assets denoted also as knowledge assets or intellectual capital. The system of national accounts (SNA) recognizes several types of intangible assets (e.g. R&D, computer software and databases, mineral exploitation, artistic and literary works). Other types of intangible assets, such as organization capital, brand or copyrights might play an important role in the growth of GDP and productivity. Their exclusion from the group of SNA is related to the practical problems of their measurement (OECD, 2016).

Accounting for intangible assets is governed by the law of the country. International Financial Reporting Standards (IFRS) were developed as an effort to unify compilation and comparison of financial statements. Accounting according to IFRS is in Slovakia obligatory for consolidated financial statements of European enterprises and all institutions in public interest (banks, insurance companies, etc.). All the other institutions may apply IFRS voluntarily. Montresor, Perani, and Vezzani (2014) define intangible assets as *non-financial, non-physical assets, which are created over time and through investment, and are identifiable as separate assets*. This definition results in three conditions that each intangible asset must meet to be recognized in accounting. The first condition is identifiability. An asset is identifiable when it is separable and arises from contractual or other legal rights. The second condition is the control (power to obtain benefits from the asset) and the last one is the possibility to create future economic benefits (International Accounting Standards Board, 2016). IAS 38, that is part of IFRS, defines intangible assets as *non-monetary assets which are without physical substance and identifiable (either being separable or arising from contractual or other legal rights)*. This, however, is a very narrow definition of intangible assets eliminating the majority of internally generated intangible assets, goodwill, etc.

One of the most problematic aspects of intangible assets is their intangibility and therefore difficult measurability. Measurement of intangible assets became a challenge for academicians and practitioners. During the decades it was proven that intangible assets contribute to the growth of firms and the whole economics, improve business performance and represent a significant competitive advantage. Firms systematically rebalance their financial sources with increasing proportion of intangible and decreasing proportion of tangible resources. The biggest boom of inventing and estimating new intangible asset measurement methods have been noted over the years 1988 – 2009 (Osinski, Selig, Matos, & Roman, 2017). However, the problem of measurement remains unsolved. It is still not possible to capture the value of all intangible assets in the firm, we can only estimate their value and recognizing of an intangible asset in financial statements of the firm must undergo strict regulations. A comprehensive taxonomy of intangible asset measurement methods has been done by Sveiby (2010). He assigned more than 40 measurement methods into four categories: direct intellectual capital methods, methods based on ROA, market capitalization based methods and scorecard methods. More than half of methods belong to the scorecard methods that have mainly qualitative character. Because it is difficult to make a comparison between companies, their contribution is limited (Hunter, Webster, & Wyatt, 2005).

2 Theoretical background

The first step in measuring intangible assets is to define what we understand under intangible assets within our measurement method. Intangible assets in general cover all types of internally created and externally acquired assets of the firm that generate intangible driven earnings. Denicolai, Zucchella, and Strange (2014) state that intangible assets are able to create value only in combination with other tangible assets. In praxis, it is not possible to capture all dimensions of intangible assets, we can only estimate the value. Moreover, it is not easy to choose the best method from all that are available for estimating the value of intangible assets. Choosing the right method depends on two main factors – quality and availability of data and purpose of value estimation.

Corrado, Haltiwanger, and Sichel (2009) divided intangible assets into three broad categories: computerized information, innovative property, and economic competencies. A major component of computerized information is software. Innovative property groups all investments and activities that lead to discovery and development of new assets. Usually, they are listed in profit and loss statement as expenses, not as intangible assets in a balance sheet. Many authors, therefore, use R&D expenses as a proxy for intangible intensity. Economic competencies cover knowledge that is embedded in firm's human and structural capital. A typical example might be market-based assets, such as brands, customer loyalty, strategic relationships or marketing knowledge (Barney, 1991; Doyle, 2000; Benda-Prokeinová, Dobeš, Mura, & Buleca, 2017). Another market-based asset, customer equity represents value added to existing and potential customers generating profit for the firm (Sacui & Dumitru, 2014).

When it comes to recognition and disclosure of intangible assets in a balance sheet, strict rules must be applied. Accounting treatment that internationally regulates such assets is the IAS 38 directive. It respects several cost-, earnings- or market-based methods, according to which it is possible to calculate the value of an asset and disclose it in a balance sheet. Most of the assets disclosed are externally acquired asset recognized at their purchasing price and intellectual property, which includes all creations of the mind and WIPO (World Intellectual Property Organization) divides it into the industrial property (patents, trademarks, industrial designs and geographical indications) and copyrights.

This paper is based on qualitative research of published publications that apply some of the valuation methods for intangible assets. We have limited our research to analyzing financially and economically related journals with articles published over the years 2013 – 2017. We have analyzed publications of ScienceDirect database as it belongs to one of the most effective search engines for investigating research documents. We have limited our output by submitting keyword "intangible asset" and choosing only journals with economic or research focus. Our initial sample then consisted of 250 most relevant publications, from which ten was directly linked to our research.

Table 1 An overview of papers on valuation of intangible assets in 2013-2017

Author	Journal	Intangible asset measurement	Applied method and objective of the paper
Andonova, Ruiz-Pava (2016)	J. of Business Research	Possession if intangible assets - Brands, Patents, Franchise, Know-how, Licenses	Analysis of the relationship between ROA/ROS and intangible assets using hierarchical linear models for variance decomposition.
Sacer, Malis, Pavic (2016)	Procedia Economics and Finance	Non-current intangible assets according to IAS 38 (development expenditures and licenses)	Determination of the influence of different management estimates on the overall financial position and business performance (ROA, profit margin, total assets turnover). Financial statements analysis instruments are used to quantify the impact of accounting estimates on the financial position and business performance.
Contractor, Yang, Gaur (2016)	J. of World Business	Intangible assets from Orbis database	Using panel data model for verifying internalization theory about the positive relationship between parent intangibles and foreign affiliate performance.
Arrighetti, Landini, Lasagni (2014)	Research Policy	Intangible assets originally reported as assets on companies' balance sheets (intangible fixed assets, i.e. research and advert. expenditures, patents, licenses, and trademarks.	Probit analysis of factors that motivate firms to invest in intangible assets.
Clausen, Hirth (2016)	J. of Corporate Finance	ROTA Rank Measure based on Calculated Intangible Value (CIV)	Estimating the value of intangible assets and relationship between estimated intangible assets and firm performance.
Peters, Taylor (2017)	J. of Financial Economics	Knowledge (R&D spending) and organizational (% of selling, general and administrative spending) capital	Calculation of new Tobin's q proxy that accounts for intangible capital.
Borisova, Brown (2013)	J. of Banking & Finance	R&D investments	Using a variety of estimation approaches for testing the relationship between tangible asset sales and investments in intangible assets.
He, Wintoki (2016)	J. of Corporate Finance	R&D investments	Investigating the relationship between R&D investments and cash holdings of US firms.

Source: Authors, own editing

Table 1 shows that R&D expenses are used the most often as proxies for intangible assets. Clausen and Hirth (2016) suggested new, earnings-based method for calculating the value of intangible assets that summarizes the value of existing and new intangible assets. Another group of published paper base their intangible assets' value on intangible assets recognized on balance sheets. We, therefore, look in more detail on this three groups of estimation approaches, analyze them further and describe main advantages and disadvantages of using each approach.

3 Data and methodology

Our data sample consisted of 4799 European companies listed on a stock market from 37 European countries of database Amadeus for the years 2011 – 2015. Based on results from our qualitative literature review, we decided to compare three basic measures: intangible fixed assets from the balance sheet, R&D expenses from profit and loss account and indirect measure of intangible assets suggested and proved to express intangible intensity by Clausen and Hirth (2016). All necessary

data were available in financial statements. ROTA rank measure was more difficult to obtain and we calculated it according to the procedure proposed by Clausen and Hirth (2016). Return on tangible assets (ROTA) was calculated as the ratio of EBITDA and tangible assets. Authors devote their model from Cobb-Douglas production function and prove that return on tangible assets affects the intensity of intangible assets and allows us to estimate their value indirectly. We started with the calculation of ROTA and we deducted industry and year median from each value to eliminate the effect of business cycle variations and other factors not related to the productivity of intangible assets. Finally, we normalized our data by standard deviation. As proposed by Clausen and Hirth (2016) and resulting also from the problem of interpretation of CIV by Stewart (1998), we assigned zero value to the items, where ROTA rank measures were negative. In these companies, we assume no value of intangible assets.

Financial statements' items related to intangible assets are known for problematic accounting recognition and disclosure. For that reason, we had to clean our data for missing and extreme values. We excluded firms with the negative or missing value of R&D expenses or intangible fixed assets. Table 2 provides mean values of our indicators and numbers of available observations.

Table 2 Mean values of selected indicators for each analyzed year

	2015	**2014**	**2013**	**2012**	**2011**
Mean ROTA rank measure	0.025	0.038	0.026	0.054	0.036
Observations	3537	3586	3563	3580	3569
Mean R&D expenses (EUR)	97163.148	88069.567	79237.487	85278.984	81817.287
Observations	932	946	952	949	949
Mean Intangible fixed assets (EUR)	509407.572	466326.091	438196.084	454227.287	440209.011
Observations	4651	4664	4660	4656	4586

Source: Authors, own editing

After excluding unsuitable observations, we analyzed 492 companies from six countries of Europe. Geographical structure of our data sample is listed in
Table 3.

Table 3 Geographical data structure

Country	**ISO Code**	**Number of companies**	
		Data sample	**Cleaned data**
Germany	DE	410	70
France	FR	551	131
United Kingdom	GB	941	176
Switzerland	CH	159	69
Luxembourg	LU	3	1
Sweden	SE	235	45

Source: Authors, own editing

Our final sample consisted of several most developed countries of Europe. In these countries, we expect a higher value of intangible assets in comparison to the other countries.

4 Results

We were interested, whether there is some similar development between direct and indirect measures of intangible assets. To fulfill our goal, we first performed correlation analysis. Whereas the correlation between intangible fixed assets and R&D expenses was relatively high for each year (0.73 for the year 2015), there was no correlation between ROTA rank measure and intangible fixed assets or R&D expenditures (for the year 2015 it was correlation 0.02 for R&D expenditures and 0.03 for intangible fixed assets).

To gain some more insight into the development of chosen indicators, we divided our observations for the year 2015 into ten deciles according to their value. Ten percent of observations with the lowest value of indicator belonged to decile D1, and ten percent of observations with the highest value belonged to decile D10. To show what these three indicators capture, we calculated a mean value for each decile of the ROTA rank measure, natural logarithm of R&D expenses, and natural logaritm intangible fixed assets, respectively.

Table 44 Mean values for 2015 deciles

Mean values sorted by ROTA rank measure										
	D1	**D2**	**D3**	**D4**	**D5**	**D6**	**D7**	**D8**	**D9**	**D10**
ln R&D expenses	7.932	8.336	9.149	9.905	9.840	9.765	9.973	9.894	9.799	8.610
ln Intangible assets	8.035	9.420	11.083	12.178	11.607	12.344	12.006	12.162	11.433	10.527
ln Total assets	10.252	11.523	13.654	14.544	13.902	13.957	13.691	13.644	12.875	11.934
Mean values sorted by R&D expenses										
	D1	**D2**	**D3**	**D4**	**D5**	**D6**	**D7**	**D8**	**D9**	**D10**
ROTA	0.109	0.099	0.169	0.095	0.111	0.101	0.134	0.111	0.114	0.113
ln Intangible assets	8.773	8.618	9.628	9.803	10.104	11.017	10.952	12.459	13.777	15.576
ln Total assets	10.647	10.721	11.567	11.660	12.076	13.055	13.225	14.429	15.466	17.040
Mean values sorted by intangible fixed assets										
	D1	**D2**	**D3**	**D4**	**D5**	**D6**	**D7**	**D8**	**D9**	**D10**
ROTA	0.067	0.141	0.097	0.108	0.140	0.126	0.117	0.137	0.112	0.11
ln R&D expenses	7.445	7.724	7.827	7.91	9.101	9.013	9.657	10.205	11.230	13.014
ln Total assets	9.782	10.553	11.132	11.606	12.478	12.837	13.616	14.613	15.791	17.473

Note: D1, D10 represent deciles from the lowest 10 percent to the highest 10 percent of observations sorted by ROTA rank measure, R&D expenses normalized by standard deviation, and intangible fixed assets normalized by standard deviation, respectively. Color scales represent conditional formatting from the lowest (red) to the highest value (green) in a selected category.

Source: Authors, own editing

From Table 4 we can observe that R&D expenses and disclosed intangible assets tend to increase with increasing ROTA rank measure. From Table 4, we can clearly see increasing values of intangible fixed assets with increasing R&D expenses and increasing values of R&D expenses with increasing intangible fixed assets. The variable total assets is used to express the size of the firm and tends to be lower for companies with the lower intensity of intangible assets measured by all three indicators and higher for higher intangible intensity. This result indicates that bigger firms are more intangible intensice and it is clear for R&D expenses and intangible fixed assets and less clear for ROTA rank measure.

From the comparison of ROTA rank measure and other two indicators, we can confirm that ROTA rank measure estimates the value of intangible assets of European companies and might be used as

useful intangible intensity indicator. This is observable for first eight deciles. Last two deciles move in opposite directive.

5 Conclusion

Our paper provides empirical evidence on three basic intangible assets measurement approaches published in economic journals in the period of last five years. European data sample is less intangible intensive measured by all three indicators. This was confirmed also by INNODRIVE and COINVEST project funded by European Commission and concluded by Corrado, Haskel, Jona-Lasinio, and Iommi (2016). They state that in Europe in comparison with the US, the share of intangible assets is lower and the share of tangible assets is higher. Moreover, whereas the share of intangible assets in the US exceeds tangible assets, we can observe an opposite trend in Europe.

We compared our results for the last analyzed year by dividing it into ten deciles according to each measurement approach. We already know that R&D expenses and intangible fixed assets represent only small part of the intangible intensity of the firm. R&D expenses are related to newly generated intangible assets and do not involve intangible assets created in the past. On the other hand, not all investments allocated to R&D must be successfully translated into intangible assets. In such cases, we can talk about them as about sunk costs. Intangible fixed assets are usually externally acquired or we can clearly determine their monetary value when they are internally generated. That means that they do not include most of the internally generated assets, which are difficult to evaluate. We were therefore interested, whether the third indicator – ROTA rank measure is more suitable for estimating the value of all intangible assets of the firm. We assumed that increasing value of ROTA rank measure will be accompanied by increasing R&D expenses and increasing intangible fixed assets as proved by Clausen and Hirth (2016) on the sample of US firms. This assumption was confirmed for first eight deciles. In last two deciles, the value of R&D expenses and intangible fixed assets decreased again. The analysis of Clausen and Hirth (2016) has been performed on the sample of US companies that are more homogenous and their accounting regulations are similar. European countries are a more diverse entity. Our sample consisted of intangible intensive France, UK and Sweden and less intangible intensive Germany (Corrado, Haskel, Jona-Lasinio, & Iommi, 2016). This might be the reason for the not monotonical development of R&D expenses and intangible fixed assets with ROTA rank measure.

We see that all approaches have their limitations in case of measuring intangible intensity. ROTA rank measure represents just estimation of intangible assets based on rentability of tangible assets, R&D expenses are investments made for creating new intangible assets and do not include already existing intangibles and intangible fixed assets cover just small part of all intangible assets that might be present in a firm. However, we have no other possibility to get more historical data.

Acknowledgements

This research was supported by VEGA project No. 1/0311/17 on Measuring and Reporting Intangible Assets

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Quick overview of public procurement and possibilities in this area

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Abstract

We can hear news regarding public procurement really often. Sometimes there are good, sometimes not. Not, because of many scandals that occur. It happens really often, that contract is disadvantageous, because price is too high. Usually because only few companies take part in tender, so competitive fight is too weak and price rises. Sometimes it is vice versa, price is too low, we can say unrealistic. Winning company later admits that and asks another money in order to proceed with delivery of subject of procurement. In most cases procurement authority has to accept this, because other companies aren't able to continue in semi finished task, e. g in IT projects. Aim of this work was identification of possible free data sources for public procurement analysis and subsequently to understand attributes and to design analyses we could do with them. Analyzing of results of procurement can bring us some interesting knowledge about this process, like who is winning tenders, what criteria can affect final price, what type of competition is most useful and so on. We used data source from Aliancia Fair-play, ORSR - Trade Register of Slovak Republic (Obchodný Register SR) and Register UZ - Register of Financial Statements (Register Účtovných Závierok). Generally we come with this article to present some interesting view on results of public procurement in Slovakia in chosen time period from 2009 to 2016. We have found, that draft price in tenders is mostly overvalued, even in case of one competitor in tender. We also found, that EU fund tender can affect final price more than number of competitors. In last part of use case study regarded financial indicators and draft/final price we proved some common thoughts, that companies with bigger assets hit final price better than those with lower or that companies with bigger liabilities compete in low value tenders.

Keywords: Public Procurement, Data-mining, SPSS, Analyzes.

JEL Classification: H57

1 Introduction

"Public procurement refers to the government's activity of purchasing the goods and services which it needs to carry out its functions" (Arrowsmith et al., 2011). Arrowsmith (2011) identifies three phases of the public procurement process: 1. Deciding which goods or services are to be bought and when (procurement planning). 2. The process of placing a contract to acquire those goods or services which involves, in particular, choosing who is to be the contracting partner and the terms on which the goods or services are to be provided. 3. The process of administering the contract to ensure effective performance. Public procurement has had 3 main aims (Kelman, 1990): integrity (what is avoiding corruption), equity (what means providing fair access to all bidders), and

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economy and efficiency. Nowadays aims are especially cost effectiveness and sustainability. “It has become clear that strong efforts are needed to mobilise procurement at all state levels for innovative markets. Those efforts need to be based on a better understanding of how public procurement actually can and should work in a very practical sense to contribute to more innovative activity in industry and to the growth or even creation of markets for innovative and services” (Edler, 2005). Edler (2005) gives example for innovative procurement - In Denmark the Ministry of Environment has published an action plan for “green” public procurement which acknowledges environmentally friendly criteria before price. Edler (2005) concludes his work, that there is no doubt about difficulty and unconventionally about innovative procurement, but in many countries in EU it goes to foreground.

Public procurement is controlled by law system applied by each country. In EU, there are being applied directives that can adjust all those individual laws to common rules approved by European Parliament. Example of that rule can be order to apply eProcurement system in each member state by 2016. eProcurement is process where - instead of paper form - for each part of procurement process electronic systems are used. This provides efficiency and transparency and in most cases it saves money. Procurement system in Slovakia is regulated by act 25/2006. According to EU directive - 2004/18/ES Slovakia in 2015 introduced a new system for eProcurement called EKS – Elektronický Kontraktačný Systém, used for purchasing of ordinary products. The aim of EKS is to make everyday contracting authority's needs as easy as possible. This system is used only for under limit orders, where the aim is price. The second system used in Slovakia is EVO. This is older system, used especially for bigger procurement operations, where you can set order more specifically. Announcements from that system are electronically uploaded on sites of UVO, which is Úrad pre verejné obstarávanie, main organization that controls and monitors process of public procurement in the state. This institution stores all documents regarding procurement on its site www.uvo.gov.sk. They are free of charge. In order to enhance transparency, you can search results of each tender in journal on portal UVO. You can use build in searching tool on UVOs website. But that is not all. UVO enabled SOAP Web Service, too. With this could any organization develop its own application and monitor procurement data according to its own needs.

Aliancia Fair Play is standard nonprofit, nonpolitical, civil institution, held in 2002 by Zuzana Wienk (Aliancia Fair-play, 2017). This institution has created portal datanest.fair-play.sk. It was created as source of information about expenditures of public finances in Slovakia (Datanest Aliancia Fair-play, 2017). In this portal we have found csv file where journal of public procurement is stored. This we will use as source for our analysis and data-mining tasks. However we used our own application which extracted data based on UVO's SOAP web services, too. There we connected results of tenders with other interesting facts, e.g. regarding financial situation of winning company.

2 Procurement system

According to OECD (OECD, 2017), over 37% of Slovak GDP is spent through public procurement. Public procurement process in Slovakia have to undertake following types of subjects: Slovak Republic and its organizations, towns, regions, law subjects or law subjects where state institutions partly take part. Here belong organizations, whom state has given more than 50% of purchase value for any good or service, too. Minimal value, from which they have to undertake this process was 1,000 Eur. Lately it was changed to 5,000 Eur (Centire.com, 2017). But public procurement is long

term process. “ICT-based solutions play an important role in achieving the goals of procurement teams, enabling on-time supplies with an efficient quality-price ratio, regardless of the type of product (goods or services) procured and the negotiation method chosen, e.g. sealed bid tender, electronic auction or even pre-commercial procurement (PCP) and innovative partnership for highly innovative products” (Janke & Packova, 2016). Procurement EKS system was introduced in begin 2015. It was created to buy ordinary products and services – of daily usage. With this system average time of procurement process - 7 weeks has turned into 1 week (Elektronický kontraktačný systém, 2017). Today, it usually takes 5 days to announce tender, to compete and to buy goods with this tool – useful especially when buying things of everyday usage. EKS was ordered by Ministry of Internal Affairs. It's final price was 3,514,201 Eur. However draft price was 17,740,000 Eur (Datanest Aliancia Fair-play - vestník VO, 2017). The final price was at about 5 times lower than estimated. This is unusually alas there came only one offer for this tender. We can tell, that estimating real price in IT and other projects does not have to be easy.

For more sophisticated tenders, like buildings, transport or science there is tool EVO. This system was introduced in 2007 by UVO. It consists of 2 parts – public and internal. Public is available for everyone. You can find a list of tenders there. Internal part is donated only for procurement authorities and competitors to prepare and process tender there. Competitors can also write their questions for procurement authorities and send their offers there, which are encrypted and are “opened” only in evaluation process.

If tender oversteps EU limits, it has to be published on EU portal of TED – Tenders Electronic Daily. Each year supply and public works contracts worth about EUR 300 billion are published by public authorities in the EU (SIMAP - TED, 2017). This portal is free. “Every year, over 250 000 public authorities in the EU spend around 14% of GDP on the purchase of services, works and supplies” (European Commission, 2017). On field of EU procurement a lot of systems are being used to enhance effectiveness. We will introduce them in next part.

There are many challenges in public procurement. “Public procurement is a multi-faceted challenging field” (Thai, 2017). Thai in his publication presents some of them. As author says: “Sheer magnitude of procurement outlays has a great impact on the economy and needs to be well managed”. According to Guy Callender and Darin Matthews (2017) public procurement in each country can represent 10% - 30% of their GNP so it represents a huge part of public finance.

According to Thai public procurement faces external and internal challenges. Between external belong market, legal, environments, political, organizational and socio-economical factors. Especially market factor – e.g. number of competitors in tender can be considered as one of most important, and in this paper we will use this in our analysis. Between internal factors belong interactions between authorities, types of goods, professionalism and quality of suppliers and budget resources. Those all factors could all be considered in our procurement data. Arrowsmith and Trybus claim, that the last decade of the twentieth century had witnessed the start of a ‘global revolution’ in the regulation of public procurement (Thai, 2017). Frimpong (2017) adds, that actually, challenges in procurement reforms are beyond procurement regulations to include procurement process, methods, procurement organizational structure, and workforce. Procurement reforms occur constantly in all countries, developed as well as developing countries (Gavurova et al. 2016). A lot of organizations are aware of the possibility to improve on the organization of internal processes (Delina, 2012; Soltes & Gavurova, 2015; Stefanescu et al., 2009). In this regard,

rising importance of electronic procurement (Lancioni et al., 2003) within supply chains can be identified.

2.1 EU procurement systems

In EU there have been developed many electronic systems, to support different parts of public procurement process. They have been created to enhance transparency and to help with fight against frauds. You can find them on Figure 1. They have been described more detail in PwC study called "Identifying and reducing corruption in public procurement in the EU" (European Commission, 2015). In next part we will describe some of them.

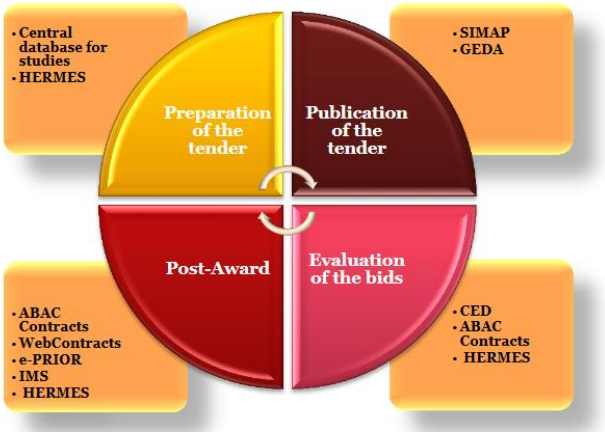

Figure 1 IT - tools and databases at EU level per phase of the procurement process
Source: European Commission (2015)

Preparation of the tender - CDS - Central database for studies – Aim of this database is to avoid double financing, e.g. to avoid, that some grant or tender will be funded more times. This system supports prevention. Publication of tender - SIMAP – it is web portal, where all information regarding public procurement are published. It consists of three parts – TED, eNotices and eSenders. In TED you can look for any contract in EU. Evaluation of the bids - CED - Central Exclusion Database – this is database that contains names of organizations excluded from EU funding. It can be caused for example for bankrupt, unpaid tax, corruption or other reason. Data are being entered by European institutions and by member states. Post award - Web Contracts – this system is used to store all contracts with European Parliament. It stores current and creates new contracts. It has reporting and search function, too. This system is nowadays used mostly by contract management. It can help with detection of corruption and prevention.

2.2 Known fraud cases

"Due to many reasons (including greater scrutiny of taxpayers and competing vendors), public procurement has been perceived as an area of waste and corruption" (Thai, 2017). "Once a contract is awarded, however, much uncertainty remains over production costs and ultimate demand. Even though contracts, typically specify prices, contract prices commonly are subjected to a process of almost continual renegotiation and revision. It is the perception, that contractors can extract abnormal profits at this point of the process" (Karpoff, 1995). Karpoff adds, that into fraud we classify: falsifying accounting documents, falsifying test results, charging personal expenses to government contracts, submission of invoices that include false claims, bribery, defective pricing

of proposals submitted to the government to obtain additional government contracts, fraudulent accounting classification process, intentional mischarging or misallocation of costs and product substitution. There are plenty of fraud cases in public procurement. We don't need to go abroad to find some. In Slovakia there were plenty of them. But come and first take a look on what are most known types of frauds and how can we classify them. During tender can be often used secret agreements. It means that there are chosen exact companies whom will be given tender to. Example for that can be secret agreement about rotating winners between companies (now me, next time you) or that company will knowingly not gain tender (will offer too high price) and winning company will compensate it for them. It can happen with or without knowing or procurement authority. There can be many shapes of bid rigging. PwC in their study presented some of them (European Commission, 2015):

- Bid suppression – one company will not bid so other can win.
- Bid rotation – companies rotate in winning tender.
- Customer or market allocation – bidders will divide market, based on geographical location.
- Lowballing - submitting the lowest bid. Bidder has agreement with authorities, that amended the final price will increase
- Complementary bidding - some of the bidder's bid too high price or offer conditions that they know, that procurement authority will not accept them. Winning bidder then reward them.
- Subcontract bid rigging - some of the conspirators agree not to submit bids. They have agreement, that winning company will give them some subcontract in tender.

Let’s take a look now on some real procurement frauds. Cases from Slovakia are published on website www.monitoringfondov.eu (Monitoring fondov, 2017). In search field you can find any of them. We can start with most known “Notice board tender”. Tender worth 3.6 mld. SVK (119 mil. Eur) was announced in May 2007 only on notice board located on one of Ministry of construction and regional development corridors. In March 2009, different ministries have paid for websites regarding EU funds. Although they were almost similar, difference between cheapest and most expensive site was at about 73,000 Eur. Other cases is Star EU and Sensim. Those two companies were extremely successful while competing. First one has won 70 times from 70 tenders. Second one 87 times from 88 tenders. That case regarded choosing external management company and mentioned two companies were winning most often. One of most known is purchase of CT machine for hospital in Piešťany where price of machine was much more expensive than other similar units in other cities in Slovakia or Czech. In Czech Republic was very known “draw fraud”. Adjusted programs designed for choosing best offerings, were choosing pre-selected winners and after polling they erased all data to erase traces. Portal www.politico.eu (Collins, 2017) has announced, that EU loses each year 5 bil. Eur. Nowadays trends lead to create systems that automatically control expenditures and help to analyze relationships between parts interested in procurement process. Company SAS introduced hybrid analytical approach, in which are used business rules, anomaly detection, text mining, associated linking and other advanced analytic (Lemon, 2017). This system uses e.g. HSBC. One of the biggest IT companies - IBM is using steam computing and machine learning to detect financial fraud. Result of their work: 15% increase in fraud detection, 50% reduction of false alarms and 60% increase of savings. IBM is using a lot of analytical techniques including predictive and geospatial analytic, transaction velocity, text mining, social network analytic, automated profile generation and peer group clustering. IBM is using all

these sources to search fraud from all perspectives. They can track money flows or unusual relations between people (IBM Research, 2017).

3 Use case study

In previous parts was to make general intro into topic of public procurement. In this part we would like to present results from our analysis. As we mentioned earlier, for this purpose we have used as main source for data-mining data from journal of public procurement available on portal www.datanest.fair-play.com. We will also use data retrieved by parser we have created.

To be able to make some advanced modelling, it is important to reveal several data sources, which we could use and interconnect them. For this work we used dataset from Aliancia Fair-play, ORSR (ORSR, 2015) - Trade Register of SR (available at orsr.sk) and for financial purpose we used portal registeruz.sk (REGISTERUZ, 2015), where according to ID of winning company in tender we found information about economical statements, e.g. assets and other. However due to change of web service on UVO's portal we did not extract a lot of rows from all those three sources necessary for reliable data mining tasks, so for purpose of this article we will bring just sample charts for financial stats. Dataset from Aliancia Fair-play containing information from tender had enough rows for data mining purpose. These three sources are good for beginning. Other source of data can be portal data.gov.sk, where you can find plenty of free files in different formats about various things in SR. There exist other private companies that offer you data, but they are not free of charge.

This paper will have similar purpose as Grega and Nemec (2015), however we will use other sources of data and will try to make some different analyses, too. We can use their work (Grega & Nemec, 2015) to verify some our conclusions. At first, we have downloaded excel sheet with results of tenders from period between 2009 and 2016 and in same time we have used our own dataset, that we have retrieved from our own application, too. Downloaded data contained around 60 000 rows. Because there were some missing or bad parsed values, we filtered them. We selected rows where offers count > 0 and < 11 (to avoid extremes), draft and final price have some value and at the same time, district of authority, customer type, final price are not empty, draft price is between 100,000 Eur and 2,000,000 Eur and price difference in % is between -250 % and 250 % - to filter out extreme price change.

Totally we have used round 10 000 rows. In second dataset, extracted by our application, we were able to use at about 1,500 rows, however with some other attributes.

Some attributes in our first dataset were joined from other sources. Other attributes, like price_change_prct we deduced from other existing attributes (draft price and final price). So we have created symbolic attribute final_price_change, which contains only 3 values – decline, no change and rise. This will be our target attribute, we would like to classify. In our modelling we will try to use most known classification algorithms like C5, then Apriori.

Neural nets and regression. In downloaded dataset there were available 70 attributes. But lot of them we cannot use, some of them we have to adjust and some were brought from other resources. In our second dataset we have some extra attributes that are not in Datanest's dataset. Those we extracted by our own parser, where we e.g. found some financial data regarding winning company,

like assets or liabilities. On the Figure 2 you can find attributes that we have selected for classification task using C5 algorithm.

Figure 2 Selected attributes for data mining task
Source: Own elaboration

Our question in this modelling is to find, if it is possible to model our data regarded public procurement and to classify possible price change after setting draft price and other tender parameters. We have used C5, Chaid, Quest and neural nets modelling algorithms. The biggest % of success we got with C5 algorithm. On next picture you can find evaluation of our model.

Results for output field final_price_change

Comparing $C-final_price_change with final_price_change

'Partition'	1_Training		2_Testing	
Correct	5,751	83.24%	1,898	81.85%
Wrong	1,158	16.76%	421	18.15%
Total	6,909		2,319	

Coincidence Matrix for $C-final_price_change (rows show actuals)

'Partition' = 1_Training	declined	no change	raised
declined	3,569	218	582
no change	10	1,068	7
raised	278	63	1,114
'Partition' = 2_Testing	**declined**	**no change**	**raised**
declined	1,346	56	57
no change	47	321	5
raised	245	11	231

Figure 3 Evaluation of C5 model
Source: Own elaboration

We have got efficiency over 80 % on testing and training set. That means that we can model those data. From this picture we can find, that this model was able to predict on training set when price declines and didn't change. But on testing set it had problem with last case – to predict when price grows. Many times it predicted that price will rise and it declined. Always when price is lower than expected is good for authorities because they save money. Worse situation is when model predicts, that price will decline or will not change, and in spite of that it will rise. This presents unexpected higher spending and can cause problems within budget. But we can find that there was minority cases of this type. From Figure 3 we can find that setting draft price is sometimes really hard and market overview may seem not so simple. We can find that price declined or raised much more often rather than did not change.

In our next analyze we would like to find, how exactly some attributes can determine final price. We used regression in order to make this task. Our question is to predict % of change of final price. On the Figure 4 you can find our target attribute and all numeric inputs we were able to use for this task. On the Figure 5 we can find results, how final price % change could be calculated:

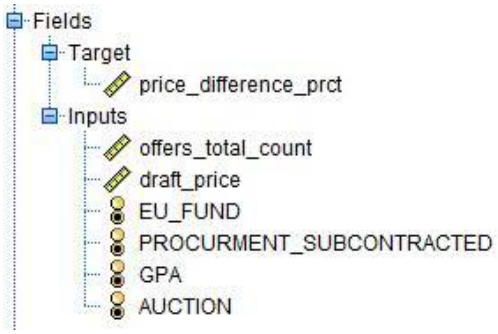

Figure 4 Selected attributes for linear regression
Source: Own elaboration

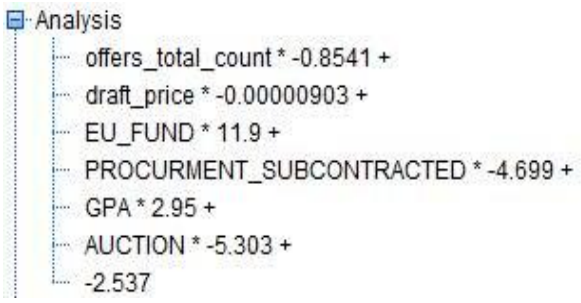

Figure 5 Coefficients calculated from regression modeling
Source: Own elaboration

This coefficients (from Figure 5) help us to determine one interesting thing – positive and negative correlation. We can find e.g.: in case of offer total count that there is negative correlation – the more offers come, the more final price in % can decline. Same with procurement subcontracted and auction – when they are used, the price declines. In case when EU funds or GPA is used (there is positive correlation), final price tends to rise. There is one special case – draft price. In this case was found negative correlation. We can understand this that the bigger draft price is, there is bigger chance that it has been determined uncertain and that it can decline or we can just simple say that data we examined have overrated draft price. It confirms that it can be sometimes hard to set real market draft price. This is most important part of each procurement process, because draft price is most important predictor of final price (Figure 6). Generally, this model can help us to find – or maybe confirm, what impact on final price different attributes can have. So in order to set tender right, you should consider those facts in preparation. Although we got bit different result as those presented in (Grega & Nemec, 2015), positive or negative correlation for common attributes was identical in both cases. Our results could be caused by usage of different attributes and sources of data.

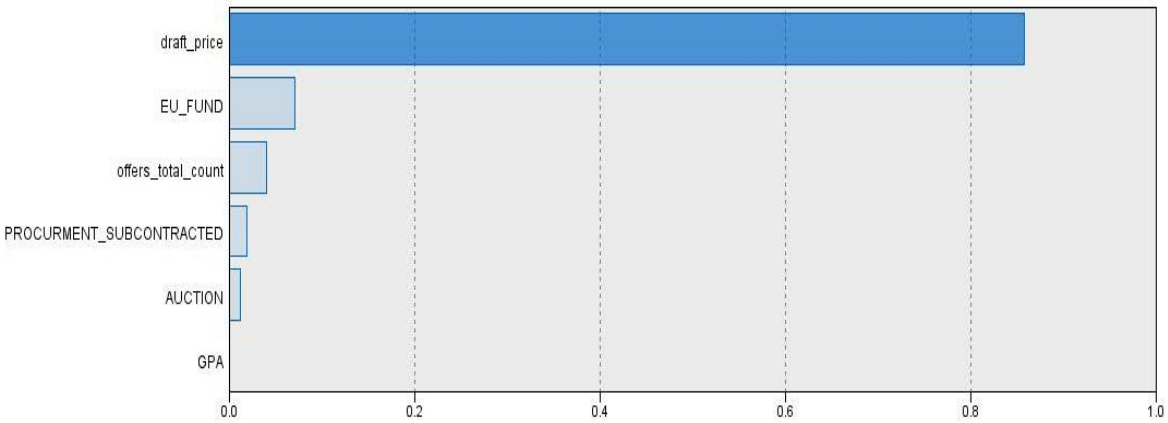

Figure 6 Importance of inputs in regression model
Source: Own elaboration

On the Figure 6 you can find importance of each input for this regression model. It is obvious that most important attribute is draft price, because final price usually moves around this value. On next table we can find results from our regression model by analysis of variance.

Table 1 Analysis of variance

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	892020.093	6	148670.015	35.035	.000[b]
	Residual	39128888.51	9221	4243.454		
	Total	40020908.60	9227			

b. Predictors: (Constant), AUCTION, EU_FUND, draft_price, GPA, PROCURMENT_SUBCONTRACTED, offers_total_count

Source: Own elaboration

Tab. 1 can tell us that all selected attributes are important for model. We can find that residual mean square is around 4200 what in our followed range of draft prices between 100,000 and 2,000,000 is good. We did not omit draft price on Figure 4 - 6 and Tab. 1 by purpose, because such models could help to create e.g. some calculator, which could return directly some approximate final price. There are many other chances, where similar models could be used. Let's go now and make another analysis. We have mentioned that with rising number of offers the final price declines. We decided to take just those two attributes and depict it in chart. As we found in regression model, with rising number of offers should final price decline – bigger offer causes better concurrency fight ant this should affect final price. On next Figure you can find result. On axis X there is number of offers, on Y % of change between final and draft price.

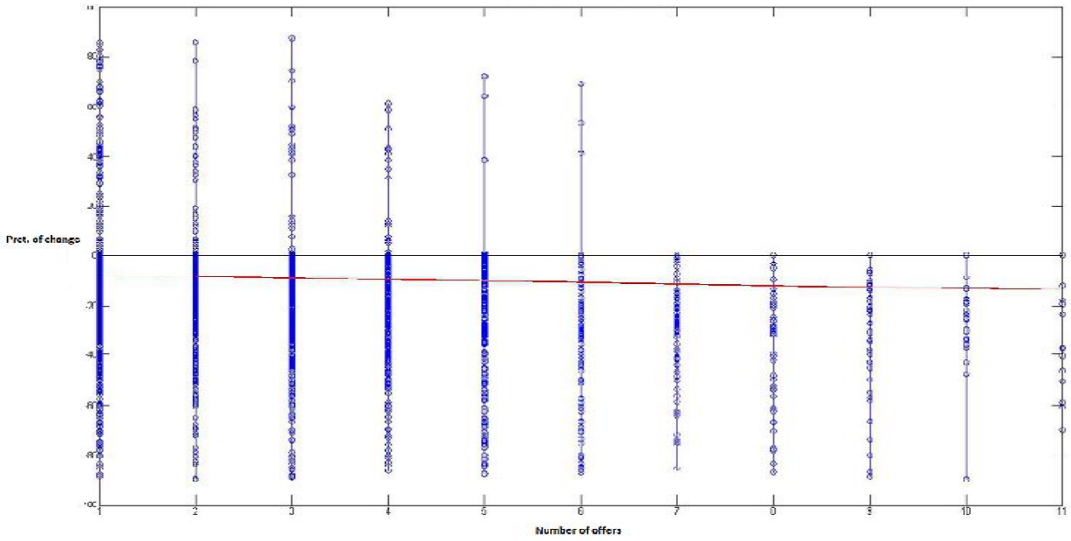

Figure 7 Final price % change based on number of offers
Source: Own elaboration

We can find that negative correlation has been confirmed – red line (more competitor, the more – in % price declines). However we have found that either in case of one offer final price has declined

more often than raised - we can find more circles in case of 1 offer under x-axis than above. Our finding were little bit different as Figure 5 in work of Grega and Nemec (2015), which could be caused by using of different data – we used also data after 2014. But Fig. 5 in work of Grega and Nemec (2015) proved, that in case of one offer final price tends to decline, too. It confirms that setting draft price can be problem and probably more purchased goods were over valuated. It is hard to distinguish if price difference was caused by market factors or by wrong set draft price. As we mentioned, we extracted dataset with our own application, too. We were able to extract results from UVOs journal with SOAP web service and then we through winning organization's ID join those data with some financial facts. In case of foreign companies we were not able to find those data. We used around 1,500 rows. On following 3 Figures you can find our results.

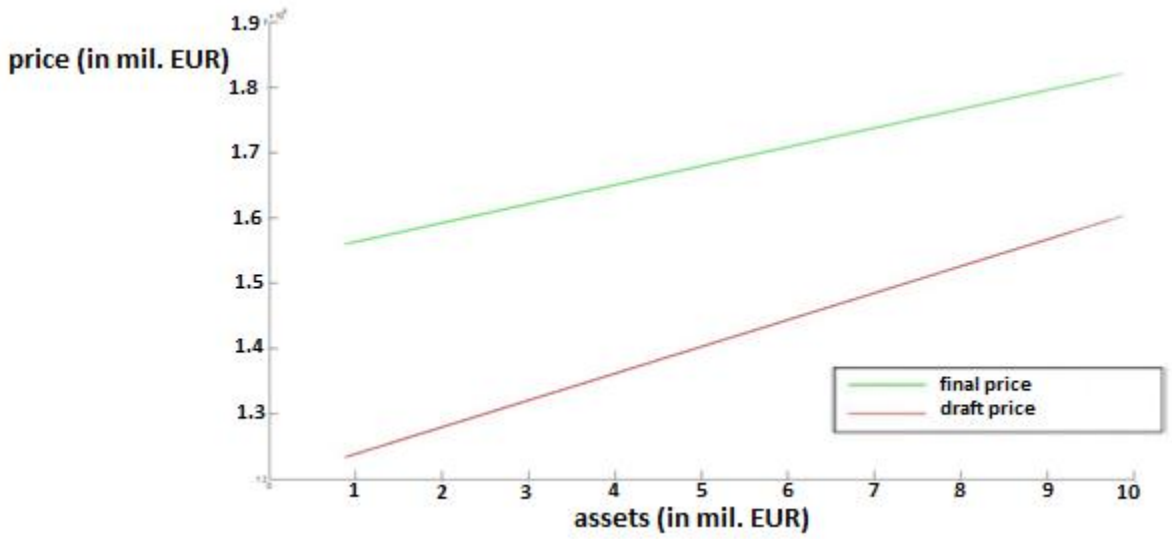

Figure 8 Assets and draft price
Source: Own elaboration

On Figure 8 we described relation between assets and tender's draft and final price. We can find there direct correlation what means that companies with bigger assets usually compete and win tenders of bigger price. On Figure 8 we see, that difference between final and draft price is by companies with lower assets bigger than by those with big. That can be explained as that big companies can better offer final price. As they usually take part in expensive tenders, they can evaluate its value more realistic and do not overvalue their capabilities. Our chart presents only some chosen assets range. On the next Figure 9 we confirmed negative correlation between liabilities and draft price.

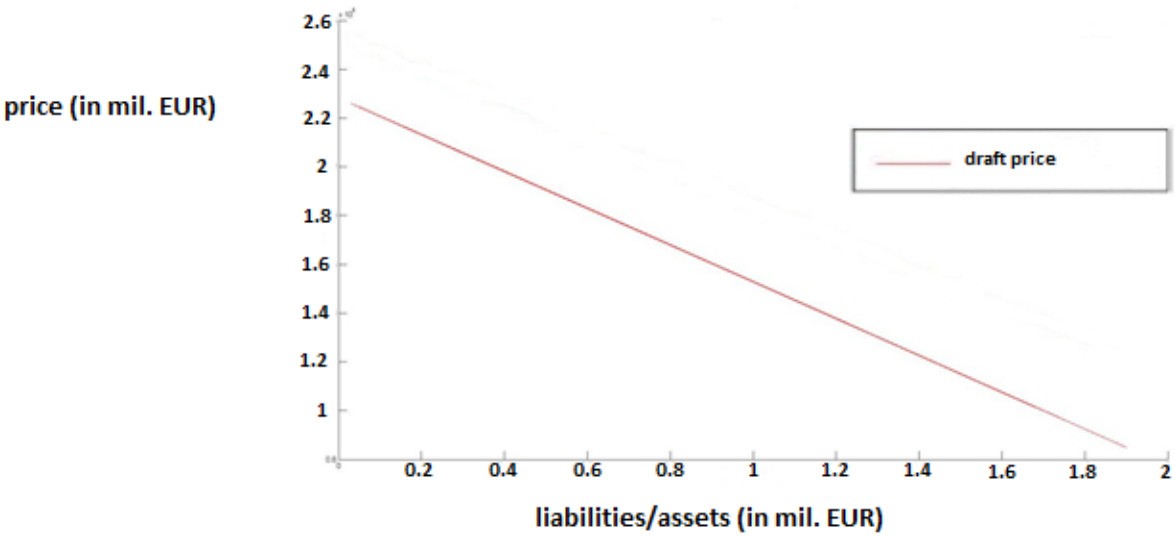

Figure 9 Liabilities/assets and draft price
Source: Own elaboration

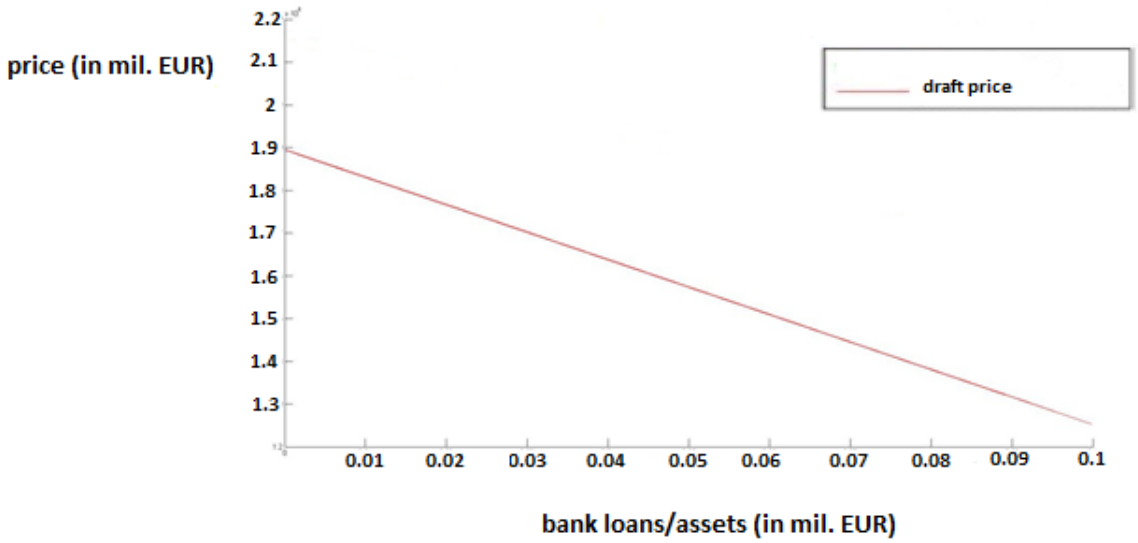

Figure 10 Bank loans/assets and draft price
Source: Own elaboration

In Figure 8 - 10 we can find direct and indirect correlation between winning company's financial indicators and draft or final price. This reveals new way how data mining of public procurement could be realised. Our analyses proved, that there is dependency between those attributes and that they can present important item in revealing new new knowledge.

4 Conclusion

The aim of this article was to make general intro into public procurement thesis and to present our results of modelling of data regarding public procurement in Slovakia in chosen period. In first four parts we tried to describe generally what is public procurement and to mention what kind of

electronic systems are being used there. Using of electronic systems means that there are possibilities how to generate and store data. Those data are becoming important asset in process of analyzing. We can create models and predict, how procurement process will proceed. How we described in part 4 in this article, public procurement is area where a lot of frauds occur. With developing and inter-connecting e-procurement systems we are able to create big source of data which would be used for data-mining and fraud revealing processes. Modern systems are able to process structural and semi-structural data (e.g. documents) so every source of data may nowadays seem important. Modern systems, like IBM Watson, are able to interact with human and such systems sourced with procurement data could present added value for procurement authorities. Supporting such systems presents key activity for each country. These systems bring transparency and enhance efficiency of tenders. In last part of this article we finally introduced some possible analysis of procurement data and we directly confirmed some generally known facts about what can affect final price of tender. We confirmed that those data can be modelled and adjusted individually to everyone's needs. However there are other challenges for future. In dataset with tender results there were no names of all companies that took part in competition. With getting access to them we would be able to model e.g. bid rotation or another type of corruption acting. Together with dates of submission of their offers we could reveal even more. So this shall be our challenge for future. Trends in public procurement lead to minimising costs and this concludes with splitting tenders into smaller parts, where small companies could take part too. Models based on public procurement data mining are useful especially for fraud revealing and for authorities. Data provide evidence of human acting and so they could be useful to determine suspicious patterns. On the other site authorities could use similar models to be able to set draft price more realistic and to be able to predict, how could final price change after setting tender parameters and after inviting into tender more competitors. With such models and artificial intelligence based tools would authorities have powerful tool, how to lower costs for their activities.

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Economic theory must expand beyond economics in order to take direction towards a true holistic social science

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Abstract

Contemporary mainstream economic theory has been criticized for many things. Being too detached from today's reality is arguably among the most serious charges. This paper briefly shows how the mainstream economic theories fail to explain 2008 global economic crisis. It also points out that these theories do not take into account limits of Mother Nature and have nothing to say about the environmental crisis the human kind is facing.Author argues that the new concept of economic crimes against humanity and the new development paradigm should be embraced and further developed by the economists who aspire to take economic science to become a true holistic social science. Author also suggest to focus on society institutions as they are behind fundamental workings of any economy and any society. This paper also recognizes difficulties economists who deviate from the mainstream have to face.

Keywords: Economic theory, Global economic crisis, Environmental crisis, Economic crimes, New Development Paradigm, Institutional economics.

JEL Classification: E02, P00, P16, P48

1 Introduction

It is at one's own discretion which one[s] of economic theories out there one considers relevant, most complex or telling. However, it is the everyday reality of today'sworld which leaves us with very little doubt that the classical and neoclassical, Keynesian and Neokeynesian economic theories together with the monetary economic theory are the ones that dominate economic discourse and decision making processes the most by far. The Marxist economic theory is trailing behind slightly serving a different role than the former as it provides more realistic view of capitalist economy and of capitalist society dynamics.

A truly good theory should be able to explain and predict. However, all of the mentioned economic theories fail to explain and had failed to predict the 2008 global economic crisis. Not to mention far more serious environmental crisis that threatens the very survival of species on Earth – crisis caused by human activity dictated by the ideology of contemporary economic system.

The economic theory needs to be taken to a whole different level of social science.

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2 Economic theories fail to explain the global economic crisis of 2008

Economic crisis in standard terms is understood as sudden drop in economic activities. All economic theories explain the phenomenon economic crisis from their own perspective which is derived from their core ideological setup. Classical economic theory of Smith, Ricardo, Mill and others came to life in the second half of the 18th century and the beginning of the 19th century. At those times economic crisis was rare phenomenon of sectoral and regional character and the causes were seen in overproduction in a particular sector. However, each crisis was seen as having its own particular cause on the top.

According to Marx economic crisis are caused by diminishing rates of profit as a result of market competition. Falling profits make manufacturers to abandon their production thus creating unemployment which causes further drop in demand and production. The vicious cycle breaks after high unemployment pushes wages down enough to create new profit margins of sort that attract new investments.

John Maynard Keynes lived through two major economic crises and published his ground-breaking *The General Theory of Employment, Interest and Money* in 1936 in the midst of the Great Depression. First-hand experience of such serious economic crisis certainly provided him with insights of his day society and economy which allowed him to formulate the causes of economic crisis phenomenon. In his view the crisis occurs when either investments or savings prevail over the other –if savings prevail over investments the aggregate demand becomes insufficient thus production fails in response; if investments prevail over savings certain sectors of economy experience boom or even bubbles which eventually burst thus causing sudden drop in economic activities.

Monetarists approach economic crisis through the lenses of the role of central banks in economies. The crisis begins when aggregate demand and aggregate supply do not meet. This imbalance is caused by either too much money circulating in the economy or too little money. The role of central banks therefore is to make sure there is just about right amount of money that follows the amount of production in the economy.

Neoclassical economics, the dominant mainstream economic theory of today, sees the causes of crisis in external shocks coming predominantly from governments in form of regulation. According to neoclassic economists the governments push aggregate demand and aggregate supply out of equilibria thus triggering vicious cycle of unemployment, falling demand and falling production.

None of these major economic schools can explain or could have predicted the 2008 global economic crisis as it originated in financial sector and through various channels infected the whole world economy. The result was the terrible suffering of millions of people who lost their jobs, plunged into poverty and despair. On the other hand, the significant drop in industrial production also meant the environmental destruction slowed down for a short period of time. These two effects of the 2008 crisis illustrate the irrationality of the contemporary economic system.

Even more serious is the environmental crisis the world is facing today. Unprecedented destruction of natural environment, unprecedented levels of pollution and the climate change they all threaten

the very existence of the human species on Earth. Nevertheless, the major economic theories have virtually nothing to say about this issue as Mother Nature is barely a footnote for them.

The human kind in the 21st century prides itself with countless scientific achievements that improved human life quality but yet social science of economics is not capable [seemingly] of developing a theory for economic activity which would terminate unemployment, poverty and hunger (and inequality) in the age of unprecedented wealth. On the contrary the contemporary economic model of neoliberal global capitalism generates social and environmental destruction wherever applied. For way too many the neoliberal capitalism which basis itself in the principles advocated by neoclassical economics means that *the economy is doing fine it's just the people aren't*. The economy being the corporations, their top managers and their owners.

3 Important contributions to economic theory: Economic crimes against humanity, New Development Paradigm proposal

The 2008 economic crisis created for a brief period a window of opportunity for heterodox economists - criticism of neoliberal capitalism was allowed to be heard and alternatives were allowed to be presented. Two new very important contributions to political economy emerged which I find extremely innovative or one may also say ground-breaking. The two are the concept of economic crimes against humanity and the New Development Paradigm proposal.

Response to the 2008 economic crisis by governments around the world differed significantly in policy. The policies ranged from government bailouts of large corporations, massive public infrastructure projects to weakening worker's protection and financial austerity. However, declared aims of crisis response policies were virtually identical - economic growth support, fighting unemployment and poverty, etc. A rational observer may have asked how contradictory policies can achieve identical goals?!In fact, many honest economists warned that austerity policies implemented by some governments and supported by the EU would lead to worsening of economic situation and social conditions.

In Europe countries like Spain or Greece experienced extremely severe austerity which resulted in serious unemployment and poverty increase, even increase in suicide rates (Chang, Stuckler, Yip, &Gunnell, 2013). The loss of human life as a result of deliberately implemented policies has been in international law for some time considered as crime in cases of attacks for political reasons, racial, ethnic or nationality reasons, cultural, religious or gender reasons. The economic reasons are not included. Seeing the suffering caused by austerity policies in Spain in the aftermath of the 2008 economic crisis professor of economics Juan Torres López proposed development of [such an obvious] concept of economic crimes against humanity. The idea was picked up and followed by Manfred Max-Neef a Chilean economist who made further contributions and made proposal for establishing of International Tribunal on Economic Crimes against Humanity.

The characteristics of conducts or policies of an economic nature that might be identified as economic crimes against humanity are as follows (Max-Neef, 2014):

1. they produce direct harms and also indirect and collateral harms;
2. they harm great masses of population;
3. the harms that are produced can be foreseen, yet despite this, they are inflicted;

4. the harms are part of a balance of asymmetric effects. The effects are not solely negative. They also include significant benefits for minority power groups;
5. the economic conducts and policies that produce such harms are based on ideological presuppositions;
6. they are politically and not technically based conducts;
7. they are policies and conducts that require the falsification of the language;
8. honest, deserving and intelligent alternatives are possible.

Severe austerity implemented in many countries especially in the EU would easily fall into the category of economic crimes against humanity. I would argue that the whole ideology of economic neoliberalism that continues to guide the EU's economic internal and foreign policies qualifies as well. Too many Europeans are feeling left behind and struggle to make ends meet. The changing political landscape across Europe shifting towards far right presents stark warning as it brings back ugly memories from the European past.

British historian John Darwin who specialises in the history of the British Empire describes fundamental workings of British colonial policies as follows: *"Colonialism had imposed a cruel yoke of economic dependency that locked much of what became the 'third world' into exchanging ever cheaper raw produce for imported manufacturers in a cycle of growing impoverishment. Revolution and class war were the only escape"* (Darwin, 2012). The description fits perfectly the contemporary global neoliberalism which bases itself in the neoclassical economic theory. I propose that not only to conducts and policies should the concept of economic crimes against humanity be applied to but to economic ideologies, theories and their creators as well. Complexity of social reality and limited knowledge make any straightforward judgements extremely unlikely. Nevertheless, the fundamentals of economic crimes against humanity can serve as an everyday tool for economists across the board.

In 2013 so called Bhutan Group[2] produced a report with the title *Happiness: Towards a New Development Paradigm*. The report (submitted to the United Nations) is considered to be a milestone in Bhutan's involvement in the worldwide endeavour to define a new global development agenda (NDP Steering Committee and Secretariat, 2013). The holistic approach to development presented in the New Development Paradigm (NDP) is what is so urgently needed in the contemporary economic research and for development of a new economic theory.

Authors of the NDP drew inspiration from Bhutan's Gross National Happiness Index and used concept of societal happiness as a guiding vision. Figure 1 describes five core components that contribute to societal happiness which needs to be strived for within the limitations of our planet. Individual happiness is what each human being naturally seeks however man is a social being therefore individual happiness can never be truly achieved without happiness of the surrounding society as well. The diagram of societal happiness shows that the main economic theories and the contemporary mainstream economics take very few aspects of it into account.

The NDP avoids discussion on institutional changes and words like profit, private property, owners, class, capital[ism], coercion, exploitation, domination etc. do not appear in the report. The report

[2] The International Expert Working Group comprised of 71 eminent international contributors with a wide range of expertise.

wisely and rightly chose this path as it aspires to enter into public debate. Proposing institutional changes would effectively marginalize the report to yet another academic paper hardly anyone knows about.

Academia enjoys more freedom with regard to use of vocabulary and choice of allowed topics. Hence economic research should not avoid institutional level of our societies. Institutions play absolutely crucial role in any society. They stand at the very heart of creation and distribution of value; they define the decision making mechanism - they are present at every level of human society. In fact, they were the root cause of the 2008 economic crisis. Institution of unrestrained private property and institution of private corporation both in their current definitions are the primary cause of the global economic crisis of 2008 (Ondrovič, 2008) and in fact of all economic crisis so far. Research of human institutions has to be at the centre of economic research and has to become integral part economic theory.

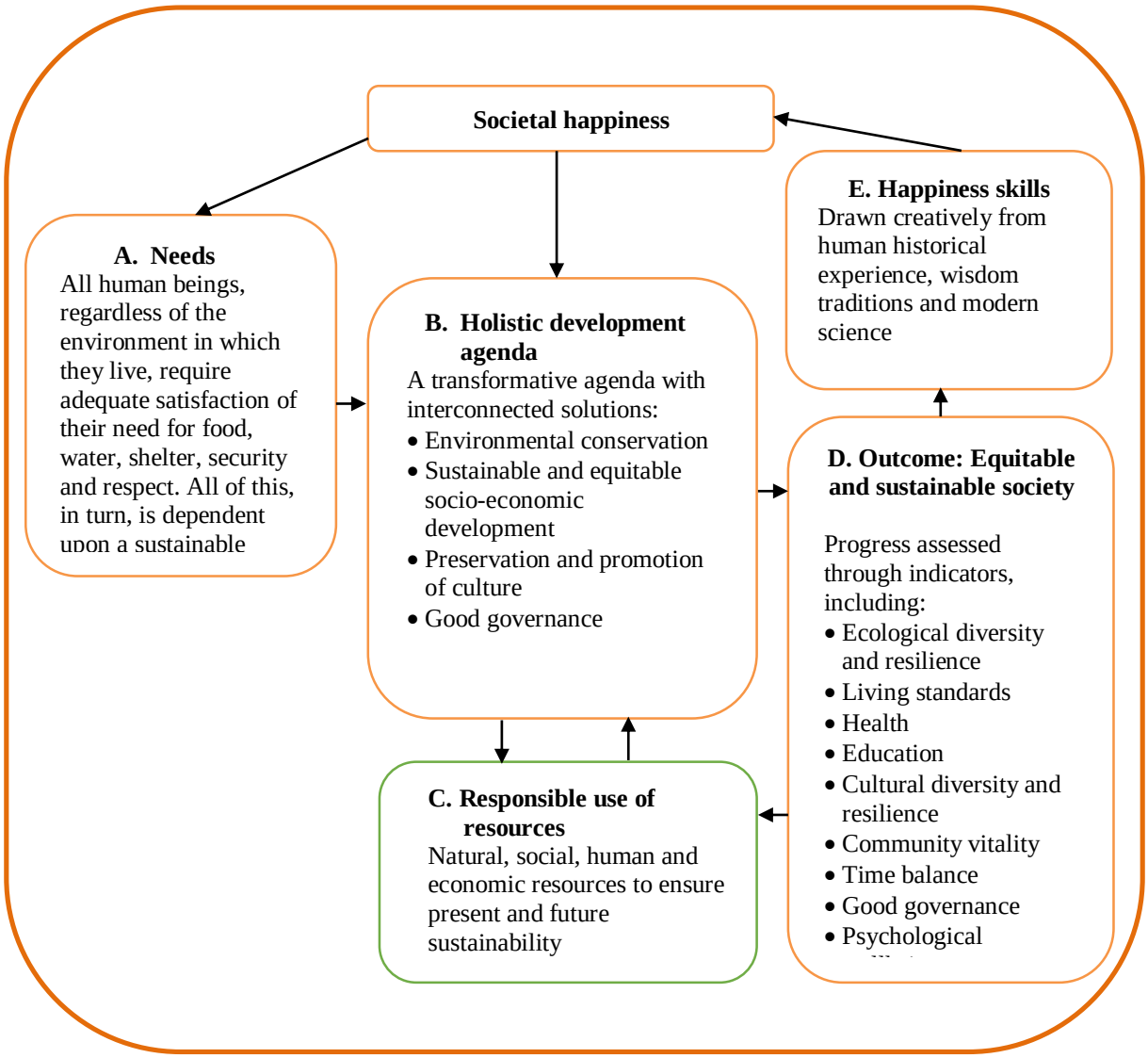

Figure 1 Societal happiness

Source: NDP Steering Committee and Secretariat (2013)

All economists need to keep in mind that the dire environmental crisis is something that threatens the very survival of human species, meaning us as individuals, our loved ones including our children and grandchildren. According to Living Planet Index[3] the world animal population dropped by 52 % since 1970 until 2010 (McLellan, Iyengar, Jeffries, & Oerlemans, 2014).We are in the midst of massive extinction of species which 1,000 times exceeds the natural extinction rate (Pimm et al., 2014). The period was dubbed the sixth extinction (the fifth extinction happened 65 million years ago when dinosaurs went extinct as a result of asteroid hitting the Earth). The climate change is already changing our lives. We economists must be honest to ourselves –we economists bear a significant portion of the blame for this unprecedented environmental destruction.

The holistic approach of the NDP is the way the economic research should be moving forward. Manfred Max-Neef, a co-author of the NDP, formulated five fundamental postulates and one moral principle the new economy should be based on (Max-Neef, 2014):

1. the economy should serve the people and not the people serve the economy;
2. development has to do with people and not with objects;
3. growth is not the same as development, and development does not necessarily require growth;
4. no economy is possible in the absence of eco-system services;
5. the economy is a sub-system of a larger and finite system, the biosphere, hence permanent growth is impossible;
6. no economic interest, under any circumstances, can ever be above the reverence for life.

Figure 2 presents fundamental areas the economic research needs to expand its focus into in order to take direction towards a true holistic social science.

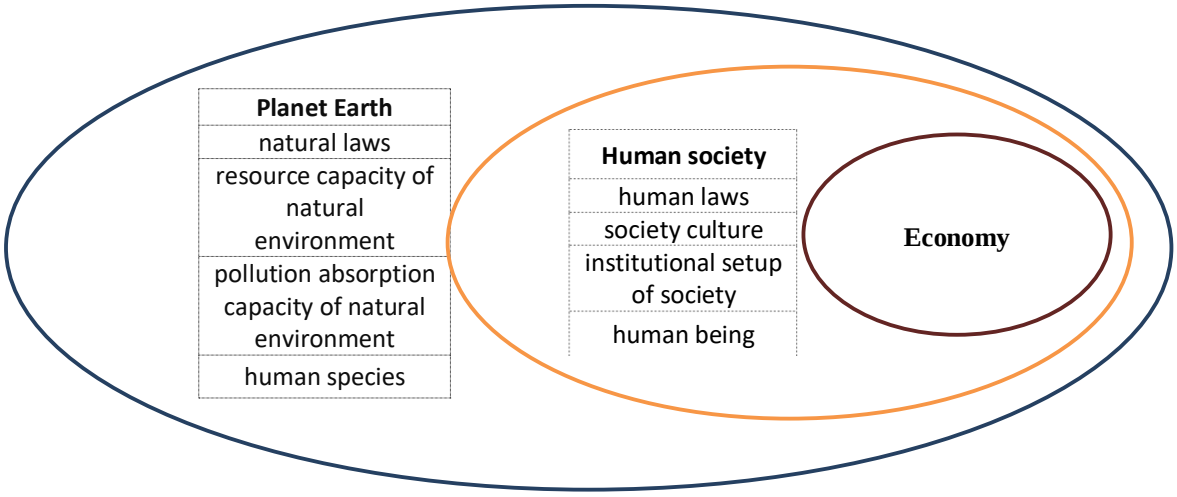

Figure 2 Economy within human society and planet Earth
Source: Author

4 Regression to the mainstream, institutional and ideological traps

Economics is probably the most politically abused science of all. Economists can often be found among the high ranking officials of all sorts of institutions on both national and international levels. Economics is used to rationalize all kinds of political decisions and policies including the ones outright harming society and the environment. Political and corporate powers therefore make

[3] LPI measures more than 10,000 representative populations of mammals, birds, reptiles, amphibians and fish.

tremendous efforts into making sure the science of economics serves their interests first and foremost.

To that end significantly contributes the corporatization of academia that has been going on for some time in many western countries. Universities, academies of sciences and other research institutions in public domain are increasingly pressured to seek corporate funding and redirect evermore of their research capacities towards corporate sector needs. These changes diminish freedom of academic research and effectively exclude research areas that do not comply with the prevailing doctrine of contemporary corporate capitalism. The new 2017 reform of Slovak Academy of Sciences follows exactly this trend of corporatization of science.

In all societies with hierarchical institutions the mechanism of institutional filter plays an important role. The top positions in hierarchical institutions naturally select people on lower level positions according to their own intentions. This mechanism also applies to economic research institutions and if the top positions are predominantly occupied by supporters of the mainstream economic ideology they tend to fill vacant lower positions with likeminded newcomers. Overtime this mechanism gradually changes ideological diversity of the research institution. Proponents of ideas that deviate from the dominant mainstream ideology may become marginalized, often face ridicule or even threats from their colleagues or superiors. It often requires personal courage and sacrifice for progressive and honest economists to survive in such environment.

These conditions cause much of economic research to regress towards the [neoclassical] mainstream. The social science of economics appears to be captured in ideological and institutional traps that put visible restrictions on allowed areas of economic research. Example of such restricted areas are the core institutions of capitalism, i.e. private property, private firm, markets, etc. All these real life constrains suggest that there really is no such thing as objective social science of economics. Rather there is only political economy (with econometrics as one of the research methods) and it comes with sometimes openly stated and sometimes with carefully disguised political, social and environmental attitudes and agenda.

5 Conclusion

A tremendous human effort has been put into economic research worldwide over the years. And yet the mainstream economic theories cannot explain the global economic crisis of 2008 and they remain indifferent to the unprecedented destruction of nature which happens right in front of our eyes. The reason for that is very straightforward - due to ideological and institutional restrictions imposed on the field of economic science by the powerful sectors of society most of the economic research is skewed towards serving and protecting their interests and not the interests of society. This also explains why those particular mainstream economic theories were allowed to become mainstream and not the other ones.

Two very important contributions to political economy have emerged in recent years that provide economic theory with much needed inspiration for future research. The economic theory should fully embrace and expand further the new concept of economic crimes against humanity. The concept brings back philosophical, ethical and moral aspects into economic science. It being a social science cannot pretend any longer it can exist without them.

The second contribution in the form of proposal for new development paradigm provides economic theory with important example how to look at the complexity and interconnectedness of various aspects of social and individual life including natural environment. The holistic vision of societal happiness proposed by the NDP is certainly direction economic research should embrace. It sees reality as much more versatile and complex than the contemporary mainstream economics.
Economic research also needs to put more focus on the role of institutions in human society and the economy. The main economic theories treat institutional setup of society as static and given. It is a fact that they change relatively slowly and sometimes remain unchanged for centuries but they are product of society and change along with society. Institutions are pillars that define fundamental workings of all societies. Economic research cannot continue marginalizing the instructional level if it aspires to be rigorous.

The academia enjoys gradually diminishing but still significant levels of freedom and the research for new paradigm of societal development is allowed. However, it is never without some kind of opposition and it may be hard and difficult sometimes as the pressure not to deviate from the mainstream can be strong.

Vis major is the power of Mother Nature and she does not ask questions, she does not know mercy, and she does not give second chances. If we humans push the destruction of natural environment too far (and maybe, we have already) there will be no economy and no society to research.
Economists can help revert this self-destruction course. It surely will not be easy. But it can be done. It is our choice.

Acknowledgements

The paper was supported by grant agency *Vedecká grantová agentúra Ministerstva školstva, vedy, výskumu a športu Slovenskej republiky a Slovenskej akadémie vied*under the contract [nr. 2/0182/17].

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Corporate Social Responsibility as a Part of Strategy Management of Corporation

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Abstract

Currently, there are just few corporations, which would be able to apply the principles of Corporate Social Responsibility (CSR). In case of multinational corporations, there is an advantage of the corporations operating in Slovakia as their mother corporation has already implemented the principles of CSR. The aim of this article is to show the positive consequences of the CSR application to entrepreneurship on the case study of the Saint-Gobain group operating at global markets. Thanks to their experiences and competencies of constant innovation, it belongs to the top 100 of global industrial corporations. The main goal of this article is to review the application of CSR conception in particular corporation, which operates at the global market, review how CSR is applied practically and whether the theory meets the criteria of practice itself by the application of theoretical knowledge. There is a parallel goal to follow the impact of the selected indicators of CSR on its profits.

Keywords: Corporate Social Responsibility, Financial efficiency, Stakeholder, Sustainable development.

JEL Classification: L10, M14, Q50

1 Introduction

The Concept of the Corporate Social Responsibility (hereinafter "CSR") is well-known worldwide. How to do the business to profit a wider range of society from the processes and results of the corporation production, is the question old as the entrepreneurship itself.

The concept of CSR is well-known in Slovakia mainly in large corporations, which, as subsidiaries of multinational corporations, overtook the strategies for implementation of CSR from their mother corporations and perform all their activities according to them in accordance with the principles of responsible business making. That is the reason, why it is possible to research the range of CSR activities in large corporations, which have their concepts of responsible entrepreneurship not only developed, but even implemented in their business strategies.

The main goal of this article is to review the application of CSR concept in selected corporation, which operates at the global market by the application of theoretical knowledge. There is a parallel goal to follow the impact of the selected indicators of CSR on its profits.

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For the purpose of our research, we have chosen an international corporation Saint-Gobain (hereinafter "the Saint-Gobain group"), where the Saint-Gobain Construction Products Ltd. group is its member operating in Slovakia covering divisions such as ISOVER, PAM, Ecophon, Rigips, Weber and Glassolutions Nitrasklo.

We have chosen the Saint-Gobain group as it operates at the global markets since 1665 and it is one of the oldest corporations in the world. It belongs to the Top 100 of global industrial corporations because of their experiences and competences of constant innovation. The French corporation joined the Global Compact UN in 2003. The aim of the use of an international network is to contribute to the development of humane and sustainable economics.
Regarding the identified goals, we asked some research questions:

1. How (or if) does the Saint-Gobain group define its social responsibility?
2. What areas are included within their social responsibility?
3. What is the influence of the selected indicators of CSR on their services?

Primarily, we focused on the social area in our article. Thus, we didn't look for the contribution of CSR in the profits' increase, but in other particular advantages CSR mean for society and the corporation itself. We suppose the corporations supporting the concept of CSR and the corporations investing in CSR have more positive results within their entrepreneurship than the ones which do not consider this concept within their business policy.

2 The concept of CSR

The idea of CSR has been established in the 1950s by Howard R. Bowen, who is considered as the first theoretician of CSR. In his book "Social Responsibilities of the Businessman" from 1953, he wrote: *"Social responsibility presents an obligation of the entrepreneurs who strive for the strategies, make the decisions or perform the actions, which are required from the point of view of the goals and values of our society."* According to this theory, the goal of a producer was not the best available satisfaction of the customers, but even the whole society.

Even though the concept of CSR has already been developing from 1970s, there is no unique worldwide definition for it. There is no unique and generally valid definition, because the concept of CSR is based on voluntariness, there are no strictly specified borders, therefore a broad discussion is possible, as well as a broad understanding of such a complex concept by particular interest groups (Antošová, M. & Csikósová, 2015).

The most significant critic of CSR, Milton Friedman, emphasized in his article "The Social Responsibility of Business is to Increase its Profits" (1970) that if profit is the only goal, it is logical that every profit decreases, even though for the purpose of philanthropy, it reduces the value itself. On behalf of his opinions, the second half of the 20th century is characterized by the effort to maximize the profit.

The main argument against Friedman's criticism of responsible entrepreneurship is the theory of stakeholders introduced by Freeman. It reflects the idea that we shouldn't consider just the owners, but even other stakeholders, such as employees, customers, suppliers or the society (Bosch-Badia, et al., 2013).

Recently, the number of studies dealing with the relationship of CSR and financial results has dramatically increased. In 1972-2007, 167 studies dealt with this issues (Margolis, et al., 2013). However, not all of the studies came to the same results. Empirical studies regarding the relationship of CSR and financial efficiency consist of two types of views (McWilliams, et al., 2000). The first group of studies assesses a short-time financial impact of the corporation involvement on the socially responsible and irresponsible activities. The results of these studies confirm positive relationship, some negative relationship and some of them didn't find any relationship. For instance, negative relationship resulted from the work of Wright and Ferris (1997), Posnikoff (1997) reached positive relationship, whilst Teoh, Welch and Wazzan (1999) claim there is no relationship between CSR and financial efficiency. The second group of studies follow a long-term influence. However, the results of the studies are not identical. Aupperle, Carroll and Hatfield (1985) didn't find any relationship between the observed variables, Waddock and Graves (1997) found positive correlation, while McGuire, Schneeweis and Branch (1990) assigned negative relationship (Ghelli, 2013).

Orlitzky with his collective team belong to the authors, who found the positive relationship between corporate social and financial performance within the analysis of 52 empirical studies. Margolis and Walsh (2003) investigated 127 empirical studies in 1972 - 2002 and the results say there is the positive relationship between social performance of corporation and its financial efficiency. The results were confirmed, as well as the fact that irresponsible behavior of corporations leads to negative financial performance of corporations.

3 Methodology, used methods and material

So far, there is no constant methodology measuring the social efficiency of corporation and it seems we cannot expact radical changes. Currently, CSR research is an issue because of the complexity and applicability in several areas.

We set a hypothesis in relation to the main goal, parallel goal and raised research questions presented in introduction: *SZP indicators influence the Saint-Gobain group sales' revenues positively.*

We strived to confirm or rebut the truth of a given hypothesis by creating the model, which describes the influence of twelve explanatory variables – CSR indicators of given explained variable – the revenues of selected Saint-Gobain group. We used data for the same time period for all variables, between 2002-2016, i.e. since 2002 when Saint-Gobain corporation began to publish even their numeral indicators in their annual reports in terms of CSR, besides of a descriptive strategy.

We used program R to analyze the created model with the help of its functions. Opensource character and simple manipulation with data is undoubtedly the advantage of selected program. We were inspired by numerous studies based on the applications of various methods of Igalens and Gond (2005), who classified them to groups: from the so-called "content analyses" and evaluations by indexes and ratings through the surveys of questionnaire technique and statistic methods of correlational and regression analysis.

The combination of data creation has been used by acquiring the primary resources, as we chose the case study of the Saint-Gobain group as a main tool because of the realistic complexity of this method. According to Robert K. Yin (2009), the methods of case studies are the most suitable in searching the answers for "Wh-questions" and are especially useful in testing the hypotheses deducted from recent theories. Regarding the fact that CSR is very broad and complex subject of the research based on already presented theory, we consider the case study as a suitable strategy for its use.

According to Bryman and Bell (2010), there are two types of the solution of survey, deductive and inductive. We use deductive approach. They used the methods of the analyses of the Saint-Gobain group, which practizes the CSR activities by quantitative and qualitative approach. We used historical method within this analysis, which helped us to understand historical development and CSR contexts of particular corporation from the point of view of global market. We related the method of future state prognosis to this method.

Regarding the recency and objectivity of solved problem, annual reports of the Saint-Gobain corporation were the primary source. We can define annual reports as publicly published document available to all corporation partners, offering a detailed view on the position of corporation and its activities in broader economic, environmental and social contexts (Slater, 2004, p. 24). Furthermore, we sourced our information from promotional and informative materials, media reports on the activities of researched corporation and information published on corporational web pages.

4 Case study of the Saint-Gobain group at global market

The reason of the focus of case study on the Saint-Gobain group is their leadership at the market of sustainable housing and it improves everyday life through the satisfaction, thus presents the needs and the sustainability, or future needs. Activities covered within CSR are the same as pillars of sustainable development and are divided into 3 fields – economic (Profit), environmental (Planet) and social (People) field.

The subject of the activity of corporation is the production and the distribution of highly efficient building materials, which provide solutions for qualitative, economic and sustainable housing. It is number one in the industry of highly efficient materials and number two in the industry of flat glass. It consists of five major divisions: building materials, glass, wrapping materials, special High-Tech materials and distributive networks (www.saint-gobain.sk, 2017).

Currently, the corporation operates in 67 countries of the world presenting the global market from the point of view of seven regions: North America, Latin America, Africa and Middle East, Asia and Oceania, Central and Eastern Europe, France and other Western Europe countries. The highest share of sales' revenues and the number of employees is in Europe. There was a quarter share rate (25%) of total revenue as well as the number of employees in France in 2016. Other Western European countries' share the rate of 42% presents the highest share rate of total revenues and makes approximately 43% of total number of employees. North America presents 13% of revenues and Asia 20%. It is evident that the Saint-Gobain group is one of the largest European seller of building materials, what is proved by the fact that each second vehicle using European roads has

their windscreens made by Saint-Gobain and each third roof in Europe uses isolations made by this corporation (www.saint-gobain.sk, 2017).

Within British division of British Gypsum, the Saint-Gobain group created an internal program of sustainable development called Gypsum FOREVER consisting of eight steps: 1. Environmental priorities, 2. Education, 3. Communication, 4. LCA (presents the review of environmental cycle of the product based on positive and negative impacts of the product on environment) and EPD (Environmental Product Declaration – presents the results of the analysis of environment in the form of environmental declaration of product), 5. Recycling, 6. Responsible resources, 7. ECO innovations and 8. CSR strategies.

The Saint-Gobain group dealt with CSR strategy since 2001 as its strategy has been described in its annual report. It was possible to find numeric indicators since 2002. Since 2012, it established "the environmental, health and safety" (EHS) strategy setting long-term goals, such as: zero work-related accidents, no occupational diseases, no environmental catastrophes and globally minimal impact on environment.

4.1 Results

We focused on the allocated non-financial indicators in our analysis. In terms of specified hypothesis, we followed the influence of selected CSR indicators on the profits of the Saint-Gobain group. In spite of the time changes, we grouped 15 indicators indicated as identical in the time period of fifteen years, between 2002 – 2016. We selected 12 of the CSR indicators for the purposes of analysis. We focused mainly on a social field represented by 8 indicators. Other four indicators are related to environmental field. Lower number of this field is caused by the change in allocating the impacts on environment in recent years. We analyze particular indicators in the following chapter. Thereafter, we created a model from the selected indicators and followed the influence of indicators on the corporation profits.

In Table 1, we introduce short financial characteristic of the Saint-Gobain group in 2016. As we can see in Figure 1 since 2002 till the crisis in 2008, profits were increasing. Great economic and financial crisis intervened even this corporation what can be visible in profits as well as rising employees' number (Figure 2). After 2009, there was a slow increase in profits till 2012. At that time till the presence, profits are slightly decreasing.

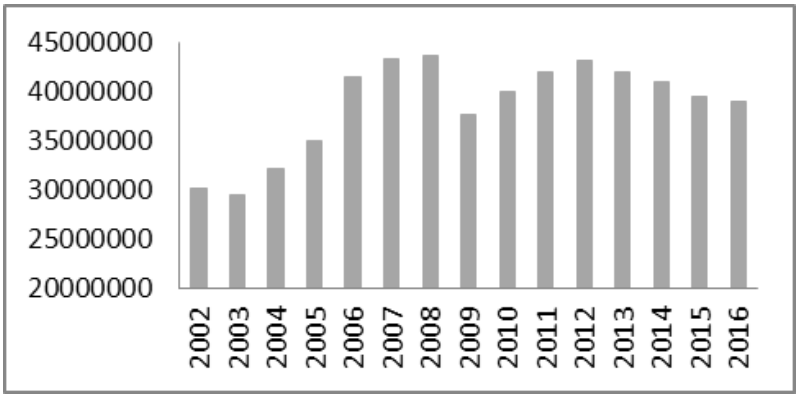

Figure 1 The Saint-Gobain group incomes
Source: Annual reports of the Saint-Gobain group

Table 1 Financial characteristic of the Saint-Gobain group

Profits	39 093 000 000 Eur
Net consolidated income	1 352 000 000 Eur
Additional value	12 361 000 Eur
Earnings per share (EPS)	2,53 Eur
ROA	3,01%
ROE	7,15%

Source: www.saint-gobain.com; www.ycharts.com

In the field of employment rate, the Saint-Gobain Group differentiates direct, indirect (mostly suppliers and subcontractors) and retrieved working positions. In 2015, this group offered 170 500 direct, 594 000 indirect and 190 000 retrieved working positions at the labor market (www.saint-gobain.sk, 2017).

Development of employees' number is presented in Figure 2, which shows the influence of the worldwide crisis in 2008, when the number of employees reached the top, since it mostly decreases to the present state of 172 696 employees. The subject of their activity is a building industry, therefore a low number of employed women in certain field can be considered as discriminatory aspect. That is also the reason of the long-term effort to keep diversity by constantly growing tendency of employed women. There is higher rapid growth recorded mainly in the last two years, what is visible in Figure 3.

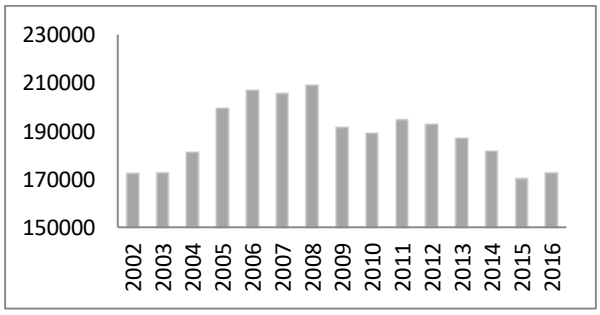

Figure 2 Development of employees number
Source: Annual reports of the Saint – Gobain group

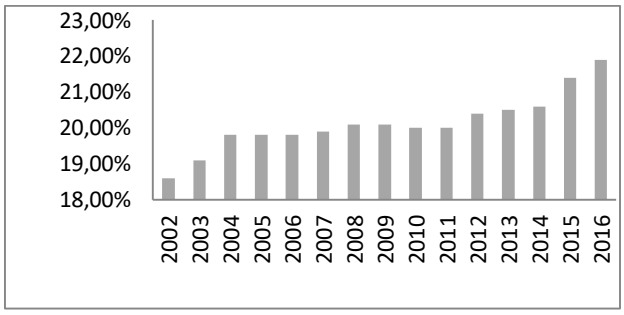

Figure 3 Ratio of women per employees number
Source: Annual reports of the Saint – Gobain group

The following indicators, such as the rate of departures, resignation rate and recruitment rate, are presented together in Figure 4. Departure rate and recruitment rate have been changing the same way. Both rates are moving around an average value of 16 %. Resignation rate has not been changing dramatically, it was approximately 6 %.

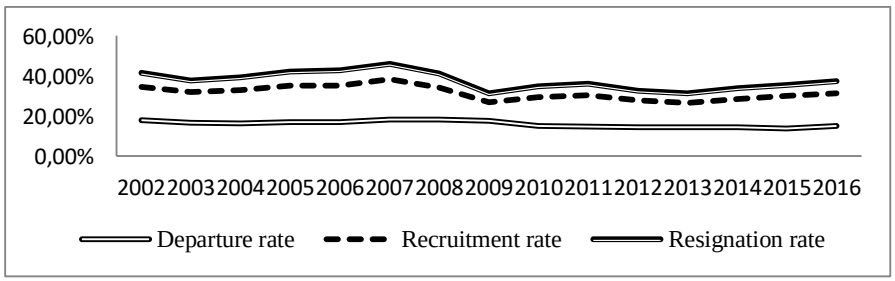

Figure 4 Departure, recruitment and resignation rate
Source: Annual reports of the Saint – Gobain group

Expenses for the courses are important indicator. Education of employees enables not only the corporational benefit, but even the growth of the employees themselves. As you can see in Figure 5, the courses' expenses increased more dramatically during 2007. Since 2009, the education expenses had relatively settled down. But if we look at the employees' education (Figure 6) from the perspective of the average number of classes of education per employee during one year, we can follow the increasing tendency. We can conclude that the growth is enabled to a greater number of employees, or in spite of not increased expenses, the courses are offered in an increased rate.

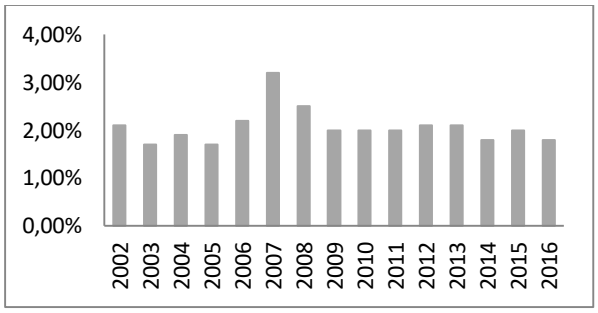

Figure 5 Expenses for the courses as rate per income
Source: annual reports of the Saint – Gobain group

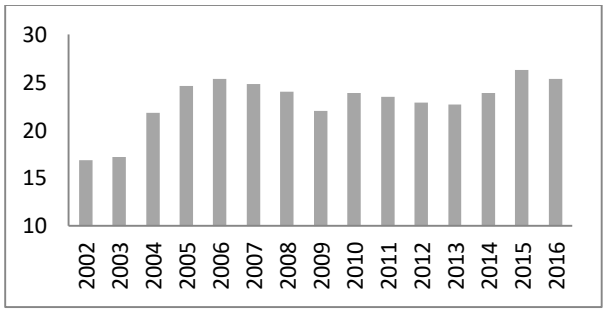

Figure 6 Average number of course classes of employee per year
Source: Annual reports of the Saint – Gobain group

The indicator of accidents rate in Figure 7 presents the evident decrease of accidents. The accident rate presented 11.6 % in 2002, since that time, it was decreased up to 1.7 %.

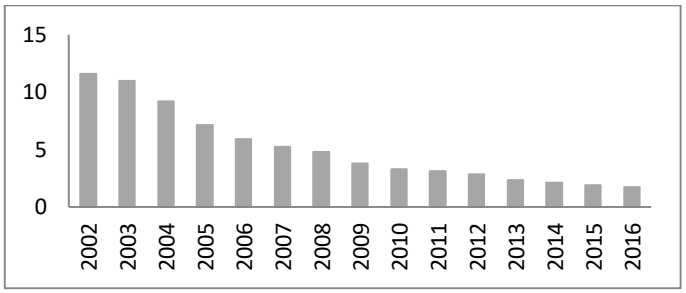

Figure 7 Accidents rate
Source: Author

We created the model out of the selected CSR indicators by which we observed their influence on the profitability of earnings. It can be calculated as the rate of net profit and earnings, what indicates how much Euro of net profit can bring one Euro of earnings. We focused on the period between 2002-2016. However, declaring the profits of the Saint-Gobain group, we found a huge difference in declaration of the profits in 2009, 2012 and 2013. We didn't find the reasons of such differences by the analysis of annual reports. We supposed that the differences can significantly influence the results of analysis and therefore we focused only on the absolute earnings. Expected econometric model following the influence of indicators on the earnings is in this form:

$$NS = \beta_0 + \beta_1 * EMP + \beta_2 * TH + \beta_3 * TE + \beta_4 * PW + \beta_5 * DR + \beta_6 * \mathrm{Rec}R + \beta_7 * \mathrm{Res}R + \\ + \beta_8 * CO2 + \beta_9 * LTIR + \beta_{10} * WC + \beta_{11} * CE + \beta_{12} * TEE + u \qquad (1)$$

Legend:
NS are earnings (Net Sales) in Euro; EMP - employees; TH – training hours; TE – training expenditure; PW - proportion of women; DR – departure rate; RecR – recruitment rate; ResR – resignation rate; CO2 – amount of CO2 emissions in metric tons; LTIR - lost-time incident rate; WC – water consumption; CE – capital expenditure for environment protection; TEE – total enviromental expenditures for environment protection.

We used the program R to analyze selected model, which had to be reduced by statistically insignificant variables, such as RecR, ResR, CO2, PW and WC through its functions. Thereafter, we tested the normality of residuals, presence of heteroskedacity, autorelation, multicolinearity and correctness of model specification within defined and modified model. We did not encounter any problem when testing.

One of the presumptions of econometric model is that residuals come from a normal distribution. We confirmed this presumption through Jarque-Bera test of normality at significance level $\alpha = 0,05$.

The normality of residuals (p-value = 0.513), absence of heteroscedacity (p-value = 0.708) and autocorrelation (p-value = 0.55) has been confirmed. Any value of VIF did not exceed the value of 10. We tested the significance of modified model by a complex summary of regression analysis at the end.

Table 2 Influence of selected CSR indicators on earnings

	Estimate	**Std. Error**	**t value**	**Pr(>**
(Intercept)	34,940,000	6.530e+01	5.351	0.001744**
EMP	138	3.116e+01	4.425	0.004447**
TH	-671,000	2.305e+05	-2.911	0.026956*
TE	2,997,000	9.328e+05	3.212	0.018311*
DR	-738,100	2.922e+05	-2.526	0.044938*
ResR	1,381,000	7.168e+05	1.926	0.102392
LTIR	-1,438,000	2.308e+05	-6.231	0.000791***
CE	-0.004	3.617e-02	-0.115	0.912342
TEE	-0.014	1.287e-02	-1.121	0.305016

Source: Own elaboration

Approximately 96% of variables is explained through given variables in our second model, what confirms statistical significance of given model. Analysis, except of its focus on the impact of CSR on earnings, brought the conclusions characterized by the nature and power of association between these variables and earnings. After the estimation of the rest of indices, the equation gained the following form:

$$NS = \beta_0 + \beta_1 * EMP + \beta_2 * TH + \beta_3 * TE + \beta_4 * PW + \beta_5 * DR + + \beta_9 * LTIR + \\ + \beta_{10} * WC + \beta_{11} * CE + \beta_{12} * TEE + u \qquad (2)$$

It is true that if the number of employees is increased in 1 unit, the value of earnings is increased in 138 units. There is a positive relationship with the earnings coming from statistically significant variables in case of the course expenses, a negative relationship with the departure rate of employees and the accidents rate which can possibly happen. However, according to the results with the growth of an average number of course classes, the value of earnings is decreasing, what contradicts with our presumption.

Thereafter, we compared the suitability of particular models on the basis of the so-called "informative criteria". We used the most significant tools, such as Akaike and Bayes' information

criteria. The lowest values of information criteria definitely determined the second model as the right one. Therefore, we continued in the prediction of earnings for 2017-2018 on the basis of the prediction of particular variables. We expect the growth of earnings within the next two years: in 2017, as the value should range from 41,663,557 Eur to 46,741,970 Eur and in 2018, ranging from 42,288,939 Eur to 47,484,362 Eur. Finally, we claim that the positive relationship confirmed hypothesis that CSR positively influences the profitability of the Saint-Gobain group. We expect the incompleteness of proving the given hypothesis based on the influence of various internal, as well as external factors.

5 Discussion and conclusion

Currently, the problem of CSR becomes actual from the point of view of searching for the ways of effective implementation of its thoughts into the practice. According to us, the diversity of the opinions of technicians and practicians contributes to a growing interest of corporations in CSR, which is supported by the European Commission and governments of economically developed countries.

Distinctions between annual reports are the reflection of different environmental legislative and regulation, as well as political situation and social pressure in particular countries. Also Chen and Bouvain (2008) conclude the research of comparing the reports on SZP by reasoning of differences based on various institutional scopes.

We suppose the corporations supporting the concept of CSR and the corporations, which invest in CSR, have more positive results within their business than the ones, which do not include this concept within their business policy, were confirmed. According to the study The innovation bottom line, the rate of corporations making a profit by sustainable solutions has increased in 37 % last year. “Green Giants” show that sustainability can be changed into a profitable business-making, such as the corporations: IKEA, Tesla, Toyota, Nike, Natura or Whole Foods. Thousand dollars investment in these corporations from 2010 increased up to 3,251 dollars in 2015. The same investment in portfolio of their competitors, who do not possess their products and services built on sustainability, was worth of only 1,932 dollars in 2015 (Business Leaders Forum, 2016).

In spite of the mentioned facts, many stakeholders are sceptic towards CSR. The aim of this article was to show the positive consequences of the application of CSR in business. Expected asset of the research was to decrease the insufficient awareness of CSR, which negatively influences the practices of given problem. We have to say that the solution of indicated problems remains open for further researches with more sophisticated methods and schemes of new evaluations of the influences of CSR application to entrepreneurship.

Acknowledgements

This paper was written in connection with scientific project VEGA no. 1/0961/16. Financial support from this Ministry of Education’s scheme is also gratefully acknowledged.

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Comparing the success of integrating Europa2020 strategy objectives by EU member states

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Abstract

The European Union development strategy - Europa2020 (European Commission, 2010c) – identified three key drivers for EU growth: smart growth, sustainable growth and inclusive growth. At present, the planned the time period defined to fill the targets is almost at the end, and it seems to be time for comparing the success with its objectives by particular EU member states. The Europa2020 strategy is defined by its priorities, objectives and main initiatives. Every target is described by more indicators, which are identified and reported to European Commission on the year basis. Within the paper the Europa2020 strategy is briefly described, with identification of main indicators influencing the defined targets. Based on indicators values achieved by every EU member state it is possible to compare the states and cluster them to different categories and try to summarise the strong and weak factors influencing the Europa 2020 integration success.

Keywords: Europa2020 strategy, Integration, Idicators, Targets.

JEL Classification: A13, F63

1 Introduction

In the globalization age it is important to stay competitive. The level of productivity of economy presents the heart of competiveness. We can say, that economy is competitive, if is able to provide high and rising living standards, allowing all members of a society to contribute to and benefit from these levels of prosperity. More over, it is important that it meet the needs of the present generation and not compromising the ability of future generations to meet their needs. (World Economic Forum, 2014) EU is union of 28 economically different countries. The national and regional disparities exist in providing an enabling enterprise and innovative environment in Europe - between strong performers at northern and north-western Europe and poor performers at southern Europe and Central and Eastern Europe. (World Economic Forum, 2014) Therefore, it is very important to use the various tools and mechanisms by which we would enable the weaker members to achieve the stated objectives of the development of the EU as a whole. This objective is described in the most significant document – Europa2020, strategy for European development – begins with the sentence, that year 2010 must be a new beginning, from which Europe must come out stronger. (European Commission, 2010c) As economic and financial crisis in the years 2008 – 2009 showed us, economic realities are moving faster than political realities. In connection with previous, the strategy Europa2020 highlighted three mutually reinforcing priorities: smart growth,

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sustainable growth and inclusive growth. (European Commission, 2010c) The headline targets presents the main EU needs and expectation where it wants to be by 2020:

- 75 % of the population aged 20-64 should be employed.
- 3% of the EU's GDP should be invested in R&D.
- The "20/20/20" climate/energy targets should be met (including an increase to 30% of emissions reduction if the conditions are right).
- The share of early school leavers should be under 10% and at least 40% of the younger generation should have a tertiary degree.
- 20 million less people should be at risk of poverty. (European Commission, 2010c)

To achieve the goals outlined in this documents, effective governance mechanisms are necessary at the regional, national and European levels for managing, monitoring and enforcing change. Further, transformations that impact competitiveness and productivity require the combined support of government, business and civil society. There are defined identificators indicating progress in target implementation process during the strategy lifetime and they also serve as a useful and succinct communications tool. (European Commission, 2013) Monitoring progress and involvement of EU member states are the keys of being suceessfull in achieving aims. Monitoring process is named European Semester and represents an annual cycle of macro-economic, budgetary and structural policy coordination.

Despite of European Semester existence and publishing information about success of integrating strategy itself, most of them is concerned on publishing information abou particular indicator level at the particular country, there is no aggregated information about integration success the strategy as a whole. On the official pages of European Commission just particular country documents, data, reports are available (e.g. European Commission, 2010c; European Commission, 2015; World Economic Forum, 2014; etc.).

Because the lifetime of the Europa2020 strategy is coming to the end, it is really important to map the target fulfilment progress in every member country. The aim of this comparison is to evaluate progress itself, but it can help to identify the leaders and motivate and inspire the poor integrators to follow them and implement similar strategies and tools in governance the country. The main aim of this paper is to confront implementation success of particular EU member states and identify the position of Slovakia in this union. Finally, we will present the main shortcoming in process of Europa2020 implementation, in brief.

2 Europa2020 strategy

The Europe 2020 strategy (European Commission, 2010a) was formally agreed and started by the European Council on 17 June 2010. This agenda is a common European Union strategy to ensure sustainable economic growth and also to overcome the economic crisis and create new jobs. The previous strategy – Lisbon strategy - was also focused to economic growth and employment, but its implementation ended in time of economic crisis affects without achieving its main objectives (European Commission, 2010b), (Ministry of Finance of the Slovak Republic, 2010). The three dimensions of growth of the Europe2020 strategy focus more on other dimensions of an overall development strategy, which are complementary to economic growth:

- Smart growth: developing an economy based on knowledge and innovation.

- Sustainable growth: promoting a more resource efficient, greener and more competitive economy.
- Inclusive growth: fostering a high-employment economy delivering social and territorial cohesion. (European Commission, 2010b)

To strengthen the success of these dimensions, they were divided into more detailed targets These growth dimensions are considered as successfully fullfiled if set targets are achieved by help of seven flagship agendas/initiatives (Figure 1).

	Targets	Flagship initiatives
Smart growth	— Increasing combined public and private investment in R&D to 3 % of GDP — Reducing school drop out rates to less than 10 % and increasing the share of the population aged 30 to 34 having completed tertiary education to at least 40 %	— Innovation Union — Youth on the move — A digital agenda for Europe
Sustainable growth	— Reducing greenhouse gas emissions by at least 20 % compared to 1990 levels — Increasing the share of renewable energy in final energy consumption to 20 % — Moving towards a 20 % increase in energy efficiency	— Resource efficient Europe — An industrial policy for the globalisation era
Inclusive growth	— Increasing the employment rate of the population aged 20 to 64 to at least 75 % — Lifting at least 20 million people out of the risk of poverty and social exclusion	— An agenda for new skills and jobs — European platform against poverty and social exclusion

Figure 1 The Europe 2020 strategy's key priorities, headline targets and flagship initiatives;
Source: Eurostat (2015)

These objectives are mutually related. For example, a higher level of education helps to find work and helps to increase employment, while reducing poverty. Greater share of research, development and innovation capacity in all sectors of the economy combined with more efficient use of resources will improve competitiveness and promote new job development. E.g., investing in cleaner, low-carbon technologies will help our environment to participate in combating climate change and creating new opportunities for employment and entrepreneurship. These objectives should mobilize general attention and will require strong political leadership, determination and an effective mechanism for changing attitudes and EU procedures to achieve the results that are included in the objectives of the Europa2020 strategy (European Commission, 2010c). The seven flagship initiatives, presented at Figure , commit all strategy participants. Mobilisation of union level instruments (single market, financial levers, external policy tools, etc.) is necessary in tackling the possible bottlenecks, delivering the Europe2020 objectives, ensuring budgetary consolidation for long-term growth, and strengthening coordination within the Economic and Monetary Union. (European Commission, 2010c)

In order to achieve the required changes, the EU and individual Member States must focus on the objectives, the control and the assessment of progress made by both the European Union and the countries concerned. For this reason, the strategy is based on a thematic approach and more targeted

supervision of member countries. The thematic approach is primarily concerned on fulfilment of the five headline targets. Strategy Europa2020 itself is a most important tool for achieving these goals, which requires both EU and Member State action. Under more targeted supervision, we can understand continuous reporting about particular Member states, which help them in establishment and implementation national strategies to overcome crisis consequencies, to restore macroeconomic stability and to detect possible obstacles existing on national level, to restore suistainable growth of national economies and public finances (World Economic Forum, 2014).

Progress towards the Europe 2020 objectives supports and monitors the European Semester, which represents the annual cycle of economic and budgetary coordination of the EU. European Semester is described by following key levels:

- In January, the Commission issues its Annual Growth Survey, which sets out EU priorities for the coming year to boost growth and job creation.
- In February, the Council of the European Union and the European Parliament discuss the Annual Growth Survey.
- In March, EU Heads of State and Government (i.e. the European Council) issue EU guidance for national policies on the basis of the Annual Growth Survey.
- In April, Member States submit their plans for sound public finances (Stability or Convergence Programmes) and reforms and measures to make progress towards smart, sustainable and inclusive growth (National Reform Programmes).
- In May, the Commission assesses these Programmes.
- In June, the Commission provides country-specific recommendations as appropriate. The European Council discusses and endorses the recommendations.
- In July, the Council of the European Union formally adopts the country-specific recommendations.
- In autumn, the Governments present the budget draft to their Parliaments. (European Commission, 2012), (European Commission, 2016)

3 Comparison of EU member states in Europa2020 targets implementation

To evaluate the success of the implementation of the Europe2020 objectives, we used scaling technique (Kothari, 2004), semaphore method (Kutscherauer et al., 2010) and spatial analysis (Greene, 2017), (Stanilaa, Andreicab, & Cristescub, 2014). Using this approach, we divided all EU countries into five clusters according to the success of individual Europa2020 objectives performance indicators, and also the success of the implementation of headline targets as a whole.

3.1 Methodology and results

This research uses the freely available data originating different statistic portals, mainly from Eurostat databank (Eurostat, 2017) and also other data from related resources (Dijkstra & Athanasoglou, 2014; Dijkstra & Athanasoglou, 2015; European Commission, 2015; European Commission, 2016; Eurostat, 2016). In order to evaluate the success of the implementation of Europe2020 targets by individual countries, we have used data comparison methods and spatial analysis of all EU Member States. As input data for spatial analysis are used:

- 28 EU Member States data fro the 2015 year[3]

[3] The year 2015 is the last available period with published indicator values; in case of emissions it is year 2014

- and particular target values defined by particular EU Member States for the year 2020[4].

To be able to evaluate success of implementing Europa2020 targets, the values of 9 indicators are used Table 1.

Table 1 Main targets and indicators used for evaluation the implementation process of Europa2020 strategy

Target	Indicator	No of indicator
Increasing the employment rate of the population aged 20 to 64 to at least 75%	Employment rate (in % of total population)	1
Lifting at least 20 million people out of the risk of poverty and social exclusion	Rate of people out of the risk of poverty and social exclusion (in % of total population)	2
Reducing school drop out rates to less than 10% and increasing the share of the population aged 30 to 34 having completed tertiary education to at least 40%	Early school leavers rate; Tertiary educated population rate (in % of total population)	3 4
Increasing combined public and private investment in R&D to 3% of GDP	Volume of the investments (in % of GDP)	5
Reducing greenhouse gas emissions by at least 20% compared to 1990 levels	Volume of greenhouse gas emissions (in %, while 1990 = 100%)	6
Increasing the share of renewable energy in final energy consumption to 20%	The share of renewable energy in final energy consumption (in % of total energy consumption)	7
Moving towards a 20% increase in energy efficiency	Final energy consumption; Primary energy consumption (in Mtoe[5])	8 9

Source: Own processing based on European Commission (2010c)

Implementation success is computed using:

$$IL_{xC} = \frac{IL_x(C)}{TL_x(C)} * 100 \qquad (1)$$

where

- IL_{xC} represents percentage of achievement of the final target value by following the value of indicator x by country C in 2015,
- $IL_x(C)$ represents the indicator x value achieved by country C in 2015,
- and $TL_x(C)$ represents the indicator x value planned to achieve by country C in 2015.

In order to distinguish the level of Europa2020 target implementation by particular countries, we employed the scaling/ranking method. (Kutscherauer A. et al., 2010) The level of success was scaled into following 7 levels:

- number 1 indicates achievement of 100% and more of monitored indicator value,
- number 2 indicates achievement of 90% - 99% of monitored indicator value,

[4] There is no value specified for United Kingdom for more monitored indicators – for analysis was used value specified for EU as a whole.

[5] Mtoe means Million tons of oil equivalent

- number 3 indicates achievement of 80% - 89% of monitored indicator value,
- number 4 indicates achievement of 70% - 79% of monitored indicator value,
- number 5 indicates achievement of 60% - 69% of monitored indicator value,
- number 6 indicates achievement of 50% - 59% of monitored indicator value,
- and number 7 indicates achievement less then 50% of monitored indicator value, what means that particular country fails in implementing particular Europa2020 target.

Scaled values of indicators[6] are vizualised (Table 2) by semaphore method by which they are assigned to particular scale level by different colours or symbols (Kutscherauer et al., 2010).

Table 2 Scaled values of monitored indicators visualized by semaphore method

Indicator No.	1	2	3	4	5	6	7	8	9
Country									
EÚ (28)	2	3	2	2	5	1	3	1	2
Austria	2	1	1	1	3	3	2	2	1
Belgium	2	2	2	2	3	1	5	2	2
Bulgaria	3	7	3	3	5	1	1	2	2
Croatia	2	5	1	3	5	1	1	1	1
Cyprus	2	5	1	1	2	6	4	1	1
Czech republic	2	1	3	2	1	1	1	1	2
Denmark	2	1	1	1	1	1	1	1	1
Estonia	1	3	4	1	6	1	1	1	1
Finland	2	1	3	1	4	2	1	1	1
France	2	1	1	2	4	2	5	2	2
Germany	1	2	2	4	2	1	3	2	2
Greece	4	6	1	1	3	3	3	1	1
Hungary	2	5	3	1	4	1	1	3	1
Ireland	2	4	1	3	4	4	6	1	2
Italy	2	5	1	2	3	2	1	1	1
Latvia	2	5	1	1	7	1	2	1	1
Litva	1	5	1	1	6	1	1	3	1
Luxemburg	2	1	1	4	6	3	7	1	1
Malta	2	3	6	3	7	6	6	3	3
Netherlands	2	1	2	1	3	2	7	1	2
Poland	2	3	3	2	6	2	4	1	1
Portugal	2	4	4	4	7	4	2	1	1
Romania	2	6	6	2	7	1	1	1	1
Slovakia	2	1	3	4	2	1	2	3	1
Slovenia	2	1	1	1	4	3	3	1	1
Spain	3	5	4	2	5	5	3	2	1
Sweden	1	1	1	1	3	1	1	2	2
United Kingdom	1	3	2	1	6	1	6	2	2

Source: Own processing based on Eurostat data

[6] Used values of particular indicators are available at (Eurostat, 2017) and also other data from related resources (Dijkstra L. and Athanasoglou S., 2014), (Dijkstra L. and Athanasoglou S., 2015), (European Commission, 2015), (European Commission, 2016), (Eurostat, 2016). They are not publish there because of defined limits for page numbers of the paper.

Based on previous results EU Member States were grouped according level of Europa2020 target implementation. Clustering method give insights into similarities among particular countries in EU. EU countries we clustered using Table 353 contitions. As follows from table below, in EU countries comparison is important to take into account not only fulfilment of particular indicators, but also fulfilment of targets affected by these indicators. The specific target implementation level can be influenced by more as one identificator (climate changes and energy consumption, education, etc.), that is why it was computed the average value of target implementation based of mentioned indicators. Based on these three values (indicator values, number of partially fulfilled targets and completely fulfilled targets) was every EU member state included into specific cluster.

Table 35 Cluster description

No of cluster	Description of cluster
1	fulfilment of min. 5 indicators, min. 3 partial targets and min. 2 full targets
2	fulfilment of min. 3 indicators, min. 2 partial targets and 2 full targets
3	fulfilment of 4 indicators, min. 2 partial targets and 1 full target
4	fulfilment of 2 indicators, min. 1 partial target and min. 1 full target
5	fulfilment of 0, 1 or 2 indicators, 0 or 1 partial target and 0 full target

Source: Own processing

Figure 2 presents result of spatial analysis, based on previously defined clusters done in R program.

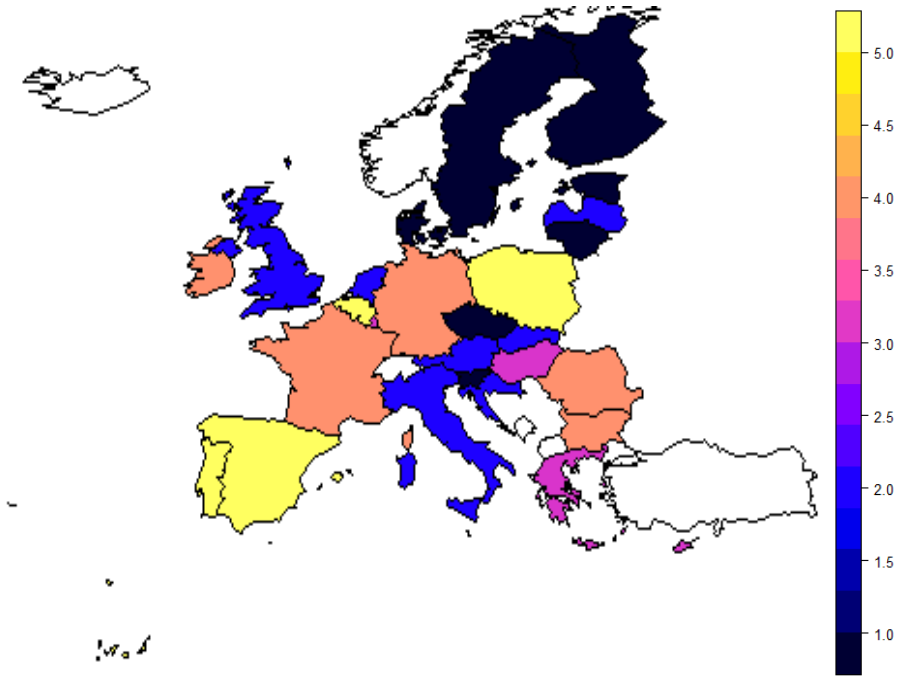

Figure 2 Success of Europa2020 strategy implementation by all EU Member States;
Source: Own processing based on Eurostat data

3.2 Evaluation of the Europa2020 target achievement

Several publications (e.g. Athanasoglou & Dijkstra, 2014; Dijkstra & Athanasoglou, 2015; etc.) are dealing with EU Member states comparation and their success in implementation of Europa2020. In these publications and publication working with up-to-date data, it is only possible to find comparisons of countries in terms of separate indicators. Our research is based on the use of currently available data and the objective is to create a comprehensive comparative view of the implementation of the targets of Europe 2020 strategy by EU Member States.

Not all member countries are equal in implementation process of the Europa2020 targets. To So we have decided to divide them into five clusters for the easier identification of leaders as we described above. Based on the previous analysis, countries could be splited into the following clusters:

- Cluster No.1: Czech Republic, Denmark, Estonia, Lithuania, Slovenia, Finland and Sweden;
- Cluster No.2: Croatia, Italy, Latvia, the Netherlands, Austria, Slovakia and the United Kingdom;
- Cluster No.3: Greece, Cyprus, Luxembourg and Hungary;
- Cluster No.4: Bulgaria, Germany, Ireland, France and Romania;
- Cluster No.5: Belgium, Spain, Malta, Poland and Portugal.

From clustering results shown on Figure follows, that the most successful countries are mainly Scandinavian countries belonging to the EU, the Baltic countries except Latvia and the Czech Republic and Slovenia. Among the followers of the mentioned leaders is also Slovakia. Denmark si most successful implementator from cluster No.1 countries (by fulfilling 8 from 9 indicators and 4 targets; target employment reached 96 % by the 2015). The second is Sweden with 6 indicators on more than 100 % and reached 4 targets (but there are still shorcomings in R&D investments; they reached just 82 % by the 2015 and in energy consumption reduction). On the other hand, the worst implementator is represented by Malta which was not able to reach any indicator level and also any target (the best results were achieved in field of employement with 97 % of target value by 2015; the worts results presents R&D with 39 % of final target value).

Slovak Republic reached 3 indicators and 2 targets (concerned on environment and poverty) by thee 2015. The next two targets (R&D (with 98 %) and employment (94 %)) are close to being reached. The third level education is weakness of Slovak Republic due to high level of university graduates outflow.

To generalize EU as a whole, the greatest implementation progress is visible in fields of enviromemnt and education, while R&D has worst one.

4 Conclusion

Europa2020, the strategy for smart, sustainable and inclusive growth very precisely describes the headline targets and indicators. This system helps governments to monitor shift of particular EU member states in their Europa2020 implementation process. Although the Europa2020 indicators are not politically binding, they do serve as policy anchors for the EU Member States. As was stated above, EU is union of 28 economically different countries and is far from a homogeneous entity in terms of competitiveness. The national and regional disparities exist in providing

an enabling enterprise and innovative environment in Europe - between strong performers at northern and north-western Europe as also our comparison prove and poor performers at southern Europe and Central and Eastern Europe. Countries that at least meet the individual objectives should take an example of countries which are more succesfull in objectives implementation.

However, the objectives of the strategy and their implementation are relatively difficult to generalize because they have been defined politically and each EU member state has set its own level of targets that wants to achieve in 2020. Their value, therefore, depends on the ambition of the particular state government. For this reason, it is interesting to check out how the fulfilment of the targets during the ten-year period is dealed by the individual countries. By 2020, there still remain a few years, so countries that do not meet their targets should focus on the areas where they have the worst results and try to improve it. It is necessary to take inspiration from the northern European countries that are successful and take similar steps to achieve the targets. This seems to be the only way for the EU to remain competitive to other countries of the world.

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The impact of socioeconomic determinants on respiratory mortality in Slovakia

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Abstract

Mortality from respiratory diseases is the third main cause of deaths in EU countries, and the number of respiratory deaths is expected to increase in the coming years. It does not focus on these issues, despite their considerable importance. The aim of this article is to explore the association between selected measures of socioeconomic status and mortality from respiratory diseases between 2005 and 2013 in the Slovak Republic. Using the panel regression model, we analysed data from the Statistical Office of the Slovak Republic and data from the National Health Information Center of the Slovak Republic. The results confirm the existence of the association between income inequalities and mortality from respiratory diseases. Income quintile ratio as a measure of income distribution inequality brings a reduction of the standardised mortality rate by 19.21 deaths each time it increases its value by one unit. Income expressed by mean equivalised net income per household performs as the least influencing indicator on the standardised mortality rate. Finally, detection of relevant respiratory risk factors is very important for planning financial and other treatment resources and managing health promotion policies.

Keywords: Respiratory system diseases, Respiratory mortality, Socioeconomic status, Income inequality, Risk factors.

JEL Classification: I14, I15, D31

1 Introduction

Economic development, associated with an epidemiological transition, has resulted in a reduction in the burden of infectious diseases, but on the other hand, it has significantly increased the burden of non-communicable diseases (NCDs) also known as chronic diseases (Byrne et al., 2015). NCDs are the main cause of premature adult deaths in all regions of the world. Nowadays, more attention has been focused on action against cancer, diabetes, cardiovascular diseases, however, it seems that the attention towards chronic respiration diseases has been in decline (Soltes & Gavurova, 2014). Respiratory diseases (RDs) are a group of diseases primarily affecting the lungs and airways. The World Health Organization (WHO) estimates that each year 4.6 million people die prematurely due to RDs, accounting for more than 5% of all deaths; most of them occur in low and middle-

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income countries (WHO, 2017; Murray & Lopez, 2013; Byrne et al., 2015). These developing countries are also characterized by high respiratory morbidity (Stringhini et al., 2017).

Mortality from RDs is the third main cause of deaths in EU countries. The most people died from chronic obstructive pulmonary disease and pneumonia, but also from asthma, influenza and other diseases. There are regional, gender and age disparities. In most countries, more men than women die from RDs and these deaths are concentrated among people aged 65 and over. In 2013, the United Kingdom had the highest death rate from RDs among EU countries followed by Ireland (Eurostat, 2017; OECD, 2016). Many deaths from RDs could be prevented by tackling some of the main risk factors. Tobacco smoking and other forms of indoor air pollution, especially in low- and middle-income countries; allergens, outdoor pollution, occupational risks, and vulnerability were identified as major risk factors for chronic respiratory diseases (WHO, 2017). The socioeconomic position is known to be associated with mortality and morbidity from a number of diseases, and several studies indicate that the socioeconomic inequalities in health are increasing (e. g. Gavurova et al., 2017a,b). Population with the highest socioeconomic status (SES) have the best health status and vice versa. Several other studies have reported an association between various socioeconomic measures and symptoms of respiratory system disease or lung function (Szabo & Sidor, 2014). SES is a significant risk factor for the incidence of RDs, in particular up to 62% of cases were statistically significant differences between high and low socioeconomic groups (Cakmak et al., 2016; Cournane et al., 2017).

Consideration of the high prevalence and the increasing respiratory mortality, it is necessary to identify the significant risk factors and to try to monitor trends in the progress of these diseases as accurately as possible. The predictions of RDs progression are very important for planning financial and other treatment resources, managing health promotion policies and developing prevention programmes to reduction risk factors. WHO considers preventable chronic respiratory diseases are under-recognized, under-diagnosed and under-treated (WHO, 2007).

2 The respiratory diseases and their risk factors

Chronic respiratory diseases (CRDs) belong to a group of chronic non-communicable diseases and, according to statistics, its morbidity and mortality are increasing in the world. In a previous study, the authors have shown that RDs are the greatest burden on people living in adverse socioeconomic conditions. Prescott et al. (2003) examined the relationship between socioeconomic factors and risk of death from RDs and chronic obstructive pulmonary. The results confirm the existence of a strong social gradient in mortality of these diseases, which are independent of smoking and is stronger in males. The latest study of Cournane et al. (2017) stated that the socioeconomic status of effects the incidence of hospitalization rates and hospitalization mortality from RDS. Local environmental conditions, such as air pollution and temperature, appear to be relevant only for mortality outcomes. Various authors in their studies showed that external pollution is a significant factor affecting both CRDs morbidity and mortality.

In recent years, there has been a significant increase in the emissions of atmospheric pollutants due to the development of large industrial sites with a growing number of vehicles. This air pollution is specifically associated with adverse effects on the field of respiratory health, and both, the life near the main journey is associated with the increased RDs (Shen et al., 2017; Cakmak et al., 2016; Urman et al., 2014; González-Díaz et al., 2016). Furthermore, the results of a study by

Shen et al. (2017) show a non-linear increase in RDs due to strong air pollution, which especially vulnerable children. Industrial cities, such as China, are experiencing strong and continued contamination of the atmosphere, as well as, concentrations of fine particles reaching unprecedentedly high levels in many countries.

The nutrition of individuals also plays an important role in prevalence of acute and chronic RDs. Bad dietary habits at an early age may compromise the integrity of the respiratory system, and lead to poor lung function, reduced protection from infections practice. Consequently, the acute of RDs are common in childhood and chronic diseases in adulthood. Nutritional interventions also have great potential to reduce the morbidity and respiratory illness of the developing world (Karim, Muhit, & Khandaker, 2017).

Significant associations in relation to the prevalence of CRDs have also been investigated by Gan et al. (2017). In their study, they examined whether people living in different types of housing had different respiratory health outcomes. The results have shown that different structures and building materials can affect the indoor environment and living conditions. Apartment living was associated with better respiratory health outcomes compared to living in family homes or living in a mobile home. The impact of the working environment and quality employment have also proven to be important risk factors affecting the prevalence of RDs, which can lead to subsequent death. This effect is relatively difficult to evaluate, because the diseases will appear after several years after the contact with substances, which caused it. At present, there are approximately 12 000 deaths due to work-related RDs, of which two thirds are caused by asbestos-related diseases. Every year this number increases (HSE, 2016). Another determinant of health is the rate of unemployment, which is associated with an increased risk of poor mental health, social exclusion and suicide. Unemployed people also have a higher tendency to consume alcohol and smoke. Many scientists agreed that the high rate of unemployment and its persistence has harmful effects on human (Barnay, 2016; Strandh et al., 2014; Park, Chan, & Williams, 2016; Sarti & Zella, 2016). To ensure financial security, to provide proactive health care and to retrain for re-employment can reduce the impact unemployment on health.

2.1 Income, income inequality and poverty in relation to respiratory health

Income directly reflects material conditions and housing conditions also reflect factors that could have direct effect on respiratory morbidity, for example humidity, crowding, and indoor pollutants (Prescott et al., 2003). A large number of studies are concerned with examining the impact of income and income inequality and poverty on public health. There are different interpretations of the evidence, but most of the researches reported that health tended to be worse in more unequal societies with higher income inequalities (Pickett & Wilkinson, 2015; Lynch et al., 2004; Macinko et al., 2004; Subramanian & Kawachi, 2004; Wilkinson & Pickett, 2006). Linden and Ray (2017) analysed annual data from 148 developed and developing countries for the period 1970-2010 to examine the relationship between health and income. The results indicate that the income gradient in the poorest countries remains much higher than in the rich countries. Furthermore, the authors found that income inequality measured by the Gini coefficient still has a significant effects on health in the poorest countries, but in rich countries are no longer significant after 2000. Similarly, in Switzerland was examined the relationship between mortality and income inequality by Clough-Gorr et al. (2015). Higher income inequality expressed by the Gini coefficient was observed in larger cities, high-income municipalities and tourist areas where the lowest mortality rate was also

at the same time. So the relationship of income inequality with mortality in Switzerland is contradictory to what has been found in other developed high- income countries. Their results challenge current beliefs about the effect of income inequality on mortality on small area level.

A new interesting view is presented in a study by Biggs et al. (2010), in which they examined the relationship between income, income inequality, poverty, and health. Consistent with previous studies, they found increases in income have a sizable positive impact on population health, but the strength of the relationship is powerfully influenced by changing levels of poverty and inequality. Low household income has also been shown to be associated with chronic obstructive pulmonary disease (COPD) in several studies (Prescott, 2000). In a Canadian study, household income was related to self-reported COPD but more strongly in males than in females. In the present study, income, both household and personal, was associated with respiratory mortality in males only and the association was seen across the whole specter of income (Chen et al., 2000).

2.2 Associations between respiratory diseases and other diseases

Exploring the association between RDs and other diseases is the subject of many studies. Byrne et al. (2015) in their study presented the relationship between tuberculosis and CRDs disease. They found that efforts to improve long-term lung health should be part of the prevention of tuberculosis. Another major global public health problem is obesity, which is associated with many diseases, particularly RDs. The prevalence of common respiratory problems, such as asthma and obstructive sleep apnea, is higher in obese children. In addition, the results of the treatment of these common diseases in the case of obese children are also worse compared to the poor children (Xanthopoulos & Tapia, 2017). According to a study Azad et al. (2017), there is a link between another chronic disease - diabetes and RDs. Diabetes is an increasing complication of pregnancy. In parallel with this trend, the increase in chronic lung disease in children has been observed in recent decades. It was a motivation for the authors to carry out the research. They found that delayed lung maturation and increased risk of respiratory distress syndrome have been consistently observed among infants born to mothers with diabetes. Further, the authors point to the need to carry out further research to confirm and characterize epidemiologic observations that diabetes in pregnancy may predispose offspring to childhood wheezing illness and asthma.

3 Data a methodology

The analysed dataset comes from the two databases – data in the Slovak Republic from the Statistical Office of the Slovak Republic and from the National Health Information Center of the Slovak Republic, which provides a primary source of national health statistics under the conditions of the contract. We analysed the time period 2005-2013. As the elementary input data for the modelling process the mid-year state of all the population divided by the sex, the age groups and the individual regions in each explored year have been applied.

Mortality rate is calculated as age-standardised to the revised European standard population by the age groups adopted by the Eurostat according to the last revision in 2012. It is expressed by standardised mortality rate, which is stated as number of total deaths per 100,000 inhabitants. We have applied the method of direct standardisation to eliminate variances resulted from differences in age structure of the population across the regions and over time, ensuring the necessary conditions for comparing the regions of the Slovak Republic. We have applied the regression analysis for the panel dataset. The chosen methodology of the regression analysis is a between

approach. This choice was done according to the executed tests that show usage of this methodology as the most appropriate manner to examine such a dataset.

The standardised mortality rate (SMR) performs as an explaining variable. It is constructed for respiratory diseases especially and is based on mortality caused just right by this diagnosis. The explanatory variables are selected indicators of income, income inequality and poverty.

There are a few notes to exactly specify the chosen income indicators. Unemployment rate (UR) means a ratio of a number of unemployed inhabitants to a number of the economically active inhabitants for the previous year. Mean equivalised net income per household (I) represents a household disposable income divided by equivalent household size. Individual household members are assigned weights – 1 for the first adult household member, then 0.5 per each additional adult member, 0.5 per each adolescent from 14 years of age and over and 0.3 per each child younger than 14 years of age. At-risk-of-poverty threshold (P) is set at 60 % of national median equivalised disposable income of individual. It expresses the percentage of inhabitants with an equivalent disposable income below a set boundary. Gini coefficient (GC) is an indicator of monetary poverty, which shows the inequality of income distribution, and is defined as the relationship of cumulative shares of the population arranged according to the level of equivalised disposable income, to the cumulative share of the equivalised total disposable income received by them. It can gain values from 0 meaning absolute income equality to 1 signalling absolute income inequality. Income quintile ratio – S80 to S20 ratio (IQR) – is a measure of income distribution inequality. It is calculated as a proportion of the total income of 20 % of the richest people in society – located in the top quintile – relative to the total income of 20 % of the poorest people – located in the lowest quintile. Social benefits (SB) include all the types of monetary social help aimed at poor, disabled, or otherwise handicapped people. This indicator expresses the whole amount of euro paid to the inhabitants that are allowed to obtain such a state financial aid. Roma nationality rate (RNS) represents a share of the Roma nationality inhabitants to the whole population of the Slovak Republic.

4 Results

The general overview of the standardised mortality rate of respiratory diseases is demonstrated by the following maps. They show regional disparities of this variable in years 2005 and 2013.

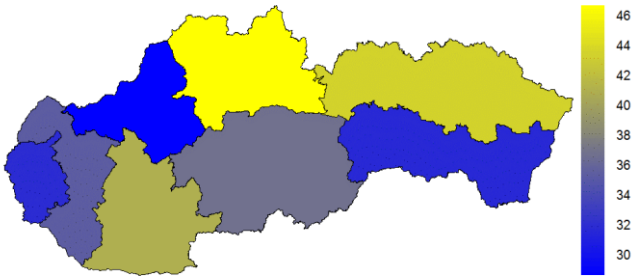

Figure 1 The standardised mortality rate of respiratory diseases in the particular regions of the Slovak Republic in 2005

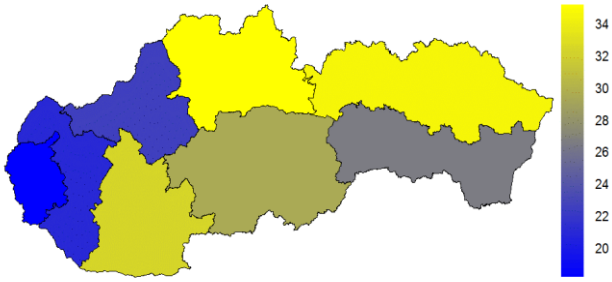

Figure 2 The standardised mortality rate of respiratory diseases in the particular regions of the Slovak Republic in 2013

Source: own elaboration by the authors.

We have applied a pooling approach. The model series is consisted of the two regression models. All the indicators except for a share of the Roma nationality enter the modelling process.

The elementary regression formula for this model series is expressed in a successive way:

$$SMR = 0.7185UR - 0.0236I + 0.973P + 4.0326GC - 19.214IQR - 0.7857SB \quad (1)$$

All the involved variables are statistically significant. They differ only by a level of statistical significance from each other. Whilst the GC and IQR variables fulfil the best significance level, the I and P variables lie under a one-per-cent significance level. The UR and SB variables belong to the third statistical significance group. At the same time as the UR variable hardly reaches a five-per-cent significance level, the SB variable stands above this level, but still fulfils a ten-per-cent significance level. Although the SB variable is significant under these circumstances, it is able to try to improve the whole model by retiring this variable from the modelling process.

The second tentative model has the following formula:

$$SMR = 0.1926UR - 0.0156I + 1.076P + 3.6969GC - 17.9613IQR \quad (2)$$

Exclusion of the SB variable takes along worsening the model itself. All the variables except from the P one, reach worse p-values. Although the P variable improves its behaviour, it remains statistically significant at the same level. The same levels are preserved also by the other variables except from the I variable, whose p-value has increased by one order, but still this variable is statistically significant. Concerning the alternations done by exclusion of the SB variable, it is more suitable to take into consideration the previous model – the first model M1. That is why we have taken the first model M1 as the best of this model series, and we will devote the successive analysis to it.

The most influencing variable according to the estimated coefficients is the IQR variable by a wide margin before the GC variable. The first one has effect in order of tens, the second one in order of units. The P, SB and UR variables succeed in order of tenths and the I variable in order of hundredths. Whilst the GC, P, and UR variable has a positive influence on the standardised mortality rate, the IQR, SB, and I variable work with a negative influence. Unemployment rate

brings an increase of the standardised mortality rate. Every increment by one percentage point adds 0.72 deaths per 100,000 inhabitants. Income performs as the least influencing indicator on the standardised mortality rate. Every time income is increased by one currency unit, which is euro in this case, the standardised mortality rate decreases by 0.02 deaths. Poverty behaves as an additive element of the standardised mortality rate. Each increase by one percentage point, which an increase of the population living in poverty is understood under, brings 0.97 deaths per 100,000 inhabitants. Gini coefficient achieves the second biggest impact on the standardised mortality rate and besides this the biggest positive impact too. A one-unit increment of this indicator means growth of the standardised mortality by 4.03 deaths. Income quintile ratio is the strongest variable involved in this regression model. It brings a reduction of the standardised mortality rate by 19.21 deaths each time it increases its value by one unit. Finally, social benefits, which were retired from the model at first, act as a deductive element of the standardised mortality rate. Each its increase by one unit means a decrease by 0.79 deaths per 100,000 inhabitants.

The following table demonstrates a summary of the regression coefficients of the involved variables. As it is seen here, all variables in the first model are significant. They differ only by a level of statistical significance from each other. Exclusion of the SB variable takes along worsening the model itself. It is more suitable to take into consideration the previous model – the first model M1.

Table 1 Summary of the regression models

Variable	Model 1			Model 2		
	estimated coefficient	p-value	significance level	estimated coefficient	p-value	significance level
UR	0.7185	0.0473	**	0.1926	0.3554	-
I	-0.0236	0.0025	***	-0.0156	0.0138	**
P	0.973	0.0016	***	1.0176	0.0011	***
GC	4.0326	$1.04 . 10^{-8}$	****	3.6969	$4.14 . 10^{-8}$	****
IQR	-19.2141	$3.88 . 10^{-6}$	****	-17.9613	$1.29 . 10^{-5}$	****
SB	-0.7857	0.0756	*	-	-	-

Legend for the Table 1: **** denotes a significance level lower than 0.001 including, *** denotes a significance level lower than 0.01 including, but higher than 0.001, ** denotes a significance level lower than 0.05 including, but higher than 0.01, and * denotes a significance level lower than 0.1 including, but higher than 0.05.

5 Discussion and conclusion

Mortality from respiratory diseases is the third main cause of deaths in EU countries, and the number of respiratory deaths is expected to increase in the coming years. However, more attention has been focused on action against cancer, diabetes, cardiovascular disease, and the focus on chronic respiratory disease has been declining. Several studies identified tobacco smoking and other forms of indoor air pollution; allergens, outdoor pollution, occupational risks, and vulnerability, as main risk factors for respiratory diseases. The impact of socioeconomic factors on the respiratory system diseases has been investigated by few studies. This current issue was motivation for exploring the association between indicators of socioeconomic status and mortality from respiratory diseases in Slovak environment. Specifically, we analysed indicators of income, income inequality, and poverty. The study shows that selected socioeconomic variables are statistically significant. They differ only by a level of statistical significance from each other. Indicators of the socioeconomic position seem to be the important predictors of respiratory mortality. These associations are also confirmed by the findings of Prescott et al. (2003) and by the

latest study Cournane et al. (2017). The existence of a strong social gradient in mortality from respiratory diseases and chronic obstructive pulmonary was found in study of Prescott et al. (2003). The socioeconomic conditions also have effects on hospitalization rates and hospitalization mortality from respiratory diseases. Many studies claim that people with the highest socioeconomic status have the best health status, conversely, the worst health status is reported by people in the lowest socioeconomic group.

According to the analyses, the most significant variables are indicators of income inequality such as income quintile ratio, also known as S80 to S20 ratio, and Gini coefficient.

S80 to S20 ratio brings a reduction of the standardised mortality rate by 19.21 deaths each time it increases its value by one unit. Gini coefficient achieves the second biggest impact on the standardised mortality rate. A one-unit increment of this indicator means growth of the standardised mortality by 4.03 deaths. Many researchers reported the same findings that health tended to be worse in the unequal societies with higher income inequalities (e.g. Pickett & Wilkinson, 2015; Lynch et al., 2004; Wilkinson & Pickett, 2006;and others). A small share of studies finds no association mainly because of the inappropriate use of control variables, subjective health measurements, or short periods of observation. The evidence that large income differences have damaging health and social consequences is strong and in most countries inequality is increasing. Narrowing the gap will improve the health and well-being of populations.

The unemployment also has a negative impact on respiratory mortality. The number of deaths from respiratory diseases is rising as a number of unemployment person increases. It could be caused by the fact that people without a job usually tend to smoke more, and the tobacco smoke has significant effects on prevalence of chronic respiratory diseases. Many scientists have agreed that unemployment has harmful effects on population health (Barnay, 2016; Sarti & Zella, 2016). Similarly, an increase of the population living in poverty is understood under, brings a significant increase in respiratory deaths. The poverty behaves as an additive element of the standardised mortality rate.

Finally, the lowest influencing indicator on respiratory mortality is income, which is expressed by household disposable income divided by the equivalent household size. These findings do not support the conclusions of Prescott et al. (2003), which states that income directly reflects material conditions, and housing conditions could have a direct effect on respiratory morbidity, i.e., humidity, crowding, and indoor pollutants. In another study also shows that household income was related to self-reported chronic obstructive pulmonary disease (Chen et al., 2000).

Socioeconomic indicators, especially income inequality play an important role in the incidence respiratory diseases and its mortality in Slovakia. The considerable differences in the distribution of income are reflected in inequality in health. Public policy should aim at reducing health disparities and consider the possibility that socioeconomic factors may have differential effects on the incidence and mortality of respiratory diseases. It is therefore important to develop an appropriate prevention plan that reflects the current respiratory morbidity situation and takes into account identified factors. The predictions of respiratory disease progression are very important for planning financial and other treatment resources. Furthermore, building a good database for national and international benchmarking also plays a significant role. Consequently, the results of

further analyses could be a valuable platform for national and regional health planners, health and social policy makers, and practitioners.

It is desirable to extend our results in further analyses, for example, relating to the respiratory risk factors influencing a targeted group of the Slovak population, or examining other social factors such as education in relation to respiratory morbidity and mortality.

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Using Screening Questionnaires in Patients over 40 Years of Age at the Department of Addictology in 2016

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Abstract

The aim of this paper is to present a specific patient population who were treated for alcohol addiction in the Department of Addictology of the General University Hospital in Prague (DoA) between 10/2016 and 02/2017, and discuss the psychopathologies, quality of life, levels of alcohol consumption and depression found in this group. After applying specific inclusion/exclusion criteria, the researchers determined a sample consisting of DoA patients over 40 years of age (54% men, 75% inpatient, the rest outpatient). In addition to basic sociodemographic data and types of treatment (inpatient / outpatient), we used standardised screening questionnaires to determine the level of patient psychopathology (SCL-90), quality of life (WHOQOL-100), risky alcohol consumption (AUDIT) and potential depression (BDI-II). In our evaluation of BDI-II we followed the screening tool manuals. The results are presented using descriptive statistics. The BDI-II test shows that a significant part of the patients (46%) were at risk of depression. Similarly, 50% of patients fell outside of the psychopathology standard when assessed by the SCL-90. More than 30% of respondents scored values indicating serious psychopathology in the category of obsessive-compulsive disorder, paranoid thoughts, psychotic and depressive states. The results will be used in comparative analysis of data collected from different populations or diagnosis groups.
Grant support: Institutional support was provided by Charles University, Programme Progres No. Q06/LF1.

Keywords: Alcohol, Health, Quality of life, Questionnaire, SCL-90, WHOQOL-100, BDI-II, AUDIT, Czech Republic.

JEL Classification: I12

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1 Introduction

Alcohol consumption and the problems it engenders have been familiar fixtures in human societies since the beginning of recorded history (Room, Babor, & Rehm 2005). Alcohol is causally related to more than 60 different medical conditions (Anderson & Baumberg 2006). Overall, 4 % of the global burden of disease is attributable to alcohol (ibid). Alcohol has an impact on health through three intermediate and linked variables: direct biochemical effects, intoxication and episodic heavy drinking, and dependence (Anderson & Baumberg 2006). Research has contributed substantially to our understanding of the relation of drinking to specific disorders, and has shown that the relation between alcohol consumption and health outcomes is complex and multidimensional (see e.g. Petruželka et al. 2017; Nechanská, Drbohlavová, & Csémy 2017). One approach to measuring the severity of alcohol-related problems in individuals is a standardised questionnaire. Questionnaires may focus on a variety of aspects of consumption, patients' health and/or quality of life, any may be used as art of screening, diagnostics as well as other phases of treatment. Furthermore, they can be used in conjunction with other tools designed to evaluate treatment efficacy in clinical or economic terms. The aim of this paper is to present a specific patient population treated for alcohol addiction in the Department of Addictology of the General University Hospital in Prague (DoA) between 10/2016 and 02/2017 and discuss the psychopatologies, quality of life, levels of alcohol consumption and depression found in this group (see e.g. Broklová, Šťastná, & Minařík 2017).

2 Methods

Data collection was carried out from early October 2016 to late February 2017 as a part of a prospective study of long-term health consequences of acute methanol intoxication, see e.g. Zakharov et al. (2015). In this study, the sample of patients over 40 years of age treated at the DoA has served as a control group for physiological examination of patients after methanol intoxication. Respondent selection ensured a more or less equal representation of both sexes and an age span roughly similar to that of the methanol patients. The sample excludes individuals using drugs with potential impact on stability (BZD, antileptics, antipsychotics, antiepileptics, etc.) and patients with a history of serious neurological disorders, demyelinating disease, neuromuscular disease, myelopathy, polyneuropathy, acute vertebrogenic pain, radiculopathy, vestibular system disorders, orthopaedic/rheumatic diseases of support joints (arthritis, osteoarthritis, joint replacements or recent injury or loss of lower limbs, corrective surgery of lower limb asymmetry).

Respondents were recruited from outpatients of the DoA ambulatory care unit and inpatients hospitalised at the DoA, both men and women. Patients were invited to participate in the study by DoA clinicians who then facilitated contacts between these patients and the research team. Patients willing to participate in the study received no financial remuneration, but were offered to undergo more complex examinations than regular hospital patients, and during the study they were provided with refreshment. Before the screening tools were applied, each patient was advised that his/her participation in the study was purely voluntary and that he/she could leave the study at any point, while an early termination of the study would not have any impact on their further treatment. The patients were also informed that the output of the study would be presented in an anonymous form and they signed the informed consent. The research objective and study design were approved by the Ethics Committee of the General University Hospital in Prague.

In addition to basic sociodemographic data and types of treatment (inpatient/outpatient), we used standardised screening questionnaires to determine the level of patient psychopathology (SCL-90;

Baštecký 1993), quality of life (WHOQOL-100; Dragomirecká & Bartoňová 2006), risky alcohol consumption (AUDIT; Nešpor 2004) and potential depression (BDI-II; Preiss and Vacíř 1999). In our evaluation of BDI-II we followed manuals by Preiss and Vacíř (1999) and Ptáček et al. (2016). AUDIT data were evaluated based on the Czech version of the questionnaire and recommendations by Nešpor (2004), taking into account the original procedure developed by Babor et al. (2001). Patients' quality of life was assessed based on the WHOQOL-100 questionnaire, evaluation of which followed the procedure developed by Dragomirecká and Bartoňová (2006), and the results were compared against values for the general population published in the same paper. Patient psychopathology was assessed based on the SCL-90 questionnaire, evaluated according to Baštecký (1933). The scores in some categories were not calculated because the respondents did not answer enough questions to allow such calculations.

3 Basic descriptive and sociodemographic characteristics of research sample

Our sample consisted of 24 patients. See Table 1 for the basic sociodemographic characteristics and types of treatment in the research sample. Out of the total number of respondents, 25 % were outpatients and 75 % inpatients. There were 54 % men and 46 % women. In terms of marital status, 58 % of respondents were married, 13 % were single and 29 % were divorced. The biggest age group in the research sample were people between 50 and 59 years old (42 %). There was a relatively high number of respondents with secondary school diplomas, making up to 79 % of the sample. Respondents with a university-level education created a minority (21 %).

Table 1 Basic sample characteristics

	N	%		N	%
Sex			**Age**		
Female	11	46	40-49	9	38
Male	13	54	50-59	10	42
Marital status			60-69	4	17
Married	14	58	70+	1	4
Divorced	7	29	**Education**		
Single	3	13	Secondary without leaving diploma/ vocational	8	33
Type of treatment					
Out-patient	6	25	Secondary with leaving diploma	11	46
In-patient	18	75	University	5	21

Source: Authors' survey

4 Patients' quality of life

Results were evaluated using the mean score in individual domains of the WHOQOL-100 questionnaire and the mean score for overall quality of life and general health. The lowest mean score was identified in the domain of physical health, with low scores found also for social relationships and psychological health. The mean score identified in each domain was then compared with the population norms according to Dragomirecká and Bartoňová (2006); this comparison is only of an indicative value, because individual samples do not completely match the relevant sociodemographic characteristics. Differences between populations are measured in terms of the difference in their mean scores. Patients show a mean score that is below the population

norm in all domains including overall quality of life and general health. The smallest difference in mean scores was in the environment domain, overall quality of life and general health, and psychological health. In the social relationship domain, there is a markedly greater difference. The biggest difference of all was identified in the domain of physical independence and physical health (see Table 2).

Table 2 Final mean scores by domain for the patient sample and the population norm, including mean score difference

	Patient sample			Population norm (Dragomirecká and Bartoňová 2006)			Mean score difference
	Mean	Minimum	Maximum	Mean	Minimum	Maximum	
Physical health	12.4	9.0	15.3	15.4	8.0	19.7	3.0
Psychological health	13.2	9.6	16.6	14.4	8.0	18.2	1.2
Physical independence	13.5	11.8	16.3	16.9	10.3	19.8	3.3
Social relationships	13.1	9.0	30.3	15.1	9.7	20.0	1.9
Environment	13.9	10.9	16.5	14.6	9.8	18.5	0.7
Overall quality of life and general health	14.0	9.0	19.0	15.2	4.0	20.0	1.2

Source: Authors' survey

5 Risky alcohol consumption among patients

The values yielded by the AUDIT test indicate problematic alcohol consumption for all patients in the sample, which confirms the expected problematic drinking among the respondents (see Table 3). The evaluators disqualified 6 questionnaires that were incorrectly filled.

Table 3 Values yielded by the AUDIT test

	Medium level of problematic drinking	High level of problematic drinking	Addiction	Disqualified questionnaires
N	2	1	12	6
%	8	4	50	25

Source: Authors' survey

6 Potential depression among patients

Based on the BDI-II test, 46% of patients suffered from depression, with 21% scoring at a medium level of depression (see Table 4).

Table 4 BDI-II results

	N	%
Minimum or no depression	13	54
Mild depression	3	13
Medium depression	5	21
Serious depression	2	8
Disqualified questionnaire	1	4

Source: Authors' survey

7 Psychopathology among patients

Evaluation of the SCL-90 questionnaire gave as an insight into the respondents' problems in several domains focusing on various types of psychopathology (Baštecký 1993). We were also able to assess the overall severity of psychopathology. It turns out that 50% of the sample show values within the norm. The domains with the relatively smallest number of respondents within the norm were the domains of obsessive-compulsive behaviour, depression, paranoid thoughts, psychotic states and miscellaneous. More than 30% of patients show values indicating serious psychopathology in the domains of obsessive-compulsive behaviour, paranoid thoughts, psychotic states and depression (see Table 5).

8 Conclusion

This paper presents descriptive data concerning a group of adult patients treated for alcohol addiction. We have also identified several methodological problems that need to be addressed in future studies. The WHOQOL-100 questionnaire helped us identify potential problematic areas related to the patients' quality of life, namely physical health, physical independence and social relations. These findings have implications for treatment. The AUDIT test confirmed that patients treated for alcohol addiction really fell within the group of alcohol drinkers at risk. An important finding for future research is the fact that a half of all disqualified AUDIT questionnaires were filled out by elderly patients of retirement age. These people seem to require more attention and assistance when filling out questionnaires. The BDI-II test showed that a significant portion of patients (46 %) may suffer from depression. Similarly, the SCL-90 questionnaire showed that in the depression domain, 46 % of patients fell outside of the norm, and 50 % of patients fell outside of the norm in terms of psychopathology. Values indicating a more severe psychopathology were indicated in more than 30 % respondents in terms of obsessive-compulsive behaviour, paranoid thoughts, psychotic states and depression. This correlates with previous findings in other Czech studies on comorbidity in more sever forms of addiction (Miovská, Miovský, & Mravčík 2006). Awareness of risk factors and early treatment of patients with alcohol addiction are also crucial in terms of prevention because patients are important agents of socialisation not only for their own children (Miovský et al., 2015). As for future research, a larger sample that would include patients in younger age categories would be of great value. It would be also interesting to apply the same test to patients at various stages of treatment and map out specific patients' progress during the treatment.

Table 5 Evaluation of SCL-90 questionnaires

		Values within norm	Values exceeding norm	Values indicating serious psychopathology	Missing
Somatisation	N	18	2	4	
	%	75	8	17	
Obsessive-compulsive	N	12	1	11	
	%	50	4	46	
Interpersonal sensitivity	N	14	2	7	1
	%	58	8	29	4
Depression	N	12	3	8	1
	%	50	13	33	4
Anxiety	N	15	5	3	1
	%	63	21	13	4
Hostility	N	18	1	5	
	%	75	4	21	
Phobia	N	16	6	2	
	%	67	25	8	
Paranoid thoughts	N	12	2	10	
	%	50	8	42	
Psychotic states	N	13	2	9	
	%	54	8	38	
Miscellaneous	N	10	5	9	
	%	42	21	38	
General severity indicator	N	12	5	6	1
	%	50	21	25	4

Source: Authors' survey

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Growth Accounting for Slovakia, Slovenia and the Czech Republic

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Abstract

The economic crisis has slowed economic performance of many countries. At present, countries are gradually returning to the pre-crisis performance. Research on economic growth and country productivity has been one of the most popular topic in economics for decades. Indeed, many researchers analysed empirically the patterns of the economic growth in the world. The purpose of this survey is to find out if it is true that our three CEE countries (Slovakia, Slovenia and the Czech Republic) have achieved their economic growth in the same way - in the sense that economic growth has the character of extensive growth or intensive growth. Reason for such an argument is a fact that selected countries have many common characteristics that predetermines them to resemble in the characteristic of economic growth. To verify this, we chose the growth accounting: dual approach. Verification was carried out in two periods, for each country: the pre-crisis (1994-2007) and the crisis and the post-crisis period (2008-2016). We conclude that only in one country (CR) it is possible to talk about the predominantly intense nature of economic growth throughout the whole period. The nature of the economic growth of the remaining two countries was mixed, with periods of rather extensive growth and periods of rather intense growth.

Keywords: Growth accounting, CEE, economic growth, Solow residuals, TFP.

JEL Classification: F43, H30

1 Introduction

Research on economic growth and country productivity has been one of the most popular topic in economics for decades. Many researchers analysed empirically the patterns of economic growth in the world. A major wave of the literature was inspired by the seminal works of Abramovitz (1956, 1986), Solow (1957), Baumol (1986), Barro (1991, 2001), Mankiw et al. (1992), Krugman (1994), Jones (1997), Quah (1997), Senhadji (1999) or Kumar and Russell (2002), Henderson and Zelenyuk (2006), Romer (2012), Romero (2012), Checherita and Westphal and Rother (2012), Zelenyuk (2014), Everaert and Heylen and Schoonackers (2015) and Mihoková, Harčariková and Martinková (2016) or Walheer (2016) to mention a few. The authors used different methods of analysis and quantification in their research. The growth accounting framework is one of the methods used. The pioneers of this method were Abrahamovitz (1956) and Solow (1957). The original idea was later elaborated and supplemented by Jorgenson and Griliches (1964) on primal and dual approach. Further adjustments brought Hulten (1990, 2009), or Musso (2006). In this analyses we use a standard Cobb-Douglas production function approach (as in Podpiera-Raei-

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Stepanyan, 2017; Dimelis & Papaioannou, 2013; Musso, 2006; Novak, 2003). We mainly follow the explanation provided by Hsieh (2002), Hloušek (2007) or Hulten (2009).
The aim of the article was to find out whether the economic growth is achieved in the same way in selected countries (which are under the common name CEE). At the same time, we want to find out whether the economic growth has been extensive or intensive. We selected three CEE countries (OECD term for 12 countries from Central and Eastern Europe). The development of the countries we chose was similar in many areas - both in economic and socio-political areas. The Czech Republic and the Slovak Republic are countries of the former commonwealth - Czechoslovakia. Currently they are part of V4 countries. Slovenia is similar to the Czech Republic and Slovakia, not only by its size but also by the historical and social environment in which it was formed. In 2004, all three joined the EU and are also part of other groupings (OECD, NATO). Slovakia and Slovenia are part of the EMU.

We can also talk about their similarity and proximity from an economic point of view. From the point of view of the unemployment rate, Slovenia and Czech Republic are closer than Slovakia. The average unemployment rate over the last 24 years was 8 % (Slovenia) and 6.5 % (Czechia). Regarding this Slovakia is specific, its unemployment is 14.2 % over the same period. Slovakia's and Slovenia's inflation has an average of 4.6 % over the last 24 years, in the Czech Republic it is 1% less. Foreign direct investment is also one of the factors for future economic growth. As Gontkovičová, Tkáčová and Kralik (2016) mentioned the region of CEE is the fourth most attractive region in the world for investors. Bijsterbosch and Kolasa (2009) find that foreign investment has been an important factor in productivity growth of CEECs. There is a very visible impact of the crisis in this area. While in the pre-crisis era, Slovakia was a leader in the volume of FDI, after the crisis the situation changed. As Gontkovičová, Tkáčová and Kralik (2016) concluded, among the countries of the V4, the highest attractiveness for foreign investors is reported by the Czech Republic whose strength is the macroeconomic environment, and weakness is represented mainly by the bureaucratic delays. On the other hand, the least attractive country seems to be the Slovak Republic. (Europe, 2015) Slovenia is slowly approaching its pre-crisis levels. However, as Hlaváček and Bal-Domanská (2016) mentioned, growth of foreign direct investment positively demonstrates itself in increasing the level of the gross domestic product.

Selected countries also developed similarly in terms of economic growth, especially in the period 2000 - 2014. (Figure 1) During this period, these countries have achieved economic growth, coupled with the opportunities they have gained thanks to accession to the EU (2000-2008), the subsequent economic downturn, but also the recovery of their economies (2009-2014). While Slovenia maintained a relatively stable level of economic growth (3-7 %) in the pre-crisis period, the Czech Republic and Slovakia tried a short period of economic downturn (in the second half of the 1990s) as well as rapid economic growth (especially Slovakia in 2007, when the value of economic growth was 10.4 %). In the post-crisis period, Slovakia was better able to cope with the situation, and from 2010 has only economic growth. The other two countries are trying to stabilize their performance less successfully so far.

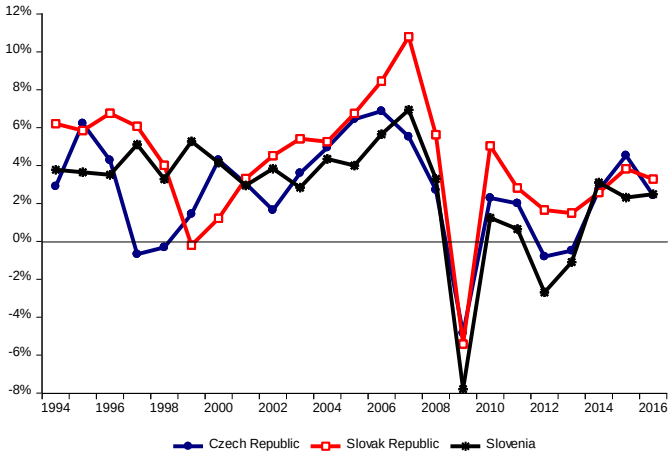

Figure 1 Economic Growth in Selected Countries, 1994 – 20016 (%)
Source: Own calculations

Our goal is to find out the character of the economic growth achieved in each country. We followed developments in the three CEE countries (the Czech Republic, Slovakia, Slovenia) in the period 1993-2016, which we divided into the pre-crisis period (1993-2007) and the crisis and post-crisis period (2008-2016). In the first part we have compiled a brief overview of the literature from the field of our problems. In the second part we briefly describe the used methodology and the data we used. In the third part we discussed our findings about the influence of individual factors on the total production of the countries. In the fourth part we summarized the achieved results.

2 Methodology and Data

2.1 Methodology

Suppose we use the basic form of the Cobb-Douglas production function. Aggregate output (Y) consists of consumption goods (C) and investment goods (I). These goods are produced from labour services (L) and capital (K). (Musso, 2006) Productivity is usually represented as a Hicks-neutral augmentation (A) of aggregate inputs:

$$Y_t(C_t, I_t) = A_t F(L_t K_t) \qquad (1)$$

The first step is derivation of the equation. The next one in this derivation is to express the production function in growth rate form.

$$\frac{\widehat{Y_t}}{Y_t} = \frac{\partial Y}{\partial K}\frac{K_t}{Y_t}\frac{\widehat{K_t}}{K_t} + \frac{\partial Y}{\partial L}\frac{L_t}{Y_t}\frac{\widehat{L_t}}{L_t} + \frac{\widehat{A_t}}{A_t} \qquad (2)$$

Hat is denoting time derivatives. The corresponding ratios are rates of change. This form of calculation means that the rate of output growth equals the growth rate of capital and labour weighted by their output elasticities plus the growth rate of the Hicksian shift parameter. These elasticities represent factor-income shares s_{K_t}, s_{L_t} when inputs are paid the value of their marginal products $\frac{\partial Y}{\partial K} = \frac{r}{p}; \frac{\partial Y}{\partial L} = \frac{w}{p}$. Then:

$$TFP = \frac{\widehat{Y_t}}{Y_t} - s_{K_t}\frac{\widehat{K_t}}{K_t} - s_{L_t}\frac{\widehat{L_t}}{L_t} = \frac{\widehat{A_t}}{A_t} \qquad (3)$$

TFP defines the „residual“ as the growth rate of output is not explained by the share-weighted growth rates of the inputs. (Hulten, 2009)

We want to examine the changes in the input prices so we use the dual approach provided by Hsieh (2002) or Hloušek (2007). We start with:

$$Y = rK + wL \quad (4)$$

After the differentiation of (1) and dividing by Y we have

$$Y` = r`K + rK` + w`L + wL` \quad (4a)$$

$$\frac{Y`}{Y} = r`\frac{K}{Y} + \frac{r}{Y}K` + w`\frac{L}{Y} + \frac{w}{Y}L` \quad (4b)$$

$$\frac{Y`}{Y} = r\frac{K}{Y}\left(\frac{r`}{r} + \frac{K`}{K}\right) + w\frac{L}{Y}\left(\frac{w`}{w} + \frac{L`}{L}\right) \quad (4c)$$

We use the substitution and it brings us:

$$Y` = s_K(\hat{r} + \hat{K}) + s_L(\hat{w} + \hat{L}) \quad (5)$$

where the identities s_K and s_L represent the factor-income share and the sum of factor-shares is equal to unit ($s_K + s_L = 1$). Variables „ $\hat{r}$, $\hat{w}$, $\hat{K}$ $\hat{L}$ “ represents growth rates. (Hlousek, 2007) To calculate dual TFP we use equation:

$$SR_d = s_K\hat{r} + s_L\hat{w} \quad (6)$$

and we obtained the share-weighted growth in factor prices.

2.2 Data

All the necessary data for the calculation were available from two sources: OECD and Eurostat. We used the data on an annual basis, sample period was from 1993 to 2016.

In particular, the real interest rate used to measure the rental price of capital is represented by the 3-month nominal interbank offered rate deflated by CPI inflation. The real wage is calculated as the ratio of the nominal wage rate to the consumer price index. The aggregate output is represented by GDP. The labour share was calculated as a ratio of total labour costs and gross value added.

Table 1 Capital and Labour Shares

Country	Labour Share in %	Capital Share in %
Czech Republic	59.3	40.7
Slovak Republic	50.7	49.3
Slovenia	77.2	22.8

Source: Own calculations

Slovenia has the highest labour-income share. (Table 1) We associate this with the fact that almost two thirds of the working population is employed in services. (CIA 1, 2016) The Czech or Slovakian values are comparable to those of the United States (62 %), G20 (61 %), Japan (57 %). Surprisingly, there is a significant difference between countries. It could be assumed that the share of individual factors will be very similar, as the labour force structure in agriculture, industry and services is very similar. However, the results do not confirm this.

3 Results

After the transformation of the data, we calculated the factor cost growth rates and TFP using the equations (3). At the same time, we calculated the shares of individual factors on economic growth. Subsequently, we also calculated the average price changes of the individual factors and the dual FTP using equations (4-6). To better understand the impact of the crisis, we divided the period into two stages and for each country we listed the results for: 1994-2007, 2008-2016.

3.1 Pre-Crisis Period (1994-2007)

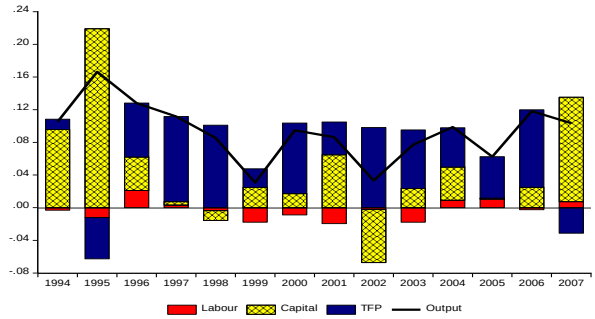

Figure 2 The Czech Republic - Input Shares on Output, 1994-2007
Source: Own calculations

Table 2 The Czech Republic - Average Changes and Shares, 1994-2007

	Czech republic		
	Capital	**Labour**	**TFPp**
average change (1994 - 2007)	0.0435	(-0.0026)	0.0511
average share on GDP (1994-2007)	32.1%	(-6.0)%	73.9%
	Rental price of capital	**Real Wage**	**TFPd**
average change (1994 - 2007)	(-0.3431)	0.045	(-0.2981)

Source: Own calculations

The Czech economy has experienced several periods (Figure 2) in which economic growth consisted mainly through growth of capital (years 1995, 2001, 2002 and 2007 - these are, in particular, years of economic and political reform). On the other hand, the TFP has the highest average share of economic growth in this period. (Table 2) The share of labour is almost zero and affects growth rather negatively than positively. The dual approach showed us that the change in the price of capital was much faster than the change in the volume of real capital in that period. The drop in prices was reflected in an increase in the volume of capital. The fall in prices was helped by structural reforms in the economy, the privatization of state property as well as positive economic developments in international markets with strategic raw materials. In addition, the results showed that both wage and hours worked were so minimal that they were negligible in both cases (Table 2).

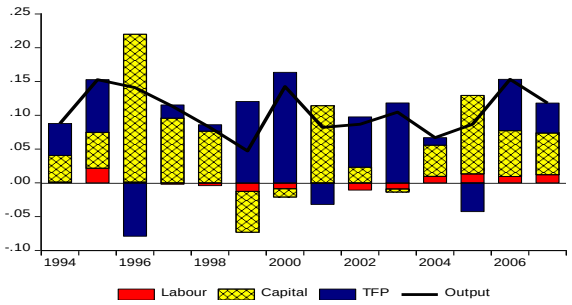

Figure 3 The Slovak Republic - Input Shares on Output, 1994-2007
Source: Own calculations

Table 3 The Slovak Republic - Average Changes and Shares, 1994-2007

	Slovak Republic		
	Capital	**Labour**	**TFPp**
average change (1994 - 2007)	0.0597	0.0013	0.0435
average share on GDP (1994-2007)	52.7%	(-0.05)%	47.35%
	Rental price of capital	**Real Wage**	**TFPd**
average change (1994 - 2007)	(-0.2300)	0.0501	(-0.1799)

Source: Own calculations

Slovakia is in the opposite situation compared to the Czech one. Capital is mostly involved in economic growth. (Fig 3 & Table 3) The share of work is almost zero. The share of the TFP is very close to 50 percent and its main impact, both negative and positive, was reflected in the first years of the transformation process and then in the years of sharp economic and political changes (1999, 2000, 2003 - only positive). During the period prices of inputs have changed significantly on the capital side, as on the wage side. However, the rise in prices occurred only in two years - 1996 and 2003 - when, as a result of the reforms, there was a sharp increase in capital prices. In the rest of the period, the price of capital has fallen, but very slowly. At the time of the highest economic performance (2006 - 2007), capital and TFP contributed approximately to the same share of economic growth (Table 3).

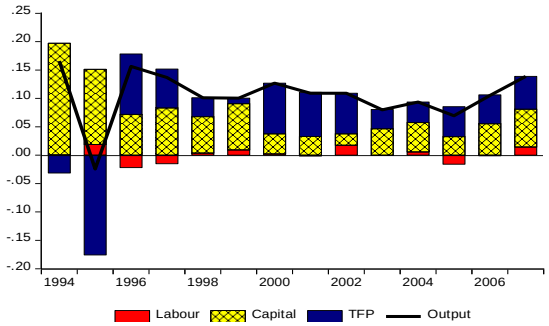

Figure 411 Slovenia - Input Shares on Output, 1994-2007

Source: Own calculations

Table 46 Slovenia - Average Changes and Shares, 1994-2007

	Slovenia		
	Capital	**Labour**	**TFPp**
average change (1994 - 2007)	0.0694	0.0012	0.0343
average share on GDP (1994-2007)	64.33%	(-0.26)%	45.78%
	Rental price of capital	**Real Wage**	**TFPd**
average change (1994 - 2007)	(-0.0634)	0.0615	(-0.0019)

Source: Own calculations

In the case of Slovenia, it is evident that the share of capital and TFP is not very different. (Fig 4) Nevertheless, capital's contribution prevails. The share of labour is again completely negligible. In terms of changes in input prices, we note that the size of changes is much smaller compared to Czech and Slovak ones. Prices have changed more slowly. On the other hand, a slower change in the price of capital was reflected in faster capital growth. On the contrary, wage growth did not show up on the number of hours worked almost at all (Table 4).

3.2 Crisis and post-crisis period (2008-2016)

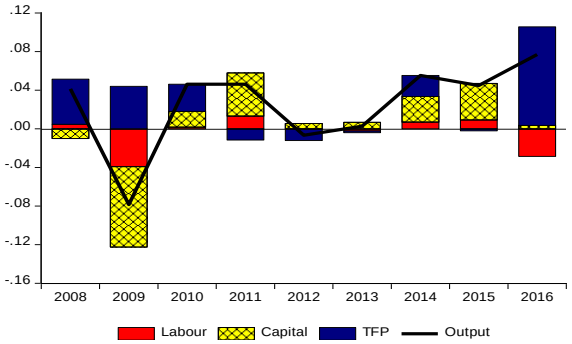

Figure 512 The Czech Republic - Input Shares on Output, 2008-2016

Source: Own calculations

Table 57 The Czech Republic - Average Changes and Shares, 2008-2016

	Czech republic		
	Capital	**Labour**	**TFPp**
average change (2008 - 2016)	0.0055	(-0.0007)	0.0142
average share on GDP (2008 - 2016)	31.73%	11.88%	56.39%
	Rental price of capital	**Real Wage**	**TFPd**
average change (2008 - 2016)	(-0.7177)	0.0149	(-0.7028)

Source: Own calculations

In the course of the crisis and the post-crisis period, the situation in the Czech Republic changed. This was mainly due to a sharp decline in investment in 2009 and 2012 (we expect it to be the direct consequence of the crisis) and the subsequent sharp rise in investment in 2015 as part of the recovery of the economy. In this period, the share of capital was more than 30%. The nature of the work contribution has also changed - it has had a relatively strong positive impact in this period. Despite the crisis, however, the nature of economic growth did not change. It was still based on the change of TFP. Changes in prices mainly reflect the impact of the crisis, with the result that the price of capital has fallen sharply (2008, 2009). The positive change in wages is rather the result of the changes brought by the recovery of the economy in 2014-2016 (Figure and Table 5).

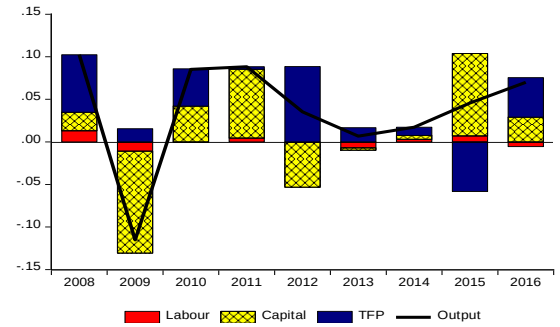

Figure 613 The Slovak Republic - Input Shares on Output, 2008-2016

Source: own calculations

Table 6 The Slovak Republic - Average Changes and Shares, 2008-2016

	Slovak republic		
	Capital	**Labour**	**TFPp**
average change (2008 - 2016)	0.0111	0.0003	0.0259
average share on GDP (2008 - 2016)	39.57%	(-6.1)%	66.53%
	Rental price of capital	**Real Wage**	**TFPd**
average change (2008 - 2016)	(-0.3593)	0.0164	(-0.3429)

Source: own calculations

In the Slovak economy, the crisis has made a significant change compared to the pre-crisis period. TFP has become the main driver of economic growth, both in the negative and, most importantly, in the positive way. As IMF mentioned (SR 1, 2014), in 2011-2012 Slovakia and its neighbours all benefited from sharp increases in FDI, but Slovakia also enjoyed high total factor productivity growth. With substantial investment in export industries (especially cars and electronics) following accession, net exports became a key driver of Slovak growth, particularly after 2009. The new investments subsequently created the space for further investment and allowed a reduction in capital prices. However, a significant drop in capital prices is also an accompanying sign of the crisis period the country underwent (Figure and Table 6).

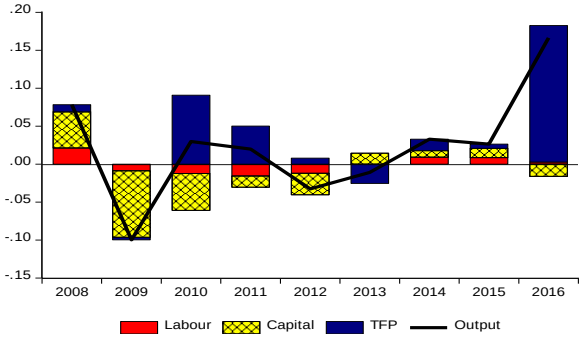

Figure 714 Slovenia - Input Shares on Output, 2008-2016

Source: Own calculations

Table 78 Slovenia - Average Changes and Shares, 2008-2016

	Slovenia		
	Capital	**Labour**	**TFPp**
average change (2008 - 2016)	(-0.0125)	(-0.0008)	0.0367
average share on GDP (2008 - 2016)	(-8.13)%	1.74%	106.39%
	Rental price of capital	**Real Wage**	**TFPd**
average change (2008 - 2016)	(-0.2497)	0.0224	(-0.2273)

Source: Own calculations

Slovenia has undergone the biggest change. While, in particular, capital and TFPs contributed to economic performance in pre-crisis terms, the capital was counter-productive and growth was secured through changes in the TFP in the post-crisis period. Negative capital changes were the result of the crisis in international markets, with fewer FDI coming to Slovenia and some even withdrawing from the Slovenian market. Another reason was that many companies went bankrupt on the national market. Labour also had a negative effect on economic growth, mainly due to the sharp rise in unemployment (2008-2010). The unemployment rate rose by around 6 percentage points since the start of the global financial crisis in late 2007 to reach close to 10 % in Q1 2014. Unemployment has risen most among young people, more than doubling since the start of the crisis to around 23 % at the end of 2013, higher than the OECD average of 16 %. (OECD, 2014) On the contrary, the performance of the TFP was very high and the economy gained economic growth (Figure and Table 7).

4 Conclusion

Based on the comparison of both periods, we can say that only one of the countries has maintained the same main input of economic growth in the pre-crisis as well as in crisis and post-crisis periods. It was the Czech Republic and TFP was the main source of economic growth throughout the period. In this respect, we note that the character of the economic growth of the Czech economy is rather intense. The structural reforms that have been adopted and implemented in the economy as well as the inflows of FDI brought to the economy know-how and innovation have helped to that end. Thanks to them the economy was able to progress. At present, however, the country is again in a situation where further postponement of necessary reforms, especially in the social sphere, may impede the further economic development of the country in the near future. Policy makers have to ask how the structure of the economy should look, so that economic growth can be achieved in the future. For Slovakia and Slovenia, the crisis marked a major change. Both countries relied on their economic growth for capital change in the pre-crisis period. Since the crisis, however, their economic growth has been more dependent on changes in the TFP. We consider this to be partly reflected in the fact that countries have made greater use of the benefits of implementing FDI in the pre-crisis economy, as well as the fact that several factors have evolved in their favour - a relatively rapid recovery of large markets to which they are economically tied, relatively stable and healthy banking sector, which has not suffered much losses during the crisis and high economic performance before the crisis. The nature of their economic growth is in our view a form of mixed growth - particularly extensive in the pre-crisis period and a mixture of intense and extensive today.

A common feature of all three countries is the share of the labour on the creation of economic growth. The impact of the labour is in fact negligible in all countries - both in terms of hours worked and in terms of wages. Rental price of capital declined throughout the period in all countries. However, prices have changed much faster than the volume of capital has changed. The development of the real capital did not reflect the development of market prices.

Taking into account the development of the monitored variables, we think that at the level of the whole economy, we do not have enough information to make it possible to determine the real contribution of individual inputs to economic growth. Taking into account the development of the monitored variables, we think that at the level of the whole economy, we do not have enough information to make it possible to determine the real contribution of individual inputs to economic growth. We believe that there is a need to further analyse the contribution of individual inputs to outputs of individual sectors. We expect such an analysis, combined with the findings of the overall

economy, should provide a more realistic picture of economic growth and its resources in the countries under review. Therefore, this will be the subject of our further research.

Acknowledgements

This paper was written in connection with scientific project VEGA no. 1/0994/15 and VEGA no. 1/0961/16. Financial support from this Ministry of Education`s scheme is also gratefully acknowledged.

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Real Exchange Rate and External Competitiveness: An Empirical Investigation for the Eastern European Countries

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Abstract

External competitiveness and level of export product sophistication to a large extent shapes the possibility of further country development and achievement of higher growth rates. A lot of empirical studies show that if country succeed to develop higher export sophistication in relation to the GDP per capita level, than it should achieve faster economic growth in the future. In comparison to similar studies, this research will add to the existing literature by focusing not only on relationship between GDP and export sophistication, but on role of real exchange rate in process of structural change of the export sector of developing countries.

The basic objective of this research is to analyze one of the channels through which real exchange rate acts on the economic growth of the Eastern European Countries, which relate to its effect on the external competitiveness and sophistication of the exports sectors. The working hypothesis is that under/overvaulted real exchange rate has statistically significant impact on export sector sophistication measured by EXPY index. The paper also hypothesizes that impact of the changes in a level of under/overvaluation on export sophistication is different in pre and post crises period in countries covered by this research. Different impact of the real exchange rate under/overvaluation in those periods is related to the prevailing influence of liberalization of capital account on the overall macroeconomic indicators in pre-crisis period, as well as reduction of its influence after outbreak of the financial crisis.

The empirical analysis primarily includes a panel dataset of a total of 26 countries, covering period 1995-2013. For the purpose of the mentioned analyses General Method of Moments (GMM) panel estimation technique was employed, in order to consider some possible methodological issues like the problems of endogeneity and reverse causality. Also, level of under/overvaluation of exchange rate was estimated using panel Fully Modified Ordinary Least Square (FMOLS) estimation techniques.

Keywords: Real exchange rate, EXPY, External competitiveness, Economic growth.

JEL Classification: F14, O24

1 Introduction

External competitiveness, defined as a possibility of the country to be competitive on global level, is a complex concept that can be measured using several indicators. The most important indicator, which contributes to maintaining long-term stability of growth, is adequate export structure, driven by price and cost competitiveness. Latest literatures related to external competitiveness argue that one of the key components of economic growth and development is sophistication of country's

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export. Particularly, „what your export matters" for growth is how sophisticated is country's production. If production in export sector of country is associated with higher productivity levels, then knowledge spillovers are more possible, and accordingly it is easier to faster achieve further increase of quality of existing production, or to start production of new products (Anand, Mishra, & Spatafora, 2012). Sophisticated sectors are particularly likely to act as a driver of growth for the broader economy, if they are supported with appropriate institutional, structural and policy environment.

Important question is what enables a country to increase the sophistication of its production. Recognizing importance of the appropriate policy measures, within all other factors such as institutional and structural, main object of this research is examination of the real exchange rate under/overvaluation impact on export sophistication. Real exchange rate, its level and volatility, affects the size of the demand for exports of the country, has influence on the structure of the economy in the medium term and beyond that, to the long-term growth rate.

The purpose of this research is to analyze one of the channels through which real exchange rate has impact on the economic growth, which relates to its effect on the external competitiveness and sophistication of the exports sectors of Eastern European Countries. The working hypothesis is that under/overvaulted real exchange rate has statistically significant influence on export sector sophistication measured by EXPY index. The paper also hypothesizes that impact of the changes in level of under/overvaluation on export sophistication is different in pre and post crises period in countries covered by this research. This is direct consequence of specific conditions in export sectors of these countries (characterized with the high level of concentration and low diversification), as well as long period of appreciation in transition pre-crisis period (especially in South East European Countries (SEE)).

The rest of the paper is organized as follows. The second section gives an overview of theories related to the research subject. The third section presents research design, description and sources of data and methodology applied in measuring under/overvaulted real exchange rate impact on EXPY. In this section is also given estimation of under/overvaluation of real exchange rate for countries included in sample. Findings of the analysis are presented in the fourth section, while the fifth concludes the paper.

2 Theoretical Framework

Various theories attach different importance to the role of exchange rate in changing the structure of the export sector. Looking at the theory of exogenous and endogenous growth, and traditional trade theory, it can be noticed that the issue of impact of the real exchange rate on the development of the export sector and the economic growth rate is very little directly elaborated, it is only implicitly addressed.

Unlike traditional trade theories, the theory of export-led growth assumes an open economy and the primary impact of the demand side, namely the export, for the growth of a country, with more or less regard for the importance of exchange rate in the process. In the structuralist and Keynesian school, exports are not viewed only as part of aggregate demand, and yet it is emphasized that a sustainable level of exports is necessary for the growth of other components of domestic demand.

In the context of long-term growth theory in an open economy, post-Keynesian economists developed two related, but also in some respects, very different models of export-led growth. The first is the model of cumulative causation (better known as the Kaldor Model (Kaldor, 2013), while the second is the balance of payments constrained growth model (Thirlwall's Law and its amendments (Thirlwall, 2011). While Kaldor's model considers the impact of the real exchange rate in the medium term on the achievement of long-term balance, Thirlwall's model is based on the view that the purchasing power parity applies in the long run. This is the basis for the assumption of Thirlwall's Law that changes in relative prices, and hence the real exchange rate, have no effect on the rate of growth in the long term. Thirlwall's Law implies that changes in the exchange rate may have an impact on changes in growth rates, but only in the case of continuous real depreciation, where the Mrshall-Lerner condition must be met.

Starting from limitations of the long-term Thirlwall's Law, some authors suggest that changes in relative prices may be very important for the movement of growth rates. The impact of the exchange rate is recognized over the impact on structural changes in the economy, creating the conditions for the development of the export sector and the reallocation of capital and other factors of production. Thus, Barbosa and Filho (2006) believe that the level of the real exchange rate may be a significant determinant of price and income elasticity of trade flows. It affects the relative prices of tradable and non-tradable goods in the country, and therefore the structure of exports and the growth rate of the economy.

Rodrik (2008) has a similar view, indicating that the increase in the exchange rate, as measured by the change in relative relationship between tradable and non-tradable goods, leads to structural changes, on the basis of which the positive growth experiences of certain countries can be explained. As distortion (caused by institutional factors and market failures) is as a rule higher in the export sector, the main conclusion is that the depressed real exchange rate leads to a positive impact on the redirection of capital to the export sector. This leads to creating a new structure of the economy, which, as such, affects the long-term economic growth rate.

Besides this, additional econometric studies indicating the above described relationship between real exchange rate and the growth rate of the economy (or the rate of growth of employment in the tradable sector) include: Razin and Collins (1997), Hausmann, Hwang and Rodrik (2005), Aghion et al. (2006), Galindo, Izquierdo and Montero (2007).

Empirical research of Pasinetti (1981), Grossman and Helpman (1991) shows that it is not only important whether the country has a developed export sector or not, but it is more important which direction the development was moving to, or what the country exports. Specialization in the production of a single type of product (with a higher level of sophistication) leads to higher growth rates. Comparative advantages of the country do not depend only on the availability of traditional factors of production, but also the willingness and motivation of a sufficient number of entrepreneurs to engage in the development of the modern sector of the economy.

A significant contribution to the research of export basket sophistication and its consequential impact on growth, was given by Hausmann and Rodrik (2005) and Hausmann, Hwang and Rodrik (2005). They define new quantitative measures for sophistication of products and export basket of the country: product productivity index (PRODY) and the index of sophistication of each country's export basket (EXPY) which is based on PRODY. Their empirical research confirms that countries

with higher EXPY index value realize faster growth and the production of goods with high value PRODY index is the way to faster development of the country.

The main conclusion of the conducted analysis is that the EXPY index is highly correlated with GDP per capita. Countries with a higher value of the index are countries that grow faster even when variables, such as initial per capita income, the level of human capital, time invariant characteristic of the country and so on, are controled[3]. It can be concluded that, assuming the other conditions do not change, the rich (poor) countries tend to export the goods which are exported by other rich (poor) countries, and that the production and export of goods produced by rich countries is an effective way for faster growth[4]. On these grounds is based relativly new theorethical approach "product space" analysis, which aims to answer the question what is the likelihood that the country will produce and export products in which it has a comparative advantage, but currently are not in the export basket, taking into account existing accumulated skills. (Hidalgo, Klinger, Barabasi, & Hausmann, 2007).

Concerning the impact of under/overvaluation of the real exchange rate on the movements in exports sophistication measured by EXPY index, a different result can theoretically be expected. For the development of sophisticated production in the export sector it is necessary to strengthen human capital, have favorable macroeconomic conditions and the presence of positive externalities. In addition, the cost of entering a new market and learning during the work process has an important role. On the one hand, a competitive real exchange rate allows the creation of conditions for the expression of those externalities and raising productivity. However, it can also lead to an inert and inactive behavior of the owners of capital with risk aversion, in the sense of not joining in the process of discovering the costs despite opportunities to achieve higher rates of return. This situation is realistic due to the fact that depreciation allows increasing profits even in existing export industries.

The form of specialization of production, which should lead to higher growth rates, implies the existence of selective industrial policies that would enable faster development of specific industries on a higher level of sophistication, which are close to existing ones where comparative advantage is already accomplished. In this case the policy of competitive exchange rate can create a stimulating environment equally for all industries in the export sector. Yet in the case of external effects outside companies, market forces alone will hardly lead to a fully adequate allocation of resources (Eichengreen, 2007). Quality institutional environment can have an additional role here by reducing costs of self-discovery through more efficient procedures (such as the process of patenting) and providing better conditions for financing new investments in the export sector.

The research of Hausmann and Rodrik (2005, 2007), did not measure the impact of the real exchange rate on the structure and sophistication of the export sector, and its impact on the value of EXPY index. Results of other empirical examinations, which include broader sample of countries, (Anand, Mishra, & Spatafora, 2012) show that overvaluation reduces the positive growth

[3]The relationship between EXPY index and GDP per capita exists even in terms of the very structure of PRODY index. However, if PRODY indexes, which are specific for a particular country, are calculated not including participation in the exports of the country, the results are not significantly changed.

[4] This can be partially linked with the Heckscher-Ohlin's theorem which states that products of rich countries are more intensive in the use of human and physical capital.

spillovers from a sophisticated export sector, but undervaluation yields no corresponding benefits. The empirical section of this paper will include the results of such measurements for the countries of Eastern Europe.

It is necessary to mention some important restrictions on the use of real exchange rate as an instrument to increase competitiveness, sophistication and the resulting impact on growth. In developing countries there are often limited effects of short term changes in the exchange rate on the reallocation of resources from the non-tradable sector to the tradable sector. It should be noted that under certain circumstances, contraction effects may occur in the short term, or the occurrence of J curve, both on the demand and supply side. (Edwards, 1989). The effects of this reallocation largely depend on the exchange rate regime applied by the country. In addition, due to the fact that investments and the associated allocation of resources to the export sector are the main indicator of the effect of changes in exchange rates on economic growth, excessive volatility and frequent changes in exchange rates may have a negative impact on their attraction. (Akyüz, 2009).

3 Research Design, Methodology and Data Source

Based on theoretical background discussed above, the aim of this research is to investigate the relationship between under/overvaluation of the real exchange rate and sophistication of the export sector in the observed region. In order to empirically test mentioned relationship, a dynamic model of panel data analysis (General Method of Moments - GMM) was employed, using on the smaller and broader sample of countries of the observed region of Eastern Europe. GMM method was applied in order to eliminate bias assessment of model parameters that can be obtained using static analysis methods Fixed Effects and Random Effects, in the case of existence of endogeneity and reverse causality. GMM is a dynamic specification including a lagged dependent variable, implying the method of instrumental variables, where lags of the first differentiation of endogenous and dependent variables with a lag are used as instruments. The method is robust in case of heteroscedasticity and autocorrelation in the panel. The validity of instruments is checked by Sargan -Hansen J test, while Arellano-Bond test (Arellano and Bond, 1991) is used for autocorrelation testing. In addition, as in this case T<N (number of observed periods is less than the number of units of observation), GMM is an appropriate technique. Also, as the observation period is rather short, it is not necessary to test the stationarity of variables.

Panel specification of the influence of under/overvalued exchange rate (RERD) on the value of EXPY index was done on a sample of 19 countries[5] in the period 2000-2011, and additional two sub-periods (1995-2008 and 2008-2013) on a larger sample (26 countries)[6]. The analysis of a smaller set of countries, in addition to RERD, as one of the explanatory variables human capital per capita (*hcp*) was included. Increasing human capital should enable the expansion of the scope of new patents, modes of production and contribute to the enhancement of productivity, as well as its positive impact on the sophistication of the export sector is assumed. In addition to human capital, the control explanatory variables taken include the number of residents in countries (*popmill*), and GDP per capita (*gdppc*). Both remaining variables are expected to have a positive

[5]Albania, Armenia, Bulgaria, Croatia, Czech Republic, Estonia, Greece, Hungary, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Mongolia, Poland, Romania, Russia, Slovenia, Turkey and Ukraine

[6] In addition to the above Azerbaijan, Belarus, Bosnia and Herzegovina, Cyprus, Georgia, Slovakia, Macedonia, Turkey and Turkmenistan were also included, while Lithuania and Slovenia were excluded from sample used for a longer period of time, due to the unavailability of data for EXPY.

impact on the sophistication of exports. At that, population data are taken from national statistics, United Nations databases and the data of the World Bank representing a replacement for the size of the country and the availability of labor. Larger population should affect the reduction in the cost of entry to a new market through initially lower wages. The size of the sample and the time period were defined by the combination of EXPY index and human capital data availability in the Penn World Table 8.1 (PWT) database, which was used as the source. In addition, in order to examine the impact of under / overvaluation of the exchange rate in the period after the onset of the financial crisis, which was associated with a reduction in the possibility of capital inflows, a dummy variable (*dum*) was introduced. This variable takes the value 1 for all years from 2008 to 2011, and the value 0 in all other years. In addition, an interactive value of this dummy variable and the RERD (*RERDdum*) was introduced. All variables were used in a logarithmic form, and data frequency is annual.

EXPY index, whose main characteristics are provided in the previous paragraphs, was used to measure the sophistication of the export sector. Rodrik and Hausmann (2005) take EXPY as a measure of the level of productivity of a country, or technological sophistication of the export basket. High index values indicate the export product basket of high quality, or the increased sophistication that creates preconditions to achieve a higher income[7]. The analysis used the values of the EXPY index available in the WITS (World Integrated Trade Solution), where this index is derived using data on the export of the country on the basis of "mirror" data analysis.
Formally, the EXPY index is derived as the weighted average of the average PRODY index. In this case, the weight is the share of export value of products in the total exports of the country.

$$EXPY_{c,t} = \sum_{s=1}^{n} \frac{X_{s,c,t}}{X_{c,t}} * \overline{PRODY_s} \qquad (1)$$

where PRODY index represents a weighted average of per-capita GDPs, where the weights correspond to the revealed comparative advantage of each country in good (sector). Accordingly, high values of PRODY index refer to the highly sophisticated sectors, and its value for the sector *s* in the year *t* is obtained by the formula:

$$PRODYs,t = \sum_{c=1}^{n} RCA_{s,c,t} * GDPpc_{c,t} \qquad (2)$$

where RCA stands for - revealed comparative advantage for the sector *s*, of the country *c* at time *t*:

$$RCA_{s,c,t} = \frac{\frac{X_{SCt}}{X_{ct}}}{\frac{\sum_{C=1}^{n} X_{SCt}}{\sum_{c=1}^{n} X_{Ct}}} \qquad (3)$$

where: Xsc – export of products manufactured in the sector *s* of the country *c*, Xc- total exports of the *c*, $\sum_{C=1}^{n} X_{SC}$ – total export of the sector *s* for the observed group of countries, $\sum_{c=1}^{n} X_C$ - the sum of exports of the observed countries, t- period of time in which the RCA is measured. The index takes values of the interval $(0,\frac{\sum_{c=1}^{n} X_{Ct}}{Xct})$. The sectors which have the RCA index value in the interval (0,1) have no comparative advantage. Where the index value is $1<RCA\leq \frac{\sum_{c=1}^{n} X_{Ct}}{Xct}$, the sector has a

[7] Although used empirically a lot, EXPY as an indicator of sophistication has its limitations. This relates to its immobility and non-inclusion of services; it does not take into account differences in quality of different variants of the same type of products, or the importance of imported components in the final product.

comparative advantage in relation to the same sector in other countries. (Hausmann-a i Rodrik-a, 2007).

3.1 Determination of under/overvalued exchange rate

Given that no RERD data in the observed countries is available, it had to be determined in the first part of the empirical analysis, as the required input variable. The level of under/overvaluation of the real exchange rate was assessed by determining its actual value deviation from the values in line with productivity growth.

When it comes to the countries of the observed region, the use of many methods of determining the deviation of the exchange rate from the balance is quite limited, very often significantly conditioned by poor quality or complete absence of the necessary data, as well as their availability in the short time interval. The approach applied herein is based on the assumption of compliance of domestic price level with the Balassa - Samuelson's effect, which despite the simplicity has the advantage of comparability between countries and at different periods. The theoretical framework for the applied methodology for assessing under/overvaluation of the real exchange is provided in papers written by Dollar (1992), Rodrik (2008) and Holzner (2006). A similar approach in assessing under/overvaluation of the real exchange rate was used in the paper by Orszaghova, Savelina and Schund (2013), as part of the analysis in the context of the application of BEER model for transitional European countries.

According to the above method, in order to determine the value of the exchange rate deviation from the long-term level aligned with productivity growth, the real exchange rate is first evaluated based on a systematic relation between the price levels and GDP per capita. Given the nature of these data and the constancy of the coefficient of elasticity of the real exchange rate in terms of GDP per capita, the formula $RER_{it} = \alpha_0 GDPpc_{it}^{\beta}$ is transformed into the following form:

$$\ln RER_{it} = \alpha + \beta \ln GDPpc_{it} + u_{it} \qquad (4)$$

where $\alpha = \ln \alpha_0$, and u_{it} is a random component of the model. In the specified equation a negative coefficient β is expected, considering that according to the Balassa-Samuelson effect an increase in GDP per capita means appreciation of the real exchange rate.

At the same time, the annual data of GDP per capita and the real exchange rate were obtained from the Penn World Table 8.1 (PWT) database, which were available for the countries in the observed region for the period of 1990-2011. Missing values for the next two years were obtained by applying the same calculation methodology to the available data of national statistics and UN databases.

$$\ln RER_{it} = \ln\left(XRAT_{it} / PPP_{it}\right) \qquad (5)$$

where *XRAT* – is the value of the exchange rate and PPP - conversion factor of purchasing power parity expressed as the ratio of the national currency against the US dollar from 2005.
Final data for under/overvaluation of the exchange rate are obtained as a difference of logarithms of the real value of the exchange rate (equation no. 1) and estimated value of depended variable in the equation 2.

$$\ln RERD_{it} = \ln RER_{it} - \ln \hat{RER}_{it} \qquad (6)$$

where RERD is the value of under/overvalued real exchange rate, where its value greater than one indicates a state of undervaluation, and a value less than one indicates a state of overvaluation.

In order to obtain values of the RERD index following the described procedure, a panel data analysis was done on the above defined sample of 26 countries based on annual data from 1990 to 2013.

The real exchange rate is the most commonly non-stationary variable, as well as the largest number of macroeconomic variables that affect it. Although this length of the time series can be considered quite short for analyzing stationary condition, due to the nature of data, the presence of unit roots was nevertheless tested. The following tests for unit root were used, adapted for panel analysis of data: IPS t-test, ADF - Fisher - Chi-square, PP -Fisher Chi-square, Levin, Lin & Chu (LLC)) and Hadri test[8].

Table 1 Panel unit root test results

		H0: Unit root (assumes individual unit root process)			H0: Unit root (assumes common unit root process)	H0: Stationarity	Decision
Variables		IPS W-stat	ADF - Fisher Chi-square	PP - Fisher Chi-square	Levin, Lin & Chu t*	Hadri Z-stat	
lnRER	Level	0.9858	0.9855	1	0.2145	0.0000***	I(1)
	First difference	0.0000***	0.0000***	0.0000***	0.0000***	0.4380	I(0)
lnBDPpc	Level	0.9999	0.9956	1	0.6913	0.0000***	I(1)
	First difference	0.0000***	0.0000***	0.0000**	0.0000***	0.0000***	I(0)

Note: Standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1); deterministic components include individual effects; number of used lags is defined using AIC criteria.

Based on the results shown in the Table 1 it can be concluded that all tests indicated the presence of a stochastic trend for the level of both observed variables (the level of significance of 1 %). If we look at the first differences of thus defined variables, their stationarity is observed, except in the case of Hadri test application, with the first difference of GDP per capita. However, as the Hadri test in small samples, with the present problem of autocorrelation, tends to accent rejecting the null hypothesis, and taking into account the results obtained from the four other tests, one can reach a conclusion on stationary character of the first difference of GDP per capita.
Checking the existence of cointegration was carried out by using Pedroni (Pedroni, 1999) and Kao test (Kao and Chiang-a (2000).

[8]See details of the unit root tests in panel data analysis in Baltagi (2005), Wooldrige (2012), Pesaran and Shin (2003), Levin, Lin and Chu (2002), Hadri (2000)

Table 2 Pedroni residual cointegration test results

Null Hypothesis: No cointegration			Weighted	
	Statistic	**Prob.**	**Statistic**	**Prob.**
Panel v-Statistic	-1.1846	0.8819	-0.89707	0.8152
Panel rho-Statistic	-0.26217	0.3966	-0.89302	0.1859
Panel PP-Statistic	-2.81784	**0.0024**	-3.46752	**0.0003**
Panel ADF-Statistic	-2.72456	**0.0032**	-2.90758	**0.0018**
Group rho-Statistic	0.405885	0.6576		
Group PP-Statistic	-3.7452	**0.0001**		
Group ADF-Statistic	-3.9631	**0.0000**		

Source: Own elaboration

Table 3 Residual cointegration test results

Null Hypothesis: No cointegration		
	t-Statistic	**Prob.**
ADF	-3.48114	0.0002

Source: Own elaboration

From the foregoing tables (2 and 3) it can be observed that Pedroni test confirms the presence of cointegration in 6 out of 11 tests mentioned (4 of which are based on the weighted values). In addition, given the short time series in the sample, it is important that the tests of group ADF and panel ADF- Statistics reject the null hypothesis of no cointegration at the level of significance of 1%. In addition, Kao test confirms as well the existence of the cointegration of the real exchange rate and GDP per capita at the same level of significance.

As the existence of cointegration was established, instead of applying the classic OLS method which in this case gives an inconsistent and biased estimate of model parameters, we started evaluating the parameters via Panel Fully Modified Least Squares (FMOLS) or Panel Dynamic Least Squares (DOLS) method. The basic condition for the application of these methods to assess the parameters of the model is that the observed data series represent an integrated process of the first order I (1), that they are cointegrated and that there is a vector of cointegration, which in this case is satisfied. The advantage of FMOLS method is that it provides a consistent assessment even in a relatively small sample[9], and additionally controls the endogeneity of regressors, heteroskedasticity and serial correlation (Pedroni, 1999).

The Table 4 below includes estimates of long-term parameters measuring the impact that GDP per capita has on the value of the real exchange rate.

[9]Pedroni (1999) shows through Monte Carlo simulations on small samples that the biasedness of estimators when using FMOLS method, which is based on an evaluation of the variation between the units of observation, is quite small, even in panels with significantly expressed autocorrelation, fixed effects and endogenous regressors.

Table 4 FMOLS and DOLS panel estimation

	FMOLS		DOLS	
Dependent variable lnRER	unweighted	weighted	unweighted	weighted
lnGDPpc	-0,59521*** (-9.67)	-0.570723*** (-57.81)	-0.731948*** (-13.11)	-0.866615*** (-19.64)
R-squared	0.611523	0.613185	0.757263	0.752226
Adjusted R-squared	0.593839	0.595577	0.721542	0.715764

Note: Standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1); deterministic components include individual effects; number of used lags and leads for DOLS is defined using AIC criteria.

It can be noted from the above Table 4 that regardless of the method used there is a negative and statistically significant (at the level of significance of 1%) correlation between GDP per capita and real exchange rate. The dependency is in line with the economic logic that an increase in GDP per capita leads to the appreciation of the exchange rate. As noted in the previous section, FMOLS model is taken as the most relevant one given the size of the sample and its other characteristics, so that the estimates given by other methods show a higher degree of bias.

If the results are compared with similar studies dealing with the evaluation of the impact of GDP per capita in the movement of the real exchange rate, it can be noticed that the resulting value of the coefficient is in accordance with the results obtained on samples of developing countries and countries in transition, where the coefficient value, depending on the methodology applied, ranges from 0.4 up to 1 (Egert, 2005; Randveer and Rell (2002)).

In order to obtain the amount of under/overvalued exchange rate, the assessed logarithmic value of the real exchange rate using the FMOLS method is subtracted from the logarithm of the current value of the exchange rate. Obtained values of RERD represent the input variable in the following part of the study.

4 Empirical Results

Before presenting concrete empirical results measuring the influence of real exchange rate under/overvaluation on the sophistication of exports, it is important to present the state of competitiveness of the export sector of the countries in the observed region, as well as the development of sophistication of the export basket of products.

Despite the significant increase in the share of exports and imports in GDP in the countries of SEE, in the aftermath of the nineties, the total amount of trade and an increase in world market share of these countries was below the level of the Central Europe (CE) countries. Additional increase and unsustainability of the current account deficit payment, along with the deterioration of terms of trade, and a small share of industrial exports in relation to some services, indicate that international trade had no impact on the sustainable increase in growth rates. Loss of competitiveness is noticed in the period after the crisis through reduced participation in world exports in some countries such as Montenegro and Croatia.

The appreciation of the real exchange rate, in particular expressed in the SEE countries to the emergence of the global financial crisis, led to a decrease in competitiveness. Depreciation as a result of the crisis period, improved the situation in countries with flexible exchange rate regimes

compared to those that held a fixed value of the exchange rate. The loss of competitiveness in the pre-crisis period in the SEE countries was higher than in the CE countries, where moderate appreciation could be justified by productivity growth. Also, in all SEE countries there was an increase in unit labor costs. Maintaining a high level of wages at the beginning of the crisis indicates the lack of flexibility in the labor market, which is a problem for the implementation of internal devaluation under the conditions of a fixed exchange rate regime (Torbjörn at al., 2010).

Diversification of exports also in terms of industrial sectors and the number of trading partners is an important condition for improving the resistance of the country against demand shocks and strengthening exports. The SEE countries show different levels of diversification of exports, while all are characterized by high dependence on imports. Common to all countries to a greater or lesser extent is an increase in diversification of products in the framework of the existing industrial sectors. Accordingly, despite of improving diversification indicators, the problem arises when the share of a single export product in total exports is high and when exports to one or a small number of trading partners dominate (which poses a significant problem in Montenegro[10], Macedonia and Croatia).

By observing the data on the share of exports of certain products in the total exports of the SEE countries (according to HS-2 classification), certain differences among countries can be noticed in the structure of the export basket. In Croatia, in the period from 1995 to 2013, there was a reduction in the share of the textile industry and increase in the share of production of mechanical and industrial mineral products, while in recent years the share of exports of transport equipment has decreased. In Serbia[11], in the period of 2005-2013, there was a gradual decrease in the share of exports in extractive industries, and the share of production of transport equipment and machinery was increasing, which indicated positive movements in the export structure transformation. As for other sectors, export of agricultural products recorded the highest share, which was quite stable in the observed period.

The most unfavorable structure of the export basket in terms of concentration and sophistication of exports are noticed in Montenegro, where the whole observed period (2005-2013) was dominated by exports of raw aluminum, with some decline in recent years. The fall of export of aluminum was mainly caused by the poor functioning of enterprises in the sector in the post-crisis period, which resulted in a growing share of other sectors, such as agricultural and mineral products, in the reduced total exports. Macedonian export is also characterized by a significant share of labor-intensive and extractive industries that have a lower sophistication, such as textile and metal industry. Positive shifts in the structure of the export basket have been noticeable in the last few years with a reduction in the share of those sectors and increase in chemical products and machinery. A similar situation exists in Bosnia and Herzegovina, where a significant reduction in the export of timber is noticed, which accounted for a large part of exports at the turn of the new century. In Albania, there is a higher share of labor-intensive textile industry in the export basket of products, with quite a significant increase in exports of mineral products industry in the recent period. The Figure1 below shows the developments in the export structure in Serbia.

[10]The degree of concentration of export markets measured by the HHI index for Montenegro amounted to 40 % in 2010.

[11] Data on export structure are available from 2005 to 2013.

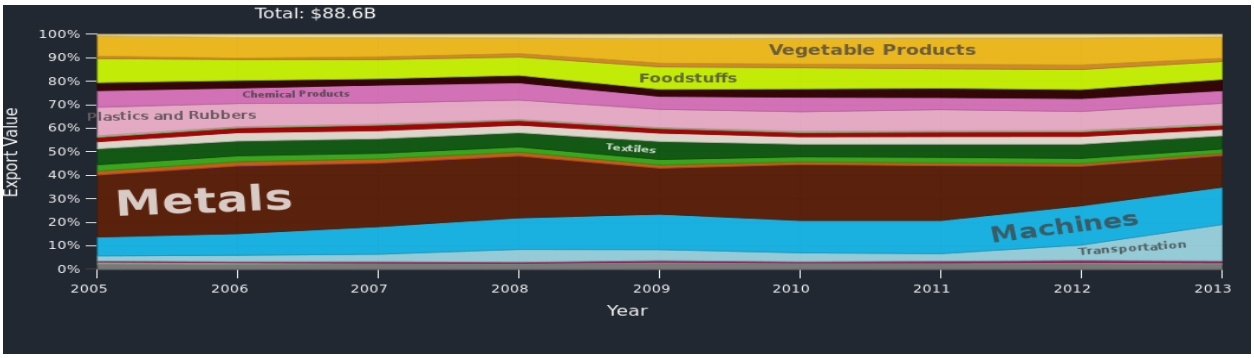

Figure 1 Structure of export in Serbia (2005-2013)
Source: Adjusted based on data retrieved from http://atlas.media.mit.edu/en/profile/country/srb/

These data demonstrate that movements in the export structure towards more complex production and greater diversification were observed mostly in Serbia and Croatia, despite a crisis impact on the reduction of sophistication. Observing the movements in the export structure of Slovenia and the Czech Republic (which is highly ranked sixth in the world in terms of complexity of export products), it is noticed that the highest share in the structure of the export basket is recorded by the mechanical and transport industry, whose share in Serbia is slowly increasing, while in Croatia it had a growth tendency until the crisis period. As for the other countries in the region, they specialize in slow growing export sectors, and their export could not reach the world average. Most of the export structure consists of low complexity products - agricultural, textile and metal industry. Also, to further attract investment, particularly in the industrial sector, it is necessary to significantly improve the structural and institutional environment (Orszaghova, Savelina & Schund, 2013).

As for the geographical diversification of exports, countries in the region are still mainly oriented to their region and the European market, although there is some progress in terms of expanding trade ties with the Middle East and North Africa, while exports to fast-growing Asian countries has not increased. This fact indicates their high sensitivity to changes in demand and macroeconomic conditions in quite a limited circle of trading partners. The number of trading partners in these regions has increased in almost all countries, and the indicators of Montenegro and Serbia are the weakest. Movement of changes in the share of trade partners for Croatia is shown as an example in Figure 2, while a similar situation with constant domination of the share of European countries and the region in the total number of export destinations is present in all other countries as well.

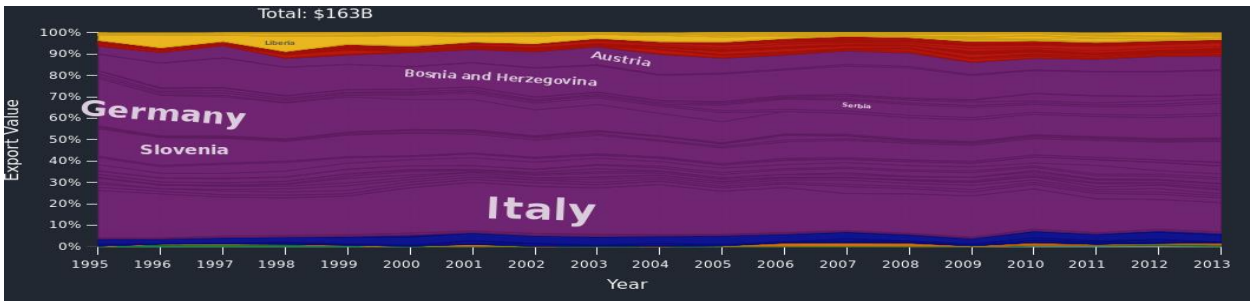

Figure 2 Structure of export destinations in Croatia (1995-2013)
Source: Adjusted based on data retrieved from http://atlas.media.mit.edu/en/profile/country/hrv/

Results from the panel specification of RERD impact on EXPY are shown in Table 5 below. Besides, the results given in the first column of Table 5 are related to the sample of 19 countries

for the period 2000-2011. The second and third column of Table 5 show the results of the RERD impact on the value of EXPY index on a larger sample (26 countries) and for the two sub-periods (1995-2008 and 2008-2013), where from the previous set of explanatory variables human capital is excluded, which proved to be insignificant, allowing the inclusion of a larger number of observations. Also, this allowed the observation of the impact of exchange rate on EXPY in the period before and after the crisis. All specifications included a set of fixed time effects, whose applicability was checked by F test. In all three specifications, Sargan and AR (2) test show that the instruments are valid and that there is no second-order autocorrelation.

Table 5 GMM model specification results of RERD impacton EXPY

Dependent variable – ln EXPY			
Time	2000-2011	1995-2008	2008-2013
Independent variables	GMM1	GMM3	GMM2
Lagged ln EXPY (L.lnexpy)	0.877***	0.908***	0.825***
	(0.0453)	(0.0459)	(0.0686)
RERD	-0.0563***	-0.0128	0.0502**
	(0.0170)	(0.0212)	(0.0228)
Ln GDP per capita (Lngdppc)	0.0290***	0.0159*	0.0373**
	(0.00932)	(0.00827)	(0.0171)
Ln population (Lnpopmill)	-0.00196	-0.000598	-0.00266
	(0.00176)	(0.00122)	(0.00256)
		(0)	(0.0125)
Ln human capital (Lnhcp)	-0.0218		
	(0.0187)		
RERDxDum (RERDdum)	0.0806**		
	(0.0380)		
Dummy variable (Dum)	-0.0105		
	(0.0141)		
Constant	0.983**	0.752*	1.380**
	(0.376)	(0.384)	(0.548)
Observations	204	312	130
Number of countries	19	26	26
Fixed effects	YES	YES	YES
Time effects	YES	YES	YES
Sargan test (H0: over-identifying restrictions are valid) Prob>chi2	0.075	0.485	0.148
Arellano-Bond test for first order autocorrelation (Prob>z)	0.051	0.166	0.109
Arellano-Bond test for second order autocorrelation (Prob>z)	0.208	0.095	0.135

Note: Standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1);
Source: Penn World Table 8.1, UN data, World Bank Development Indicators, World Integrated Trade Solution, own calculations

It can be noticed from the obtained values in the first column that the variable representing the population has no significant influence on the EXPY index (the same conclusion applies to the

other two specifications). The fact that the level of development of human capital has no significant effect on the level of sophistication shows that the development of human capital in these countries did not reached enough high level to greatly contribute to enhancing the quality of the export structure. This result is different from result of some similar studies, but they used wider sample, that includes developed countries (Anand, Mishra & Spatafora, 2012).

On the other hand, the coefficient of the GDP per capita has the expected sign, pointing to its positive correlation with the sophistication of the export basket. The same sign, with slight variations in the values was obtained in the other two specifications as well.

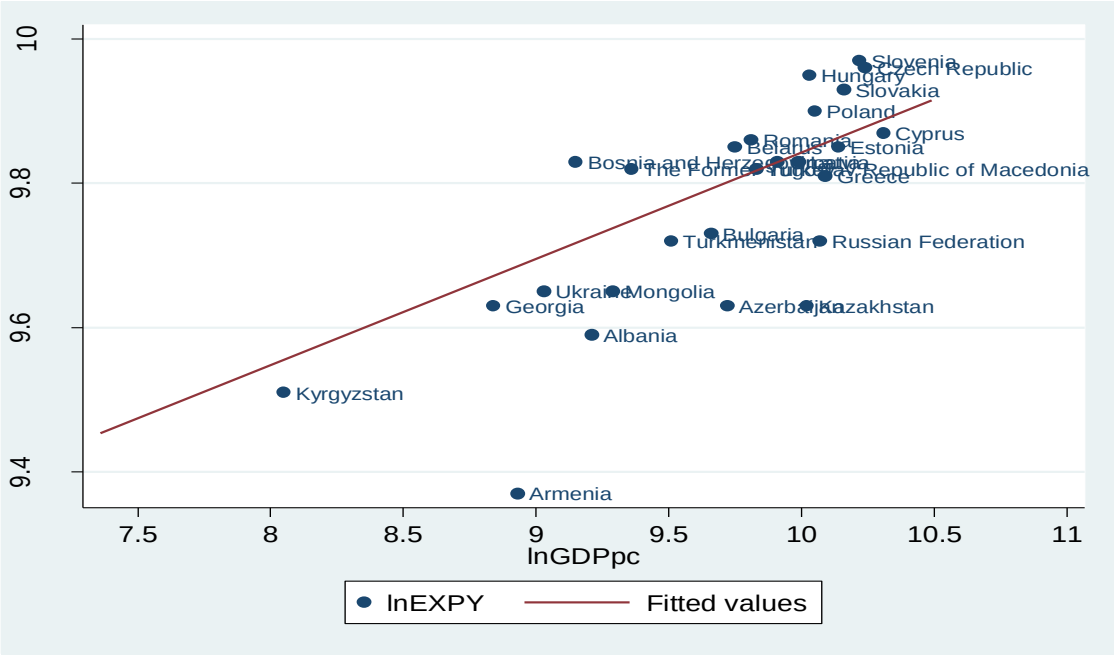

Figure 3 Relationship between EXPY and GDP per capita for 2013
Source: Own elaboration

Graphical representation Figure 3 of the ratio of GDP per capita and EXPY index shows that most of the countries of the former Soviet Union covered by the sample have an unfavorable ratio of GDP and sophistication of exports, which is most extremely noticeable in Armenia. The situation is the best in the CE countries, characterized by the highest GDP per capita and the highest value of sophistication including positive deviations from the amount determined by the level of GDP.

On the other hand, as observed on average throughout the period, Croatia, Macedonia, Romania, Bulgaria and Bosnia-Herzegovina had fairly coherent values of GDP per capita and EXPY index. Of the SEE countries for which the EXPY index data were available, Albania showed worst ranking in terms of the level of income and sophistication, with the presence of a negative deviation from the amount determined by the level of GDP, which could adversely affect its further performances. Figure 4 provides a more detailed picture of developments in the level of sophistication of export sectors for the selected SEE countries, along with the values of GDP per capita in selected five years from 1995 to 2014.

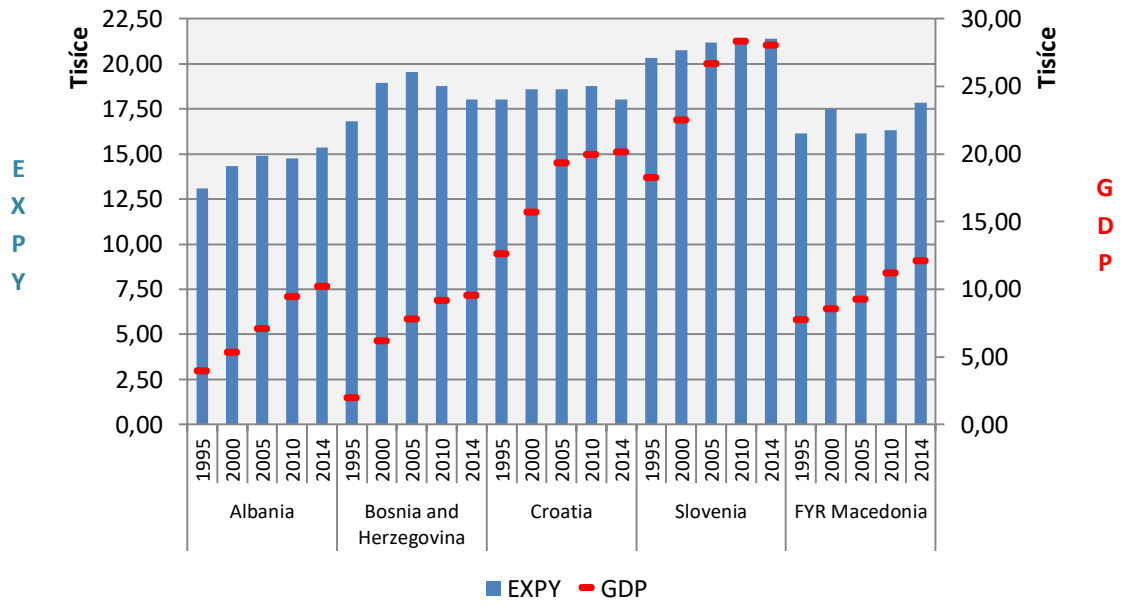

Figure 4 EXPY and GDP per capita in selected SEE countries
Source: Own calculation based on World Integrated Trade Solution data

As can be seen, sophistication of export basket in the SEE countries rose in the period from 1995 to 2005, or until the financial crisis, after which, in most countries, there was a stagnation or decline in the value of the index. This shows that in total export there was a growth of share of exports of less technologically complex products, and a decrease in the share of exports of more sophisticated industrial products of the region in world exports compared to the world average. Movements in the EXPY index show that the gap between its value and GDP per capita decreases, which indicates that the sophistication of exports decreased compared to the wealth of the country. The first period of increase in sophistication may be linked to the process of market transformation and reform activities implemented in the countries studied and the related growth of GDP per capita. Since the index does not cover the services, the process of de-industrialization and the slowdown in productivity growth is associated with a fall in values of the EXPY. Positive trends observed last year were noticed in Macedonia, while the ratio of GDP per capita and sophistication of exports is the worst in Croatia, where less sophistication of the export basket is observed after the crisis than expected according to the wealth of the country.

The resulting significant coefficient estimates of the RERD variable and its interaction with the dummy variable value for crisis years *RERDdum*, indicate different effects of under/overvaluation of the exchange rate in the two periods of observation. More specifically, in the pre-crisis period (where the dummy variable takes a value equal to 0), increasing of the variable RERD has a negative effect on the increase of EXPY index (at constant values of other variables, RERD increase of 10% leads to a drop of EXPY index by 0.56%). On the other hand, in the period after 2008, under/overvaluation had the opposite effect on EXPY (with constant values of other variables, RERD increase of 10% leads to the growth of EXPY index by 0.27%). Calculated values of EXPY index for different values of RERD, in the period before and after the crisis (different values of the dummy variable) are shown in Figure 5. The Figure 5 also shows 95% confidence intervals for the calculated values of EXPY index, where it is noticed that the most accurate

estimates were obtained at lower values of undervaluation and overvaluation, which was expected due to the fact that in most countries no high values of appreciation and depreciation were recorded.

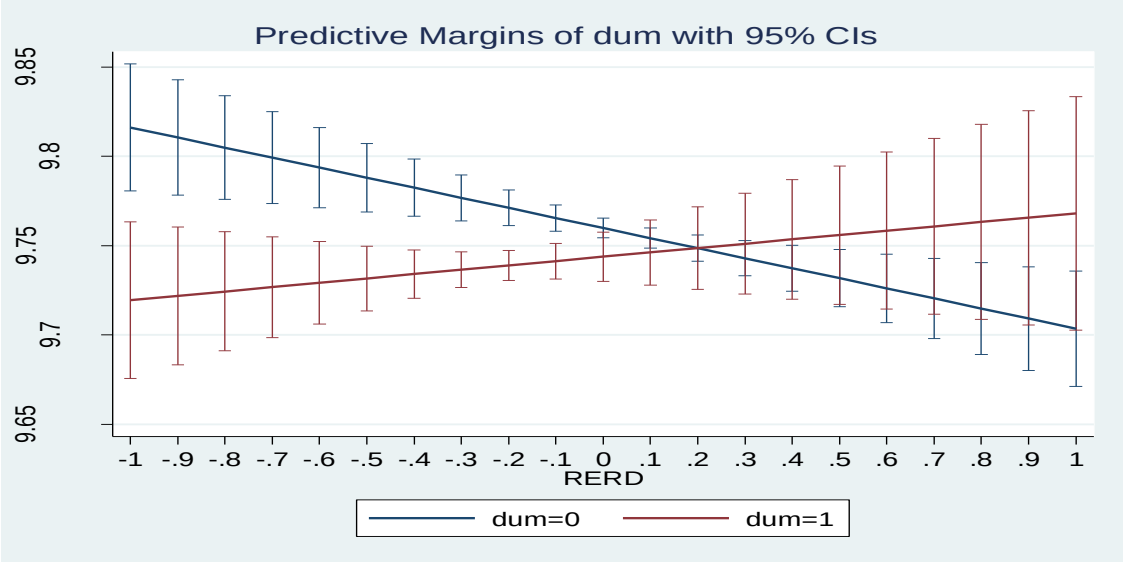

Figure 5 RERD impact on EXPY in pre- and post-crisis period
Source: Own construction

The model evaluated in the second column of Table 5 also showed a negative coefficient of RERD, and yet it loses significance as well, while in the period from 2008 to 2013, on a larger sample of countries, depreciation showed a positive impact on increasing the sophistication of the export basket (third column of Table 5).

Different effects of under/overvalued exchange rate at different times, is mostly linked to the dominance of capital account liberalization impact on the overall macroeconomic movements in a pre-crisis period and to reduction of its impact upon the occurrence of the crisis period. The increase in productivity occurred under the influence and in line with the growth of GDP per capita, leads to an increase in imports, as well as exports of the country (Petrovic and Gligoric, 2009). In most of the surveyed countries, after a certain period of the reforms and the transition to the new market system, and after the initial period of growth in imports and stagnation in exports, there was significant growth in exports mostly fueled by foreign direct investment inflows and an increase in the level of productivity of the sector. In the period up to the beginning of the financial crisis, the dominance of the influence of openness of the capital account to the other developments in the economy was observed. As there was a simultaneous appreciation of the exchange rate, it influenced the increase in the concentration of the industrial sector. The part of FDI inflow that was invested in remaining industries in the export sector led to an increase in their sophistication. Thus, the EXPY index was increased by removing the industries that were not able to survive in the market, and by increasing the productivity of those industries that persisted (Čizmović & Popović, 2015).

Such an increase in sophistication, involves only the initial productivity growth in existing sectors. Diversification of the export sector is a necessary pre-condition for achieving higher levels of its quality. Thus, in a certain period of time, when due to the low savings and great need for funds

capital inflows are necessary to promote faster growth, thenthe amounts of appreciation which are in line with increases in productivity have no negative impact on sophistication in the short term. However, as capital inflows were very quickly moved mostly to domestic demand trends, such growth leads to adverse consequences for the balance of trade and loss of competitiveness, accompanied with an increase in unit labor costs.

At a time when external funding sources are no longer available (as in the period of the financial crisis), the dominance of international influence on macroeconomic trends in the country is taken over by the trade account. In this situation stimulating effects of depreciation are necessary to increase production in the export sector and to raise its quality, through the means of external effects and reduction in market distortion. However, the extent to which depreciation can contribute to the revival of growth largely depends on the negative impact of national indebtedness in foreign currency, weakening demand by major trading partners, the level of price elasticity of the export sector, as well as the exchange rate regime. More specifically, if the country can use the exchange rate as a measure of economic policy, it allows faster implementation of the necessary depreciation, unlike internal devaluation in countries with fixed exchange rate regime.

Viewed in the long term, the countries of the same region, because of their interconnectedness and orientation to the same markets, show a similar response to changes in the international level. However, it is important to bear in mind that differences in conditions specific to each country, such as for example the level of dependence on imported semi-finished products, exchange rate regime, etc., may lead to their significant deviations from the average, and different movements in the structure of export basket of products.

5 Conclusion

Examples of countries like China, India and Indonesia show that countries converge to levels of income which are implicated by their respective export baskets. More specifically, if a country manages to develop greater sophistication of the export basket in relation to their level of GDP per capita, then faster economic growth should follow in the future. Also, unsophisticated export basket is linked with slowdown in economic growth.

There are some differences in level and development of the export basket sophistication, and its relation to GDP, in EE countries included in research sample. Sophistication of export basket in the SEE countries rose in the period from 1995 to 2005, or until the financial crisis, after which, in most countries, there was a stagnation or decline in the value of the index. Movements in the EXPY index show that the gap between its value and GDP per capita decreases, which indicates that the sophistication of exports decreased compared to the wealth of the country. Movements in the export structure towards more complex production and greater diversification were observed mostly in Serbia and Croatia, despite a crisis impact on the reduction of sophistication. However, beside positive steps in absolute amounts, in Croatia less sophistication of the export basket is observed after the crisis than it was expected according to the wealth of the country. Most of the countries of the former Soviet Union covered by the sample have an unfavorable ratio of GDP and sophistication of exports, which is most extremely noticeable in Armenia. The situation is the best in the CE countries, characterized by the highest GDP per capita and the highest value of sophistication including positive deviations from the amount determined by the level of GDP.

An appropriate macroeconomic policy plays a particularly important role in sustaining sophisticated goods exports. More economy distorted, there may be less scope for knowledge and technology spillovers. Among other factors educated workforce, external liberalization, adequate real exchange rate level, policy and regime are important prerequisites for developing sophisticated exports of goods.

The main object of this research was examination of influence of one of the above mentioned factors- the real exchange rate under/overvaluation on structural changes and sophistication of export sector. Research results show that control variables representing the population and development of human capital have no significant influence on the EXPY index. This indicates that development of human capital in these countries has not reached enough high level so it can greatly contribute to enhancing the quality of the export structure.

On the other hand, the coefficient of the GDP per capita has the expected sign, pointing to its positive correlation with the sophistication of the export basket. The resulting significant coefficient estimates of the RERD variable and its interaction with the dummy variable value for crisis years *RERDdum*, indicate different effects of under/overvaluation of the exchange rate in the two periods of observation (pre and post-crisis period). These results confirm stipulated hypothesis at the beginning of research. Different effects of under/overvalued exchange rate at different times, is mostly linked to the dominance of capital account liberalization impact on the overall macroeconomic movements in a pre-crisis period (when RERD increase has negative effect on sophistication) and to reduction of its impact upon the occurrence of the crisis period (when RERD increase has positive effect on sophistication).

At the end, how far exchange rate policy can contribute to country's external competitiveness improvement, to large extent depend on conditions specific to each country, such as for example the level of dependence on imported semi-finished products and exchange rate regime.

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Ryanair's flight price development on selected routes

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Abstract

This paper looks into development of prices during certain reference period on two specific routes. It should show to a reader a practical example of how the revue management of Ryanair airline works and what is the best strategy when buying the air ticket when planning to use Ryanair's services. Results of data analysis also shows that the price development is not systematic but rather route specific and it takes into consideration many internal as well as external factors.

Keywords: Ryanair, Price, Airline ticket, Fare, Air transport.

JEL Classification: L93

1 Introduction

Ryanair is well known for promoting very low fares. Few years ago, it was even possible to observe advertising campaigns for flight at prices of one eurocent. These extreme bids have already passed, but it still realistic to buy flight tickets to various destinations at special promotions with prices starting from 2€ (1). It is logical that not all tickets will be offered at these price levels, and of course, these special offers are limited in time or quantity.

These stunts are part of Ryanair marketing and free advertisement as its quickly spread among potential passengers through social media and other outlets. And it seems to fulfil its purpose as the airline has in 2016 carried the most passengers amongst all European air carriers including EasyJet, British Airways, Air France – KLM or Lufthansa (excluding its subsidiaries), with loading factor reaching 90 %.

Of course, we need to take in consideration that those prices are for base fare only and if a traveler would like to fly with a checked baggage, pick a specific seat or to board an airplane ahead of his

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or her fellow passengers, he or she needs to dig deeper into the pocket for extra payment. Ryanair however gives these options to passengers well before the final payment and it is up to each passenger to choose between higher price and more comfort or the cheap and really low-cost travelling. Now the question is, when is the right time to buy the ticket. Is it better to wait until the last moment, or perhaps to buy well in advance? This paper should, based on long term collection of data and subsequent analysis, offer at least a basic answer to this question.

2 Creating a price

Ryanair has a very strict policy as to selling and reselling its tickets. For a long time, it didn't even allow third party websites authorised access into company's system for price comparison purposes. It has now. However, the passenger can reserve and buy ticket only directly at Ryanair's website. Among other reasons, it's because of this way Ryanair doesn't have to use multiple global distribution systems and has price of each ticket under its control and therefore doesn't have to manage whole departments that would take care of publication and control of the tariff structure. Another reason that simplifies revenue management of the company is its core business strategy which is point-to-point flights.

Revenue management, or profitability management, is based at legacy carriers on the assumption of product diversity. The basic way of how to divide the product, which is the air transport service, is the differentiation of first, business and economy class, which offer different levels of comfort for which the customer is willing to pay different prices. Different products, however, are also created by the restrictions attached to individual tariffs. This is, for example, a "Saturday night stay", limitations in re-booking, advance booking of the ticket before departure, restrictions in case of refunding the ticket, etc. The lower price for the service, the more are these rules and restrictions applied.

On the other hand, a low-cost airline model doesn't count with such differentiation and therefore can avoid itself of big complexity and calculations built on EMSR (Expected Marginal Seat Revenue). In general, low-cost airlines, including Ryanair, offer one product at one rate at the time. Price usually increases as the date of departure getting closer. However, as it will be shown in the following parts of the article, it does not apply exclusively. Without the presence of various restrictions and segment customer differentiation, as explained in previous paragraph, all demand at a given moment is satisfied by one particular offer. So, the forecasting and price optimization is no longer determined independently for different segments of the market, but it is fully based on current price information and its elasticity. Ryanair's revenue management task is therefore to determine the best time for increasing, or in some cases reducing the current ticket price and to achieve the maximum possible income for available seat in the aircraft at the time it is booked.

Low-cost airlines use dynamic pricing method when assigning certain price to available seat. There are specific attributes and factors that need to be considered while setting a desirable ticket fare. Remaining time to the departure, historical statistics, information on prices offered by competition on same or similar routes, season, as well as anticipated development based on current situation. In practice, these changes to the price are made by an automated system, although managers can execute manual correction to support or dampen sales. It is not beneficial to sell all tickets for a given flight in big advance. Ryanair offer same product for all its customers. Those can be divided into two categories. First is price-sensitive but time independent and therefore is willing to buy the

ticket well in advance but for a small price. The other is exact opposite, which means it buys at the last moment and is willing to pay much higher price than first group. Hence it is advisable to leave some seats available ideally until the date of the departure. Of course, overbooking plays its role here also. It means that the airline usually sells more tickets that there are seats in the airplane, basically because the statistic says that on average around 5 percent of passengers do not show up for the flight.

3 Price development statistics

Data for the statistics were compiled from two Ryanair's routes in 24 hours intervals for 123 and 112 days respectively, up to the date of departure. At each route from Monday to Sunday. The observation results have been afterwards calculated in daily and weekly averages. At the same time, changes in weekly averages of these prices were observed. The last output of this observation is then the total average of prices in individual days throughout the reference period. Those two routes of the total of 1800 that Ryanair operates each day cannot bring a comprehensive view, however they can at least outline a picture and show practical example to the reader who is interested in problematic of Ryanair's fare pricing. Prices were compiled as base fare price only, which means without any other fees for additional services (priority boarding, check-in luggage, etc.) The collection of data began in November and ended in March and April respectively. First chosen route was one between London Stansted (STN) and Dublin (DUB) and back. Route that is connecting two major Ryanair's bases, with 16 daily flights (8 in each direction). Second route connects Bratislava (BTS) and Stansted with up to 4 flights each day.

The development of average daily price on the given routes in both directions can be seen in graphs (Figure 1). The first noticeable deviation that we can see when comparing these two graphs is that the course of price development is quite different. While on route between STN and DUB the price had stagnated or even declined, changes in air fares on flights between BTS and STN were experiencing a very dynamic progression throughout the whole time of observation. We can see a regular rise and fall of prices, but it is interesting that the final growth, which is the point beyond which prices have not fallen, occurs in between two and three weeks before departure. It is not true for Monday and Tuesday though, where we observe average price drop even two days before the departure. This course is reflected in the fact that flights weren't sold out. Until the last moment, managers had been trying to make prices more appealing to improve the use of aircraft's capacity. This claim is supported by the fact that in some cases the lowest average price was not registered in the beginning of observation, where it could be expected, but 29 and 31 days respectively, before the departure. We can see this on the London – Dublin route as well, where this occurred even 14 days before departure, when the airline ticket could be purchased for only 9,98€. Another difference between those two routes is the tendency of growth and decline of the price. While on first route (STN – DUB – STN), we can see somewhat steady progress, on the BTS – STN – BTS route we observe rapid changes almost on day-to-day basis. The major cause of this is number of reservation, seat capacity and the speed with which are offered seats sold. Some flights on Monday, Thursday, Friday and Saturday were completely sold out.

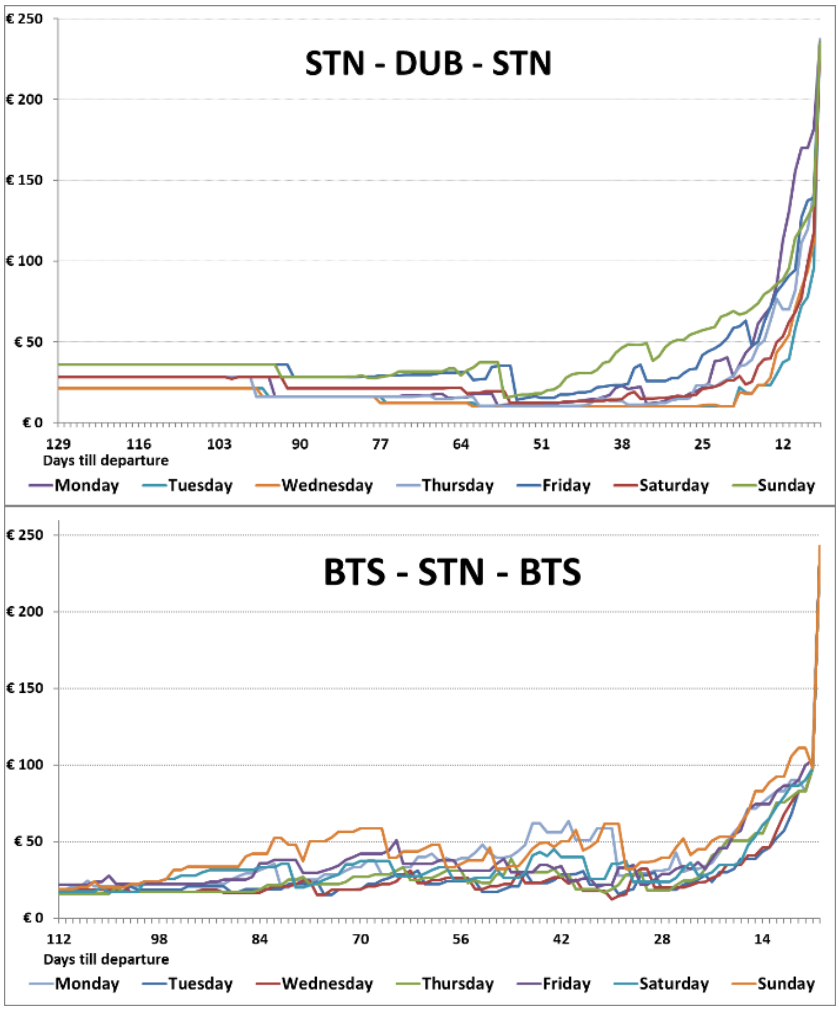

Figure 1 Development of average prices in individual days
Source: Own elaboration

This difference between price change can be also observed in Figure 2, where the average price is represented in between individual weeks prior to the departure. As far as the maximum average prices are concerned, they had been reached on both routes not until the day of departure. Although the two routes differ in a flight time (1:20 vs. 2:20) and one could logically expect this difference will be applied while setting a price as well, the maximum average prices for air ticket were quite similar. 235€ on STN – DUB – STN route and 243€ on BTS – STN – BTS. Another interesting fact is that even though the route from Bratislava to London is more than 800 km longer than the flight from Stansted to Dublin, it offered an air ticket with a lower price, 8€ to 9.98€ specifically.

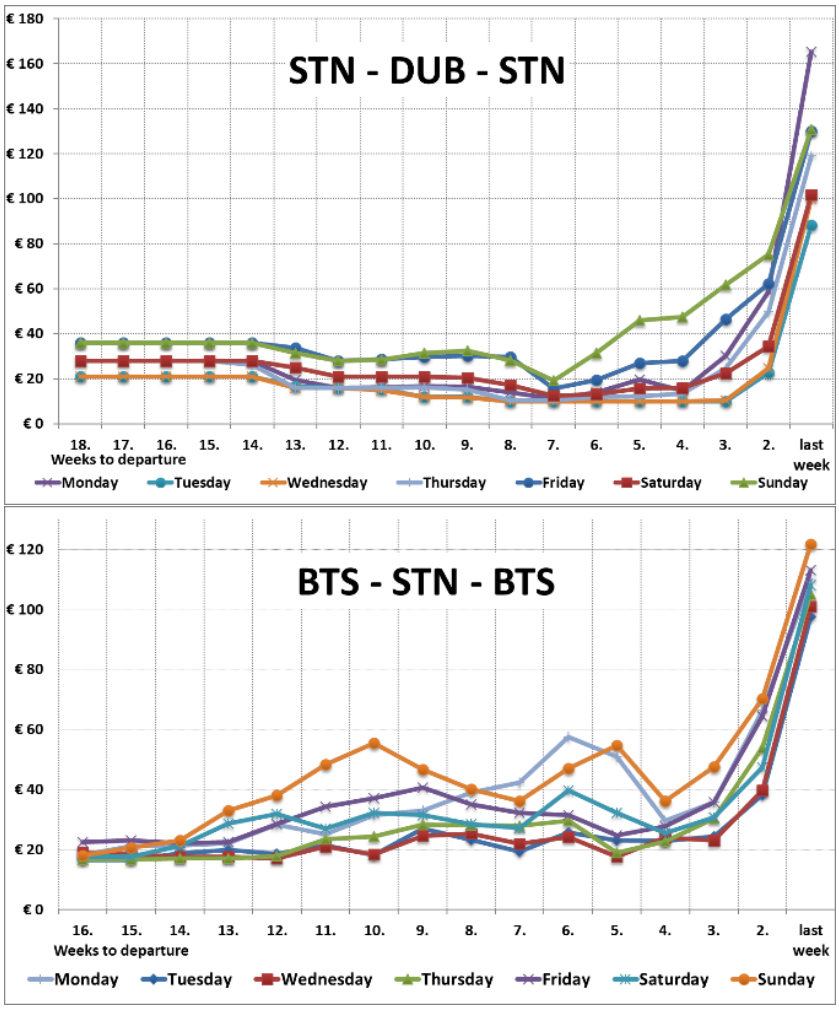

Figure 2 Development of average prices in individual weeks
Source: Own elaboration

In next graphs (Figure 3) we can see the percentage difference between the individual changes and it is probably the best way how to observe the rise and decline of average prices in individual weeks. We also clearly see the difference between individual routes. On the London – Dublin route we can see mainly price stagnation or even reduction up to 6 weeks before departure. On the second route, we see prices mostly going up for first 5 weeks. After that there is an alternate fall and rise in prices. It is interesting to observe the maximum and minimum deviations and the time of their occurrence. It is not extraordinary to see 50% fall on certain days, even just 4 weeks before the date of the departure. And in the last week it is absolutely normal to observe rapid increase of the ticket price, in certain cases by 150 % or even up to 305 % of the value in the previous week.

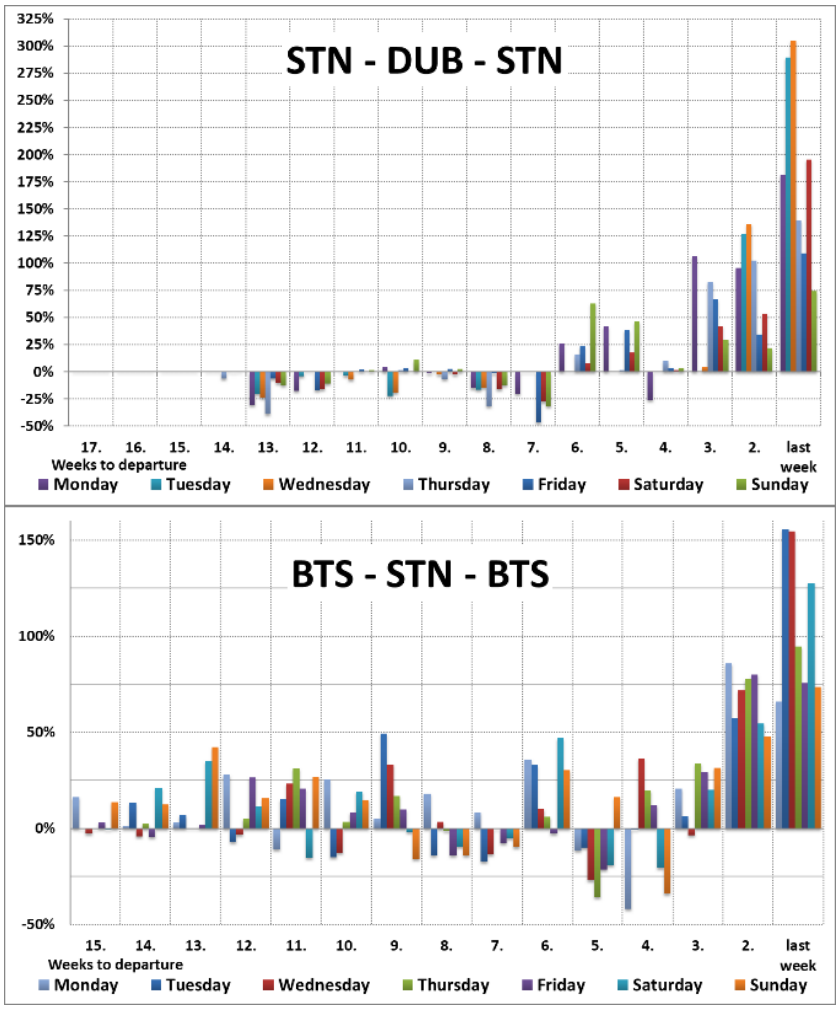

Figure 3 Percentage change in average prices between individual weeks
Source: Own elaboration

The last figure (Figure 4) shows the average prices per day for the whole reference period as well as the total cumulative average. We can see that the highest average bid on both routes was on Sunday. Days of a second and third highest prices were also same on both routes, Monday and Friday, but in different order. Significant difference is however, the different ratio between the first and second most expensive day, second and third, and so on. For example, on the STN – DUB – STN route, the average price on Sunday is 10.7 % higher than on Friday. On BTS – STN – BTS route is a difference between the highest price and second highest 14.7 %. This all would suggest that it is not systematic but route specific. The cumulative averages are 29.14€ and 34.53€ which is below company average of 46.67€ (2).

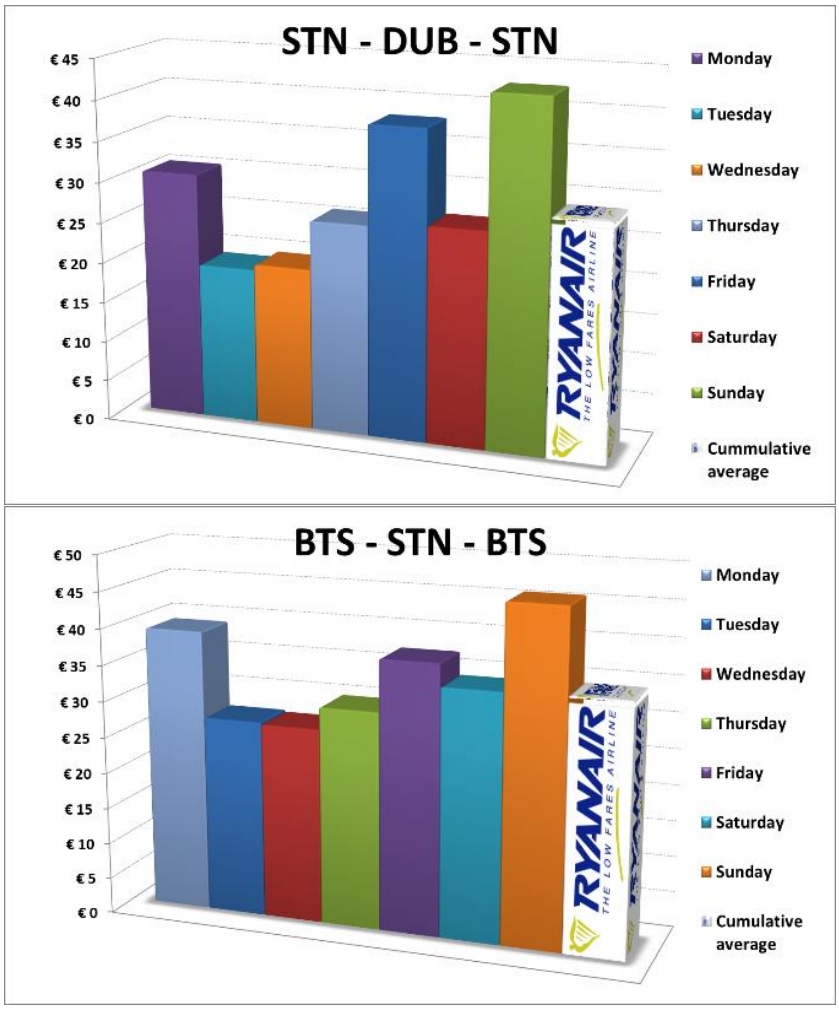

Figure 4 Average prices in individual days in reference period
Source: Own elaboration

4 Conclusion

Every passenger would like to know the answer to a simple question. When is the most appropriate opportunity to buy an air ticket. In general, when we consider group of people who has a time and doesn't have to fly at the last moment, then we can divide this group into two in perspective of when and how they decide to buy an airline ticket. The first part of this group would observe the price development for some time and after considering the situation they will decide to buy. The rest of the group are people who buy tickets even months in advance because they think this is the best way to get the cheapest fares. As we can see from charts and analysis, the latter group wold not be making a good decision in case they would want to fly with Ryanair. For Ryanair, this rule doesn't really apply, which is, to buy as soon as possible. The potential passengers should at first observe the development and, depending on the availability and price movement decide while not be afraid to wait until even few weeks the day when they want to fly. Another good move would be to register for a newsletter in which company often times notify their potential customers about flash sales or other offers with interesting prices. As we can see, prices can drop and get to its lowest point even only couple weeks before the departure. Also, a potential traveller should consider day of the week of the flight. As we can see, it is much better to fly in the middle of the

week (Tuesday, Wednesday, Thursday), where the prices are lowest. It is due to business passengers and others who travel to and from work in the end and the beginning of the week which creates higher demand and thus generates higher prices of air tickets.

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QALYs and cost-effectiveness thresholds: critical reflections

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Abstract

We summarize the criticism of utilizing the QALY and cost-effectiveness threshold concept in health-economic studies that is recently growing stronger. Despite of their strong limitations, these tools have been frequently used in many healthcare systems. However, some countries in their political decisions refuse utilization of QALYs and thresholds as optimizing criteria. The critical reflexion concerns both theoretical and experimental foundations. Based on a literary review, fundamental arguments against the concepts are summarized, and a synthesis of material objections is presented. As a whole, the critics´ arguments can be judged as quite strong. Instead of these two concepts, the decision makers should consider the whole spectrum of clinical, economic, moral, political and organizational arguments, and employ also other mathematical models.

Keywords: Health economy, QALY, WTP, Cost-effectiveness, Threshold.

JEL Classification: I11, I18, H51

1 Introduction

Application of economic theories in healthcare would not be necessary if the available financial resources were unlimited (Schulenburg & Schöffski, 1993). Unfortunately this is not the case. hence, the economic point of view of healthcare funding is rooted in three fundamental observations (Fuchs, 2011):

1. Resources are scarce in relation to human wants.
2. Resources have alternative uses.
3. People have different wants.

Already in 1996, Fuchs said in his lecture delivered at the meeting of the American Economic Association: *"This economic point of view stands in stark contrast to the romantic and monotechnic points of view that I found prevalent among health professionals and health policymakers. The romantic point of view refuses to accept the notion that resources are inherently scarce; any apparent scarcity is attributed to some manmade problem, such as capitalism or socialism, market failure or excessive government interference."* (Fuchs, 2011)

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Hence, like in all other economic fields, also in healthcare it is necessary to take into account not only the outcomes (i.e. clinical effects) of medical interventions, but also their economic aspects. Once we agreed that resources for healthcare are inevitably limited, it is necessary to make decisions on a regular basis, what healthcare will be paid for and what care will be behind the limits of possibilities of the particular society (Gavurova et al. 2017a; Soltes & Gavurova, 2015). In developed countries, searching for effective healthcare is a public interest that is directly related to the values that our systems of healthcare and health insurance have been based on (dignity, fairness and/or solidarity), as well as it concerns the interests of large population groups (citizens and residents), how can be seen from numerous practical observations (Clark et al., 2017; Fuchs, 2011; Gavurova et al, 2017b).

In the end of the 20th century, Health Technology Assessment (HTA) was developed for evaluation of health technologies (widely comprehending drugs, medical devices, equipment and supplies, medical and surgical procedures, preventive measures, support systems, and organizational and managerial systems). HTA comprises a number of methods for assessing safety, effectiveness, appropriateness and costs, impact on the healthcare budget, as well as ethical, social, legal, organizational and political consequences. HTA can inform us, which care is efficient from the point of view of the society as a whole, or from a narrower perspective of a healthcare payer, provider, and/or patient (Goodman, 2014; Schöffski & Schulenburg, 2012).

As a rule, the cost-utility analysis (CUA) is applied; it relates costs to gained "life years in full quality", so-called QALYs. Introduction of QALYs as a general measure of outcomes made it possible to compare cost-effectiveness of various (in principle any) medical interventions and/or technologies. Then it was quite natural to define cost-effectiveness thresholds, i.e. the limit costs of one QALY that is still considered cost-effective. This approach is often called the (societal) willingness to pay (WTP). However, many authors have called the routine and uncritical application of both these notions into question.

Definitely, the development of systems for a "fair" distribution of limited resources has not been finished yet, and the work on them remains to be very challenging and attractive for researchers in the field of health services and systems.

2 QALY

Strictly speaking, a QALY (abbr. of "quality-adjusted life year") is a unit used for expressing the value of utility (representing the outcome of a technology or intervention). Its attractiveness lies in the simplicity of its definition (Goodman, 2014), a maximally simplified application of a multiple-criteria metrics that combines life expectancy and quality. The utility expressed in QALYs is a variable resulting from a simple multiplication of the life expectancy and the quality of life. The quality of life is rated by the patient (using either one of direct methods, or a secondary tool, i.e. a generic questionnaire – see below), while a researcher estimates the life expectancy on the basis of epidemiological reports. Since the quality of life is decreasing in a long-time perspective, the utility is mathematically represented by the area under the curve expressing the quality of life over time (see Figure 1). In this definition, one QALY is equal to one year of life in the full quality, or two years in the quality of 50 %, or e.g. ten years in the quality of 10 %. Thus, the definition of QALY is based on a linear relation on the life expectancy and on the quality of life.

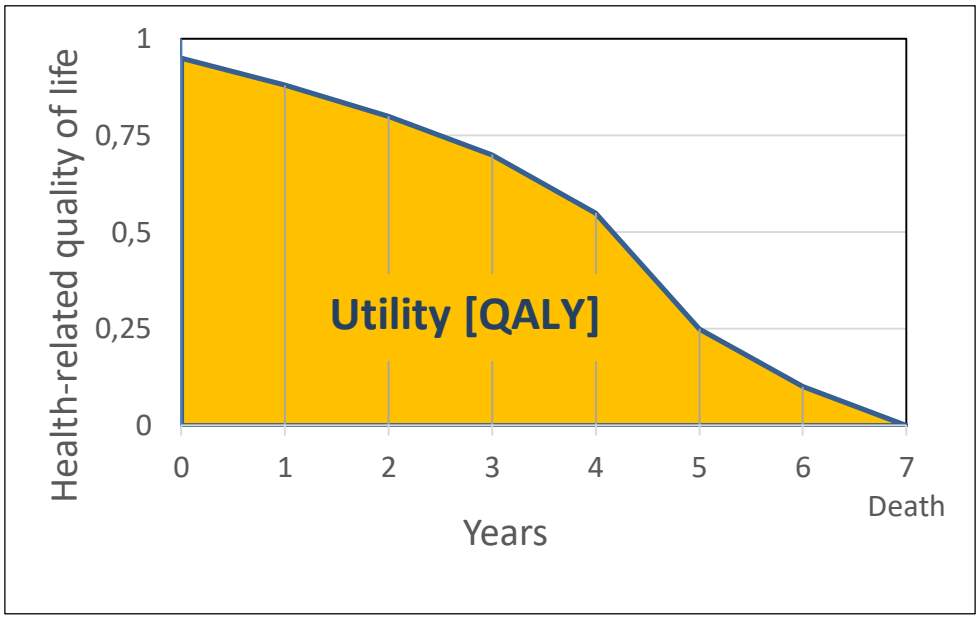

Figure 1 Graphical representation of the utility in QALYs
Source: The authors

The utility defined in this way enables us to calculate costs per one QALY for individual interventions, which is attractive above all when we calculate the incremental cost-effectiveness ratio (ICER), i.e. costs per one extra QALY gained for the particular intervention. Then we can compare very distant types of interventions (e.g. surgery with a conservative pharmacological treatment), as well as to fix a threshold, over which the interventions are considered cost-ineffective. Using the cost-utility analysis (CUA) based on QALY, we can now try to find answers to such questions, as whether it is better for the society to invest in the robotic surgery, or in a network of psychiatric centres (in the sense, where an invested dollar will bring more benefit for patients), while data in each branch can come from another trial. The idea of QALY was mentioned for the first time in 1968 (Klarman et al., 1968), and the acronym QALY was introduced by Weinstein and colleagues in 1977 (Weinstein and Stason, 1977). Hence, it is quite an old concept, and the objectivity (the feeling of objectivity) of assessments based on it led to an introduction of QALYs into standard proceedings of drug reimbursement in many countries all over the world.

Rather recently there were two international projects focused on an assessment of theoretical and methodological problems in application of the QALY concept aimed at possible ways, how to make this concept more precise and how to proceed in its application. First, there was an ISPOR workshop with the objective to get a consensus in the field of methods for estimation and utilization of QALYs (ISPOR Consensus Development Workshop) that took place in Philadelphia (USA) in November 2007. Its conclusions were published in a special issue of Value in Health (2009). Second, there was a FP7 project called Echoutcome solved by a consortium coordinated by Claud Bernard University in Lyon in 2010-2013 (Holmes, 2013). Both projects came to the same conclusion: „Rather than moving HTA science and practice forward, QALY research appears to be stuck in a methodological traffic jam.“ (Johnson, 2009), and „... the use of the QALY multiplicative model cannot be justified in healthcare decision making.“ (Beresniak et al., 2015). Subsequently, Pettitt et al. published the historically first review of papers on this topic in April 2016 (Pettitt et al., 2016).

Let us describe in a nutshell groups of objections raised against QALY during nearly 50 years of its application (all of them will become critical when QALY is applied to determine a cost-effectiveness threshold – see below) (Rogalewicz and Bartak, 2017):

1. The QALY concept is based on the utilitaristic theory (Dolan, 2001; Schöffski & Schulenburg, 2012), which itself is a subject of controversies in economics. Simplified, the utilitarianism is a theory based on the idea that if each individual strives for maximizing his/her satisfaction, as a consequence this leads to a satisfaction of needs of the whole society. The critics of utilitarianism argue that some of its solutions are not in agreement with our moral intuition. These questions attain a quite new ethical dimension when we discuss, who will be given or refused some particular healthcare (e.g. biological treatment of multiple sclerosis, or proton therapy in oncology) (Gyrd-Hansen, 2007; McGuire, 2007; Nord et al., 2009).
2. A more important objection is that QALY definitely fails to comply with the fundamental ethical principles that we wish to swear to. Due to the relation to the life expectancy, women will take precedence over men, young persons over seniors; the preference on the basis of QALY depends also on the diagnosis (Pettitt, Raza, 2016, Schöffski and Schulenburg, 2012). Hence, the QALY concept is in a contradiction with the ban of discrimination. Any reduction of healthcare on the basis of costs per QALY has been prohibited by the German supreme court (the Federal Court of Justice) (den Exter, 2015, Schulenburg, 2013) as well as the US Congress (for governmental programs) (Abraham et al., 2013; Weinstein & Kaiser, 2011).
3. It has been shown many times that measuring of the quality of life (how it is currently applied in HTA and pharmacoeconomy) is neither stable nor robust (Beresniak, & Medina-Lara, 2015; Craig et al., 2014; Whitehead & Ali, 2010). Different results are obtained not only using various primary tools (standard gamble, time trade-off, visual analogue scale) and different secondary tools (EQ-5D, SF-36/SF-12/SF-6D, HUI1, HUI3, WHOQOL-100/WHOQOL-BREF etc.), but also a single tool used repeatedly on similar groups of patients or healthy individuals (Kiadaliri et al., 2015; Marra et al., 2005; Nord, & Daniels, 2009).
4. Practically, the quality of life of patients is usually evaluated by one of generic questionnaires that contain questions like “Do you have problems with selfcare?” or “Are you anxious or depressed?” Answers to such questions are subsequently transferred to a numeric value – a utility (quality of life) – using so called “scores”. The scores were previously experimentally set by a comparison of values received by primary tools and by the respective secondary tool in a tested population (Oppe & de Charro, 2004). There are two views at this task: according to the first, the utilities should be measured in patients, according to the second in a healthy population (Drummond et al., 2009; Stamuli, 2011; Whitehead & Ali, 2010). This problem has not been scientifically decided yet. An overview of European practice was published by EUnetHTA (EUnetHTA, 2015).
5. Even if we agreed to use EQ-5D, the prevailing tool in Europe, we would need sets of scores to transfer the answers to utilities. Such sets are provided by the EuroQoL society (EuroQoL) together with the language-specific localization of the questionnaire (Rabin et al., 2014). It is well-known that these sets differ between countries (Cleemput, 2004; Oppe & de Charro, 2004). These sets of scores do not exist, have methodological deficiencies, or are incomplete for many countries (Rencz et al., 2016; Xie et al., 2014). On the other hand, correct or incorrect values of scores significantly affect results of utility measurement in any experiment (Craig, & Reeve, 2014; Kiadaliri, & Eliasson, 2015; Parkin et al., 2010),

and their translation and/or localization is a rather complex and time-consuming process (Rabin, & Gudex, 2014).

6. The most controversial theoretical assumption of the QALY definition is the requirement of a linear relation between the life expectancy and its quality given a fixed value of QALY (Johnson, 2009). Experimental studies have shown that the willingness to trade the length of life for its quality differs between various groups of population and maybe even across individual groups (Brazier, 2007; Schlander, 2010). The length of life seems to be so strong that patients do not want to trade it for anything; when they evaluate QALYs, the length of life is superior to its quality (Nord, & Daniels, 2009; Pinto-Prades et al., 2014; Schlander, 2010). However, this is in a contradiction with the definition of QALY that assumes the same priority of the length and the quality of life.
7. QALY is not sensitive enough to express small changes in health state, although they may be important from the point of view of the physician or the patient. Such small changes may be extraordinary important in particular diagnoses, e.g. in oncological patients. They can have a short life expectancy that put them in a disadvantage in QALY calculation (Devlin & Lorgelly, 2017; Garau et al., 2011). Another disadvantaged group in the relation to QALY are seniors who are often not able to see any changes in their health state. If an intervention has a minimum effect on the length of life in such a patient, then it won´t have any impact on an increase in QALY at all (Coast, 2004; Garau, & Shah, 2011; Pettitt, & Raza, 2016). Some authors also criticize application of QALY in pediatrics (Ungar, 2011) or psychiatry (Fitzpatrick et al., 2010).
8. The QALY metrics takes into account only two effects: the quality of life (evaluated by the patient) and the life expectancy. This approach omits many other effects that a particular intervention may have. According to many pharmacoeconomists, QALY measures the satisfaction of the customer, i.e. the patient in medicine. However, is a patient really able to assess all effects and outcomes of a particular technology? This is usually not true in diagnostic methods (de Lissovoy et al., 2011; Rogalewicz, 2015; Rosina et al., 2014), in medical devices (Markiewicz et al., 2014; Rogalewicz and Jurickova, 2014b; Wahlster et al., 2015), or even in some therapeutic interventions (e.g. in IVF (Fiddelers et al., 2009) or in some rare diseases (Drummond, 2008).
9. The idea of justice in healthcare among the general public probably differs substantially from the approach based on QALYs (Buxton & Chambers, 2011; Kolasa & Lewandowski, 2015; Stamuli, 2011). It is straightforward from the definition of QALY that one QALY is one QALY regardless of the way we achieved it, QALY is blind to the health state or personal qualities of a patient (Schlander, 2010; Whitehead & Ali, 2010). Culyer called this principle an „egalitarianism of QALY“ (Culyer, 1992). From this perspective, CUA is an optimization method, whose objective is to maximize the amount of QALYs for the given sum of money (the healthcare budget). The gain of a QALY is equivalent in patient A or patient B. When QALY was introduced, it was stressed that one of the main benefits of this approach is that it is a value indicated by (potential) patients themselves. Thus QALYs should have expressed patients´ preferences. However, literature suggests that most people prioritize, they prefer to attach more importance e.g. to healthcare for children, seriously ill persons, or socio-economic disadvantaged citizens (Brazier, 2007; Schöffski & Schulenburg, 2012; Whitehead & Ali, 2010).

Thus, the question is, whether there is any use of QALYs and their application at present? Many authors answer it in the affirmative; in their opinion, QALY has its shortcomings, but still it is the

best available measure of utility (Drummond, & Brixner, 2009; Pettitt, & Raza, 2016; Whitehead & Ali, 2010). It is expedient to have a universal measure that can evaluate all interventions across all branches of medicine and groups of patients. The support provided to QALY by many countries is also important. Among pioneers of HTA that have prescribed application of QALYs for a long time there are England (NICE), Canada (CADTH) and Australia. At present, QALYs are routinely applied also in at least 16 European countries, i.e. in most countries participated in the EUnetHTA program (EUnetHTA, 2015). Utilization of QALY (often supported by law) can be advantageous for some stakeholders. This can be the reason, why QALY is still frequently applied, although its limitations and drawbacks have been repeatedly proved and documented in research reports (Beresniak, Medina-Lara, 2015, Pettitt, Raza, 2016). Any other quantitative criterion would probably do the same work. Beresniak et al. (Beresniak, & Medina-Lara, 2015) state that behind the QALY studies there is also the intense economic activity and financial interests connected with pharmaceutical reimbursement proceedings. Despite of a large number of critical studies published repeatedly since the beginning of 1990s, the notion of QALY stays to be popular.

3 Cost-effectiveness threshold

Once we accept that resources for (publicly funded) healthcare are limited, we have to set a rule, how to determine, which interventions or technologies will be reimbursed and which ones will be ruled out. Introduction of the notion of QALY enabled to attach a numerical value to any intervention, and thus to evaluate any intervention with a cost-effectiveness ratio (C/E ratio), which, in fact, is the cost of one QALY gained. Now, it is sufficient to determine a threshold value: interventions with the C/E ratio under that value will be considered cost-effective and will be funded, while interventions with the C/E ratio above such a threshold will be considered cost-ineffective, and will not be paid for. (In practice, a new technology is usually compared with a current one – the comparator –, and the C/E ratio is calculated based on incremental values and denoted ICER; it can be interpreted as the price of one extra QALY gained thanks to the new technology. However, this does not change the fundamental principle of the threshold value.)

Since this criterion is quite easily understandable, it quickly gained massive support. The threshold has been often explained as the limit price that the society is ready to pay for a definite utility unit (QALYs being described as the numerical expression of the utility). This approach is often called the (societal) willingness to pay (WTP).

Using cost per QALY for the decision rule leads to maximizing the amount of QALYs purchased for the limited budget. As we discussed above, any QALY is then equal regardless of the health state, socio-economic status, or personal characteristics of the patient (Schlander, 2010; Whitehead & Ali, 2010). All the drawbacks of the QALY concept discussed above translate and amplify, when applied for determining C/E thresholds. Now we do not discuss theoretically about which technology is better, we are deciding, who shall be treated, and who shall be refused.

Seemingly, a well-defined WTP threshold should be a very fair approach of healthcare budget utilization. However, the issue of defining an exact threshold to be used in a national healthcare system appeared to be quite complex and challenging. In all countries that have tried to establish and apply a (single) C/E threshold this issue appeared politically, ethically, and eventually also practically an extraordinarily sensitive topic (Schwarzer et al., 2015; Vallejo-Torres et al., 2016).

It is obvious that the C/E threshold is in a tight relation with the budget. Thus, the first attempts to set the threshold dated back to 1990s reflected a simple consideration: "What can we afford?" Soon it was clear that the public opinion must be taken into account. The society expects definite interventions (health risks) to be covered; an automated application of a threshold may appear insensitive, unethical or at least unsympathetic. The discussion was supported by publishing of so-called "league tables", i.e. lists of C/E ratios for (arbitrarily) selected health interventions (Detsky & Naglie, 1990; Drummond et al., 1993; Gold et al., 1996; Marseille et al., 2015).

The United States were among the first countries to discuss and set a threshold. The value of USD 50,000 is frequently mentioned. Although some authors date it back to 1980s, the researchers slowly converged to it in mid-1990s. Allegedly it was based on the C/E ratio of dialysis for patients with a renal failure, however, other authors are raising questions about it (Grosse, 2008; Schöffski & Schulenburg, 2012). In the United States, partly due to the diversity of the US healthcare system, the USD 50,000 threshold has never been formally adopted. Since the ninetieth, it was never changed (e.g. due to inflation or new evidence). Eventually the 2010 Patient Protection and Affordable Care Act prohibits the federal government from basing policy on QALYs (Weinstein and Kaiser, 2011). Moreover, research indicates that the USD 50,000 threshold would be "very unlikely consistent with societal preferences in the USA" (Braithwaite et al., 2008).

One of few concepts with an explicit threshold is that of NICE in the UK (responsible for England and Wales). Its value has the form of a range of GBP 20,000–30,000 per QALY gained. NICE has used this threshold for more than 15 years, however, their policy has been changing. In the early years, an official statement to an explicit threshold was missing (Devlin & Parkin, 2004; Rawlins & Culyer, 2004). Later, an officially acknowledged threshold was published. The current NICE guideline of 2013 (NICE, 2013) describes in detail, how the technology shall be treated in each of three intervals defined by the threshold range (below, between, above). However, the threshold is not the sole basis for decision making, although a decision against the threshold rules requires special reasons and a detailed justification.

In Germany, general cost-effectiveness thresholds across different diseases or interventions are deemed to be against German history and interpreted to be against the German Constitution (den Exter, 2015; Schwarzer, & Rochau, 2015). There is also an explicit statement in Germany that no universal threshold should be used across all diseases (IQWiG, 2017). Actually, the Institute for Quality and Efficiency in Healthcare (IQWiG) is providing cost-effectiveness analyses, however, they can be compiled only within a particular indication group following very strict, rather bureaucratic rules (IQWiG, 2017).

Also WHO contributed to the C/E threshold discussion. In 2002, they published, without any justification, that averting one DALY (Disability Adjusted Life Year) for less than the country´s GDP per capita is very cost-effective, averting one DALY for less than three times the country´s GDP per capita is still cost-effective, and averting one DALY for more than this amount is not cost-effective (WHO, 2002). Although there are differences in the construction of DALYs and QALYs, their incremental values are comparable: one averted DALY can be considered as one gained QALY. The three-fold-GDP-per-capita threshold seems to be accepted more in low-income countries (Brazil, Thailand) than in high-income countries. According to Schwarzer and colleagues (Schwarzer, Rochau, 2015), this threshold would be between USD 100,000-135,000 in most high-income countries, while between USD 11,000-25,000 in Thailand or Brazil. Also in the Czech

Republic, the threshold of three-fold GDP per capita is frequently cited, although there is no officially acknowledged threshold (even no officially acknowledged health technology assessment). This threshold is currently a little above CZK 1.2 million (≈ USD 54,000).

A special situation is in Slovakia. According to the Act No. 363/2011 Z.z. on the scope and conditions of drug reimbursement, two thresholds are defined: λ_1 equals to 24-times the annual salary (published by the Statistical Office of the Slovak Republic for the year by two years preceding the year of the report), λ_2 equals to 35-times the annual salary. Since the 2015 annual salary was EUR 993 (Pečíková, 2016), the lower threshold amounts to EUR 23,832, the upper threshold to EUR 34,755. The law is strict, drugs with the C/E ratio above λ_2 cannot be covered from the public health insurance (with the exception of orphans).

There are only a few countries with an explicit C/E threshold. Next to England and Wales (NICE), such a threshold exist in Thailand, Poland, Hungary and Slovakia. However, there are many countries using implicit threshold values, including USA, Canada, Australia, New Zealand, Japan, Brazil, the Netherlands or Scotland. On the other hand, neither explicit nor implicit thresholds are applied in Germany, France, Austria, Romania or Czech Republic (Gulacsi et al., 2014; Schöffski & Schulenburg, 2012; Schwarzer, & Rochau, 2015; Skoupá et al., 2014).

A C/E threshold can be determined by several methods. Up to now, the most common ones have been the following:

(i) An arbitrary value is chosen by an expert or by a group of experts.
(ii) Individuals' (general public or patient´s) WTP is directly elicited using surveys.
(iii) The threshold is calculated based on some economic indicators (typically GDP per capita).
(iv) The threshold is calculated in such a way that it maximizes total health (whatever it may mean) from the available resources.

All these methods have their drawbacks that may lead to massive problems when they are applied in a healthcare system. If we omit the fundamental question about justification of the chosen or elicited value, there are other practical problems. The methods (i), (ii) and (iii) are independent on the budget. Once a C/E threshold is set, any intervention that is more effective than this threshold must be reimbursed, which can easily lead to exceeding of the budget. Hence, we can set (optimize) either the budget or the threshold, but never both (Gyrd-Hansen, 2007; Schöffski & Schulenburg, 2012).

The principle of the QALY concept is trading life expectancy for better health, while the principle of a threshold is trading money for better health. Linearity between these two measures is assumed. However, if there are a rich and a poor persons, the willingness to trade money for health will differ, although the willingness to trade life expectancy for health may be the same. Moreover, regardless of the measure, people naturally differ in their valuation of health (and life) (Gyrd-Hansen, 2007).

Next to that, all reservations to the QALY concept (see above) translate to the cost-effectiveness threshold idea in a much more burning, or even critical way. Thus, the problem of setting any thresholds for healthcare reimbursement stays open.

4 Discussion

The myth that decisions about the allocation of care are based on clinical criteria alone is slowly coming to an end. Due to an extreme growth of spending on healthcare in the last twenty or thirty years, it is more and more obvious that economic criteria must be applied in healthcare similarly to other branches (Barták, 2010; Fuchs, 2011; Gavurova et al., 2017; Schöffski & Schulenburg, 2012). All policy makers should recognize that neglecting economic considerations is unethical, as spending resources on one health program reduces the resources available for other health programs, especially in a fixed budget situation (Cleemput et al., 2011). A transition from implicit to explicit rationing tools is in the interest of a fair and efficient allocation of resources in healthcare (Schöffski & Schulenburg, 2012).

Any system for resource allocation requires a measure attaching a value to any intervention. The QALY concept was developed for this purpose. It is quite simple and understandable, and at first sight it seemed well-justified and fair. However, its practical application showed that it is afflicted with serious limitations (Beresniak, & Medina-Lara, 2015; Rogalewicz & Bartak, 2017).

The situation with the cost-effectiveness thresholds seems to be even worse. Although several methods were suggested for its determination, serious problems appear, when anybody tries to fix it. It usually seems to be chosen arbitrarily as a nice rounded number (compare USD 50,000 or GBP 20,000) (Grosse, 2008). However, since it is arbitrary it will not necessarily lead to optimal resource allocation (Gyrd-Hansen, 2007). The authors usually do not make any effort to justify them.

A lot of people do not understand mathematics and are dazzled by it; mathematical theories seem to be genuinely "scientific". Health economists and policymakers are using mathematical models (read: QALY, WTP, thresholds) to add more importance to their arguments. After all, results of complex formulas can´t be false, they do not need to be justified or proofed anymore! In fact, the opposite is true. Already in 1970 Wassily Leontief, the Nobel laureate in economics, said in his presidential address delivered at the eighty-third meeting of The American Economic Association: "Uncritical enthusiasm for mathematical formulation tends often to conceal the ephemeral substantive content of the argument behind the formidable front of algebraic signs … Policy oriented models … are gaining favour, however non-operational they may be. This is in part because the choice of the final policy objectives … is considered based on normative judgment, not on factual analysis. Thus, the model builder can secure at least some convenient assumptions without running the risk of being asked to justify them on empirical grounds." (Leontief, 1971).

The Czech economist and philosopher Tomáš Sedláček adds: "Nothing more can come out from a mathematical apparatus than what was put in it. And if mathematics is the fundamental language of economics, then the economists must put some proper economic content into the formulas, otherwise their theory becomes only an empty exercise, when, after mathematical *abracadabra*, the coveted result comes out from the axiomatic assumptions." (Sedlacek, 2011)

Most economists recognize there might be legitimate reasons for wanting to sacrifice efficiency for more equity. Because the QALYs and thresholds cannot provide the magic solution to decision making, the focus should primarily be on transparency in the decision criteria and their relative importance of each of the criteria in each decision (Cleemput, & Neyt, 2011). Economic modellers

should present the results of their analyses in a disaggregated form and present all relevant outcome parameters that can be derived from the model. There are alternatives. The most promising seem to be multiple-criteria decision-making (MCDM) techniques that can be used at different stages of health-economic analyses (Hummel et al., 2011; Ivlev et al., 2015; Rogalewicz & Jurickova, 2014a; Thokala & Duenas, 2012).

5 Conclusion

QALYs and thresholds helped to put methods of health technology assessment through. However, due to their serious drawbacks, it is time to rethink the whole concept. QALYs should be fully abandoned (maybe replaced by simple life years, how recently recommended by numerous authors). Thresholds are quite useful (of course, better in relation to life years than to QALYs), but they should not create the single, sacrosanct and inviolable rule. Instead, the decision makers should consider the whole spectrum of clinical, economic, moral, political and organizational arguments, and employ also other mathematical models. The multiple-criteria decision analysis appears to be a good candidate.

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Reputation Management: (almost) the Alpha and the Omega of all Business Activities in the Digital Age

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Abstract

People's willingness to buy and recommend products, to work for a company or to invest in a company is driven primarily by their perceptions of the company. In today`s digital world, however, a negative customer experience will directly and immediately affect a company's reputation and sales. This is because never before have customers had real-time access to so much information about functionality, quality, prices, customer service or alternatives and never before has it been easier for customers to switch to a competitor in the space of seconds. Therefore, the main aim of this paper is to provide current knowledge about reputation management in a concentrated form and to point out how the digitalization of communication is revolutionizing corporate reputation. This paper states that the digital transformation of a business requires trust. As a result, companies have to shift their strategic focus to the reputation management, concretely to the complex, consistent and individualized optimization of the customer experience across all traditional and digital contact points.

Keywords: Corporate Reputation, Digital Disruption, Process of Reputation Management, Reputation Management, Trust.

JEL Classification: L14, O14, O33

1 Introduction

The world has changed radically in the past few decades due to shifts in technology, culture and globalization. Digital disruption is everywhere today, resulting in a great opportunity and an inevitability of exponential change. Mobile technologies made it possible to access information, and thus to interact, communicate, and make any decisions, at any time, from anywhere (Jurisic & Azevedo, 2011). Social media changed fundamentally the opportunities for interaction and communication within companies as well as with the general public, partners and customers (Abolhassan, 2017). Analytics, big data, and data-driven innovation enabled managers to make well-founded decisions and to develop new, data-based business models. Cloud computing technologies allowed companies highly flexible access to data and applications under reasonable financial conditions so that a small start-up in India or Netherlands has access to the same kind of information and computing resources that previously only big international companies could afford

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(Curley & Salmelin, 2018). And finally, the Internet of Things – potentially the future largest industry in the history of electronics – promised companies unlimited opportunities for interaction, communication and new business models by connecting products and various sensors (Châllons & Dufft, 2017). As a result, the use of digital technologies dramatically increased market transparency and lowered the barriers and cost of entry to global opportunity.

With the arrival of the new millennium, moreover, a new period began that was characterized by general uncertainty and a collective fear among people and markets. Natural disasters, terrorist attacks, political scandals, and financial and debt crises, namely, have all shaken people`s sense of security, leading to talk of a culture of fear. In particular, the 2007-2008 financial crisis brought up the issue of trust, or rather a lack of trust (Aula & Heinonen, 2016). Therefore, trust and reputation have become (almost) the Alpha and the Omega of all business activities in the digital age.

In light of this, the main aim of this paper is to provide current knowledge about reputation management in a concentrated form and to point out how the digitalization of communication is revolutionizing corporate reputation. People's willingness to buy and recommend products, to work for a company or to invest in a company, namely, is driven 60% by their perceptions of the company and only 40% by their perceptions of the company`s products (Frighetto & Wolf, 2013). However, in a networked, digital world, where customers share their experiences with everyone, at any time, from anywhere, and can switch to a competitor in the space of seconds, the optimal customer experience has become the key criterion to remaining competitive (Châllons & Dufft, 2017). As a result, companies have to shift their strategic focus to the reputation management, concretely to the complex, consistent and individualized optimization of the customer experience across all traditional and digital contact points.

The remainder of this paper is organized as follows. Section 2 provides current knowledge about reputation management in a concentrated form and points out how the digitalization of communication is revolutionizing corporate reputation. Section 3 discusses process of reputation management in the digital age, and finally, Section 4 concludes this paper.

2 Corporate reputation in the digital age

Reputation is „[w]hat is generally said or believed about a person or a thing." (Beke, 2013, p. 10) Evolutionary theories explain the term "reputation" as one of many signals that provide information about the likely behaviour of an individual, whereby such signals can apply to different aspects of behaviour. However, when it comes to companies, reputation is referred to as corporate reputation, representing a valuable intangible asset that needs to be managed as it influences stakeholders' perceptions and preferences of companies as community members, as investment opportunities and employment opportunities, and as suppliers of products and services (Hall, 2003; Aula & Mantere, 2008; Burkhardt, 2008). Fombrun (1996) defines corporate reputation as „[…] the overall estimation in which a company is held by its constituents." (Fombrun, 1996, p. 37) and Elsbach (2003) states that reputation management means to systematically influence and to design the perceptions that form this estimation.

In general, corporate reputation is affected by a number of factors. These include provenance, sectors, and core values. Corporate reputation also varies from one country to the next and is culture-dependent (Fombrun & Shanley 1990; Schwalbach, 2000). Moreover, as multiple networks

are these days formed between stakeholders, suppliers, competitors, society, and the media, corporate reputation and an organization's success depend on building strategic partnerships and working within them. Corporate reputation, however, is time-independent and always present so that a company without a reputation is a conceptual impossibility (Fombrun & van Riel, 1997; Balmer, 1998; Weigelt & Camerer, 1998).

Nevertheless, the simultaneous evolution of the business environment, both in the global and local scale, has brought the rapid spread of social, financial, and political changes thus making it difficult to be controlled by managers. As a result, many companies are redefining their activities so as to differentiate themselves from their competitors and to adjust and adapt to the temporary and lasting pressures (Aula & Heinonen, 2016). In today's digital world, therefore, corporate reputation is the difference between a brand or a company that has a future and one that may struggle.

A good reputation, namely, enables an organization to attract customers, suppliers or stakeholders easily and maintain the loyalty of the existing ones besides hiring the best employees (Fombrun & Van Riel, 2004; Rindova, Pollock, & Hayward, 2006; Kambara, 2010). A superior reputation also can significantly reduce the economic vulnerability of companies. Further, an excellent reputation is a basis for the good relationship between the media and the organization since the company's sources of information will be frequently consulted as it is trusted more. In other words, an exceptional reputation gives a company a competitive advantage over other companies, which in turn is reflected in terms of resources, growth, profits, and financial fortune (Fombrun, 1996; Weigelt & Camerer, 1998; Aula, 2011). Figure 1 summarises the dimensions of corporate reputation and their relations to a company's performance.

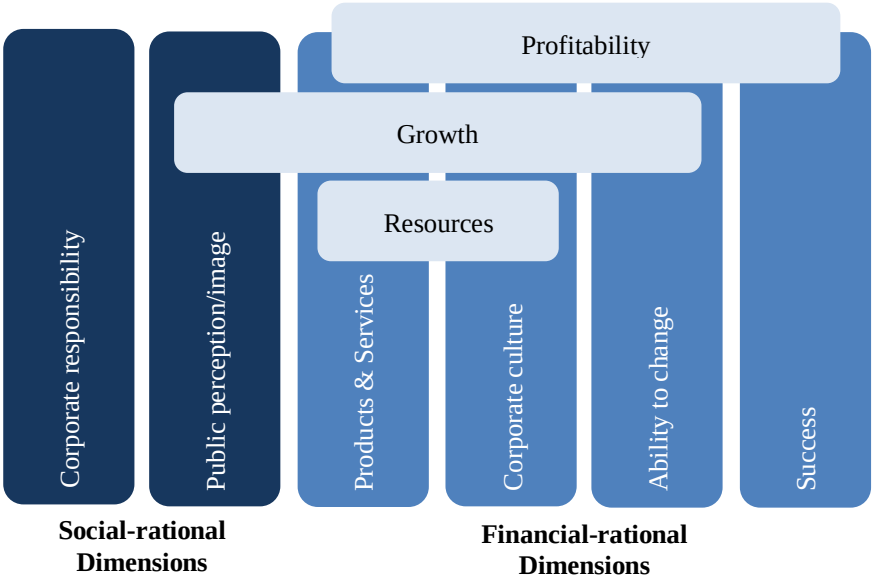

Figure 115 Dimensions of corporate reputation and their relations to a company's performance
Source: Aula & Heinonen (2016)

According to Burkhardt (2008), a positive corporate reputation is determined by four factors: trustworthiness, credibility, reliability and responsibility. Customers tend to be more loyal to a company with a good reputation than to a less well-publicized competitor. This can be the key to

customer retention, especially in uncertain and dynamic environmental conditions, which is increasingly difficult to achieve by quality and performance due to increasing product homogenization. Reputation management therefore encompasses the entirety of all systematic company activities for the establishment, maintenance, and improvement of a positive corporate reputation. Sustainably successful reputation management means responsible communication with all stakeholders and reflects the corporate culture and values, both internally and externally (Ternès & Runge, 2016; Abolhassan, 2017).

Companies should be visible to customers and distinguishable in the public perception. Communicative measures should be transparent, authentic and in line with the aims pursued (Fombrun, 2001). The theoretical differentiation between image and reputation is important here as images are representations that are made by viewers. Reputation, however, means the aggregation of these images into an absolute value, which ultimately determines the perceived quality and succession. A high reputation leads to strong trust, which is important for long-term customer loyalty.

It is thus clear that it pays to invest in a high reputation. Companies with a good reputation can demand higher prices, attract and retain customers and the best employees and, especially in times of crisis, feed on their high reputation as an important intangible asset, as a competitive advantage. The problem with trust, however, is that it is very hard to build, but terribly easy to destroy. Therefore, it requires proactive and long-term oriented strategic management. Only in this way, namely, can companies consistently exploit the market opportunities that result from their reputation. However, it should be acted both online and offline. The Internet, namely, has become the medium of choice for market agents that creates a picture of a company. Using blogs, interactive company pages or fan pages, it is possible to actively influence opinions and create trust (Ternès & Runge, 2016; Abolhassan, 2017, Curley & Salmelin, 2018). The customer of today, namely, is the so-called "prosumer" – a key determinant of success of a product or a brand (Petersen, 2012).

In the War of Talents the reputation of the company also plays a decisive role. Being proud of the company and its work, namely, is an essential element of the meaning of life for many employees. This refers to the identity-based, internally and externally effective development and positioning of a company as a credible and attractive employer.

The prerequisites for this, however, are a systematic, professionally supervised and active reputation management and a properly set reputation management process. Building a high reputation, namely, takes time, perseverance and consistency.

3 Process of reputation management in the digital age

In the context of "the digital revolution", the formation of corporate reputation can be described in three ways: multi-voiced, multi-focal, and multimodal. Companies are increasingly using the digital publicity for communication since it integrates the search engines, the social media, and the mainstream media (Jurisic & Azevedo, 2011; Laaksonen et al., 2012). The public is actively taking the role of forming the corporate reputation and the reputation stories of companies through the innovative context of digital publicity (Frighetto & Wolf, 2013).

The formation of the reputation of a company through the digital platform, however, is characterized by substantial uncertainty due the increased power of market agents in telling stories. The word of mouth, namely, is no longer constrained to the direct and traditional social networks, namely the colleagues, friends, and family. The social media make it possible to access a wider audience (de Bussy et al., 2000; Dellarocas, 2003; Aula & Mantere, 2008; Scott & Walsham, 2005).

As a crisis management, reputation management can also be used singularly in an emergency to solve an acute reputation problem. However, this is only a short-term troubleshooting that cannot replace sustainable reputation management. Reputation management only becomes meaningful and sustainable if it is integrated into the classic and online marketing and the communication strategy of the company (Ternès & Runge, 2016). In many companies, however, there is still no strategic implementation of reputation management. Therefore, Figures 2 shows the steps of reputation management that should be implemented in the company management in the digital age.

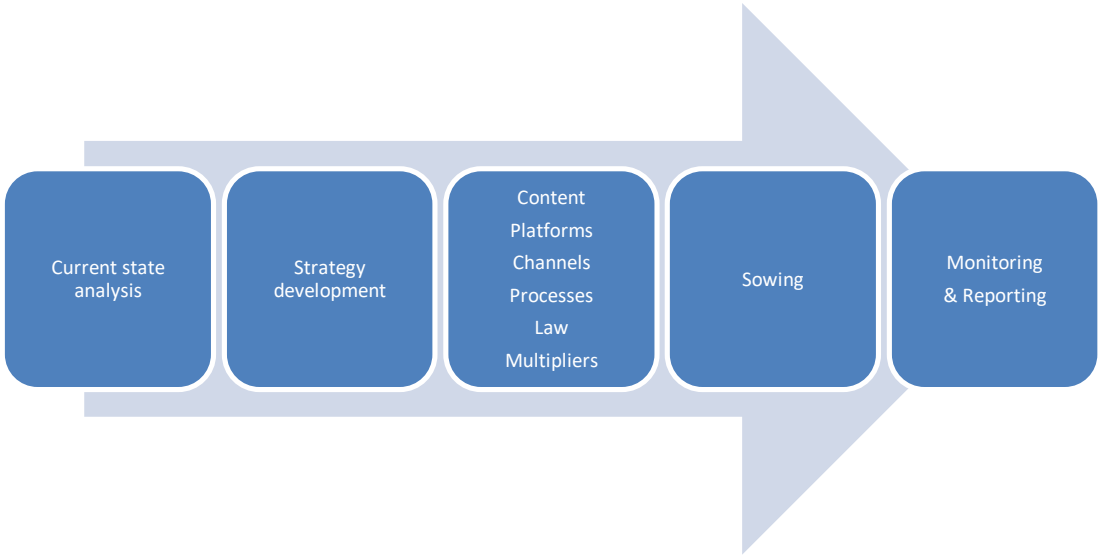

Figure 2 Flowchart of reputation management
Source: Ternès & Runge (2016)

Ideally, the process of reputation management is a cycle, a continuous process that constantly reconnects with the relevant issues and results-oriented, constantly optimizes the company's reputation. As shown in Figure 2, structured procedure guarantees traceability. Therefore, the first step should by a regular and precise current state analysis based on the purpose, the vision and the business strategy of the company.

For this purpose, both internal and external aspects should be considered. Externally, all relevant stakeholders should be identified with their expectations and communication channels and instruments. In this area, however, the identification and use of multipliers can help to increase the effectiveness of measures taken. The internal starting situation and the social and functional reputation of the company also directly affect the perceived quality of products or services and are therefore of central importance to the perception of the company by third parties.

The analysis should always follow a consistent approach in order to create comparability and make optimization easy. It is helpful to refer to predefined instruments and areas that the company can

only activate or deactivate. In this way, the focus is on the content and it is easier to keep track. Therefore, the analysis can be done using proven tools such as the SWOT analysis, the Balanced Scorecard, resp. the Crisis-focused Crisis Management Balanced Scorecard, as well as the four or five Ps, the three generic competitive strategies or the five-force model of Michael E. Porter work. In this way, categories are developed, which form the basis for the further course of action and subsequently serve as a test parameter for evaluation and controlling.

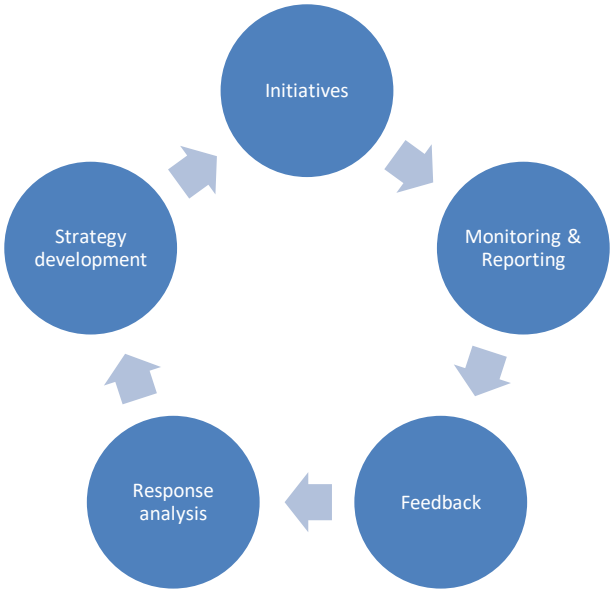

Figure 3 Process of reputation management
Source: Ternès & Runge (2016)

On the basis of the current state analysis, strategies of reputation management are developed. A strategy should always be generally understood, as it needs to be understood by many quickly and without explanation. It should be simple and concrete to guarantee the best possible applicability. The strategies, as well as the analysis, should take a holistic approach and consider both internal and external reputation.

The implementation of the previously defined points can also be described as sowing in the sense of the flowchart. This takes place in the context of a concerted planning. If several people or different departments of a company are involved in the implementation, it is extremely important to clearly define and coordinate the interaction of the individual areas and persons in advance and to clearly identify areas of responsibility in order to avoid overlaps, exchange information in a timely manner and intersections productively manage (Helm, Liehr-Gobbers, & Storck, 2011).

Once the overall strategy is defined, it is important to translate it into operational procedures. In order to do so, the content has to be created, offline and online suitable platforms and channels have to be found, processes have to be defined, the legal situation examined and multipliers have to be defined and addressed. The financial, personnel, organizational and time resources of a company must not be left out of the question. These are partly independent from each other, partly they are caused. A legal and objective examination is essential to avoid procedural errors, to avoid becoming vulnerable and to have a qualified external opinion (Ternès & Runge, 2016).

When implementing the strategy, it is essential to ensure consistency. All stakeholders should be emotionally involved. Reputation is based on credibility and trust. The communicative measures must meet the expectations of the stakeholders as well as reflect the corporate identity, so that a coherent picture emerges, which enables transparency and ultimately trust. Stakeholders should be multipliers, who can strengthen the reputation of a company. Similar to referral marketing, in times of demand-driven marketing and interchangeable products, customers increasingly listen to other customers. The accuracy of the target audience is as crucial to effective reputation management as it is to any marketing activity.

In order to find suitable channels and methods, moreover, monitoring and reporting processes are indispensable. Ideally, it should have already accompanied the previous planning steps in order to be able to gain an optimum of insight from each step. Who initiates and controls these processes depends on the structure of the company, but also on the platforms, channels, processes and multipliers. Quality assurance can be done on the basis of various methods. These include qualitative and quantitative surveys, interviews and evaluations (Ternès & Runge, 2016).

Monitoring and reporting are important in order to check the quality and impact of the disseminated content. In particular, representations and statements on the Internet must be kept constant and consistent. Professional response analysis and feedback are indispensable process components in order to be able to measure the effectiveness and scope of the selected instruments and to be able to understand changes in the perception of others. Acceptance and organizational commitment can only be promoted by demonstrating the specific value-adding benefit of reputation. In turn, these results can identify executives and employees who can translate their positive attitude to the business toward customers and potential new employees.

The best reputation management strategy, however, is worthless. It should be lived by all involved and effectively anchored in the organizational structure. It is also crucial to adhere to the ten golden rules for successful reputation management throughout the process (see Figure 4).

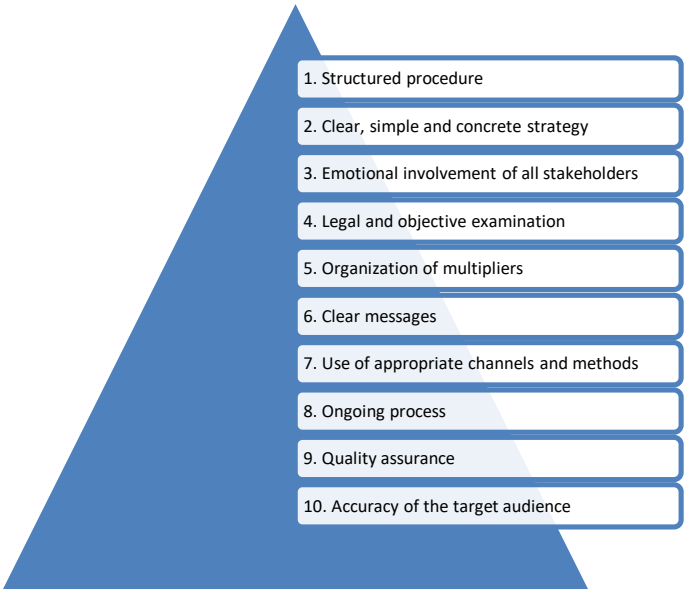

Figure 4 The ten golden rules for successful reputation management
Source: Smith (2010)

A good reputation management requires individual, perfectly coordinated steps that complement each other perfectly - to build, maintain and improve a positive corporate reputation. An external strategy consultancy can help to implement these steps correctly and efficiently by bringing the necessary know-how as well as objective input, new solutions and fresh ideas into the company. Then nothing stands in the way of a good reputation.

4 Conclusion

Communications landscape has changed significantly over the past few decades. What was once quite a local and offline world is now global and online space. This change also affects companies and corporate reputation, as communications landscape is being redrawn each day.

Traditionally, the company's reputation has been a product of the media and the static environment provided by the traditional forms of media such as newspapers, magazines, radio or television (see also Fombrun & Shanley, 1990; Deephouse, 2000; Scott & Walsham, 2005). Nowadays, however, far too few companies are able to transform themselves efficiently according to the demands of the times. This resistance to change is reflected in weakness of these companies to utilize corporate reputation and trust as an intangible asset, i.e. as a capital.

It is also clear that the post-crisis period requires new approaches by business. The determined and systematic building of a company's reputation is one such new approach. Strategic reputation management creates new opportunities for doing better and sustainable business. Therefore, companies have to shift their strategic focus to the reputation management, concretely to the complex, consistent and individualized optimization of the customer experience across all traditional and digital contact points.

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Debt Capacity of Nonprofit Entities: Jobs on the Green Economy Background Case

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Abstract

Nonprofit social economy entities usually are concentrated on realization of their social mission. One from the areas of social economy fields is a green economy activity. In this article, green jobs are defined as decent work places for young people who can commence employment in section E of PKD. On the background of green economy young people situation is analysed in chosen group, then data suitable for Poland are synthesized to provide calculations. Young people situation is very difficult due to many factors on local labour markets but for very specific group able to undertake green employment the same situation can be different - stabile and balanced. This young people group can easily find employment in future because of accepted by government responsible development plan for Poland.

Keywords: Financing non-profit, Capital structure, Green economy, Green jobs, Unemployment.

JEL Classification: Q20, Q56, E24, J43, Q13, R11

1 Introduction

Nonprofit organizations are concentrated on realization of the social mission. One from the areas of social economy fields is a green economy activity. Environmental challenges raise serious concerns for the welfare of current and future generations. Therefore, modern economy has to be sustainable and responsible in three dimensions: economic growth, environment protection and social development. This new economy is called green economy and jobs which offer are green jobs. On the other hand, the most precious natural asset is drinking water, which allows society to thrive and prosper and because of that it all related to water and water treatment are so important for economy (comp. Bem, 2016; Siedlecki, 2016; Michalski, 2013; Michalski, 2014; Nemec, & Svidronova, 2017; Nemec, Merickova, & Svidronova, 2016; Cheben & Lancaric, 2015; Pokrivcak & Toth, 2016).

For the purposes of this article the definition of the United Nations Environment Programme (UNEP) is used and states that green economy is "one whose growth in income and employment is driven by public and private investments that reduce carbon emissions and pollution, enhance

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energy and resource efficiency, and prevent the loss of biodiversity and ecosystem services" (UNEP 2017) Firms that are active in reduction of carbon emissions or in reduction of pollution, by which they enhance energy and resource efficiency, or prevent the loss of biodiversity and ecosystem services are part of social efforts in creating the 'better world' mission typical for social economy (Michalski 2016a), (Michalski 2017a).

An important document is report created by UNEP's Green Economy Initiative in collaboration with economists and experts worldwide (UNEP 2017). The greening of economies is an effect not only governmental initiative but also local firms and NGO's initiatives that are part of social economy oriented businesses (Sinicakova et al. 2017; Soltes & Gavurova, 2016). It demonstrates that the greening of economies is not generally a drag on growth but rather a new engine of growth; that it is a net generator of decent jobs, and that it is also a vital strategy for the elimination of persistent poverty (Sulich 2016a, 2016b). The report also seeks to motivate policy makers to create the enabling conditions for increased investments in a transition to a green economy (UNEP 2017). The policy makers by creating the enabling conditions for increased investments in a transition to a green economy should be potentially supported by for profit businesses and non-profit entities working as part of social economy sector (Michalski 2016b), (Michalski 2014).

Nowadays is very important to create new jobs in the Environmental Goods and Services Sector (EGSS). This sector of economy is distinguished by Eurostat sector of the widely discussed green economy (Eurostat). During increasing investments in a transition to a green economy, support by for profit businesses and non-profit entities working as part of social economy sector will create new jobs in that area (Michalski 2017b), (Brozyna 2015). Green Jobs describes the state-of-play of green employment in renewable energy, buildings, transportation, basic industry, recycling, farming, and forestry. This article follows the definition of green jobs according to the International Labour Organization (ILO) which defines this positions "being decent jobs, either in traditional sectors or in the new green ones, which contribute to preserving or restoring a sustainable environment" (ILO 2017). Growing investments in a transition to a green economy in for profit businesses and non-profit entities working as part of social economy sector will support that activities in both traditional and new sectors (Brozyna 2016), (Bem 2015), even in healthcare oriented social economy businesses (Szczygiel 2015). More precisely green jobs are decent jobs that: reduce consumption of energy and raw materials, limit greenhouse gas emissions, minimize waste and pollution and protect and restore ecosystems (UNEP 2017). By creating green jobs reducing consumption of energy and raw materials, limiting greenhouse gas emissions, minimizing waste and pollution and protecting and restoring ecosystems, social economy businesses reduce general risk of economic system in the country they operate (Sinicakova & Gavurova, 2017). Thank that is possible to use lower levels of debt to equity indicators in social economy enterprises (comp. Ucieklak-Jez, 2015; Ucieklak-Jez & Bem, 2015; Belas, 2016; Homolka, 2015; Belas, 2014; Bem & Michalski, 2015; Brozyna & Michalski, 2015).

In July 2014, the European Commission presented the "Green Employment Initiative" based on EU Commission Communication 2014 which assumes (EC, 2017):

- upholding a debate on the prospects of the green economy involving all stakeholders, employers and trade unions and sharing knowledge and practices on the green sectors at international level;
- identifying new competences that are needed and training for workers;
- shifting the tax burden from work to pollution;

- supporting small enterprises in the transition to comply with environmental regulations.

Green jobs initiative highlighted the dual challenge of green jobs: to make economic growth and development compatible with climate stabilisation and a sustainable development footprint. The shift towards greening the economy will require the second greatest economic transformation after industrial revolution and will bring tremendous changes on labour market. Now Polish society has to pay more attention to the social dimension of sustainable development, especially its implications for employment, training and decent work (comp. Michalski, 2016a; Michalski, 2016b; Brozyna, 2016; Michalski, 2015; Michalski & Brozyna, 2015).

The social development is important in Poland, especially as a part of labour market, because it brings better qualifications and awareness of society. Fundaments of social development are young people because they are factor of generational change. Moreover, business has to also concern the role of young people as a guarantee of its future. In this article following definition is formulated as consequence of methodology assumed by Central Statistical Office (GUS) in Poland: the terms "youth" and "young people" are referred respectively to the age groups (GUS 2017), 15-24 and 25-34. Young people in this age are students or graduates from vocational and secondary schools or universities.

The aim of this article is to examine possibilities of employment new entrants to the labour market, which are graduates up to one year after graduation, in green jobs sector. The analysis is based on results of survey conducted among Polish universities which offer education allowing young people to commence employment in chosen sector. Then these data are compared with results of Central Statistical Office (GUS) collected in Poland and gathered in Local Data Bank (BDL).

2 Delivering a green economy - the twin challenge

In balancing environmental, economic and social elements, the green economy concept has much in common with the notion of sustainable development. There is a need to ensure an equitable distribution of the benefits (and also the costs) of the transition to a green economy.

Green jobs hold the promise that Polish society will be able to respond effectively and fairly to the following two defining challenges of the 21st century. First is averting dangerous and potentially unmanageable climate change and protecting the natural environment which supports life in Poland. The second challenge is providing decent work and thus the prospect of wellbeing and dignity for all. Decent work is defined as opportunities for women and men to obtain decent and productive work in conditions of freedom, equity, security and human dignity. Therefore, decent work sums up the aspirations of people in their working lives: opportunity and income; rights, voice and recognition; family stability and personal development; for fairness and gender equality. Ultimately these various dimensions of decent work underpin peace in communities and society.

Announced in 2016 by Polish Ministry of Development plan titled "Plan for responsible development" consist map of intelligent specializations which focuses on assets in chosen economy segments where Poland can be successful (MD, 2017). Intelligent specializations are based on possibilities and expectations towards each voivodship. Few of these specializations are closely related to green economy (Figure 1).

Figure 1 Regional intelligent specializations in Poland
Source: Polish Ministry of Development

The intelligent specializations describe perspective of future development of Poland in areas economy which can mitigate differences between eastern and western Poland and reduce unemployment especially among young people. Accepted by ministry plan is also compatible with Polish Classification of Activities (PKD) and fields of education on all its levels (MD, 2017).

Green jobs are not defined in Poland in any legislative act. However, it is possible to distinct this sector from Polish Classification of Activities (PKD). This classification consists group E which can be accepted as an equivalent of green jobs category (Journal of Laws, 2004).

Table 1 Green jobs as a category based on PKD in Poland

PKD section	PKD group number	PKD description of group
E - water supply; sewerage, waste management and remediation activities	36.0	Collection, purification and distribution of water
	37.0	Sewage disposal and treatment
	38.1	Waste collection
	38.2	Waste treatment and disposal
	38.3	Materials recovery
	39.0	Remediation activities and other service activities related to waste management
	84.2	Services to the entire society

Source: Data extracted from Journal of Laws and GUS 2017b

The choice of the E section presented in Table 1 is based also on statistics provided by Eurostat. According to its official statistics 61% of employed in Environmental Goods and Services Sector (EGSS) works in areas distinguished in Table 1 (Eurostat, 2017). The most developed subsector of EGSS is water and waste water management (40 % of all employed in EGSS) next to waste management (34 %) (Eurostat, 2017). Green sectors will require new jobs, but they will also need to redefine many existing job profiles. Creating green jobs is possible in all fields of activity, but some industries are more suited, such as renewable energy, construction, agriculture, transport, recycling. Thus, the development of these fields of activity offer significant opportunities for jobs

creation, but also leads to some challenges for traditional jobs. Employment changes in E section of PKD are presented in Table 2, which shows steady grow in number of employed in full time in this economy sector.

Table 2 Employment changes in E section of PKD in Poland

Year	2010	2011	2012	2013	2014	2015	2016
Number of employed	142096	144411	145603	146704	147738	149 909	151230

Source: data extracted from Local Data Bank

Poland is developed country which is EU member from 2004 and since then many projects related to drinking water supply and water treatment were confounded with local and European funds. This investments demand growing work to improve environment protection and local society standard of life.

3 Greening young people employment

Green jobs are central effort to reduce poverty and to achieve equitable, inclusive and sustainable development. This effort begins with education younger generation which in time understands how important environment protection is, sustainable development and decent work which helps society to prosper because of activities in section E of PKD (Journal of Laws, 2004). In agricultural business, social economy philosophy is realized by such understood education of younger generation (Pokrivcak & Toth, 2016; Toth, Lancaric, & Savov, 2016; Toth, Holubek, & Serences 2016). Sustainable development and decent work which helps society is much safer in realization if the relationship between debt and equity in greening social economy firms is smaller because the financial risk is smaller in that time.

In Table 3 presented numbers for young people transition from education to employment in Poland with increase (14.88 %).These numbers refer to people who commence employment for their first time (BDL 2017). The highest increase of young people undertaking professional activity observed in voivodships: Lodzkie (89.41 %) and Dolnoslaskie (24.39 %).

Table 3 Young people participation in labour market

Name of voivodship in Poland	Young people transition into their first employment		
	2014	2015	change
Łódzkie	12 978	24 582	89,41%
Dolnośląskie	29 170	36 285	24,39%
Mazowieckie	61 921	76 719	23,90%
Pomorskie	10 333	12 123	17,32%
Świętokrzyskie	4 230	4 887	15,53%
Podkarpackie	8 890	9 881	11,15%
Lubuskie	4 940	5 469	10,71%
Zachodniopomorskie	6 127	6 685	9,11%
Małopolskie	17 789	19 276	8,36%
Opolskie	3 351	3 501	4,48%
Podlaskie	4 897	5 091	3,96%
Lubelskie	7 682	7 766	1,09%

Warmińsko-Mazurskie	5 797	5 828	0,53%
Wielkopolskie	26 912	26 846	-0,25%
Kujawsko-Pomorskie	10 360	10 158	-1,95%
Śląskie	24 774	20 787	-16,09%
Poland	240 151	275 884	14,88%

Source: authors own interpretation based on BDL

Comparison of employment in E section of PKD (Table 2) which is considered for synonym of green jobs reveals that obviously not all young people can commence employment in this sector. Therefore, the number of offers in green jobs for two voivodships: lodzkie and dolnoslaskie were examined in Table 4. The choice of these two voivodships is not only based on significant change presented in Table 3, but also on information provided by Ministry of Family, Labour and Social Policy (MRPiPS 2015), which states that dolnoslaskie voivodship had in 2015 the biggest factor of free work places equal 0,71. What is surprising Voivodship Labour Offices [Pol. Wojewódzki Urząd Pracy] rarely use PKD classification as a part of their methodology for labour demand and supply analysis. There are many differences between these offices and they do not cooperate with each other or Ministry of Family, Labour and Social Policy or GUS to provide comprehensive information about exact number of free positions in each of section or group listed in PKD.

Table 4 Number of demanded green jobs in chosen voivodships in Poland

Name of voivodship	Number of demanded work places in E section of PKD					
	2010	2011	2012	2013	2014	2015
Łódzkie	462	583	392	455	691	447
Dolnośląskie	1081	624	896	1104	781	586

Sources: Voivodship Labour Offices [Wojewódzkie Urzędy Pracy], [Ministerstwo Rodziny, Pracy i Polityki Społecznej].

From comparison of Table 3 and 4 just for two voivodships it is clear that green jobs can satisfy demand only of tiny percent of young people commencing employment. There is no research indicating how many young graduates start their professional career in section E of PKD in Poland. Based on methodology proposed by Ministry of Family, Labour and Social Policy calculated if green jobs are deficient, balanced or surplus jobs (MRPiPS 2015), as described in section E of PKD and results were presented in Table 5.

Table 5 Job availability indicator for green jobs in selected voivodships in Poland

Name of voivodship	Job availability indicator					
	2010	2011	2012	2013	2014	2015
Łódzkie	1,91	1,74	1,63	1,45	1,41	1,12
Dolnośląskie	1,51	0,88	1,10	0,92	2,11	0,90

Sources: Own calculations

The job availability indicator was calculated based on formula:

$$\frac{B^k}{O_t} = \frac{\overline{B_t^k}}{\overline{O_t^k}} \qquad (1)$$

where:

$\overline{B_t^k}$ – is average number of registered unemployed from group E of PKD in each year,

$\overline{O_t^k}$ – is average number of job offers available for people with qualifications to work in group E of PKD jobs in each year.

Table 6 Job availability indicator results interpretation

Job status	Job availability indicator
deficient	$\frac{B^k}{O_t} < \mathbf{0,9}$
balanced	$0,9 \leq \frac{B}{O_t^k} \leq \mathbf{1,1}$
surplus	$\frac{B}{O_t^k} > \mathbf{1,1}$

Source: Voivodship Labour Offices

In 2015 in Dolnyslask voivodship jobs from section E of PKD were balanced group of jobs, whereas in Lodzkie voivodship the same group was surplus (Table 5 and 6). Situation on labour market in many voivodships of Poland is dynamic what shows Table 5, with two different trends observed in green jobs.

4 Corporate social responsibility aspect

Mentioned above greening young people's employment can be helpful to define what the Corporate Social Responsibility (CSR) is. Modern companies trying to thrive take into consideration of two aspects human resources management and company public image. To make it clear, CSR is a kind of management strategy in accordance with enterprises in their daily operations are taking into consideration social interest, environmental aspects and relations with different stakeholders, especially with employees. To be socially responsible means to invest in human resources, environmental protection, relations with company surroundings and putting up about such actions. Those things lead enterprise to competitiveness, increase and formulate balanced social and economic development.

Corporate Social Responsibility is about making as much money as possible while conforming to the basic rules of society, both those embodied in law and those included in ethical custom (Rutkowska-Podołowska & Sulich, 2016). Many socially responsible firms can achieve reliefs from this particular confidence in several opportunities: becoming an eligible employer for young people, retention of high-quality employees and the enhancement of reputation.

The conceptual evolution of CSR has started when large numbers of companies recognized this strategic business approach which offers them measurable benefits. These benefits are:

- reduce of legal conflicts on complying with regulatory requirements,
- changing relationships all along the chain value, based on trust and doing things right way with suppliers and customers,
- improving working climate, thus increasingly including CSR criteria to make business more competitive,
- building a reputation as a responsible business, linked to increasing market share, maintaining key personnel and directing investors' confidence towards CSR,
- assuming positive and negative impacts of the company activity as a key question in management decisions, with long-term perspective,

- re-designing processes with CSR green parameters, reducing waste that often simplifies operations and saves money,
- improving relations and implications within local community, given the wide range of opportunities in terms of reputation, positive press and wealth.

These bullet points can be assumed as seven activities for employing strategy for environmental issues. Savings can be achieved simply in such areas related to transport and packaging services as well. Business begins by looking at switching to green electricity and sustainable development as core elements of their future.

5 Conclusion

Young people who gained education and training can find employment thanks to accepted by government program including regional intelligent specializations; however in two analysed regions their situation can be assessed as dynamic. Green jobs belong to balanced group of positions offered by local labour markets. In that way social economy ideas are realized in agroculture economics areas (Pokrivcak & Toth, 2016), (Toth, Lancaric, & Savov, 2016), (Toth, Holubek, & Serences 2016), but in the much more effective realization of social aims there is a need to keeping smaller financial risk reflected by debt to equity relationship.

Green jobs will develop existing sectors of economy and will change labour market in many voivodships in Poland. The demand for new related skills will also rise in most occupations. To meet this challenge, education and training systems will need to supply a well-trained, highly skilled labour force. Therefore, proposed by Ministry of Regional Development plan should be compatible with training and guidance services that steer people towards jobs in growing sectors should focus on skills related to energy efficiency and renewable energy implementation. Putting in place the right training programmes for employees in declining sectors will help Polish economy redeploy workers who are difficult to place. A well-trained and environmentally aware workforce will also be more innovative in improving resource efficiency. To achieve mentioned above as a society, we need comprehensive lifelong learning strategies and training systems that integrate sustainable development and ensure that the right skills are supplied. Moreover, the CSR approach has to wide spread around companies who give employment and educate local societies.

Acknowledgements

The presented work and results is part of monothematic cycle realized as part of grant titled: Determinants of capital structure in non-profit organizations. The work is supported by National Science Centre, and financed from the Polish budget resources in the years 2016-2019 as the research project DEC-DEC-2015/19/B/HS4/01686.

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The impact of transparency and competition on electronic reverse auctions

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Abstract

Since the Internet usage boom in 1990 electronic reverse auctions became an important procurement tool within private and public sector. We concentrated on the impact of transparency on efficiency of electronic reverse auctions. To prove the efficiency of costs of electronic reverse auctions we analysed empirical data. On the base of electronic purchases from certain Slovak company results show that increasing transparency in a certain way can lead to a lower purchasing price and therefore higher savings for a buyer. We also analysed the influence of number of participants on savings. We found out that increasing competition does not always lead to higher savings and it is important to define optimal number of suppliers for securing the most efficient purchasing price.

Keywords: Electronic reverse auctions, Efficiency, Savings, Procurement.

JEL Classification: D44, O32, M21

1 Introduction

New communication technologies accompanied transition of traditional economy to electronic-based economy (Tarazona-Bermudez et al., 2014). The availability of Internet connected with the introduction of innovative communication and information technologies caused changes on any market and brought new opportunities for cost optimization and efficiency increase not only in a procurement area (Tarazona-Bermudez et al., 2014). Procurement via Internet exceeded US1$ trillion already in year 2003 (Mendoza, 2002). One of the key difference that distinguishes traditional markets from the digital one is increased transparency of participants and their bids by the online realization of auction (Zhu, 2004).

Recent economic development is focused on crucial reduction or optimization of costs to enable reaching company goals. Electronic reverse auction or e-auctions became one of the main procurement methods for sourcing products and services widely used by public and private companies thanks to many benefits for both participated buyers and suppliers (Smart & Harrison, 2002; Schoenherr&Mabert, 2007). Recently, electronic reverse auctions became popular widely in almost every sector of the economy including aerospace, automotive, and industrial chemicals (Wang et al., 2013). Auctions are considered to secure independent price setting and efficiency of the process via dedicated Internet platforms (Pinker, Seidmann et al., 2003). Wide theoretical analysis of the benefits of electronic reverse auction, especially their costs efficiency and impact of transparency, needs to be accompanied with corresponding deeper empirical analysis.

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The aim of this paper is to examine impact of increased transparency and number of participants on the final price savings achieved in electronic reverse auction. The given problem is not sufficiently examined on the empirical data especially in middle and eastern European countries and therefore creates new opportunities for widening scientific knowledge in the area. For analyses, we used secondary data from the electronic reverse auctions of one Slovak company collected by software within four years.

The structure of the paper is split into three main sections. The second section reviews literature regarding electronic reverse auctions and the importance od transparency for them. Following chapter describes methodology and data applied in this paper together with specification of main objectives. Results of empirical analyses are presented in the next chapter. Final chapter concludes results and findings.

2 Theoretical background

Electronic reverse auctions radically changed corporate procurement practices since their introduction in 1993 (Lucking-Reiley, 2000). The word "reverse" evokes that instead of one supplier and many interested buyers presented in traditional auction, there is just one buyer against a number ofpre-defined bidders (Messer et al., 2017). Buying entity invites group of pre-selected suppliers to offer bids through specialized online software at certain time and to win an opportunity to supply goods or services by offering the most suitable criteria, such as design, quantity, required quality, delivery conditions and other related terms and conditions, against the other suppliers (Beall et al., 2003). Electronic reverse auction is a special type of price determination of supplied goods or services initiated by setting conditions by buyer and finishes by awarding the contract to the most suitable supplier (Caniëls & van Raaij, 2009; Schoenherr & Mabert, 2007).

Between many examples of benefits that electronic reverse auctions brought, we mention reducing transaction cost for counterparts, geographical distances, making process more flexible, shortening cycle time and many others (Lucking-Reiley, 2000).Among long list of benefits of electronic reverse auctions losing long-term relationship with suppliers is possible side effect and therefore, at the beginning auctions need to be carefully organized by an experienced entity with later easy repetition of the process (Shawn & Nath, 2005; Ray et al., 2011; Smart & Harrison, 2003;Smeltzer&Carr, 2003; Caniëls & van Raaij, 2009; Arnold et al.,2005; Carter et al.,2004; Tassabehji et al.,2006).On the contrary, reaching savings is proved to be possible while sustaining good buyer-supplier relationship (Amelinckx, Muylle, & Lievens, 2008). It is recommended to create limited supplier base for the auction, firstly to have enough competitive auction environment and secondly, to be able to find another alternative supplier in case of inevitability (Ray et al., 2011; Min & Galle, 1999; Olorunniwo & Hartfield 2001).

According to the basic auction theory the higher number of bidders the lower the expected costs of procurement (Tenorio, 1993). Electronic reverse auctions facilitate strategic sources planning mainly of standardized goods, with low switching costs and high competition between possible suppliers (Shawn & Nath, 2005; Beall et al.,2003; Smeltzer & Carr, 2003). With increasing number of bidders, competition is increasing and therefore, prices are decreasing. Inevitable predominance is to organize the auction setting conditions that will attract adequate number of bidders (Shawn & Nath, 2005).

The auction procedure is assumed to secure efficiency of costs (Mayr et al., 2014). Many consider savings as the most important benefit of electronic reverse auction (Manoochehri & Lindsy, 2008). The definition of savings in electronic reverse auction is discussable (Wyld, 2011) and generally considered as a decrease of purchasing price (Klézl & Vasek, 2015).

The impact of transparency is not the primary issue connected to electronic reverse auctions. Electronic reverse auctions may contain full range of transparency from zero level to total transparency (Gupta et al., 2012). Relevancy of additional information was also empirically proved to bring advantageous results forboth participated sites, buyer and suppliers (Gwebu, Hu, & Shanker, 2012; Koppius & Van Heck, 2003; Strecker, 2010). On the contrary, too much market transparency can harm competition (Delina, 2014).

3 Research methodology

Our study is based on real electronic reverse auction data from Czech software provider NAR marketing s.r.o. collected by their e-auction software PROEBIZ, the most significant electronic reverse auction solution in central Europe. For quantitative research, we used secondary data.Our dataset includes 881 e-auctions in this software performed by one Slovak company from the period 2010-2013. In our analysis, we used the statistic software SPSS Clementine and IMB SPSS Modeler.

Objectives

The main aim of the paper is to analyse if the higher transparency and number of participants have impact on final price savings. Based on the previous research we set following two working hypotheses:

H_1: Does the T-Ranking influence final price savings?

H_2: Does the number of participants influence final price savings?

Data description

Firstly, we performed preprocessing of raw data exported from the software solution and carried out basic descriptive statistics in Table 1.

Table 1 Descriptive statistics of auction data

	Number of participants	Number of items	Savings in %
Min	2	1	-364.052
Max	56	28	80.365
Mean	25.184	1.48	11.469
Median	27	1	14.709
Standard deviation	12.057	1.999	37.273

Source: Own interpretation

We concentrated on a few characteristics:

- Number of items: total number of separate items contained within a single auction negotiation
- Number of participants: total number of suppliers taking part in one auction
- Final price savings: % savings achieved by the auction process calculated in relation to the comparative price
- T-Ranking: item expresses if the ranking was (1) or was not (0) showed to the suppliers

In Table 2 is displayed distribution of auctions without transparent ranking marked with value "0" and the auctions with the showed ranking marked with value "1".

Table 2 T-Ranking distribution

Value	Proportion	%	Count
0.000000		5.68	50
1.000000		94.32	831

Source: Own elaboration

4 Results and discussion

The processing of specific hypotheses was preceded by data editing using software. The first hypothesis *H1* is displayed in Figure 1. In the box plot diagram is the median value of final price savings in both cases above zero, even though, in case of showed ranking the median value is higher. The big difference we can see in the histogram where is the sum of all percentage of final price savings counted together. In the case of displayed ranking the total sum of savings is noticeably higher, that is caused by higher count of positive values of saving.

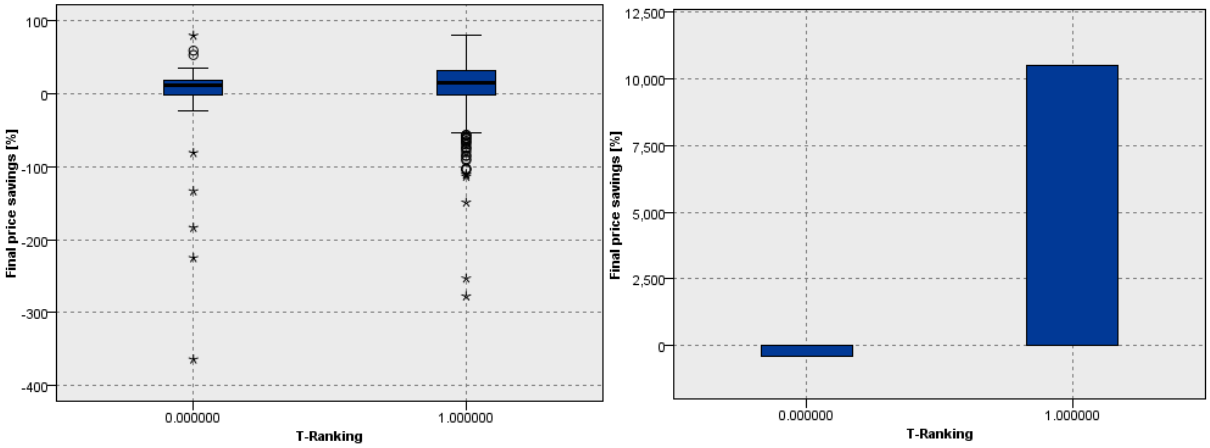

Figure 1 Dependence between T-Ranking and Final price savings in % displayed with box plot diagram (left side) and histogram (right side)

Source: Own elaboration

Based on the graphs we stated answer on the hypothesis H_1, that the increase in transparency, caused by displayed ranking of suppliers´ offers, has a positive impact on final price savings and so increases final price savings. Therefore, our result are in line with the findings of other relevant studies that confirm that adding further information is beneficial for buyer (suppliers (Gwebu, Hu, & Shanker, 2012; Koppius & Van Heck, 2003; Strecker, 2010).

Secondly, we tested if the number of participants influences the final price savings. The results are showed in Figure 2. The whole range of participants was divided into 6 groups according to the file data. The median value is slightly increasing almost along whole range while the histogram shows that in case of higher number of participants the sum of percentage savings decreased compared to the lower number of participants.

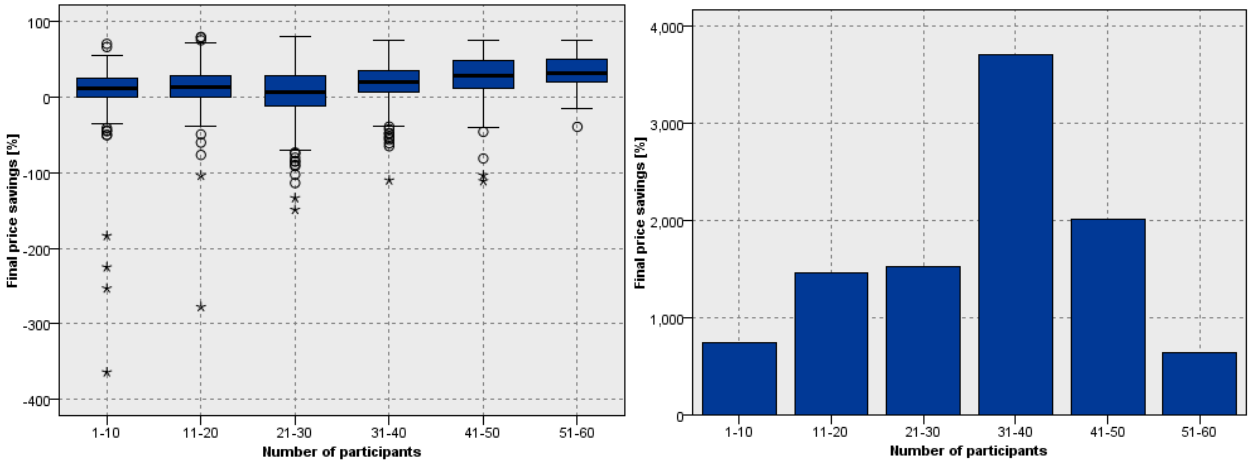

Figure 2 Dependence between Number of participants and Final price savings in % displayed with box plot diagram (left side) and histogram (right side)
Source: Own elaboration

From the box plot diagram showed on the left side of the Figure two we can generalize that the higher number of participants leads to higher sums of percentage savings that agrees with the findings of other experts (Tenorio, 1993; Shawn & Nath, 2005).

To describe the situation that differs from the common assumption that the higher competition pushes prices down and brings higher number of participants we tested final price savings separately on auctions with transparent ranking showed on the left side of Figure 3 and on auctions without transparent ranking. While the sums of savings in percentage by the auctions with transparent ranking are always positive, by the auctions without transparent ranking are the sums lower and in more than half of the cases negative.

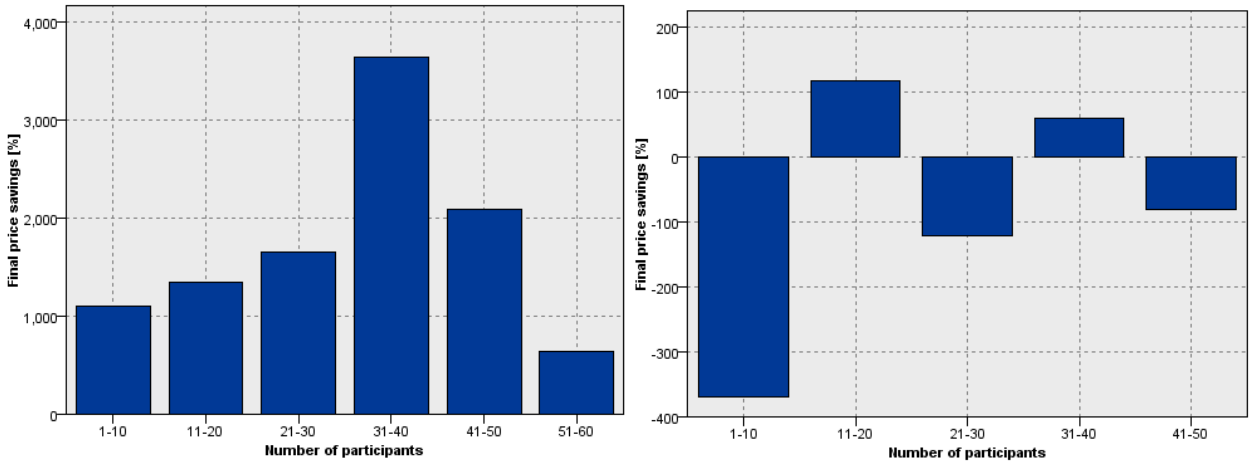

Figure 3 Dependence between number of participants and final price savings in % for auctions without T-Ranking (left side) and on auctions with T-Ranking (right side)
Source: Own elaboration

After splitting the data according to the number of participants we found out that there was not enough relevant data to prove the second hypothesis for slightly higher number of participants as

is showed in the Figure 4. However, for number of participants below 50 we confirm the prediction that higher competition leads to higher final price savings.

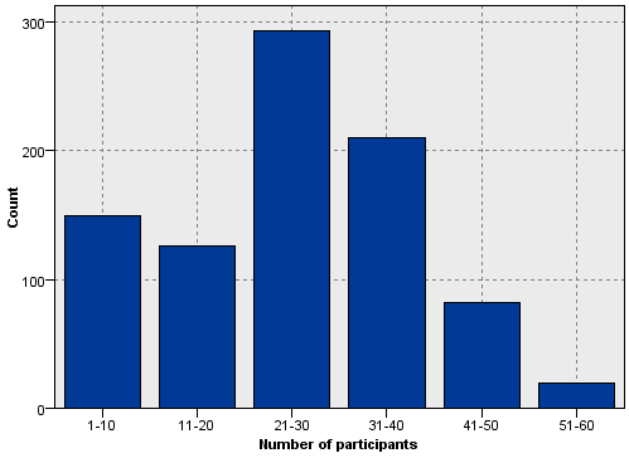

Figure 4 Auctions divided according to the number of participants
Source: Own elaboration

In the second hypothesis, we recommend choosing the most suitable number of participants for the auction to consider securing good long-term relationship and alternative supplier options for the next case.

5 Conclusion

The goal of this article was to enclose actual situation concerning electronic reverse auction and to verify previously gather knowledge on empirical data. Based on the literature review we set two hypotheses that we decided to test.

The first hypothesis tested the impact of transparency on final price savings. In this case, we separated all auctions on two categories. The first category represented auctions without transparent ranking of winning supplier offers, the second category was composed of the auctions with transparent ranking of the suppliers winning bids. The result was that in our case with higher level of transparency the final price savings increases. It is important to point out that in our case was increase in transparency represented by the transparent ranking so it is important to test other types of transparency increase such as transparent price for item or whole auction, transparent criteria, transparent ranking for each individual item and others, that could lead to ambiguous results.

In the second hypothesis, we tested if the number of participants does have an impact on final price savings. Based on the common preposition that the higher concurrence the lower price and the higher savings we found out that for number of participants under 50 the median value of final price savings is slightly increasing and we can accept our set hypothesis. For higher number of participants our data file did not contain enough relevant data, so it is inevitable to test the data on bigger data set and on different companies' auction data to verify the hypotheses.

Acknowledgements

This work was supported by Scientific Grant Agency VEGA of Slovak Republic within the grant 1/0807/16 "The Efficiency of Digital Single Market Development determined by the changes in transparency level, information asymmetry and socio-economic characteristics of market subjects".

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Financial Disparities of Tobacco and Alcohol Consumption Among a Selected Target Group – Results of Own Research

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Abstract

Population ageing and reducing of the life expectancy is currently not only a health problem, but also a socio-economic problem in countries in the world. The aim of this paper was to examine the differences in alcohol consumption and smoking among the selected group. In the analysis we used data obtained through a questionnaire survey. The questionnaire was drawn to the target group of university students in Slovakia. One of the main findings of the work is that we do not monitor the statistical significant addiction to smoking among respondents. Differences across genders are reflected in the alcohol consumption and the monthly alcohol expenditure by respondents. We do not record significant dependence on the impact of socio-economic status on the health behavior of respondents. Alcohol and smoking are a global problem. In recent years we follow the growing number of fatal disease. These disease are the main part of the avoidable mortality Reducing the negative determinants of avoidable mortality, especially the disease caused by smoking and alcohol consumption, should be a challenge for the health care system in the Slovak Republic in the coming years. The entire database of data from the questionnaire survey can be used for future research.

Keywords: Health behavior, Health survey, Alcohol consumption, Tobacco consumption.

JEL Classification: I10, I12, I15

1 Introduction

Demography play an important role in the analysis and the evaluation of the public health. At present, demographic characteristics and indicators are used in the evaluation of the health systems. The structure, development and social characteristics of the population are important indicators for assessing the health status of the population. Basic demographic and statistical indicators include mortality by causes of death, calculated per 100,000 inhabitants, life expectancy, infant mortality, morbidity, disease prevalence. It is important to note that many of the characteristics mentioned in this paper are closely related to the consumption of alcohol and smoking (Engelhardt et al., 2009). Health determinants are also the environmental factors, including: climate change, environment, workplace and social activity. Another determinant is the genetic equipment that determines differences in male and female health, the intelligence level, the tendency to certain diseases and developmental disorders. Additional determinants include lifestyle and the quality and efficiency of health care. In these determinants is monitored lifestyle and level of education, attitude to their own health care, dietary habits, smoking, physical activity. Some of these environmental factors: poverty, education, unemployment, social security and lifestyle are

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referred to as social determinants of health. Social determinants of health are among the leading themes of the World Health Organization (WHO, 2014).

According to the aim, the paper is organized as follow. In the section 2 a preview of relevant literature is provided. Applied methodology is described in the section 3. In the section 4 we present the results and key findings. The paper will focus to analyzing the questionnaire and find the disparities of tobacco and alcohol consumption among the selected target group and the paper concludes main findings and suggestions for future research.

2 Literature preview

Non-communicable diseases represent, according to the World Health Organization, the biggest problem among diseases in Europe. Tobacco use is one of the leading risk factors of health behavior. An appropriately chosen tobacco control policy is a complexly managed system of options to prevent the numerous causes of deaths and diseases in Europe as a result of tobacco use. As a result of the use of tobacco during adolescence, it can result in many cases in respiratory diseases, an increased possibility of cardiovascular disease and an increased incidence of cancer later in the life. Non-infectious diseases are the most common causes of deaths (WHO, 2014). Licandro and Croix (1999) point to the positive influence of the chosen length of schooling before starting work on life expectancy. Berger et al. (2013) highlight the importance of alcohol surveys. They point to improving the quality of care in the case of sufficient and quality analyzes which can be used to set policies and measures to reduce negative health impacts on the population.

Several authors assess the impact of unemployment on alcohol and smoking (Henkel, 2011; Dooley & Prause, 1997; Mossakowski, 2008). In several studies, the authors point to an increased alcohol consumption, which is also associated with an increasing probability of smoking (Montgomery et al., 1998; Khiat et al., 2004). Latif (2014) used data on the health status of Canada's population in 1994-2009. The author follows the impact of the unemployment rate on alcohol drinking and smoking prevalence, which affects macroeconomic conditions. The author points out that the unemployment rate has a positive impact on the further consumption of alcohol, but does not have a significant impact on smoking. Statistically significant differences between drinking and smoking are reported by men as in women. Ormond and Murphy (2017) also discuss alcohol consumption in their work. They point to interesting findings. They monitor alcohol consumption in Ireland. The main findings of their analysis were that moderate drinkers have a much better health status than heavy drinkers and those who are abstainers throughout their lives. They also point to the importance of monitoring the health status of the population. They also show what funds the country must spend in the treatment of illnesses resulting from these addiction. Wagenaar et al. (2009b) in the paper on alcohol-related deaths in the United States (Alaska) in 1976-2004, points to a significant reduction in mortality in the years under review by introducing and gradually increasing the tax burden.

Blecher (2015) mentions the impact of taxation on tobacco. He points out that, in the case of smoking, higher taxation is reflected in higher prices, and this is reflected in a reduction in cigarette consumption. The author is thinking about cases of alcohol taxation and sugar sweetened beverages. Blecher (2015) also points that tobacco is consumed mainly in the form of cigarettes. Smoking causes cardiovascular disease and cancer. Reducing the amount of nicotine in cigarettes does not result in a reduction in the population's health problems. Also, in the case of alcohol, we

monitor the direct links between diseases and possible injuries. Wang, Sindelar and Busch (2005) report that smoking is not just addiction, but it is also an economically demanding issue, especially for the young population. Authors examine the impact of spending on tobacco products and household spending in rural China. Authors estimate the relationship between tabular products and other 17 sub-categories that relate to household expenditure. The negative impact of spending on smoking is evident in poor families, where basic needs are often absent. The negative impacts of spending on tobacco expenditures are divided into the following areas: reduction of human capital investment, farm productivity, possible impacts on intra-family distribution of services and goods and risk-taking capacity.

Cervellati and Sunde (2011) and Desbordes (2011) point to the impact of life expectancy on income per capita. They point out that in the period 1940-1980 in the 47 countries around the world, the life expectancy had a non-linear effect on income per capita. This problem is mainly affected by the initial level of life expectancy of each country. In several years the health spending is highest in the US from all OECD countries. On the other hand, there is a problem with the life expectancy that is growing at a slower pace than in other OECD countries. Murthy and Okunade (2016) use in their paper a co-integration model, examining the impact of US spending on health care from 1960-2012. The result of their ARDL model is that the income per capita, the population over the age of 65, and the expenditures on research and development in health care have a positive impact on US healthcare spending per capita. Technological progress in individual years has a significant impact on the level of health spending in the US. The authors show that spending growth is linked to the future growth of the country's welfare economic.

Linden and Ray (2017) report a robust analysis of healthcare spending. They created the time series model of 34 OECD countries during the period 1970-2012. The result of their model is the division of countries into three groups based on selected indicators, such as: life expectancy, health expenditure and share of GDP. The authors also test the impact of public and private health spending and their impact on the life expectancy. Balia and Jones (2007) report the health socio-economic and demographic characteristics that affect the mortality of the population. The poor family situation is linked to the smoking and the nicotine addiction (Pennanen et al., 2014). The marital status and mortality are analyzed by Kang, Kim and Lee (2016). The aim of paper of authors is to investigate how the family status and social status of the family affect the death rate.

3 Research questions and methodology

The main objective of this paper is to analyze the questionnaire on alcohol and smoking on a selected target group of the Slovak population. The survey involved 46 questions about gender, social status, family income, alcohol and tobacco consumption and health behavior. Subsequently, respondents' responses were evaluated by statistical procedures. This paper does not list all available results, but our aim is to publish the main results of our survey. The aim is not only to look at the monitoring of alcohol and tobacco use, but also to look at the social status of respondents, level of education, family background, the financial side of tobacco and alcohol use. The whole questionnaire was developed on the basis of questions that concern health care and population health issues. The essence was to capture the relationship to alcohol and smoking among respondents and their financial situation, which helps us to better assess the health impact of these habits. The effort is to quantify the approximate cost of activities that negatively affect their health.

The two-way tables (also known as the contingency tables) and the Chi-Square Test are used in the analysis. They are used to observe the relationship of two or more statistical characters.

Using the chi-square test of independence compare the observed and the expected counts (Hudec, 2005).

The chi square test statistics is computed as:

$$\chi^2 = \sum_{i=1}^{r}\sum_{j=1}^{c}\left(\frac{O_{ij} - E_{ij}}{E_{ij}}\right) \qquad (1)$$

where:

O_{ij} the observed counts (i=1,…r;j=1,…c),

E_{ij} - $E_{ij} = \frac{R_i * C_j}{n}$; the expected (empirical) counts,

r row in table,

c column in table,

Ri sum of the values of rows (i = 1,....r),

Cj sum of the values of columns (j = 1,....c),

n sample size.

As we compare respondents' answers to individual types of questions, we generally formulate a null and alternative hypothesis as follows: *H0*: *Between the respondents answers is no association H1*: *Between the respondents answers exist association*. The null hypothesis assumes that the variables are independent. We reject the null hypothesis, if the chi square statistics is computed as:

$$\chi^2 = \chi^2_{\gamma}\left((r-1)(c-1)\right) \qquad (2)$$

with $(r-1)(c-1)$ degrees of freedom. Hudec (2005) assumes that for the use of the chi square test should be the expected (empirical) counts higher than 5, E_{ij}>5. Chráska (2007) specifies the conditions for the use the chi square test in contingency table as follows:

- no more than 20 % of the expected counts may be less than 5,
- none of the expected counts may be less than 1.

If any of the conditions are not met, some cells may be merged or we should not use the test. To confirm hypothesis testing, we also used two sample test for comparing two means. We used the IBM SPSS Statistics and SPSS Clementine Client as statistical programs. We also used proportional column tests in IBM SPSS Statistics. The conditions of the tests report the data below the tables. We also used the K-Means Node Algorithm in SPSS Clementine. The basic characteristic of K-Means (MacQueen, 1967) is that the similarity of individual objects and aggregates is measured as their distance relative to the average cluster value. The goal of the method is to minimize the clustering criterion. Most often, it is the sum of squares of errors of all objects relative to the average object. In the first step, they are randomly selected *k* objects, that will represent *k* clusters (if there is only one object, then it is the average value). In the second step, the other objects are assigned to the clusters based on similarity. Each cluster is described by its center, which can be thought of as the prototype for the cluster. K-Means does not use the target

field and is the most useful and fastest method for cluster analysis. The objective function (Yaghini, 2010):

$$E = \sum_{j=1}^{k} \sum_{i=1}^{n} \left\| x_i^{(j)} - c_j \right\|^2 \quad (3)$$

where $\left\| x_i^{(j)} - c_j \right\|^2$ is a measure to find the distance between the data point *x* and the cluster centre *c*. K-Means Algorithm is a simple method to evaluate the clusters for many types of the *n* data points.

4 Research results and discussion

The survey involved 774 respondents and almost 61% were females. We reduced the sample to 719 respondents for missing answers to some questions. We consider the size of the sample to be sufficient to induce certain characteristics and characteristics of the university students in Slovakia.

Table 1 Age ratio

			Sex		Total
			Man	Woman	
Age	less than 20 years	Count	82	131	213
		% of Total	11.4%	18.2%	29.6%
	21 - 23 years	Count	144	261	405
		% of Total	20.0%	36.3%	56.3%
	24 - 26 years	Count	52	44	96
		% of Total	7.2%	6.1%	13.4%
	more than 27 years	Count	4	1	5
		% of Total	0.6%	0.1%	0.7%
Total		Count	282	437	719
		% of Total	39.2%	60.8%	100.0%

Source: Author

Table 1 shows the age ratio of respondents. To the survey were involved more than 56 % of respondents in 21-23 years. The second largest group was students under the age of twenty. In the first three years of the university 73 % of respondents study at bachelor degree.

We also asked respondents about their social status. We found more than 21 % of students who have a different family status than "Complete (mother + father)". Figure 1 shows average smoking costs per week between respondents. Almost 70 % of students are not smokers and do not spend the money to smoke.

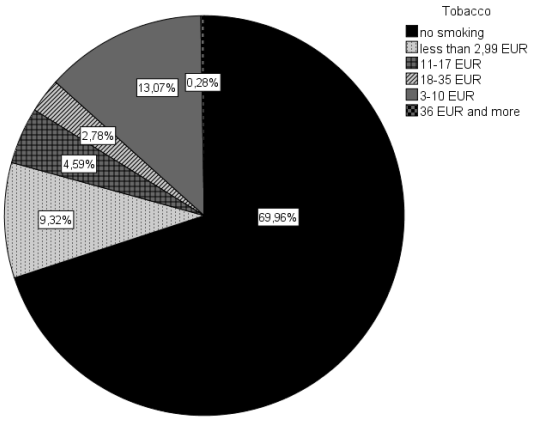

Figure 116 Tobacco use ratio
Source: Author

In the next part of paper, we tried to show you some results of our analysis. In the next section, we also will show how we proceeded to evaluate the hypotheses. We tried to determine the statistical significance of drinking alcohol and tobacco use among the respondents. Students had the option of choosing one of several options for monthly alcohol costs. These distributions and abilities are listed in Table 2.

Table 29 Money spent on alcohol per month

			Alcohol									Total
			0 €	less than 4 €	4-10 €	11-17 €	18-35 €	36-53 €	54-71 €	72-107 €	108 € and more	
Sex	Man	Count	18	55	59	47	48	22	13	12	8	282
	Woman	Count	51	134	121	58	44	18	6	4	1	437
Total		Count	69	189	180	105	92	40	19	16	9	719
		%	9.6%	26.3%	25.0%	14.6%	12.8%	5.6%	2.6%	2.2%	1.3%	100.0%

Source: Author

9.6 % of respondents do not spend money on alcohol during the month. Less than 4 € spent on alcohol per month more than 26 % of respondents. More than 11 € but less than 35 € spent on alcohol per month more than 27 % respondents.

Table 310 Chi Square Test

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	52.956[a]	8	.000
Likelihood Ratio	53.379	8	.000
N of Valid Cases	719		
a. 1 cells (5.6%) have expected count less than 5. The minimum expected count is 3.53.			

Source: Author

P-value of the chi-square test demonstrates statistical significance among the sexes in alcohol spending. At the level of 0.05, we reject the zero hypothesis of no dependence (Table 3).

Table 4 Comparisons of Column Proportions

		Sex	
		Man	Woman
		(A)	(B)
Alcohol	0 €		A
	less than 4 €		A
	4-10 €		A
	11-17 €		
	18-35 €	B	
	36-53 €	B	
	54-71 €	B	
	72-107 €	B	
	108 € and more	B	
Results are based on two-sided tests with significance level ,05. For each significant pair, the key of the category with the smaller column proportion appears under the category with the larger column proportion.			
a. Tests are adjusted for all pairwise comparisons within a row of each innermost subtable using the Bonferroni correction.			

Source: Author

In this case, it is interesting to note that statistically significant gender differences in cigarette smoking expenses have not been confirmed, but in the case of alcohol spending, we are seeing the existence of significant differences between men and women. That is why we are going to test by the column proportional testing of men and women in monthly alcohol costs (Table 4).

We have been able to track individual table proportions if column / line dependency has been demonstrated. Partially proportional column tests point to statistically significant levels between individual columns. The test will assign individual columns, depending on their number by characters (eg A, B, C, etc.). Subsequently, these letters will be generated in individual column cells by line and depending on the significant level. In Table 4 there are two columns representing gender. Men are denoted by character (A) and female by character (B).

Table 5 Column proportions

		Sex			
		Man		Woman	
		Count	Column N %	Count	Column N %
Alcohol	0 €	18	6.4%	51	11.7%
	less than 4 €	55	19.5%	134	30.7%
	4-10 €	59	20.9%	121	27.7%
	11-17 €	47	16.7%	58	13.3%
	18-35 €	48	17.0%	44	10.1%
	36-53 €	22	7.8%	18	4.1%
	54-71 €	13	4.6%	6	1.4%
	72-107 €	12	4.3%	4	0.9%
	108 € and more	8	2.8%	1	0.2%

Source: Author

As can be seen, a significant difference has not been shown only for the monthly cost range 11-17 €. The proportion of women (B) who spent on alcohol more often than men (A) is in the case of the three lowest cost bands: 0 €; less than 4 €; 4-10 €. In all other cases, there is a more significant proportion of men over women. It means that men have higher costs than women. The share of women in the bands from 0 to 10 € was statistically higher than by men A statistically higher share

of 18 € and more was for men as for women. Table 5 points to proportional testing. Thus, for example, for the band less than 4 €, 30.7 % of women who spend on alcohol are statistically more significant than 19.5 % of men in this band at a significance level of 0.05.

We mentioned the K-Means method in the previous section. Applying to our data, we obtained the following data division into 5 clusters (Figure 2). In this method, we used the respondents' answers to the following questions: *How much money do you spend on alcohol per month?; How much money do you spend on smoking per week? How old are you?; If you are a student, do you have a job (part time, full time, etc.)?; Please indicate the amount of the total monthly income of both parents: ; Sex :;*. Individual clusters represent prototypes of our respondents' answers to questions. Cluster 1 consists of women, mostly aged 21-23, who work during the year at university.

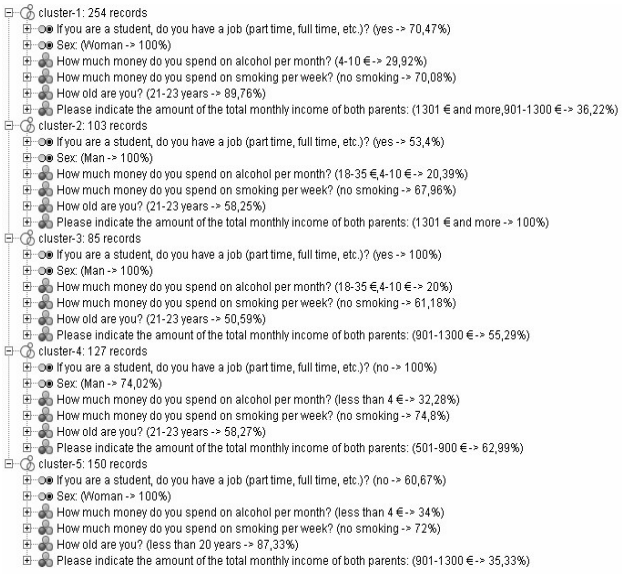

Figure 2 K-Means Cluster Model Tab
Source: Author

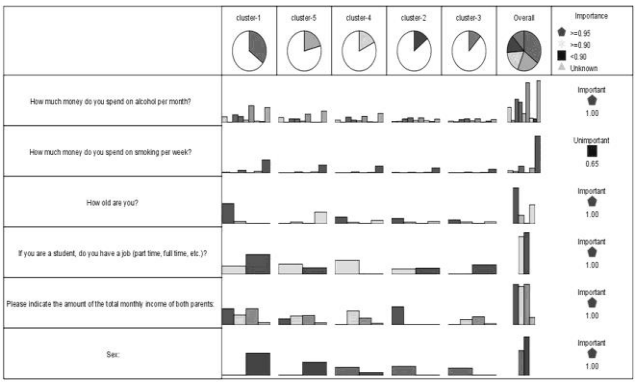

Figure 3 K-Means Cluster Viewer Tab
Source: Author

Respondent´s spending on alcohol is less than 10 € per month and they do not smoke. The monthly income of the family is between 901 and more. These responses are a characteristic of cluster 1. Interestingly, Cluster 4 shows parent's income in the range of 501-900 €. The cluster is characterized by men aged 21-23 who do not work, do not smoke and spend less than € 4 per month on alcohol. During the years 1999, 2008 and 2013 were mapped alcohol drinking, smoking and the using of abusive drugs by university students in Slovakia. In our point of view, we want to mentioned, that in 2013 the author analyzes 1,065 subjects from 30 faculties in Slovakia. Our data includes more than 700 respondents from more than 15 faculties. From this point of view, we consider our range of data to be sufficiently relevant, because the similarly large groups of respondents are almost the nation-wide research in Slovakia (Nociar, 2014). As mentioned in the previous studies, demographics and social conditions in the family are a major factor in health. That is why we were also very concerned about this situation (Terebessy et al., 2016). In Slovakia there is still sufficient interest in studying at universities. In Sweden, we also see an interest in monitoring of the addiction of the young students. These have become a matter of the public health concern. It is also noted that youth habits have an impact on future alcohol consumption. The

authors also point to the attention to the effective and numerous creation of similar surveys that help to highlight issues for college students (Thomas et al., 2017).

5 Conclusion

A frequent trigger for diseases is currently the effects of alcoholism and smoking. The main objective of the paper was to test the sample of university students with predetermined hypotheses about the relationship of alcohol and smoking. Recently, even though there are more men than women who smoke, EU surveys highlight the increasing number of women - smokers. The difference between men and women did not significantly differ in the number of cases of smoking during the life. Also no statistically significant differences were found. Another hypothesis was to see if working students drink and smoke less than non-working. In the case of working students, in addition to the study, we have shown they smoke more every day than non-working students. The family background of the respondent in our research did not affect to the relationship to smoking and alcohol. Nearly 30% of respondents spend a certain amount of money on smoking during the week. However, we did not show differences in weekly smoking costs. In the last part of the analysis, we used the K-Means Node algorithm, which we divided the respondents based on the selected criteria into 5 clusters. Reducing negative determinants of avoidable mortality, especially smoking and alcohol consumption, should be a challenge for the health care system in the Slovak Republic in the coming years.

Acknowledgements

This work was supported by the Slovak Scientific Grant Agency as part of the research project VEGA 1/0446/15.

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The issue of lifelong learning as part of the European convergence

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Abstract

Lifelong learning becomes a necessary precondition to handle with the growing requirements on the labour market and important factor for increasing labour market flexibility. According to the European Commission the lifelong learning has a particular importance for the attaining and keeping the employment. The aim of the paper is to emphasize the growing importance of lifelong learning for the society, business environment and also for the individuals. The current situation in the EU in the field of lifelong learning is described in the context of fulfillment the objectives of the Europe 2020 strategy.

Keywords: Lifelong learning, Europe 2020 strategy, Target, Labor market, Employment.

JEL Classification: I20, I25

1 Introduction

The importance of education is strongly connected with the job market. The current job market places high demands on a person, so it is necessary to develop knowledge, skills and abilities for one's entire life. The higher and higher demands on the education of the human capital lead to the need of lifelong education.

Educational policies should be among the first in the broader spectrum of public policies valuing and emphasizing learning, through training and professional development of the stakeholders involved in policy change (Ciolan, Stîngu, & Marin, 2014). Since the early 1990s, lifelong learning has become a major policy concern for the European Union, being seen as a means for enabling individuals to be more competitive in social and economic contexts that are continually changing (Clain, 2016). The EU's conception of lifelong learning has been conceived as a cure for a wide range of maladies, ranging from high unemployment, to low innovation rates and the lack of entrepreneurship. (Volles, 2016). Strategic Framework - Education and Training 2020 was created for the strategy Europe 2020 in 2009 with the purpose of cooperation between the member

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states of the European Union in the education area. For this purpose work groups of experts ensuring leadership for the individual areas were formed. In Table 1 are the basic criteria of the European Union or the partial targets for 2020 in the area of education, springing from the Strategic framework of Education and Training 2020 (European Commission, 2016). As we see, the objective in field of lifelong learning is established on the level of 15% share of the participation in lifelong learning.

Table 1 Criteria of the EU for 2020 in the area of education

Criteria	Target
Participation of children in early learning	At least 95%
15-year-old students with problems in maths, reading and natural sciences	Below 15%
The rate of premature termination of school attendance in the age group of 18-24	Below 10%
People with the tertiary education of the age group of 30-34	40%
Participation on the lifelong learning	**15%**
University graduates studying abroad	20%
18-34-year-old students studying abroad	6%
Employed graduates in the age of 20-34	At least 82%

Source: Self elaboration according to Strategic framework – Education & Training 2020

Actual EU policy support national action and help address common challenges, such as ageing societies, skills deficits in the workforce, technological developments and global competition, but each country of EU is responsible for its own education and training systems. The aim of the paper is to describe the current situation in the EU with emphasis on V4 countries in the field of lifelong learning in the context of the objectives of the Europe 2020 strategy and to assess the possibilities of fulfillment the target set on EU level by 2020.

2 The necessity of lifelong learning

Sufficient qualification is closely connected to lifelong learning. Among the targets of lifelong learning is employability and support of active citizenship. Employability is the ability to obtain a job. Active citizenship is participation in society and economic life. The significance of lifelong education requires the integration of ministries and public institutions. A memorandum of the European Commission defines lifelong learning as ”specific continuous educative effort with the aim of improving knowledge, skills and competence.” (European Commission, 2000).
According to the Memorandum on lifelong learning (2000) there exist three basic categories of useful educational activities: formal, non-formal and informal learning.

2.1 Role of enterprises in lifelong learning process

Current society places high and ever-changing demands on the knowledge and skills of a person. Employees have to constantly deepen and widen their scope of knowledge and skills to retain their job position. Education and formation of job skills becomes a lifelong learning experience.

The optimal case is when continuing education is aimed at balancing between the needs of society and the motivational structure of personality that actually allows implementing necessary mechanisms through the influence of education on the socialization of the individual (Gogunskii, et al., 2016). In this process the company plays more and more of an important role as an organizer of activities in the area of education and training for employees. It is important for the business to specify very precisely what the employees have to do and learn or how they should change their

attitude and behavior. Education becomes a tool to provide qualified, educated and able workers who are what is needed to meet the requirements of a business. One of the effective approaches to learning and the development of human resources in a business is organization of educational programs and training. These programs are focused mainly on the acquisition and improvement of the knowledge, skills and abilities of employees - because a labour force of high quality is the factor of success in every business. Business managers are starting to understand that increasing the qualification of their employees is the key to creating a sustainable competitive advantage. Thanks to technological progress companies can train their employees faster, more effectively and with less costs compared to the past (Bachman, 2000). Employers have a permanent interest in the development of human resources and to ensure the employees have the required skills and abilities to help the company prosper. In all European countries the employers spend considerable finances on education and the specialized preparation of adults. But this contribution is usually designated for non-formal educational activities such as work courses and seminars, computer courses, language courses etc. (Eurydice, 2011).

The intensity, extent and organization of the employees education depends on the strategy and policy of the business in the area of human resources. Some companies prefer to employ the 'ready' employees, technically fully prepared for the respective job position. On the contrary, some insist on training their own employees, including specialized preparation (for example, a company working with specific or designed-by-them software). Some businesses have a passive approach towards the question of education and they think that their employees can manage on their own the questions of job description or job requirements. Leading workers must understand that the education process influences all the members of a business, just as it does themselves, and consequently it has a positive influence on the competitiveness of that business. The development of skills should happen permanently with varied regularity of learning for every category of employees (Ohotina & Lavrinenko, 2014). The educational programme for new employees is defined by the direct superior or an assigned mentor. It starts immediately after the acceptance of the new employees and depends on the size of the business and the number of employees. It can include conferences, seminars, and discussions and so on. (Dragomiroiu, Hurloiu, & Mihai, 2014). The quality of one of the key elements is necessary for the survival of a business in the long term. Total Quality Management and other practices of quality management require employees to undergo training as an important precondition for their successful implementation (Miri, et al., 2014).

Nowadays, lifelong learning is becoming increasingly important, not only as a key organizing principle for all forms of education and learning but also as an absolute necessity for everyone. Given the current socio-economic conditions, where qualifications are essential in the work market, having a lower qualification is a clear disadvantage (Renta-Davids, et al, 2016). The lifelong learning is particularly important for disadvantaged individuals and groups who have been excluded from or failed to acquire basic competencies through formal schooling (Hanemann, 2015).

All the people - employed and also unemployed can increase their salary prospects by developing the level of their skills. Thanks to sufficient skills and abilities it is easier for them to find a new job even in the case of losing their current job. However, the education of adults is not spread evenly within the labour force. Employees younger and with higher qualification are more likely to receive training from their employers. In fact those are the most in need of training - elderly

employees and people with lower education - have a decreased chance of one. The important factor of stimulation learning among lower educated workers is their confidence in their ability to successfully complete their training. Trainers and training developers working for this specific target group should aim to provide training that is a positive experience, besides being a learning exercise (Sanders, Damen, & Van Dam, 2015). The important role has positive environments and supportive relationships (in spheres of influence, such as family, government, community, economy and work). These factors must not be underestimated in lifelong learning motivation if countries hope to ensure the successful cultivation of a lifelong learning culture (Ng, 2010).

2.2 Data and methodology

Methods used in the elaboration of the paper are the most commonly used methods of economic research, and they are based on the aim and structure of the article. These are general methods such as analysis, spatial comparison and trend comparison, synthesis, induction, deduction and mathematical – statistical methods. The trend analysis as specific form of regression is used for the simulation of estimated development of indicator until the year 2020. The suitability of function describing the development of participation in lifelong learning is rated based on the highest coefficient of determination (i.e. the highest probability of achieving simulated values in the future). The suitability of trend function is also checked by the Coefficient of Determination, F test and the P-value.

For analysis, comparison and realization of regression analysis will be used statistics of Eurostat (September 2017) and also official documents of the European Union. The time period for which the countries are compared and analyzed is 2002-2015.

2.3 Participation in lifelong learning

As mentioned above, the partial target in the area of education about lifelong learning defined by the European Commission for the European Union as a whole. The target is to increase the share of people aged 25 to 64 to the overall amount of people of the given age to 15% by 2020. Figure 1 shows the participation in lifelong learning in the countries of the European Union in 2005 and 2015 compared with the target value.

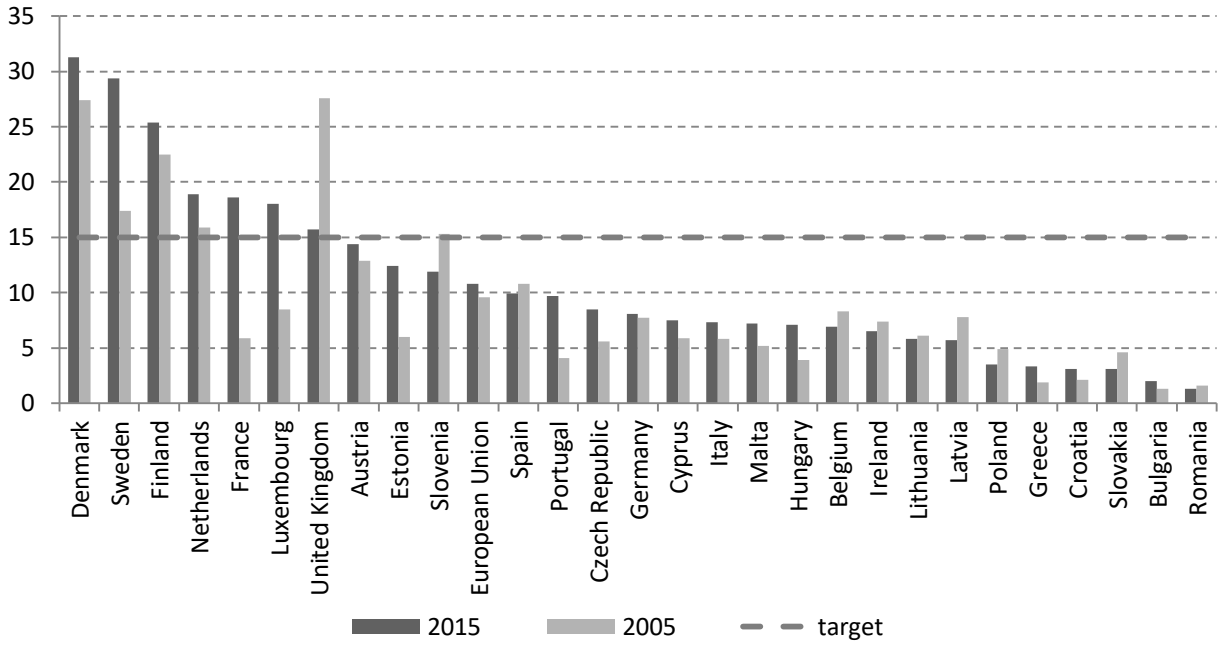


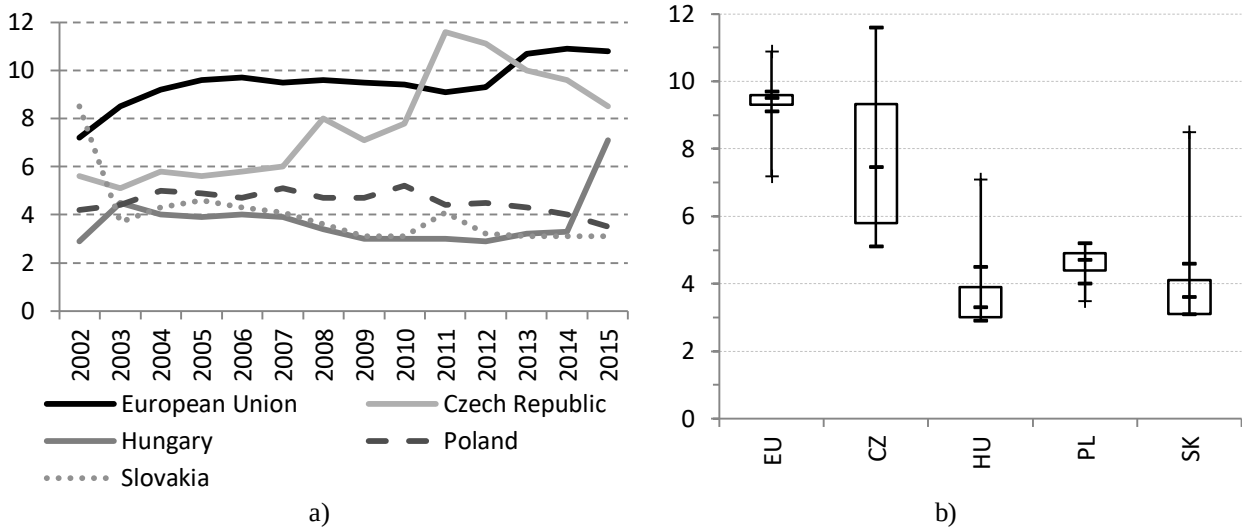
Figure 1 Participation in lifelong learning in the countries of the European Union in 2005 and 2015 compared with the target value (%)

Source: Self elaboration based on the information from the Eurostat

The greatest share of the population aged 25-64 on the overall population of that age group participating in lifelong learning in northern countries of the EU in 2015. More than 20 % in Finland (25.4 %), Sweden (29.4 %) and in Denmark even 31.3 % of inhabitants. Above the target value of the European Union that should be reached by 2020 are also the Netherlands, France, Luxemburg and the United Kingdom. The European Union as a unit is significantly below the target. In 2015 the indicator achieved only 10.8 % which was thanks to many contributing member states. The country with the lowest percentage of population aged 25-64 participating in lifelong learning is Romania (only 1.3 %). At the end of the list with the share less than 4 % are also Bulgaria, Croatia, Greece and even Slovakia and Poland.

The greatest increase in the monitored indicator during 2005-2015 was recorded by France where the share of population participating in lifelong learning during that period increased by 12.7 %. In Sweden the increase was by 12 % and the Luxemburg by 9.5 %. More member states declared a decrease of the indicator which is an undesirable trend. The most significant fall of 11.9 % was in the United Kingdom.

Figure 2 offers a closer look to the development of values in the V4 countries. It is possible to conclude that in 2015 all the countries of the V4 reached lower values in the monitored indicator that is the European average.



a) b)

Figure 2 Participation in lifelong learning in the countries of the V4 in 2002-2015 (%)
Source: Self elaboration based on the data from the Eurostat

The most dynamic development of the participation in lifelong learning could be observed in the Czech Republic. 13.5% of the employed participated in lifelong learning in the country in 2011. From then the indicator dropped to 9.6% (in 2015). The share of participation of the employed in lifelong learning in 2002 was in Poland 5.2%, in Hungary 3.2% and in Slovakia 10.4% (Figure 2a). It was in our country that people the most stopped participating in lifelong learning and in 2015 it was only 3.3%, whereas in Hungary it was 8.8%.
Closest to the average value of the EU was the Czech Republic which even exceeded the all-European average in 2011 and 2012. Poland and Slovakia record an unfavourable trend in the monitored area. The value of the indicator in Poland reached the lowest volatility (Figure 2b) and dropped from 4.2% in 2002 to 3.5% in 2015. On the contrary, in Slovakia the scale of changes is more significant. At the beginning of the chosen period 8.5% of Slovaks participated in lifelong learning, at the end it was 3.5%. A positive reversal was experienced by Hungary where during one year the interest in this type of education significantly increased (by 3.8%). Despite this positive change the country declared the lowest average value during the whole monitored period.

Table 2 Share of participation in lifelong learning according to the job position

	Managers, experts, technicians and employees of related sectors		Office workers an employees in trade and business		Qualified workers in agriculture and fishing, tradesmen and employees in related sectors		Operators and line-workers in machinery and non-qualified employees	
	2005	**2015**	**2005**	**2015**	**2005**	**2015**	**2005**	**2015**
EU	18.6	17.9	11.8	11.1	4.0	5.3	4.4	5.2
CZ	12.4	15.9	4.3	9.3	1.5	5.2	1.6	4.6
HU	8.3	13.4	4.9	8.0	1.2	5.4	1.2	6.4
PL	13.4	7.7	7.6	3.4	1.8	1.1	2.1	1.5
SK	11.1	5.7	4.0	3.1	1.4	2.2	1.5	1.9

Source: Self elaboration based on the information from the Eurostat

In relation to job positions there are big differences in participation in lifelong learning (Table 2). In the countries of the V4 uniformly dominates the education of leading workers - most significantly in the Czech Republic. In 2015 it was 15.9% which represented an increase by 3.5 %

compared with 2005. A significant increase of participation in lifelong learning among managers, technicians and experts could be seen in Hungary. In another two countries there was a decrease of participation in lifelong learning by the leading workers. In the category of office workers and trade employees again the highest value (9.3 %) of increase was in the Czech Republic. In the other two categories the best results in 2015 were reached by Hungary and the worst Poland.

2.4 The estimated development of the lifelong learning indicator

The current trend in the development of the indicator of lifelong learning in the EU is assessed by the regression analysis. Figure 3 visualizes the estimated development of the share of participation in lifelong learning by 2020. As we see, it can be described by several functions.

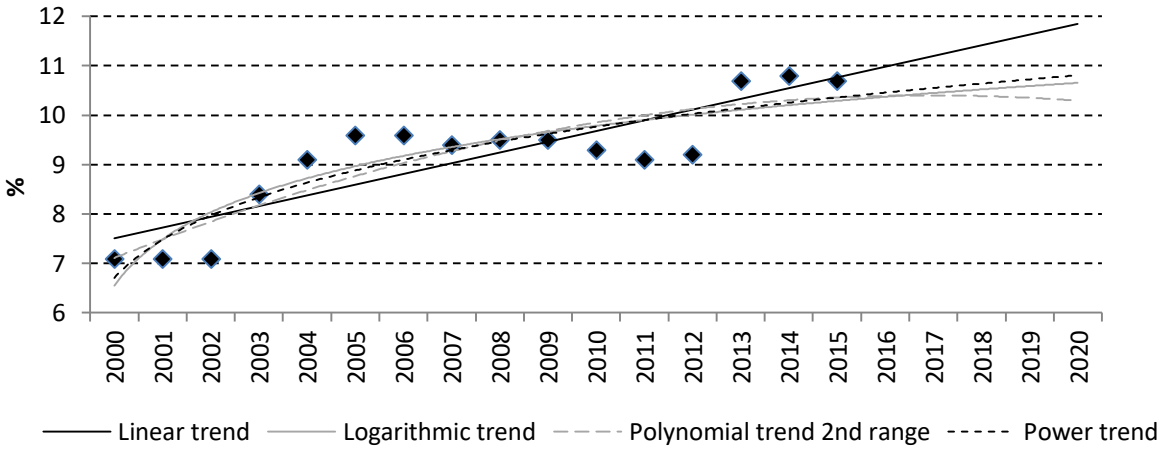


Figure 3 Estimated development of participation in lifelong learning until the year 2020
Source: Own research

The linear, logarithmic, power trend and polynomial trend of second range have been included among significant trends. Table 3 presents more detailed information on functions as well as estimated indicator value in 2020.

Table 3 The estimation of participation in lifelong learning

Trend	Function	R^2	The value of the indicator in 2020
Linear	$y= 0.2165x + 7.2975$	0.7432	11.8440
Polynomial – 2nd range	$y= -0.0115x^2 +0.4117x + 6.7118$	0.7783	10.2860
Logarithmic trend	$y=1.3474\ln(x) + 6.5545$	0.7911	10.6567
Power trend	$y=6.7108x^{0.1565}$	0.8068	10.8070

Source: Own research

As mentioned above, the objective in field of lifelong learning is established on the level of 15% share of the participation in lifelong learning. If the value of the indicator in EU develops by either of significant trend, EU would not achieve the target by 2020.

The most appropriate trend of estimated development of indicator is power trend, based on which with probability of 80.68 % the participation in lifelong learning in EU would be on the level of 10.80 %. The linear trend presents the most optimistic scenario, but the difference from target is still on 3.16 percentage points.

3 Conclusion

The paper deals with the issue of lifelong learning as one of partial objective of the Europe 2020 strategy in field of the education. It is monitored through the indicator of participation of the population aged 25-64 on the overall population of that age group and the target value is 15 %. In 2015 the indicator achieved only 10.8 % and the values of individual countries are very different. Above the target value of the European Union are countries such as Finland, Sweden, Denmark, Netherlands, France, Luxemburg and the United Kingdom. On the other hand, Romania, Bulgaria, Croatia, Greece and even Slovakia and Poland are at the end of the list.

When analyzing the results of the V4 countries, we have found that they have not yet reached the set value. Countries differ from each other in the structure of lifelong learning recipients in terms of both employment and job position. Participation in lifelong learning is not evenly dispersed within the workforce, the managers, experts, technicians and employees of related sectors are the most in lifelong learning engaged.

The development of the indicator of participation in lifelong learning for EU as whole till 2020 was estimated by trend analysis. If the value of the indicator in EU develops by any of tested significant trend, EU would not achieve the target by 2020.

The countries of southern Europe may have contributed to the gradual fulfillment of the target value, where the difference among the target value is most pronounced. One of the ways is that enterprises operating in these countries must begin to integrate in their plans also education for people and must allocate for these activities not only space but also money. An example for these southern countries should be northern European countries where the value of the indicator already markedly exceeded the target value of the European Union in 2015.

Acknowledgements

The paper was supported by the Scientific Grant Agency of Ministry of Education, Science, Research and Sport of the Slovak Republic and the Slovak Academy of Sciences under the grant VEGA No. 1/0967/15.

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Differences in SME financing through the stock exchange

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Abstract

In this paper we analyze the financing of small and medium-sized companies through the capital market. The analysis focuses on the specific differences between the European and American stock exchanges and the comparison of their performance through selected characteristics such as the amount of money invested, number of listed companies and the public subscription of shares. Based on our analysis, we concluded that the US market is more efficient than the European one. The main reason is the fact that the capital market in Europe is too diverse. As the cluster analysis has shown, there are also EU member countries whose exchanges are as effective as those of the US, but also those that are lagging behind. The European Commission is therefore seeking to promote closer financial integration within the member countries and to build a Capital market Union, thereby encouraging the growth of investment activities between countries, creating new jobs and increasing employment, or expanding the possibilities of acquiring alternative funds for new companies. Capital market Union would support and promote deeper economic integration of the EU, as well as create a competitive environment for the world's largest stock exchanges.

Keywords: Stock exchange, Stock market, SME, Capital market union.

JEL Classification: G15, O16

1 Introduction

The economic growth of the country is mainly influenced by the production of private companies. Companies stimulate the country's economic activity by creating new jobs, new investment activities and by supporting domestic demand. After the crisis in 2009, problems arose in the economy and many private companies disappeared. However on the other hand, the disappearance of older companies opened up way for new companies to crack the market. New companies, which have decided to issue their shares on the stock exchange, have benefited from economic development and have gained additional financial resources for their development.

In the current period, the most important issue is the financing of businesses. The company has several options to finance its economic activities. Business financing depends on a number of external and internal factors, such as the degree of economic development, the development of financial markets, the political situation in the country or the financial health of the business. It is generally known that businesses in the US have much greater funding opportunities and therefore their creation and existence is easier. On the other hand, in Europe, corporate financing is preferable, mainly through bank loans. In the United States, this funding is in the slightest way and funding through the financial markets, share issuance or venture capital is predominant. (Jäger-Gyovai, 2014; Schertler, 2001; Smolarski, & Kut 2011).

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For business success in a competitive market, the topic of enterprise finance is the key. Within the EU member countries, the European Commission has also started to look more intensively in recent years and in 2015 published a Green Paper, which compares the American and European way of financing businesses (besides other important characteristics). The aim of the European Commission is to bring capital market closer to the United States and to create a Capital market Union. (Sechel, & Nichita, 2010; Véron, & Wolff, 2016). The creation of a Capital market Union will not be easy, because there are big differences between the markets in the various European countries, especially in their diversity and heterogeneity. This is a significant difference compared to the US market because the US market is unified and homogeny. However, despite the diversity of the EU countries, there are countries in the EU that are leaders and their model and the efficiency of capital markets is closer to the US model. (Brühl et al., 2015; Härkönen, 2017). The European Union, through the creation of the Capital market Union, seeks to support small and medium-sized enterprises by financing through capital markets, while at the same time it will stimulate employment and economic growth. (Demary, Hornik, & Watfe, 2016; Piette, Zachary, 2015; Alexander, 2015). The single European market will expand funding opportunities for alternative resources such as risk capital, stock management or collective investment within EU member countries. Small and medium-sized enterprises will thus gain better access to liquid assets and start-ups businesses finance for their development. Diversification of funding sources will ensure financial stability of the company as well as mitigate potential problems in the future.

The paper will focus on identifying and analyzing differences in financing opportunities for companies and small and medium-sized enterprises (SME) through the stock market in the US and the European Union markets.

2 Differences in the US and EU capital market

This section of the article highlights the main differences between the US and the EU capital markets. We analyze in detail the specific differences between the EU and the US stock exchanges and compare their functioning through money, initial public offering (IPO) and other characteristics that can bring us closer look, which EU stock exchanges are as effective as those in the US.

The most significant difference is the number of exchanges in the markets. The US consists of 50 states, with two of the world's largest exchanges, NYSE and NASDAQ. In addition, there are smaller stock markets on the US market, for example in Chicago or Boston. The EU has 28 member countries, but each country has its own stock market. In the EU we can´t find such a big and important stock market as in the US. In addition, there are many other barriers to creating an efficient and unified capital market in Europe, such as a different language, culture, habits, economic conditions, laws, tax burden or currency (Ringe, 2015).

2.1 Investments flow on stock exchange

If we want to compare the difference between the EU and the US and find out which EU countries are closest to the US model, it is first necessary to determine the number of companies quoted on each stock exchange. Figure shows that there are approximately 5,200 companies listed on the NYSE and NASDAQ during the reporting period. In the European Union, from the perspective of listed companies, the most important stock market is in Madrid (about 3500) and the London Stock Exchange (about 2,600). Other exchanges in the European Union are below average of quoted

companies on the relevant exchanges, with the exception of EURONEXT (Belgium, France, Netherlands, Portugal and the UK).

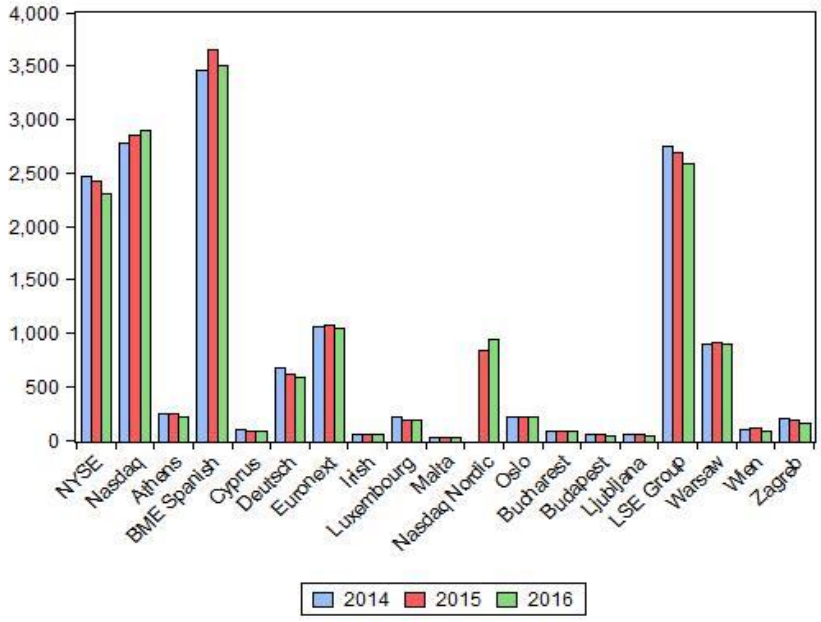

Figure 1 Number of listed companies
Source: Own elaboration according to WFE

IPO is a clear signal of the attractiveness and usability of individual stock market. Figure shows us that on the US stock exchanges the IPOs are several times bigger than on the EU stock exchanges. The only European exchanges that are at least a bit closer to the US are EURONEXT and NASDAQ NORDIC (Sweden).

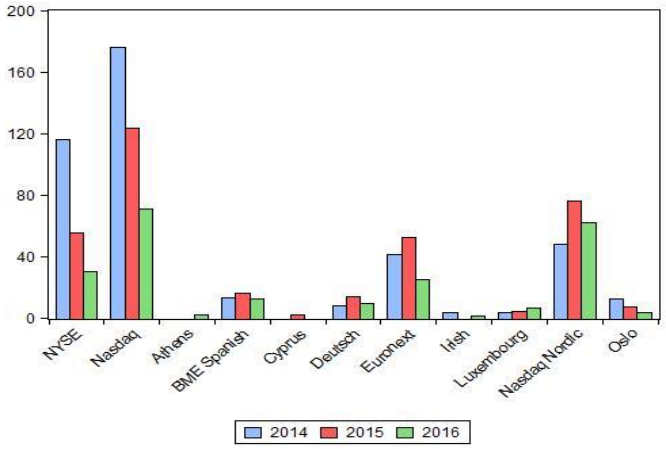

Figure 2 Number of IPOs
Source: Own elaboration according to WFE

As mentioned above, the number of IPOs in the US market is significantly higher than in the European market. Taking into account the volume of money that has been gained on the IPOs; we see a clear downward trend in both markets. But despite the declining trend, the only stock

exchanges in Europe that are similar to US dollars are LSE Group (London) and BME Spanish (Madrid).

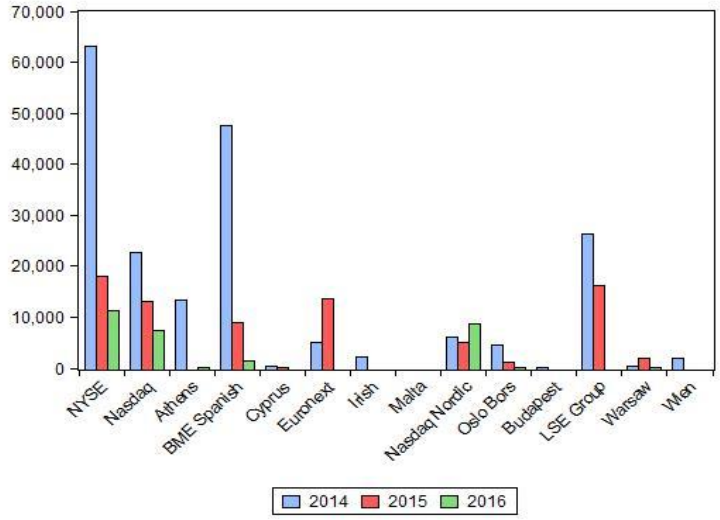

Figure 3 Investments flow to IPOs (in mil. USD)
Source: Own elaboration according to WFE

Except for IPOs, financial flow to existing businesses is also important for business financing. The emergence of new companies is a positive thing for the economy, as it brings a new stimulus to the sector in the form of new investments and innovations. However, if existing companies do not have access to additional capital for their development and investment, the company may get into serious problems and thus negatively affect the economic developments in that country. From the point of view of financing existing investment firms, we can see from Figure the similarity of the NYSE and NASDAQ with the European stock exchanges of BME Spanish, EURONEXT and LSE Group.

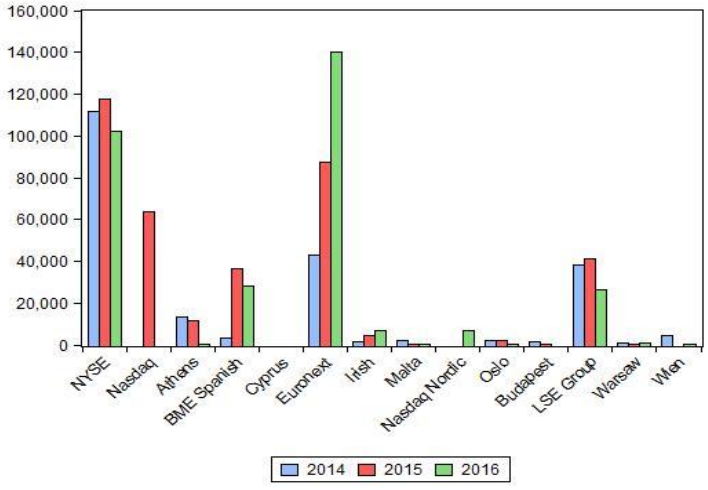

Figure 4 Investments flow to existed companies (in mil. USD)
Source: Own elaboration according to WFE

2.2 Investments flow to SME

So far in the article, we have pointed to the differences in the US and the EU investment flows in general. In this subchapter, we look at the differences in SME financing. We did not include NYSE and NASDAQ in the charts because NASDAQ stock data was not available, and NYSE data is so different to the EU that graphs were disarranged. Therefore, for numerical comparison we present numerical values.

When financing SMEs through IPOs, NYSE has a huge lead. In 2014, through the NYSE go 61,875.55 million USD (for IPO). After this year however, stock market developments slowed down (reversed) and in the years 2015 and 2016 it was only 28,874.89 million USD. The EU stock exchanges that are most closely matched the NYSE values were NASDAQ NORDIC and the Irish Stock Exchange. Their values, however, do not exceed 1 000 mil. USD.

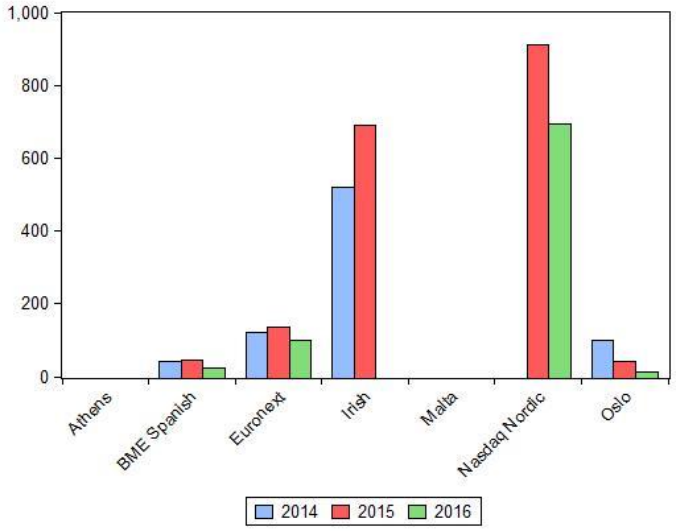

Figure 517 IPOs SME capital raised by shares
Source: Own elaboration according to WFE

Taking into account also the capital that has already been made to existing companies, the most efficient exchange in the European Union was EURONEXT (1,000.57 million USD in 2016). As can be seen from Figure , significant volumes of invested capital were also reached by the Irish and Norwegian stock exchanges (approximately 400 million USD) in 2014. Compared to the US stock market, stock markets in the EU are lagging behind. On the NYSE, the invested capital was 94,667.14 million USD in 2014, 117,453.45 million USD in 2015 and 106,451.69 million USD in 2016.

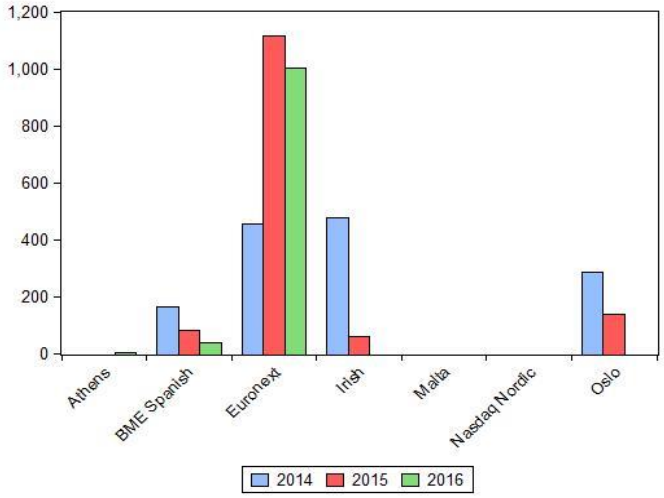

Figure 6 Existed SME capital raised by shares
Source: Own elaboration according to WFE

On the basis of previous findings, we can say that from the observed characteristics, the US stock exchanges were always in the advantage and therefore more efficient and attractive. Companies listed on the US stock market have better conditions than European stock markets to obtain funding to finance their activities and development. As we mentioned at the beginning of this article, there are a number of risks and obstacles in Europe for a more efficient and challenging environment for the use of stock exchanges to finance businesses, whether existing or newly emerging. In the different categories, individual stock exchanges in the European Union were shown to be realistically competitive compared to the US, but it should be noted that it was always another European stock exchange. That's why we decided for a cluster analysis where we were able to create the clusters of exchanges that are the most similar. In Figure we applied a cluster analysis to all exchanges from which data was available. The cluster analysis was carried out on the basis of the selected characteristic, which was the flow of our investment in general. The analysis concluded that our original hypothesis about the divergences of the global stock exchanges is true and that the US NYSE is most effective and most attractive in terms of business financing opportunities. Next, we could associate NASDAQ (USA) and NASDAQ NORDIC (Sweden) in one cluster with the NYSE. In the European Union, we would also mention BME SPANISH and the Warsaw Stock Exchange, which are closer to the US stock exchanges. The Warsaw Stock Exchange operates on the same principles as the US, so its better functioning is obvious. The remaining stock exchanges in the European Union were in one cluster, and thus proved to be the least similar to the US or to the "better" ones in the European Union.

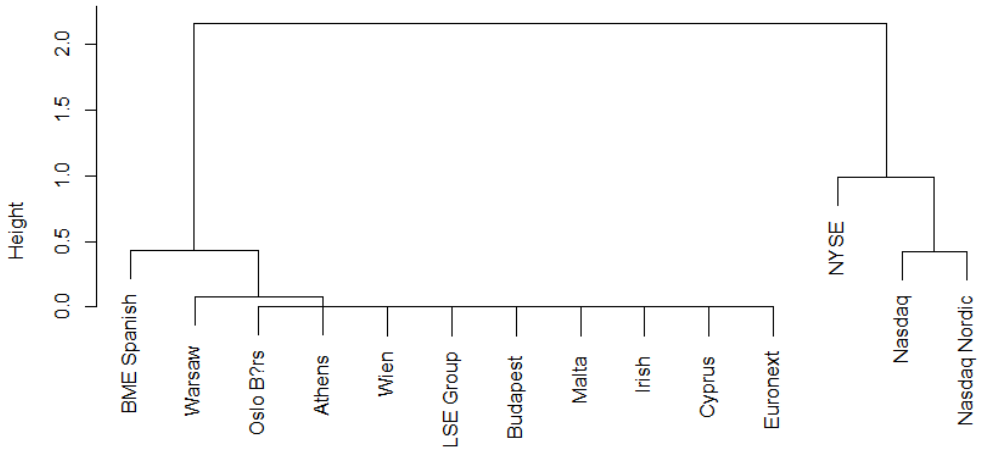

Figure 7 Cluster dendogram – Investments flows
Source: Own elaboration according to WFE

The second criterion was investment in SMEs, whether existing or newcomers. Based on cluster analysis, we have seen significant differences between the US NYSE and those of the EU. As we can see from Figure , the US stock market's efficiency was again high. Only stock exchanges within the EU, slightly different from the rest, are NASDAQ NORDIC and EURONEXT.

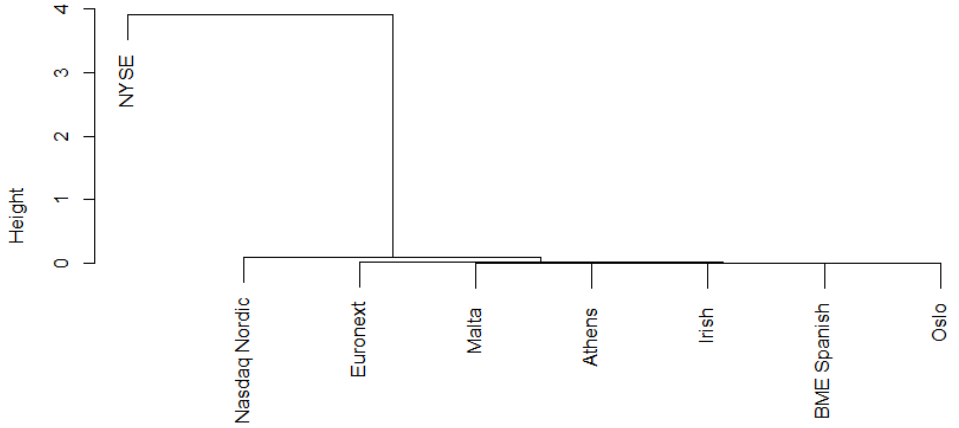

Figure 8 Cluster dendogram – Investments flows to SME
Source: Own elaboration according to WFE

3 Conclusion

In this article, we compared individual US and EU stock exchanges and analyzed how much money goes to businesses through individual exchanges. We were interested in how the stock exchanges in the European Union resemble those of the US and whether their usability in business financing (IPO or existing businesses) is approaching in some areas of the EU by the US. Last but not least, we focused on SME financing as a subcategory of total funds that went through the stock exchanges. From the results, it can be clearly interpreted that the US NYSE and NASDAQ exchanges are more used, as evidenced by the high volume of funds that go to businesses but also to SMEs. On the other hand, the European Commission seeks to create a legislative framework and create an environment for more efficient and easier financing of SMEs, in order to promote employment and economic growth and to deepen the activities of European exchanges. As this

process is challenging, the EU should take an example from some of the EU member countries stock exchanges that are closest to the US and take over the functional elements and build a Capital market Union on these bases. European exchanges, from which the European Commission could take functional elements are for example, NASDAQ NORDIC, EURONEXT, BME SPANISH and the Warsaw Stock Exchange.

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Optimization of the parameters of aircraft ground handling by cost function

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Abstract

The process of aircraft handling when preparing for further flight is a good example of using the theory of mass control to assess the effectiveness of aviation activity and its individual subsystems. All models of the system of mass control are aimed at determining the most appropriate characteristics (indicators) specific to a particular type of model. The most suitable values of the characteristics are in fact a compromise between the quality of services, which is generally proportional to the number of channels and the use of the service lines (channels) that is inversely proportional to their number. In this sense, each task of the theory of mass control is an optimization task. The most commonly used tool of the optimization of systems of mass control is the cost objective function. The aim of this contribution is to highlight the possibilities of using the cost function to optimize the parameters of aircraft ground handling system.

Keywords: Theory of mass control, Optimization, Aircraft ground handling, Cost function, Analysis.

JEL Classification: C1, C61

1 Introduction

The task of the theory of mass control is to examine models in which the operating system may have one or more handling lines (equipment and associated personnel), by which the demand are operated focusing on costs and benefits and their changes depending on the number of parallel lines. The main task of system of mass control is to find the minimum between occurring cost components. The amount of individual cost items varies according to the capacity of the operation system, i.e. according to the number of parallel lines of operation. If the capacity (number) of handling lines is small, then the operating costs are small but it creates heavy costs caused by waiting customers (penalties for delays caused to passengers and aircraft). If the capacity (number) of handling lines is large, then the costs of the handling lines are high, but the costs caused by waiting (delayed) customers (aircraft and passengers) are small or none. The total cost is the lowest

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only if there is optimum number of parallel lines of the operation, which depends on the specific shape of the curves, i.e. the concrete expression of the dependence of the individual costs on the capacity (number of parallel lines) of the operation system given.

2 Aerodrome Operation Costs Analysis

Each task of system of mass control is an optimization task. These tasks are most often focusing on (Bačik & Jezný, 2011):

- dimensioning of the optimal number of parallel lines (n), if we know the intensity of operation and the intensity of the input current of demands,
- determining the optimal intensity of the input current of demands (λ), if we know the number of parallel lines and mean handling time of one demand,
- determining the optimal operation intensity (μ), i.e. mean time to serve one demand, if we know the intensity of the input current of demands and the number of parallel lines for operation.

The most commonly used tool of the optimization of systems of mass control is the cost objective function. The various types of costs, which are included in the cost function, can be divided into three groups:

1. Group of costs, the amount of which is proportional to the number (capacity) of handling lines such as:
   - C1 - the costs of free handling lines - line that is not used and it gives rise to costs as time wage of serving staff, amortization of the cost of equipment and the like. This cost increase in proportion to the number of lines.
   - C2–the costs of occupied handling lines- line that is used and includes for example the cost of the consumed energy, raw materials, etc., consumed in operating the demands.
2. Group of costs, the amount of which is inversely proportional to the number (capacity) of handling lines such as:
   - C3 - the costs of downtime demands while waiting for the operation - includes costs such as the cost of aircraft waiting to release the track or stalls to carry out maintenance and so on. (Penalty - a fine for breach of contract caused delays of aircraft and passengers). These costs fall due to the number of lines.
   - C4 - costs of loss of demand in the system without waiting and in a mixed system - if there are many lines occupied, passenger can use the handling of another airport or another airline.
3. Group of costs, the amount of which does not depend on the number (capacity) of handling lines such as:
   - C5–costs of transportation of demands- e.g. the cost of passenger transportation at the air-port.
   - C6 - general costs of handling system independent of the number of lines.

3 Cost Analysis of the System for the Ground Handling of Aircraft

The costs of performing the technical operation of aircraft vary depending on the type (size) of operated aircraft as well as the range of services which are provided. This depends on the amount of time that is available to handling staff to perform handling (arrival / departure, stopover) or by contractual arrangements between the airline and the airport operator or company that carries out these activities. These costs also depend on the number of staff allocated to implementation of the

technical handling of aircraft, quality of used equipment, materials and mechanisms in the performance of handling etc.

An integral part of process optimization is the understanding of the costs that accompany the process and their impact on the efficiency of aircraft ground handling. We need to know how changing the system parameters will change the amount of the total costs. The optimal structure of ground handling of aircraft is one that gives us the best financial results. That means the biggest difference between income and expenses.

Given the demand of air carriers for aircraft ground handling it is not possible to increase revenue by raising fees for the handling, as this could lead to a reduction in demand. The only possible way of increasing profit is to reduce costs by optimizing the number of operating offices needed for the operation of aircraft and thus the number of stationary and mobile technical equipment and operating personnel (Bačík, 2009).

4 Input Data of the Model of Aircraft Ground Handling System

We researched the aircraft ground handling system as a single-phase system of mass control with several parallel handling stations and we will seek the optimum number for the operating conditions. To find out the system of mass control´s (SMC) efficiency, it is necessary first of all to know the values of input parameters entered into relations for calculation. The values of these parameters entered as input parameters should best correspond to the real situation in the airport company or anticipated state of Airport Company, which we want to explore Antosko, Korba, & Sabo, 2015):

- **N (NOS) -**number of parallel operator station - we want to find out optimum number of GHA workplaces. That is why we observe the changes of criteria values for different NOS, for example in the range 2 to 12,
- $\mathbf{t_{han}}$ - (**MH)** mean (most likely) time of handling of one aircraft,
- $\mathbf{t_{int}}$**- (MI)**the mean interval between two demands for carrying out the handling of aircraft,
- **CDS** - the total cost of downtime per aircraft ground handling station per unit of time - the value of the input parameter calculated from data obtained from the annual report for the year.
- **CHS** - cost of one handling station per time unit during the handling of the aircraft – we only estimate the value of the parameter, for example that it is 25% higher than the amount of the parameter CDS, because the costs of handling stations during downtime are not as high as when parking place is used.
- **DCD** - downtime costs of one demand - the value of this parameter also an estimate. It is estimated from the amount of fines paid for caused delays of aircrafts and the total delay time of aircraft per year (for the period).
- **RHD** - revenue from one handled demand- the value of this parameter is the average amount paid to the airport operator for aircraft.
- **NA** – number of handled aircraft.
- **TI**– examined length of time interval, e.g. rush hours, work shift or working day.

Note: CDS, CHS a DCD refer to the same time unit as MA, MI a TI, (e.g. if the cost is measured in terms of amount per 1 hour, then the time interval for other parameters is also 1 hour).

5 Analysis of Relations between the System Parameters of Ground Handling of Aircraft and Values of the Cost Function

The optimal number of parallel lines (parking places) for ground handling of aircraft is determined by comparing the values of the profit of each variant scheme, calculated according to the formula:

$$P = I - C \quad (1)$$

where:

- P – is profit if the result is positive or it is a loss if the result is negative,
- I – income for services,
- C – operating costs and resources the company spent on realization of services

The total income is calculated by multiplying the number of handled airplanes and charges (prices) for handling one aircraft:

$$I = NA*RHD \quad (2)$$

The total cost is calculated as the sum of the individual costs:

$$C = C1 + C2 + C3 + C4 + C5 + C6 \quad (3)$$

while:

C1 *- the costs of free handling lines*

$$C1 = CDS*TDT \quad (4)$$

where:
TDT – total downtime of handling stations operating in a given time interval.

C2 *– the costs of occupied handling lines*

$$C2 = CHS*THT \quad (5)$$

where:
THT – total time of aircraft handling in a given time interval.

Sum of TDT and THT is equal the full time pool of handling stations (HST), which is calculated by multiplying the number of service stations (NS) and the length of time interval (TI). Their particular value is calculated using the load factor of handling stations ψ **:**

$$\psi = \frac{\lambda}{\mu} \quad (6)$$

Substituting into the equation for C1 and C2 gives us:

$$C1 = CDS*NS*TI*(1- MH/MI) \quad (7)$$

$$C2 = CHS*NS*TI*(MH/MI) \quad (8)$$

C3 *- the costs of downtime demands while waiting for the operation*

$$C3 = DCD* WTD \quad (9)$$

where: WTD – waiting time of demands (delay of aircraft)

Because the total delay of aircraft (WTD) due to waiting for the execution of handling by GHA system cannot be calculated, it is not possible to determine a value of cost N3 and its amendments according to the value NS, MI and MH. The approximate value of the WTD can only be estimated according to the likelihood that all handling stations have been used (Pn). Waiting time will be proportional to the value of that likelihood.

$$WTD = TI*Pn \quad (10)$$

After substituting into the equation C3 we get:

$$C3 = DCD*TI*Pn \quad (11)$$

while:

$$P_n = \frac{\frac{\alpha^n}{n!}}{\sum_{k=0}^{n} \frac{\alpha^k}{k!}} \quad (12)$$

where: $\alpha = \frac{\lambda}{\mu} = \lambda \bar{t}_{ob}$ (13)

C4 *- costs of loss of demand*

$$C4 = NRD*CRD \quad (14)$$

where:
NRD – Number of rejected demands (aircraft),
CRD – the cost of a rejected demand (aircraft).

Taking into account only scheduled air traffic, the cost C4= 0.

C5 *– costs of transportation of demands*

Costs of transportation of aircraft at the airport can be considered part of the CDS and CHS. Then the cost C5 will be C5= 0 (Knabe & Schultz, 2016).

C6 *- general costs of handling system independent of the number of lines*

Also, the overall cost of the aircraft ground handling system can be considered part of the CDS and CHS. Then the cost C6 will be C6= 0.

The intensity of the input current of demands and intensity of the handling related to each unit of time (minute, hour or day) is calculated as follows:

λ_{Am} – intensity of the input current of aircraft, number of aircraft in 1 minute;
λ_{Ah} – intensity of the input current of aircraft, number of aircraft in 1 hour;
λ_{Ad} – intensity of the input current of aircraft, number of aircraft in 1 day;
t_{int}– the mean interval between two demands;

t_{han}– the mean time needed for handling of 1 demand;
n – the number of parallel lines for a given period of handling.

For intensity of the input current of aircraft is true that:
$\lambda_{Am} = \lambda_{Ah} / 60$ *(15)*
$\lambda_{Ad} = \lambda_{Ah} * 24$ *(16)*

Wherein it is sufficient to know one of these variables, e.g. λ_{Ah} – the number of aircraft entering the queuing within one hour (Řiha, Němec, & Soušek, 2014). For the calculation of the intensity of handling we will use relations:
$\mu_m = 1 / t_{han}$ *(17)*
$\mu_h = \mu_m * 60$ *(18)*
$\mu_d = \mu_h * 24$ *(19)*

while:
t_{han} – is mean time of handling of one demand in minutes,
μ_m - is intensity of handling by one handling station in given phase (number of demands handled in one minute).

We will calculate the load factor of aircraft ground handling lines (ψ) as:
$\Psi = \Lambda_{AM} / (N * M_M)$ *(20)*

In the example above, it is appropriate to create a spreadsheet in Microsoft Excel for all necessary calculations, where after entering the input data; the program will generate the other output values. This will simplify our analysis of the impact of proposed changes in the number of parallel lines of ground handling of aircraft and their dependence on the changing values of the input data.

Table 1 The values of the input data for calculation

t_{int}	t_{han}	**CDS**	**CHS**	**DCD**	**RHD**	**NA**	**TI**

Source: Own elaboration

The second table calculates the values of the output data ψ , TDT,THT, C1,C2,Pn, C3, C,I,P. In the first line for the number of handling stations (NOS) n=2, in the second line for n=4 etc. up to the highest value, e.g. n=12.

Table 2 Calculated variations for different variants of ground handling of aircraft

n (NOS)	ψ	**TDT**	**THT**	**C1**	**C2**	**Pn**	**C3**	**C (tot.)**	
2									
4									
6									
8									
10									
12									

Source: Own elaboration

If the tables are available in Microsoft Excel, where you can enter the real values of the input data, then the required parameters are calculated automatically. After changes (corrections) of input data values we get new values of output parameters. For faster analysis of dependence of output parameters values (N or other) on the number of parallel lines (N) and to determine the optimal value, it should be displayed graphically using bar graphs (Hulínská & Kraus, 2016).

6 Conclusion

The task of the theory of mass control is to examine models in which the operating system may have one or more handling lines. Each task of the theory of mass control is an optimization task. An integral part of process optimization is the understanding of the costs that accompany the process and their impact on the efficiency of aircraft ground handling. The optimal structure of aircraft ground handling system is one that gives us the best financial results.

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ECB´s QE related announcement´s impact on equities – event study evidence from Germany, France and Italy

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Abstract

In this paper we examine effects of QE related statements made by ECB on major indices of three largest economies in EU. Considering announcement days as events, we use event-study approach to calculate excess returns on particular announcement day for DAX, CAC40 and FTSEMIB, admitting complexity of those statements, and difficulty to isolate effects linked only to QE related information. Results show positive excess returns on each index from 2008 to 2014, while in period from 2015 when extended asset purchases programme started, excess returns fell to negative range. Therefore, for both periods we were able to define winning strategy for DAX and CAC4O, while FTSEMIB did not signal particular direction in line with announcement days' information.

Keywords: Quantitative easing, ECB, Stock indices, Event study.

JEL Classification: E520, G140

1 Introduction

Quantitative easing (QE) is nonstandard monetary policy instrument, widely used after financial crisis in 2008. According to official theory, its main goal is to stimulate economy, when base interest rates are at the zero level or even below. Monetary authorities are supposed to buy selected types of assets, and provide liquidity to banks and other institutions, while those are expected to provide liquidity further, and stimulate riskier investments. Firstly, we faced QE in Japan, then in United Kingdom and now there is still opened expanded asset purchase programme in EU managed by ECB. Question of effectiveness of this nonstandard instrument remains still open among authors, because of complexity and widespread consequences of this unconventional monetary policy.

Nevertheless, there were many attempts to quantify and identify effects of QE on particular segments or areas of economies. We can find evidences of impact of QE mainly on bond yields across the literature. For example: Gagnon et al. (2011), Wright (2012), Bauer et al. (2014), Swanson (2011), Joyce et al. (2010) present results suggesting that quantitative easing related announcements reduced long term bond yields significantly. But persistence of effects of events – announcements in those cases, is questionable. Thornton (2017) proves that event studies approach with announcements used as events cannot provide statistically significant information about persistence and durability of effects caused on bond yields by those announcements, therefore this approach cannot be used to examine effectiveness of QE. Event study was also used by Sosvilla-

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Rivero and Fernández-Fernández (2016) to examine effects of announcements from both ECB and FED on euro-dollar exchange rate, while depreciation resp. appreciation of currency would have secondary effects on economy as a whole. On the other hand, knowledge of effects caused by those announcements can be used by investors/traders in order to profit.

As stated before, there is rich representation of event studies connected to QE in every stated regions/countries, but mostly examining effects on bonds in general, hence we decided to examine effects of QE related announcements to equity/stock markets, which are easier available as bond markets for small investors or traders. In other words, aim of this paper is to determine whether information related to unconventional monetary policy, provided by monetary authority, has positive or negative impact on stock markets via examining returns on benchmark indices on announcement days. To keep our research as useful as possible, we decided to work with announcements of ECB, examining their intraday effect on benchmark indices of three largest economies in EU: Germany, France and Italy, because there are strong reasons to believe, that QE (EAPP) programme will continue till December 2017, thus knowing impact of incoming announcements from ECB could bring profit or could help to build profitable strategy for traders, respectively.

2 Methodology and data

To examine effects of announcements on selected indices representing stock markets of three largest economies in Eurozone, we adopted standard event study methodology to determine excess returns (see e.g. MacKinlay, 1997). Abnormal returns will be analysed in same time point (day) as announcement is released[2] using average returns (Brown & Warner, 1985) calculated from previous sixty days:

$$A_{AD} = R_{AD} - \overline{R}_t \ , \qquad (1)$$

$$\overline{R}_t = \frac{1}{60}\sum_{t=-60}^{-1} R_t \qquad (2)$$

Where A_{AD} represents excess return on announcement day (AD) of particular index, R_{AD} is return of particular index on announcement day calculated as difference between closing prices on announcement day and previous day and $\overline{R}_t$ is average return on particular index considering sixty days before announcement. For purposes of this study, we consider A_{AD} as a key indicator that helps us determine effect of QE related statements on equity market, while persistence of those effects cannot be examined via this methodology (see Thornton, 2017). We used daily close prices of DAX (Germany), CAC40 (France) and FTSEMIB (Italy) for indices, while returns/changes were calculated as percentage[3]. With this indicator we try to approximate how daily returns on indices deviates on particular day after selected announcements from its average performance during previous sixty days.

2 Announcements are released usually in the afternoon, while European markets closes several hours later, which gives us enough time to absorb information contained in particular announcement.

3 Returns on announcement days were removed from sample so average returns were calculated without contamination of excess returns on announcement days.

Table 1 Announcement days

Date	Event	Description
08.06.2017	ECB press conference MPD-GC	Expanded asset purchase programme (EAPP) 60B/m
27.04.2017	ECB press conference MPD-GC	Expanded asset purchase programme (EAPP) 60B/m
09.03.2017	ECB press conference MPD-GC	Expanded asset purchase programme (EAPP) 80B/m -> 60B/m from 4/2017
19.01.2017	ECB press conference MPD-GC	Expanded asset purchase programme (EAPP) 80B/m -> 60B/m from 4/2017
08.12.2016	ECB press conference MPD-GC	Expanded asset purchase programme (EAPP) 80B/m -> 60B/m from 4/2017
20.10.2016	ECB press conference MPD-GC	Expanded asset purchase programme (EAPP) 80B/m
08.09.2016	ECB press conference MPD-GC	Expanded asset purchase programme (EAPP) 80B/m
21.07.2016	ECB press conference MPD-GC	Expanded asset purchase programme (EAPP) 80B/m
02.06.2016	ECB press conference MPD-GC	Corporate sector purchasing programme (CSPP)
21.04.2016	ECB press conference MPD-GC	Expanded asset purchase programme (EAPP) 80B/m
10.03.2016	ECB press conference MPD-GC	Expanded asset purchase programme (EAPP) 80B/m
09.11.2015	Press release	Public sector purchasing programme (PSPP)
23.09.2015	Press release	Asset backed purchase programme (ABSPP)
22.01.2015	ECB press conference MPD-GC	Expanded asset purchase programme (EAPP)
30.10.2014	press release	Asset backed purchase programme (ABSPP)
02.10.2014	press release	Asset backed purchase programme (ABSPP)+Covered bond purchase programme (CBPP)
18.09.2014	press release	Targeted Long-term refinancing operation (TLTRO)
03.07.2014	press release	Long-term refinancing operation (LTRO)
22.11.2013	press release	Long-term refinancing operation (LTRO)
06.12.2012	ECB press conference MPD-GC	Long-term refinancing operation (LTRO) + Main refinancing operation (MRO)
31.10.2012	Press release	Covered bond purchase programme 2 (CBPP2)
06.09.2012	Governing Council Press Release	Outright monetary transactions (OMT)
02.08.2012	ECB press conference	Outright monetary transactions (OMT)
08.12.2011	Governing Council Press Release	Long-term refinancing operation (LTRO)
06.10.2011	Governing Council Press Release	Covered bond purchase programme 2 (CBPP2)
30.06.2010	Governing Council Press Release	Covered bond purchase programme – long-term refinancing operation (CBPP/LTRO)

10.05.2010	Governing Council Press Release	Securities markets programme (SMP)
07.05.2009	Governing Council Press Release	Covered bond purchase programme – long-term refinancing operation (CBPP/LTRO)
15.10.2008	Governing Council Press Release	Fix-rate, full-allotment operation (FRFA)
28.03.2008	Governing Council Press Release	Long-term refinancing operation (LTRO)

Note: ECB – European Central Bank; MPD-GC – Monetary Policy Department, Governing Council
Source: Own elaboration using data from ECB

As stated before, in this study we use ECB announcements containing information about unconventional monetary policy instruments as events. We checked every single press release of ECB from 2008 to July 2017 to compile Table 1, which contains only announcements with information about unconventional monetary policy[4]. In Table 1 below we then see what type of meeting or announcement on which particular day (first two columns) provided information linked to which particular non-standard monetary policy programme (third column).

3 Results and discussion

In Table 2 we present excess returns for every announcement day stated in Table 1, which are discussed below:

Table 2 Excess returns

Events	Excess returns		
Date	DAX	CAC40	FTSEMIB
08.06.2017	-0.33%	-0.41%	-1.28%
27.04.2017	-0.34%	-0.47%	-1.33%
09.03.2017	-0.01%	0.36%	0.41%
19.01.2017	-0.12%	-0.35%	0.51%
08.12.2016	1.66%	0.76%	1.49%
20.10.2016	0.43%	0.38%	0.53%
08.09.2016	-0.91%	-0.48%	0.39%
21.07.2016	0.15%	-0.03%	0.37%
02.06.2016	-0.09%	-0.27%	-0.21%
21.04.2016	-0.03%	-0.35%	0.37%
10.03.2016	-2.22%	-1.67%	-0.29%
09.11.2015	-1.58%	-1.49%	-1.84%
23.09.2015	0.69%	0.25%	0.30%
22.01.2015	1.08%	1.37%	2.37%
Average excess returns 22.01.2015 - 08.06.2017	*-0.12%*	*-0.17%*	*0.13%*
30.10.2014	0.36%	0.74%	0.22%
02.10.2014	-1.90%	-2.81%	-3.93%
18.09.2014	1.48%	0.80%	0.13%

4 Expanded asset purchase programme, which is recognized as a quantitative easing, started on March 2016, but previous programmes are also identified as nonstandard or unconventional monetary policies, hence we added them to our study.

03.07.2014	1.12%	1.01%	0.97%
22.11.2013	0.05%	0.47%	-0.30%
06.12.2012	1.03%	0.26%	-0.73%
31.10.2012	-0.38%	-0.87%	0.02%
06.09.2012	2.66%	2.81%	3.95%
02.08.2012	-2.27%	-2.79%	-4.65%
08.12.2011	-2.24%	-2.66%	-4.49%
06.10.2011	3.57%	3.78%	3.89%
30.06.2010	0.39%	0.71%	0.88%
10.05.2010	5.23%	9.76%	11.45%
07.05.2009	-1.67%	-1.08%	-1.61%
15.10.2008	-6.16%	-6.57%	-5.06%
28.03.2008	0.02%	-0.25%	0.38%
Average excess returns 28.03.2008 - 30.10.2014	0.08%	0.21%	0.07%
Average excess returns 2008-2017	-0.01%	0.03%	0.10%

Note: Excess returns bigger than 1% in absolute value are shown in grey; Table contains row with average excess returns in period from 22.01.2015 to 08.06.2017 in order to isolate average excess returns of Expanded Asset Purchase Programme (EAPP)
Source: Own elaboration using daily close data on indices

Taking into account every 30 announcements related to unconventional monetary policy, we have almost negligible average excess return for DAX (-0.01%), and little positive excess returns on CAC40 (0.03%) and FTSEMIB (0.10%), respectively. This information we consider as insignificant, because of differences in statements, hence we separated our sample into two parts: first containing announcements with information about unconventional monetary policy steps (LTRO, CBPP, CBPP2 etc., but before so called extended asset purchase programme (28.03.2008 – 30.10.2014) and second part with information mainly related to EAPP (22.01.2015 – 08.06.2017)[5].

For the first part, we can observe positive average excess returns on every index on announcement day; DAX: 0.08%, CAC40: 0.21% and FTSEMIB: 0.07%, which indicates positive reaction of market participants in general on information about extraordinary policies included in statements or press releases. Even after removing Governing Council Press Release held on 15.10.2008, which contained very negative macroeconomic overview and outlook besides information about fix-rate full allotment operation (FRFA) from this first part, average excess returns reach half a percent on DAX, 0.66% on CAC40 and 0.41% on FTSEMIB. Also we would like to point out, that in this first part, there were excess returns above one percent (or below minus one percent, respectively) in eleven cases for DAX, nine cases for CAC40 and eight cases for FTSEMIB from total sixteen announcement days. For index trading, we consider these returns as significant from market participants' point of view. To conclude, from 2008 to 2014, on announcement days we faced in total ten positive excess returns on DAX, nine on CAC40 and eight on FTSEMIB from sixteen announcements days in total, with average positive returns around half a percent. In this period buying strategy on DAX and CAC40 would bring profit.

[5] In this part were three exceptions, where press release contained information about CSPP on 02.06.2016, PSPP on 09.11.2015 and ABSPP on 23.09.2015.

For the second part, oriented mainly on EAPP, average returns are in negative range for DAX and CAC40 (-0.12% and -0.17% respectively), and little positive for FTSEMIB (0.13%). We have to point out two announcement days. Firstly, 22.01.2015, when EAPP was announced, market participants reacted very positively, and excess returns were above one percent on every index, even above two percent no FTSEMIB, secondly, ECB press conference held on 08.15.2016 which contained first information about downsizing monthly pace of purchases included in EAPP. This information was also taken by market participants very positively[6]. But if those two positive reaction days were removed from sample, average excess returns fall deeper in negative range; DAX: -0.36%, CAC40: -0.38%, FTSEMIB: -0.17%.

To conclude, for the second part (2015-2017), and hypothetically, for next announcement days, selling benchmark indices of Germany and France on announcement days appears as winning strategy, with nine negative cases of excess returns both on DAX and CAC40 from fourteen in total, while FTSEMIB had only five cases of negative excess returns.

Results also show, that in the first part, Italian benchmark index had at least excess returns above one percent (or below minus one percent, respectively) among monitored indices, while in second part FTSEMIB had most of days with such excess returns[7]. Another point for FTSEMIB is that while in first part average excess return was less positive than on the other indices, for the second part average return is less negative than on the other indices. While in general among those three indices, FTSEMIB is considered as the most volatile, taking into account average excess returns, it performs more stable than the other two indices. It is hard to bring out concrete and reliable reason why excess returns in first period were mostly positive and in the second period mostly negative. In general, every policy linked to easing is considered as dovish, which boosts equity markets in longer horizon, while on the other hand, considering only particular announcement days, we suggest following hypothesis: where continuing dovish and ease monetary policy remains (according to statements from 2015 to 2017), in those particular days, market participants could run from equities in order to profit from bond rally caused by those announcements.

Possible complication with presenting these results sources from complexity of statements, load of information, respectively. As Sosvilla-Rivero & Fernández-Fernández (2016) suggests, these events have immediate effect on exchange rate, which consequently affects stock prices. Also other macroeconomic information presented by ECB affects market participants significantly[8], therefore isolating effect of information related only to QE programme is difficult.

[6] For DAX and FTSEMIB excess return climbed above one percent (1.66% and 1.49%, respectively), while in our opinion reaction on CAC40 was tapered by political risks ahead – French presidential election in April 2017.
[7] Especially, on last two monitored announcement days, (both ECB press conferences) held on 08.06.2017 and 27.04.2017 excess return on FTSEMIB fell below minus one percent, while DAX and CAC40 were close to -0.4%.
[8] For example, Governing Council Press release on 28.03.2008 contained very pessimistic information about economy in Europe, and excess returns fell below minus five percent on each index.

4 Conclusion

In this paper we focused on benchmark indices of three largest economies among EU and their reaction on information related to QE/unconventional monetary policy from ECB. Using event-study approach, where events were considered as announcement days, we calculated excess returns on particular indices. Main advantage of this approach we consider no model errors contamination. Results suggest, that while from 2008 to 2014 excess returns were positive in average, and also more than half of events caused positive excess returns on DAX and CAC40, from 2015 to 2017 excess returns fell to negative range in average, and also more than half of events caused negative excess returns on DAX and CAC40. For FTSEMIB results did not show similar heading. This brings us to a conclusion that on next ECB QE related statements we can expect negative performance on German and French indices according to this study, which can be applicable for intraday trading. Logically, we have to add on, that limitation of used approach is difficulty to isolate information from complex statements, where market participants also pay attention to other macroeconomic data presented by monetary authority.

Acknowledgements

This work was supported by the Slovak Research and Development Agency, project number VEGA 1/0994/15.

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Economic assessment of nuclear waste disposal and energy generating

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Abstract

The purpose of the present study is to show the basic ideas behind funding applications for sinking shafts to depths of more than 1.000 metres in hard rock for underground waste disposal and energy generating, using flame melting technique. Environmental awareness in use of underground spaces also promotes environmentally positive influence on communities at the surface. The important of the deep part in the research work is ventilation and air conditioning of the deep shafts, to enable people to live and work there and to optimise the climatic conditions in the final repositories, without energy consumption from other resources than the deep shafts themselves. Physical simulation of these processes is to be used in the preliminary stage of the project, to give a reliable basis for planning and leave nothing to chance. The aim is to develop a cost-effective method, reducing the present high cost of construction for utilisation of underground space for transport and services, and for production of resources, since cost has often prevented such applications in the past. The flame melting process technique could be used for shield tunnelling in the future.

Keywords: Waste, Energy generating, Surface, Disposal, Deep shafts.

JEL Classification: Q40

1 Introduction

The present preliminary study gives scientifically reasoned analysis with relevant for subsequent funding applications, of flame melting technique and underground storage of waste materials and energy generation from underground resources, and gives information on the scenarios to be considered in construction and operation of the underground structures needed for this purpose. The major barriers to realization of such large hole drilling systems in crystalline rock today are the high costs involved. Waste materials for disposal and not for recycling in German legislative, i.e. the landfill Ordinance and the Waste Disposal Ordinance for surface disposal defines four disposal categories (DK), depending on the degree of hazard of the waste concerned:

- DK 0 for inert waste (mineral waste with low degree of contamination)
- DK I for non- hazardous wastes (with very low organic proportion)
- DK II for non-hazardous wastes (with larger organic proportion)
- DK III for hazardous wastes.

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Waste materials can be stored at underground locations after approval by the mining authorities (DK IV), as follows:

- In a mine with its own disposal area, set up separately from mineral production; or
- In a cavern that is completely enclosed by rock (Bielicki et al., 2012).

It is not possible with present conventional technology to give 100 % guarantee for long-term underground storage, because it is not possible to rule out damage to the waste cylinders and the surrounding barrier systems as a result of rock tremors, causing migration of hazardous materials to the immediate surroundings of the rock. These factors have to be taken into account in planning of final repositories (Bielicki et al., 2012).

The high radioactive wastes generating heat can be expected to have a storage duration of 100 000 years, whereby low-level and medium-level wastes are cast and compacted in concrete, and high-level wastes are vitrified and welded gas-tight into stainless steel containers, which are at present mostly stored in intermediate repositories (Nečas et al., 2007).

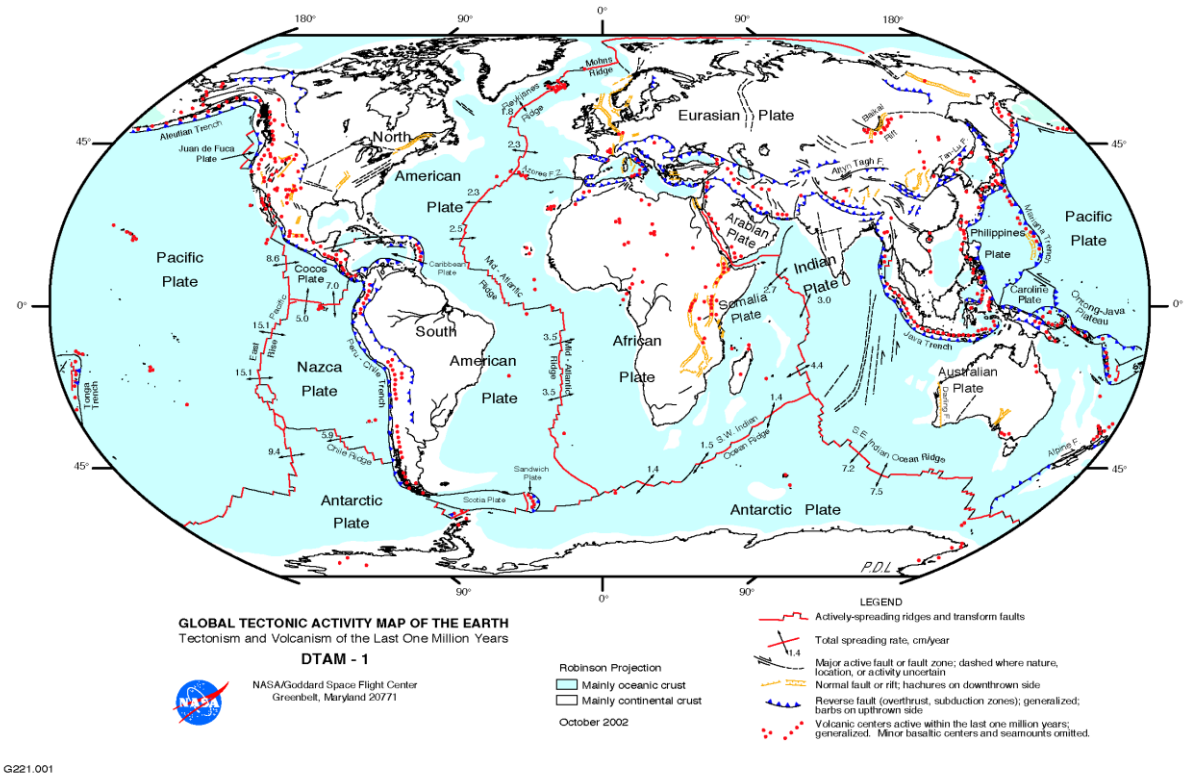

Figure 1 Global tectonic activity map of the earth
Source: NASA/Goddard Space Flight Center, Greenbelt, Maryland 20771

A schematic map of the global tectonic activity of the past 1 million years. Plate boundaries and macro-scale tectonic structures are depicted at scale for both continental and oceanic crust. A representative sampling of volcanic hotspots are geo-registered to known areas of recent volcanism.

Economic regions are geographic groupings of complete census divisions for the analysis of broad economic activity. Specifically, the relationship between the economic region approach and siting methods is assessed as is the potential ramification of the approach for different management options including deep geologic disposal, centralized storage and storage at nuclear reactor sites (Nuclear waste management organization, 2017).

2 The economics of nuclear and other energy systems in the context of sustainability

The world's population will continue to grow for several decades at least. Energy demand is likely to increase even faster, and the proportion supplied by electricity will also grow faster still. However, opinions diverge as to whether the electricity demand will continue to be served predominantly by extensive grid systems, or whether there will be a strong trend to distributed generation (close to the points of use). That is an important policy question itself, but either way, it will not obviate the need for more large-scale grid-supplied power, especially in urbanized areas, over the next several decades. Much demand is for continuous, reliable supply of electricity on a large scale, and this qualitative consideration will continue to dominate (Zachar et al., 2007).

IAEA classification of nuclear energy sustainability:

- Safe, secure, economical and publicly acceptable nuclear power with security of supply – addresses conditions necessary for newcomers to deploy nuclear energy.
- Safe disposal of all nuclear wastes in a complete once-through fuel cycle with thermal reactors and with retrievable spent nuclear fuel disposal.
- Initiate recycling of used nuclear fuel to reduce wastes. Limited recycle that reduces high-level waste volumes, slightly improves U utilisation, and keeps most of the U more accessible (Depleted U and Recovered U/Th).
- Guarantee nuclear fuel resources for at least the next 1000 years via complete recycle of used fuel. Closed fuel cycle with breeding of fissile material to improve natural resource utilisation by a factor of 10 to 100. Solves the resource utilisation issue by providing fuel for thousands of years while also significantly reducing long-lived radioactivity burden.
- Reduce radiotoxicity of all wastes below natural uranium level. Closed fuel cycle recycling all actinides and only disposing fission products to minimise long-term radiotoxicity of nuclear waste. Achieves additional substantial reduction of long-lived radioactivity burden and reduces radiotoxicity of waste down to natural uranium levels within 1000 years. As an option, transmutation of long-lived fission produces could be considered to further reduce waste radiotoxicity (Murínová et al., 2003).

3 Deep geothermal energy

Energy is transported by means of a thermal carrier medium from the deep level via drillings to the surface. There the heat can be made available directly either on a continuous basis or in accordance with demand, and converted to electricity and heat at another temperature level.

Due to differences in geological structures underground, geothermal energy is obtained from vapour deposits, hot water reservoirs or dry rocks. The technology to be used depends on the accessibility of the respective geothermal resources.

3.1 Geothermal systems

We have two sections, which can be used for production of heat and electricity:

- Conventional system is based on easily accessible steam and hot water reservoirs are restricted to geological regions characterised by volcanic or tectonic activities (California/USA, Iceland, …) and resistant hot temperatures.
- Enhanced system is based mainly on hot water deposits and hot dry rock formations.

Table 1 gives an overview of energy provision with conventional and enhanced geothermal systems.

Table 1 Technologies for deep geothermal heat and power production

	Conventional geothermal systems	Enhanced geothermal systems (EGC)
Typical deposits	Hot water, dry vapors and wet vapors sites at temperatures> 150°C at depths often <2.000m	Hot water resources with temperatures of about 100 to 160°c at depths between 2.000 and 5.000 m. Hot, dry formations with temperatures >150°C at depths >3.000 m
Locations	Active volcanic or tectonic areas	Hot water reserves in porous, karst and fissure storage areas and in fault zones. Hot dry formations in crystalline rock.
Development and operational concepts	Reservoir development with several deep drillings. Direct or indirect use of the geofluid at the surface. Condensed steam or cooled hot water is normally returned to the reservoir after use.	Reservoir development mostly with a production drilling and an injection drilling. The reservoir should be stimulated, depending on permeability. Water has to be added if there is not enough water available naturally. Usually indirect use of the heat carrier at the surface.
Heat provision	Heat transfer to heating network.	Heat transfer to heating network.
Power generating	Direct use of dry steam and wet steam, and hot water after flashing in steam turbines. Indirect use by transfer of heat to a binary process.	Mainly indirect use in binary power stations - ORC, Kalina. Currently typical installed facility size approx. 0.5 – 5MW_{el}.

Source: German GeoResearch Centre (2012)

Successful sinking of a shaft in a geothermal field requires knowledge of a series of geo-scientific parameters. Parameters are properly to determine the structure, geometry and fields of geothermal quality.

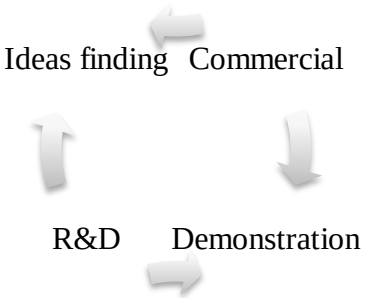

Figure 2 Details of development stages
Source: Lund, Freeston, & Boyd (2005)

Table 1 gives an overview of the current state of development of deep geothermal systems.

Commercial (Conventional geothermal and Enhanced) - worldwide
Heat: approximate 12GW installed in 2005
Power: approximate 9GW installed in 2007
Demonstration (EGS) – improvement in permeability of geothermal reservoirs by stimulation. Power and heat provision by EGS.
R&D (EGS) – exploration, development, thermal water cycle, energy provision, total system consideration.
Ideas finding – Use of magma deposits and hard to access steam resources and re-injection of used steam.

Thermal energy is thereby converted to mechanical energy, by passing steam at high temperature and high-pressure trough a turbine. Then cooling again. That is how most steam power stations generate electricity. The organic working fluid circulates in a closed cycle and is heated and evaporated from the thermal water. Fluid evaporates at lower temperatures than water, so the process is better adapted to the natural temperature of geothermal reservoir, giving greater electrical efficiency (Lemfeld, 2017).

4 Mathematical analysis

The ways for prevention is descriptive risk analysis. Risk is described by the risk number. It means arithmetic mean value over an expectation value which arises as the link product indication over the possible implications.

Formula for make risks comparable

$$R \equiv H \otimes S \qquad (1)$$

R – risk as expectation value,
H – probability of occurrence of an event,
S – normative extent of damage
This formula indicates matrix how high the actual risk is. For this purpose, it is necessary to consider "deep shafts," as systems not in equilibrium or close to equilibrium. The aim is to keep this number as small as possible. It is possible in the physical simulation to vary the initial conditions, with comparison of different safety systems and their respective risk number, to assess the advantages and disadvantages of the various technical measures.

Specific geothermal energy
The hard rock is released by a combination of pressure and thrust stresses, whereby the influence of the rock embedded in the solid material act again these combined stresses, i.e. horizontal components of geostatic pressure are active, and increase in linear form with increasing depth.

The value of the specific energy is of importance, not only in terms of energy saving, but also for reduction in wear of the separating element in the systems, and for full-face boring systems and machines.

Deep geothermal energy is produced using boreholes with depths of more than 1 000 m. During operation of such geothermal plants rupture processes of different size which are associated with induced seismicity can be generated in the deep underground. Cold fluid is injected into the borehole and heated fluid is pumped back so that the rock mass is subjected to injection pressures and thermal stress. Thereby cracks are generated or enlarged which can be detected as micro seismic activity using seismic instruments. The increase in pore pressure on existing fault planes which are exposed to tectonic loading can also cause seismicity that is felt by residents. A similar problem exists with technical processes which produce energy from the deep underground and at which pore pressure changes occur, e.g. hydraulic fracturing for the exploitation of shale gas, gas and oil production and injection of waste fluids or CO_2 (World Nuclear Association, 2017).

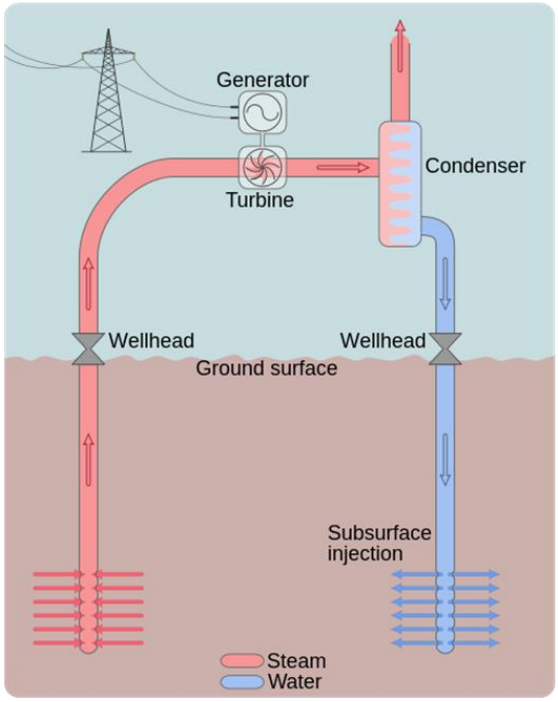

Figure 3 Source of clean energy for global demands base on enhanced geothermal system
Source: Geothermal Explorers Ltd. (2005)

Policies which favour renewables over other sources may also be required. Such policies, now in place in about 50 countries, include priority dispatch for electricity from renewable sources and special feed-in tariffs, quota obligations and energy tax exemptions (World Nuclear Association, 2017).

5 Conclusion

Nowadays, study with its alternative considerations for greater depths, and thus also safer depths, and its economic considerations, shows new possibilities for final repositories for hazardous waste in hard rock. These still need to be accepted by the scientific community and the approving authority, and by the public and also for business that would execute the work. Making deep shafts for underground waste disposal and energy generating in hard rock means special challenges for planners and the executing organisations, and can be accomplished with courage.

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The resilience at the local level: Case study of Kosice city

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Abstract

The paper is focused on resilience of the city from the economic point of view. In the first part were reviewing the theoretical and empirical studies in the field of regional and local resilience. Based on literature review were identified the crucial factors of resilience at the local level. In the second part were analysed the selected factors of local resilience based on available secondary data and on the qualitative research. The paper concludes in the enlightenment of the crucial factors of the economic resilience of Košice city. The resilience of Košice is compared with other larger cities in Slovakia.

Keywords: *Resilience, City, Industry, Reindustrialisation*

JEL Classification: R1, R53, R58

1 Introduction

Košice is an industrial city which has been one of the flagships of industrialisation in former Czechoslovakia. Most of the old industrial cities in Europe faced the serious threats of economic stagnation or decline related to the structural transformation to the knowledge based economy. Thereby it is the challenge to look at industrial cities and to assess their development trajectories with the objective to identify the factors of their economic resilience.

The concept of resilience, intended as the capability to resist or to adapt to shocks, stresses and pressures of different kinds, has been widely applied in urban studies. Since the city is a highly complex socio-economic, cultural and political system, there are a number of potential and non-linear relations between these three elements (Vanolo, 2015).

The objective of the paper is to analyse the factors of economic resilience at the local level using the case study from Košice city. The paper is organised as follows. The first part introduces the concept of resilience at the local and regional level. The next part presents the case study from Košice and identifies the most important elements of the resilience from the economic point of view.

2 Resilience and the city

There are a lot of definitions of resilience in the present literature in the field of regional science. In general adopted definition a resilient spatial system "is able to incorporate change and

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perturbation without collapsing". (McGlade, et al., 2006) This ability to absorb changing circumstances as defined by environmental, social, political or cultural fluctuations is itself a function both of the flexibility of structural organisation and system history. (Vanolo, 2015) The holistic approach to the concept of resilience and its interpretation is elaborated in the work from (Martin & Sunley, 2015). The concept of resilience was usually linked to the ability of some regions or cities to recover from some natural disasters e.g. earthquakes or floods (Paton & Johnston, 2017). Recently has the interest in the "resilience topic" expanded also in the economic and environmental research. The economic resilience of cities is deeply discussed e.g. in the old industrial cities and their ability to find new economic trajectories. The mostly published papers explore the relationship between industry diversity and economic resilience of the city. One of the recent published paper is e.g. (Brown & Greenbaum, 2016). The authors stated that there is a relationship between concentration in particular industries and the ability to withstand a shock changes over the 35 years examined counties in American Ohio. The paper formulates interesting recommendations for policy makers who have little ability to affect industrial concentration in the short run, therefore they have to adopt policies that may help buffer their local economies to effects of negative shocks in advance. (Brown & Greenbaum, 2016)

Which are the factors with crucial impact on regional and local resilience? To answer this question we looked at several research studies and case studies which deal with the topic and we compare which factors they analysed considering the resilience.

Table 1 Factors of regional and local resilience in several studies

	1.	2.	3.	4.	5.	6.	7.	8.
The presence of cluster	X							
Governance	**X**	**X**		**X**	**X**			
Transfer of technological knowledges	X			X				
Institutions	X			X				
Cooperation of stakeholders	X				X			
Economic sources		X			X			
Evolution of key industry		X						
Concentration of industries		**X**	**X**	**X**	**X**	**X**	**X**	**X**
Creative milieu		X		X				
Fiscal policy			X					
Economic situation in the country			X					
Human and social capital			**X**			**X**	**X**	
Business environment			X					X
Export				X			X	
Small and medium enterprises				X				
Marketing, city image				X				
Infrastructure				X	X			X
Flexibility					X			
Strategic planning					X			
Personal characteristics of the decision makers					X			
Labour market						X		
Economic performance						X		
Research and innovation activities						X		
The market limits							X	
Costs for living								X
Income inequalities								X
Education of inhabitants								X
The poverty								X

The health indicators								X
The participation (election, ..)								X
Migration								X

Source: (Treado; Giarratani, 2007)[1], (Vanolo, 2015)[2], (Masik, 2014)[3], (McConville, 2014)[4], (Ficenec, 2010)[5], (Svoboda, 2013)[6], (Di Caro, 2014)[7], (Foster, dátum neznámy)[8]

According to the literature review we identified three areas of factors for analysis:

- The industrial structure of the local economy
- The governance: political initiatives, strategic planning, etc.
- Human and social capital: education, health indicators, participation etc.

3 The methodology

The analysis was provided using secondary as well as primary data. The analysis of the secondary data was based on the statistics available in the field of economics, governance and human resources in the city. The data were presented in the trend analysis.

The next step of the research was qualitative research. The main data were gathered from five semi-formal interviews with experts in the area of regional and city development from several institutions (academia, regional development agency, self-government). The list of experts is in (Csereiová, 2016). In order to reduce the risk of informant bias, more than one interview was conducted. During the interviews, questions were asked about the threats to future city development and most important factors of local resilience. The objective of the interviews was to gain broader insight in the city development and to map the evolution of its industrial trajectory detailed elaborated in (Csereiová, 2016).

4 The case study: Factors of local resilience in Košice city

Košice, with 234 000 citizens, is after the capital the second largest town in Slovakia. It is located in the East of Slovakia. The technological paradigm of the Košice city was strong influenced by the steel industry localized in the region in the 1960s. Near Košice was located the biggest steel company in former Czechoslovakia. Eastern Slovak Steelworks (VSŽ – Východoslovenské železiarne), which employed around 25 000 employees before 1990 (nowadays the number of employees has dropped to about 14 000). As regards the regional economic structure, the industrialization in the 1960s is still preserved in the region – the manufacturing of basic metals and fabricated metal products in the Košice region is the dominant sector and employer (concentrated around the former VSŽ, privatized by the US Steel company in 2000). (Hudec & Šebová, 2012) The old industrial branch structure of the Košice region has predominated until now, as illustrated in Figure 1.

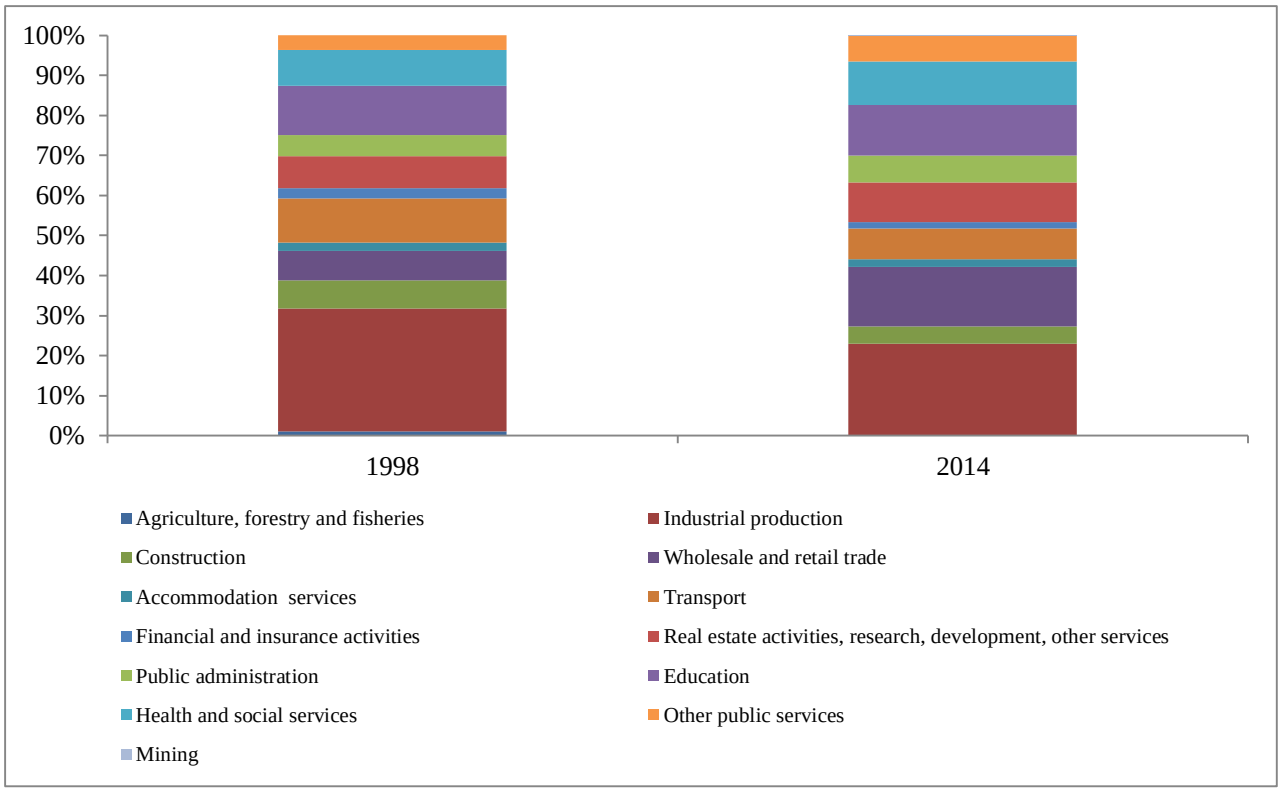

Figure 1 The changes in industrial structure of Košice city 1998 - 2014
Source: Statistical Office of Slovakia (2016)

The Košice region, as an old industrial region focused on metallurgy and steel production, has been able to attract ICT firms and seems to be the second important ICT city in Slovakia since 2005. The evolution of ICT industry in the city is deeply analysed in (Rehák, Pástor, Šipikal, 2013) (Hudec & Šebová, 2012). The expansion of ICT industry in the city was connected with the presence of the Technical university in the city. Nowadays more than 10 000 people are employed in ICT companies in the city which are branches of well-known international companies (T-System, Ness, Globall Logic, Siemens, etc.) as well as local small or medium business (Telegrafia, Lynx, Matsuko, Promiseo, etc.).

Košice was designated to European Capital of Culture in 2013. The evaluation of economic and social impacts of the project was summarized in (Hudec, et al., 2014). It seems that the investments in to the culture stimulated the production of creative industries in the city. The development of ICT as well creative and cultural industries lead to the synergy and establishment of new "media art" base. It resulted to the designation of the title UNESCO Creative City of Media Arts for Košice as the very first city in Slovakia in 2017. This title could be another milestone in the contemporary city evolution history which will support orientation toward new industries.

Despite of this tendency interviewed experts declared that there is still dependence on traditional industry in the city which routes in certain "path-dependancy" of development trajectory. We discussed the process of path dependency and concept of "lock in" in Košice region in (Hudec & Šebová, 2012)

In this paper are introduced only selected topics and trend analysis because of limited range of the paper. We concentrate at the most important factors of city resilience which were identified in interviews with experts: (1) the diversification of industrial structure (factor of economic resilience), (2) the aging and migration (factor of social resilience), (3) adaptation and mitigation to climate changes.

Narrow look at the demography in the city shows the tendency of aging population. The number of the city population remains at the same level (approximately 240 thousand people) since 90ties. There is still evident the process of suburbanisation (shift from central urban areas into suburbs). The suburbanisation could be visible in statistics about migration of people in city centre and peripheral neighbourhoods (Figure 2 and Figure 3). The central city parts shrink (or stagnate) different from the peripheral neighbourhoods which have attracted new citizens and their population was slightly grown in last decades.

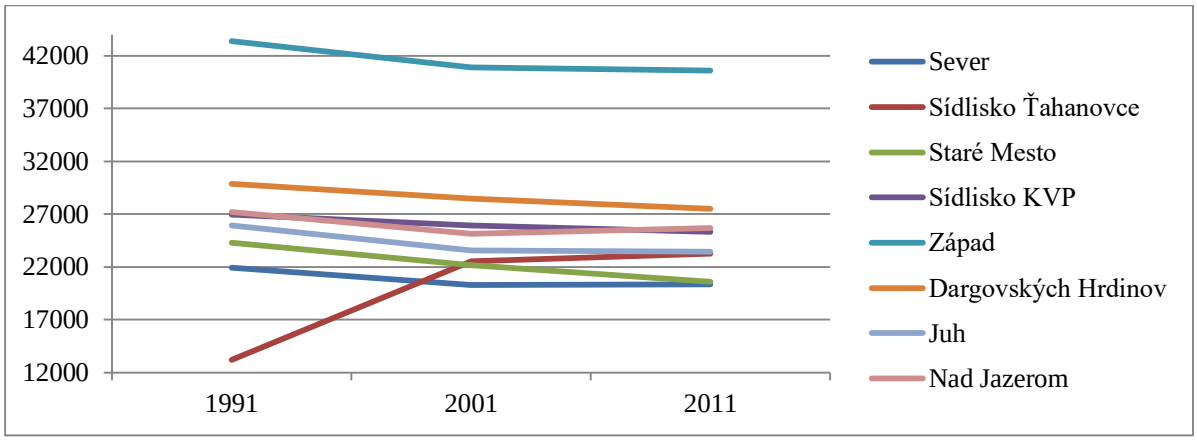

Figure 2 Decline or stagnation of population in the most populated city neighbourhoods
Source: Statistical Office of Slovakia (2016)

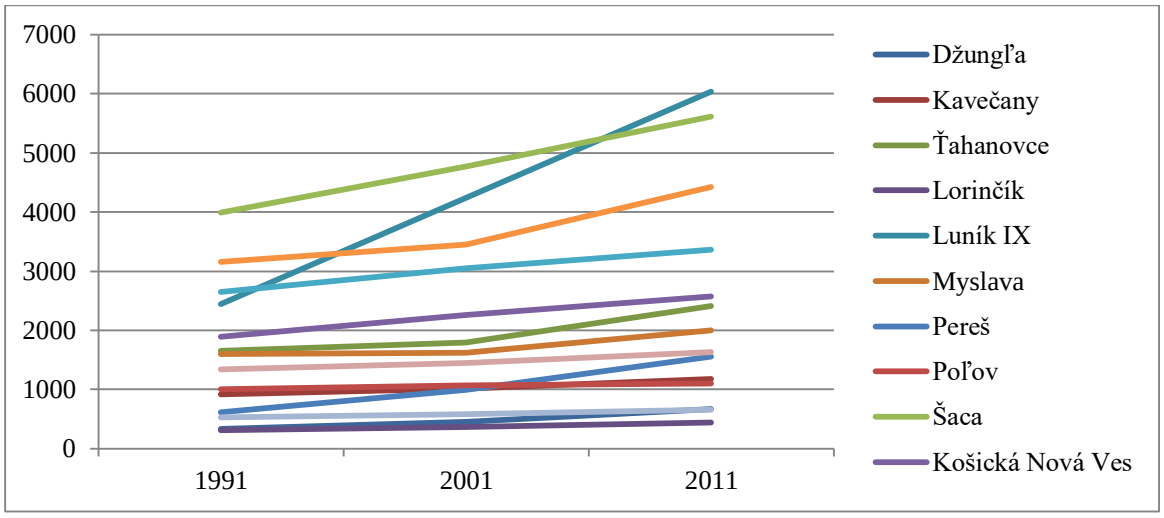

Figure 3 Increase of population in peripheral neighbourhoods
Source: Statistical Office of Slovakia (2016)

The general tendency of aging could be real threat for future sustainable management of the social public services in the city. This threat was also declared as one of the most important by the

interview experts in qualitative research. The number of people older than 65 years increased from 8.4 % (in 1995) to almost 14.5 % (in 2015). The child population (ages 0-14) as a percentage of the total population in Košice dropped from 21.3% (in 1995) to 14.4% (in 2015) (Statistical Office, 2016). The next map visualises the Aging index[3] in city parts according available data in 2009.

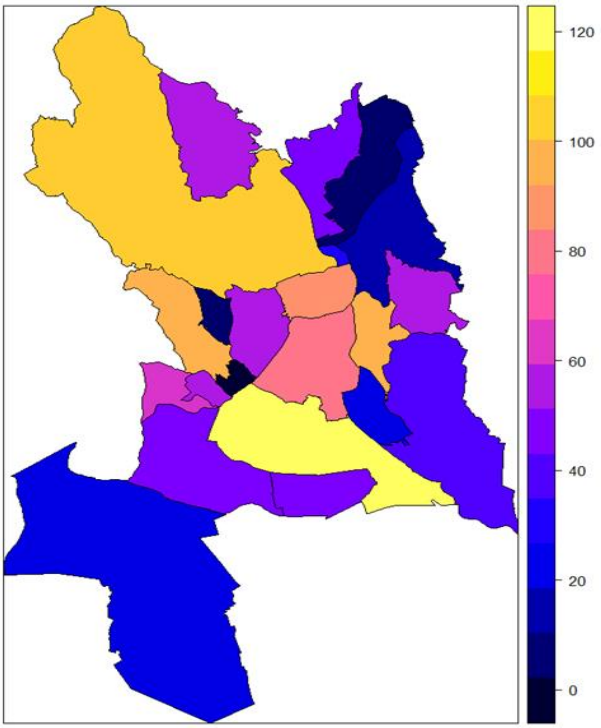

Figure 4 Aging index in city parts of Košice in 2009
Source: own compilation, data from Statistical Office of Slovakia (2015)

There is visible that older population is located in two areas. One of them is traditional central part of the city – city centre and Košice – Sever. The second one is peripheral area with features similar to rural regions (Barca and Šebastovce). The other negative demographic tendency is undeniably brain drain – migration of young talented people outside the city and region. The biggest educational institution the Technical university of Košice lost since 2009 more than 6000 students not only because of demographic decrease but also because of brain drain. (Rehák, et al., 2015) The aging and the brain drain of young people could affect the social resilience of the city in the future in negative way.

At least we would like to discuss the resilience of the city for the climate changes. The city declares in its strategic documents (e.g. The Development Program of Košice for 2015 – 2020) that it has "to prepare and realise adaptation and mitigation measures for climate change". The figure 5 visualises the "Green Index" in the city parts. The index was calculated as the share of green areas and built-up areas. Obviously the most green are peripheral parts of the city. The city centre – Košice – Staré mesto has only 30% of the greenery. The share of greenery influences the ambient

[3] The Aging Index refers to the share of people older than 65 years per 100 persons as well as people younger than 15 years old in a population. This index increases as population ages.

temperatures. There should be elaborated more detailed urban maps to analyse the areas with hot temperature risk which are not available now.

The mitigation actions are strong connected with sustainable urban transportation. Obviously the cities are introducing actions for supporting cycling and public transport. This green transportation strategies are developed at a very low level in Košice. Most people use for city transportation their personal vehicles. This fact is also challenge for future local resilience.

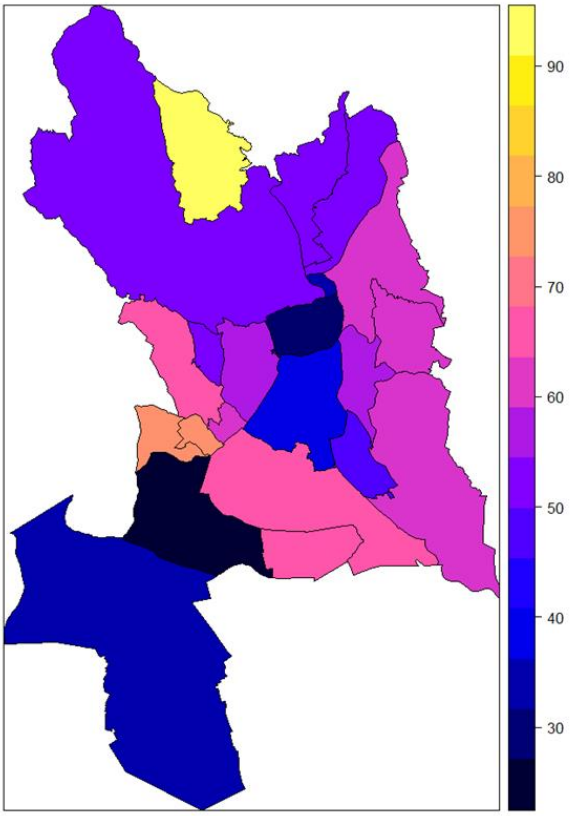

Figure 5 Green Index in city parts of Košice in 2013
Source: own compilation, data from Statistical Office of Slovakia (2015)

5 Conclusion

The paper analyses the economic resilience of the Košice city. It identifies three key threats of the resilience which should be taken into account in the process of future urban development. The decision makers have to be active in setting objectives and strategies how to tackle with these threats.

As the interviewed experts said one of the most important threats to the city is the potential collapse of the largest factory in Košice, and hence the company U.S. Steel. Therefore it is preferred to support diversification of industrial structure toward knowledge based industries e.g. ICT or creative and cultural industries.

The trend of aging and brain-drain is another threat to the city. The young people leave the city for better education or work, so the proportion of people over 65 (or over 80) years is constantly

increasing in the city. This results in increasing demands for elderly social care. In the city are located several universities, which can play crucial role by attracting young generation to stay in Košice.

The third discussed threat concerns the climate change. This topic is still quite neglected by local decision makers despite the fact that they can use suitable tools of local policy to manage the city in more sustainable way.

We have to state that all interviewed experts declared the lack of coherent planning and preparedness for economic and other shocks in strategic documents of the city. Therefore it is desirable for city leaders to think ahead of such unexpected threats and even to be able to predict their impacts which the city will have to deal with in the future.

Acknowledgements

The paper was supported by project VEGA 1/0454/15: Redefining of regional development - the shift towards more resilient regions.

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Measuring Business Cycles Synchronization – the Case of Selected Southeastern European Countries

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Abstract

The aim of this paper is to measure business cycles synchronization of selected Southeastern European countries with the euro area and to evaluate the costs and benefits of their possible participation in the monetary union based on this criterion. We focus our attention on Bulgaria, Romania and Croatia, countries which have most recently enlarged the European Union (EU) and are very similar in terms of the lowest level of GDP per capita within the EU, but differs in their exchange rate regimes. Using two methodological approaches for business cycles estimation (Markov-switching autoregressive models, Hodrick-Prescott filter) and two different measures of synchronization (rolling window correlation, sign concordance index) we conclude that Bulgaria seems to be the most synchronized among these three selected Southeastern European countries for sample period 2000M1-2017M6. We assume that one of the possible explanation for these results might be the fact, that Bulgaria unlike Romania and Croatia operates a currency board regime.

Keywords: Southeastern Europe, Business Cycles Synchronization, OCA, Markov-switching models, Hodrick-Prescott filter.

JEL Classification: C24, E32, E52, F45

1 Introduction

Implementation of the common monetary policy within the Economic and Monetary Union (EMU) induces several problematic issues. The monetary authority (ECB) sets only one target inflation rate which should reflect macroeconomic situation in the whole union and in case of undesirable economic development, the national governments of the member countries are not capable to use independent monetary policy arrangements to stabilize the economy. Problem may arise especially when member countries differ widely in terms of their business cycles. Due to the fact that common monetary policy cannot be tailored to the needs of any particular EMU member country, it can result to the incorrectness of implemented common monetary policy (Dufrénot & Keddad, 2014).

The objective of this paper is to evaluate the CEE (Central and Eastern European) countries – more closely three Southeastern European countries which enlarged the EMU at latest – Bulgaria (access in 2007), Romania (access in 2007) and Croatia (access in 2013) in terms of their suitability to adopt common currency. Besides officially specified convergence (Maastricht) criteria, we assess their suitability based on one of the essential conditions for the implementation of the optimal monetary policy – business cycles synchronization. Bulgaria represents the poorest EMU country

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(based on the GDP per capita), followed by Romania and Croatia which make them even more dissimilar with founding EMU member states. Even though, Bulgaria operates a currency board which means that national currency (the lev) is pegged to the euro. For this reason, we want to examine to which extent it differs from Romania and Croatia (and other CEE countries) concerning synchronicity of their business cycles as we assume positive impact and expect remarkable differences, although they are all former communist countries with similar income level.

The remainder of this paper is structured as follows: section 2 provides theoretical background and the review of the literature related to the business cycles synchronization, section 3 describes used methodology and data, estimates of the Markov-switching autoregressive models along with the evaluation of the synchronicity for the CEE countries are presented in section 4 and the section 5 concludes our results.

2 Theoretical Background and Previous Research

Our research is primarily based on the theory of the Optimum Currency Areas (OCA), pioneered by Mundell (1961). The OCA theory provides a set of required conditions which countries should fulfill in order to gain in fixing their exchange rates or adopting common currency. "Optimality" of the monetary union is considered based on various OCA criteria – wage and price flexibility, labor mobility, business cycles symmetry and many others (see e.g. Mundell, 1961; McKinon, 1963; Kenen, 1969).

A criterion of the business cycles synchronicity is closely related to the abandonment of the independent monetary policy; the loss of this important stabilizing instrument is less costly if member countries show similar patterns in their business cycles. The monetary policy tool in form of the use of exchange rate which serves to alleviate individual disturbances would be in this case redundant which means that the costs of giving up the independent monetary policy are inversely related to the business cycles synchronization (Dufrénot & Keddad, 2014). Member countries with synchronous business cycles similarly react to the shocks which supports the idea that common monetary policy does not create imbalances, although it does not guarantee the optimality of implemented monetary policy (Aguiar-Conraria & Soares, 2011).

Business cycles synchronization has been largely studied as the asymmetries might have significant impact on the adequacy of the monetary policy implementation. Although, empirical literature does not provide unambiguous conclusions concerning its determinants. For instance, Imbs (2004) finds a positive relationship between business cycles synchronization and financial integration based on the existence of the contagion effect, however Baxter and Kouparitsas (2005) suggest that financial integration process succeeded by the production specialization may lead to the lower level of synchronicity. Bergman (2004) finds that increase in the business cycles synchronization is identified in periods with more volatile exchange rates. But these results are not in accordance with e.g. Artis and Zhang (1999), who claim that business cycles are more synchronized when the variability of the exchange rates is low. Ambiguous results can be also found in the studies concerning fiscal convergence (see Darvas, Rose, & Szapáry, 2005 or Clark & Wincomp, 2001).

Artis and Zhang (1999) conclude that business cycles in the EMU have become more synchronized in time. Higher level of the synchronization can be generally confirmed in case of the "old" EMU member states (see e.g. Lumsdaine and Prasad, 2003). "New" EMU member states – especially

CEE countries, show different patterns in their business cycles; quantitatively less evidence can be found on the evaluation of the business cycles synchronicity within the CEE countries compared to the founding countries such as France, Italy or Germany.

Table 1 Review of the studies using Markov-switching AR and VAR models in the EMU business cycles synchronization research

Author	Sample period	Data sample
Krolzig (2001)	1960-1997	US, JP, DE, UK, FR, IT, AT, ES
Artis, Krolzig, & Toro (2004)	1970-1996	DE, FR, IT, NL, BE, UK, ES, PT, AT
Altavilla (2004)	1980-2002	DE, FR, IT, BE, UK, ES, US
Dufrénot & Keddad (2014)	1975-2010	ASEAN countries

Source: Author's own collaboration

We would like to contribute to the existing literature by use of the Markov-switching AR models along with the threshold correlation networks which to the best of our knowledge were not use in the examination of the Bulgarian, Romanian and Croatian business cycles (brief review of the studies published in reputable journals using Markov-switching AR and VAR models in business cycles research is provided in Table 1). Moreover, we would like to examine the level of synchronization of these selected countries resulting to potential benefits or costs from the monetary union membership with a connection to differences in their exchange rate regimes.

3 Data and Methodology

3.1 Data

To capture cyclical development of the economic activity, we decided to use industrial production index (IPI). The IPI represents business cycle indicator which unlike the GDP data measures monthly changes in the price-adjusted output of industry and has the ability to identify turning point of the business cycles at the early stage.

Table 2 Descriptive statistics – Industrial production index (IPI)

	EA	BG	HR	RO
Mean	102.558	100.574	97.356	102.186
Median	101.800	104.500	96.900	99.000
Standard Deviation	4.488	14.689	7.871	19.194
Kurtosis	0.737	-0.479	-0.173	-0.998
Skewness	0.443	-0.712	0.090	0.519
Minimum	90.200	69.200	79.300	76.400
Maximum	114.800	125.400	116.300	148.000
ADF test (log-differenced data)	-4.887 (<0.001)	-18.421 (<0.001)	-10.958 (<0.001)	-19.859 (<0.001)
KPSS test (log-differenced data)	0.073 (0.1)	0.188 (0.1)	0.188 (0.1)	0.087 (0.1)

Source: Author's own calculations based on Eurostat (2017)

We collected seasonally and calendar adjusted monthly IPI data (index, year 2010=100) for 11 CEE countries (Bulgaria, Romania, Croatia, Estonia, Lithuania, Latvia, the Czech Republic, the Slovak Republic, Hungary, Poland, Slovenia) and the euro area aggregate. Descriptive statistics for the euro area, Bulgaria, Croatia and Romania are available in Table 2. Our sample covers period 2000M1–2017M12, for which all data are available (210 observations for each country, totally 2520 observations in data sample).

3.2 Methodology

Two different approaches will be used to estimate business cycles of the CEE countries and the euro area aggregate. Firstly, unlike the previous studies examining business cycles synchronization of selected CEE countries, we choose Markov-switching autoregressive models to detect classical business cycles due to the fact that macroeconomic time series might show regime-switching patterns. Markov-switching autoregressive models represent non-linear models which can be used for measuring macroeconomic fluctuations (expansions and recession, respectively) modelled as switching regimes of the stochastic process generating Δy_t (log-differenced IPI time series):

$$\Delta y_t = \upsilon(s_t) + \sum_{i=1}^{p} \phi_i(s_t) \cdot \Delta y_{t-i} + \varepsilon_t,\ \varepsilon_t | s_t \sim NID\left(0, \Sigma(s_t)\right) \qquad (1)$$

where s_t represents non-observable regime variable (1=recession, 2=expansion), $\upsilon(s_t)$ – estimated regime-switching intercept, $\phi_i(s_t)$ – regime-switching autoregressive coefficients and $\Sigma(s_t)$ – variance of the error term which is allowed to switch, too. Regimes reflect different conditional distributions of the Δy_t and the stochastic process generating the unobservable regimes represents an ergodic Markov chain which can be defined by the transition probabilities (Altavilla, 2004):

$$p_{ij} = \Pr\left(s_t = j | s_{t-1} = i,\ s_{t-2} = k, \ldots, y_{t-1}, y_{t-2}, \ldots\right) = \Pr\left(s_t = j | s_{t-1} = i\right),\ \sum_{i=1}^{2} p_{ij} = 1 \quad \forall i, j \in \{1,2\} \qquad (2)$$

Number of lags (p) has been selected via information criteria and prior estimation of linear AR models. Parameters of the models were estimated via MLE and all computations were performed in an R environment (R core Team, 2016).

Secondly, to check the robustness of our results, growth business cycles will be estimated in terms of cyclical component retrieved with use of the Hodrick-Prescott (HP) filter. We choose this method for the possibility of the comparability with other studies as it is the most commonly used method. The IPI time series in logarithm are decomposed by HP filter into two components: g_t – trend (potential output) and c_t – cyclical component (output gap) calculated as (parameter lambda set to 129 600 – based on the monthly frequency of data):

$$\min_{g_t} \left[\sum_{t=1}^{N} \left(y_t - g_t\right)^2 + \lambda \sum_{t=2}^{N-1} \left[\left(g_{t+1} - g_t\right) - \left(g_t - g_{t-1}\right)\right]^2 \right] \qquad (3)$$

Consequently, we measure synchronization in two ways: traditionally, we compute correlation coefficients between selected CEE countries and the euro area aggregate based on the smooth probabilities of being in recession (classical cycles) or cyclical component from HP filter (growth cycles). We also compute the rolling windows correlations in order to observe dynamics of the relations between countries in time. The length of the windows (8 years) was selected to capture the whole business cycle within one window. Secondly, we calculate the sign concordance index (SCI) which can be more suitable for examining the inter-temporal business cycles synchronization of two countries compared to the correlation (Antonakakis, Gogas and Papadimitriou, 2016):

$$SCI = \frac{\sum_{t=1}^{T} k_t(i, j)}{T}, \qquad (4)$$

$$k_t(i,j) = \begin{cases} 1, & if\ sign(s_{i,t}) = sign(s_{j,t}) \\ 0, & if\ sign(s_{i,t}) \neq sign(s_{j,t}) \end{cases} \quad (5)$$

where in window *T* containing all observations the SCI measures for each country pair *i, j* the share of times that both time series (s_i, s_j) are in the same business cycle phase – expansion or recession, respectively.

As we are interested in synchronization of Bulgaria, Romania and Croatia with the euro area and the comparison with other CEE countries already using euro, we finally decide to illustrate their mutual ties in form of the threshold correlation network used e.g. by Namaki et al. (2011) who apply this method on financial market. In our case, *N* nodes will represent *N* countries (11 CEE countries + the euro area) those mutual relations will be illustrated by edges if they are greater or equal to θ (a certain threshold value). Furthermore, we will construct networks in which edges will reflect: i) correlation coefficients, ii) sign concordance indices, to compare them and visualize the most synchronized countries.

4 Results

Table 3 provides estimation of the Markov-switching models for Bulgaria, Croatia, Romania and the euro area. In each case, two-regime models were suitable to capture periods of recession (regime 1) and expansion (regime 2) with regime dependent intercepts, autoregressive parameters and the variance of the error term (Table 3). Regime of recession is characterized by negative intercept, whereas expansion regime is defined by positive intercept.

To derive business cycles of selected Southeastern European countries (and the euro area), we illustrate the smooth probabilities of being in recession based on the univariate Markov-switching AR models in Figure 1 (shaded areas present detected periods of recession). Except Croatia, models fitted well the recession period 2008-2009 which was marked by the global financial and economic crisis. The Markov-switching model of the euro area business cycles detected recession periods at the beginning of selected period (especially in 2001), during financial crisis 2008-2009 and at the end of the year 2012. We compared our results with those of the CEPR (Centre for Economic Policy Research) which is responsible for dating euro area business cycle and our recession results are generally in accordance with them – the only exception presents recession in 2001 which was not identified by CEPR – in 2001, GDP decreased (as well as IPI), but other indicators taken into account by CEPR did not exhibit descending behavior, so it was not identified as a recession period.

Table 3 Markov-switching autoregressive models for Bulgaria, Croatia, Romania and the euro area

	Regime (s_t)	BG	HR	RO	EA
Regime-dependent intercepts:					
	1	-0.0011	-0.0007	-0.0054	-0.0003
		(0.0018)	(0.0005)	(0.0046)	(0.0004)
	2	0.0010	0.0011	0.0010	0.0007
$\upsilon(s_t)$		(0.0003)	(0.0006)	(0.0002)	(0.0003)
Regime-dependent autoregressive parameters:					
	1	-0.3068	0.1363	-0.8817	0.2593
		(0.2134)	(0.0763)	(0.3687)	(0.1315)
	2	-0.2385	-0.7305	-0.1204	-0.6875
$\phi_1(s_t)$		(0.0692)	(0.1214)	(0.0709)	(0.2640)
	1				0.3974
					(0.1215)
	2				-0.3902
$\phi_2(s_t)$					(0.2391)
	1	0.0089	0.0027	0.0095	0.0025
Residual SE	2	0.0035	0.0054	0.0025	0.0014
LR statistic		40.815	22.865	105.562	69.201
AIC		-1646.478	-1612.068	-1789.116	-2003.542
BIC		-1611.777	-1577.368	-1754.416	-1951.549
LogLik		827.239	810.034	898.558	1007.771

Note: We provide standard deviation of estimated parameters in parentheses.
Source: Author's own calculations based on Eurostat (2017) data

Markov-switching model of the Bulgarian business cycle (Figure 1) also detected volatile period at the beginning of our sample period (2001) which can be related to the changes in the country's economic policy envisaged by the new Bulgarian government. Bulgaria (similarly as other EMU countries) experienced a real estate boom-bust cycle represented by housing price growth from trough in 2002 to peak in 2008, followed by sharp prices drop in crisis period. Recession is consequently indicated also in the period 2013-2014 characterized by Bulgarian political instability, protests and government resignation. Model of Croatia did not perform very well (concerning smooth probability of being in recession), but it can be related to the fact that Croatia was affected by the global financial and economic crisis in 2008 for a longer period than other countries; recession outlasted until 2014 (represented also by negative GDP growth). Slow post-recession recovery can be a result of very slow progress of economic reforms; process of reducing macroeconomic imbalances was delayed partly due to the parliamentary elections in 2015. Romanian Markov-switching model indicated several periods with higher volatility – year 2002, financial crisis period and year 2013. In 2013, after the decline in the industrial production, expansionary growth is mainly observed due to the manufacturing and the mining sector. In spite of the low level of GDP per capita, Romanian economy is displaying high GDP growth rates in the last decades and is expected to grow.

To measure a level of synchronization with the euro area aggregate, we displayed in Figure 2 rolling window correlations of Bulgaria, Romania and Croatia with the euro area aggregate based on the smooth probabilities of being in recession from the Markov-switching models. Results suggest that Bulgaria among selected countries seems to be the most synchronized with the euro area aggregate with average correlation of value 0.528.

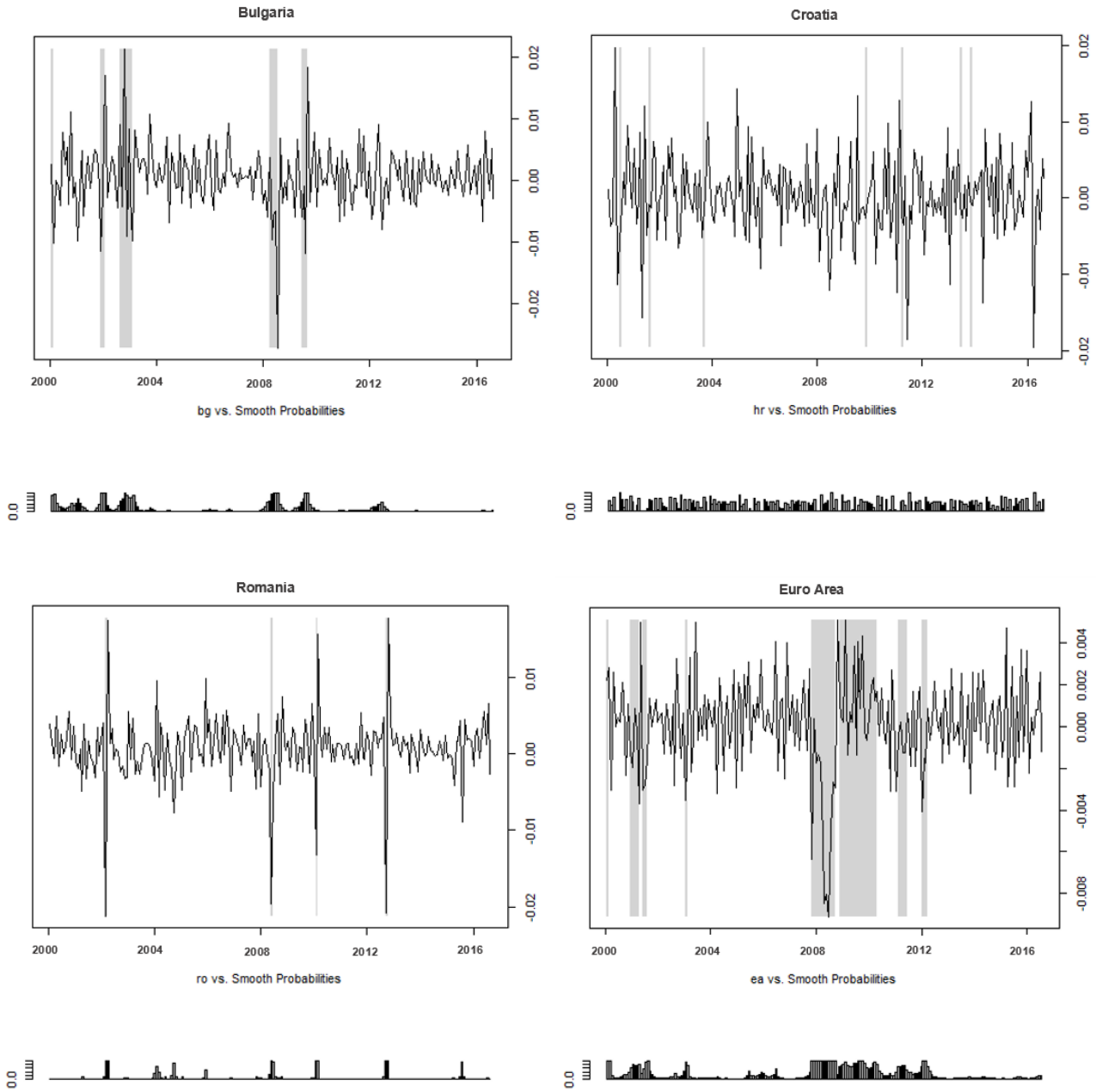

Figure 1 Classical business cycles of the CEE countries (BG, HR, RO) and the euro area
Note: Regime 1 (recession) illustrated as shaded areas.
Source: Author's own calculations based on Eurostat (2017) data

We assume that exchange rate regime in Bulgaria (currency board) might explain these results. Croatian and Romanian currencies (kuna and leu, respectively) are traded under the flexible exchange rate regimes (managed floating). The fixation of lev to the euro might be one of the reasons why Bulgarian business cycles are more synchronized than other CEE countries in the European Union currently not using euro, therefore Bulgaria might benefit from the euro adoption. Concerning nominal convergence (Maastricht) criteria, Bulgaria has fulfilled all criteria except the ERM II membership, the same with Romania, however Croatia has not fulfilled the fiscal criteria

yet – unlike Bulgaria and Romania, it faces problems with high level of budget deficit to GDP and exceeds massively permitted level of debt-to-GDP ratio (84.2%, year 2016[2]). Moreover, Croatia still battles with prevailing problem of unemployment – it has one of the highest level of unemployment in the European Union (notably high level of long-term and youth unemployment) which may decelerate a process of the real income convergence.

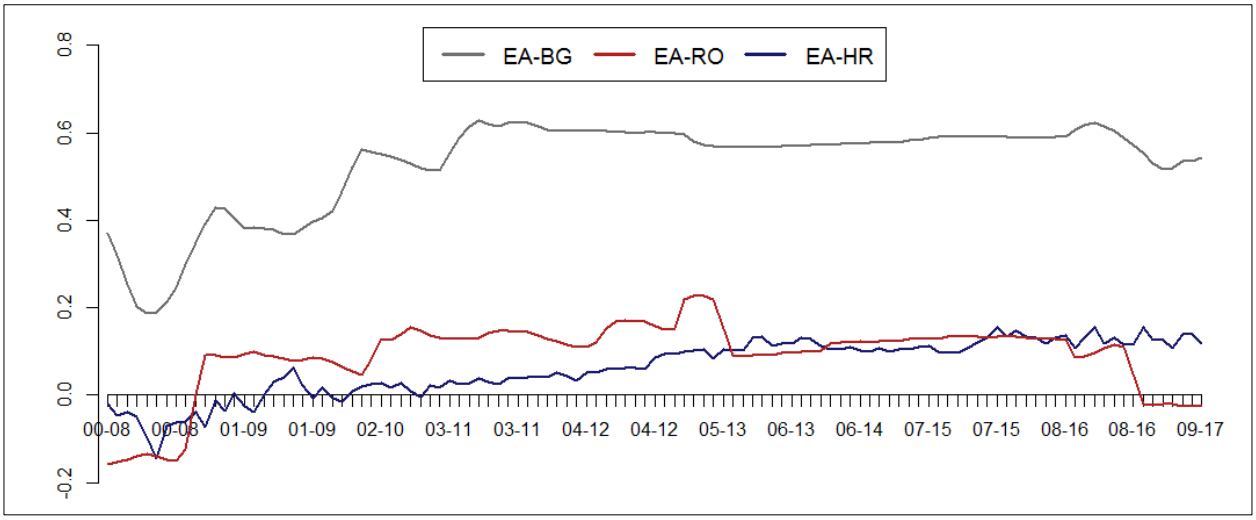

Figure 2 Business cycles synchronization between selected CEE countries and the euro area based on the Markov-switching autoregressive models (rolling window correlation, 8 years)
Source: Author's own calculations based on Eurostat (2017) data

Our synchronization results might not be conclusive (as Markov-switching models might not fitted well to data, especially for Croatia). To check the robustness of our results, we computed growth cycles based on the Hodrick-Prescott filter and measured the synchronization among them. HP growth cycles[3] confirmed previous results as Bulgaria seems to be the most synchronized among these three selected Southeastern European countries – both measured by correlation coefficient (0.789) and sign concordance index (0.714).

We were also interested in other CEE countries' business cycles synchronization (totally 11 countries, see 3.1), for which we computed classical and growth business cycles and measured their synchronization with the euro area. For the sake of brevity we decided to visualize the main findings from the growth cycles analysis in form of the threshold network for both synchronization measures: i) correlation (TH1), ii) sign concordance index (TH2). Threshold value is subjectively set on 0.6[4] as it represents average value for used synchronization indicators. The closest countries are depicted (Figure 3: left side TH1 – threshold network based on the correlation coefficients, right side TH2 – threshold network based on the sign concordance indices among countries), the strongest relations are among them. We can observe that in both cases, Bulgaria has the closest position to the euro area business cycle (compared to Romania and Croatia).

TH 1	TH 2

[2] Source: Croatian National Bank
[3] Complete results concerning growth cycles computed by the Hodrick-Prescott filter are not included in the paper for the sake of brevity (available upon request).
[4] We used different thresholds: 0.5, 0.6, 0.7, 0.8 and 0.9 (available upon request).

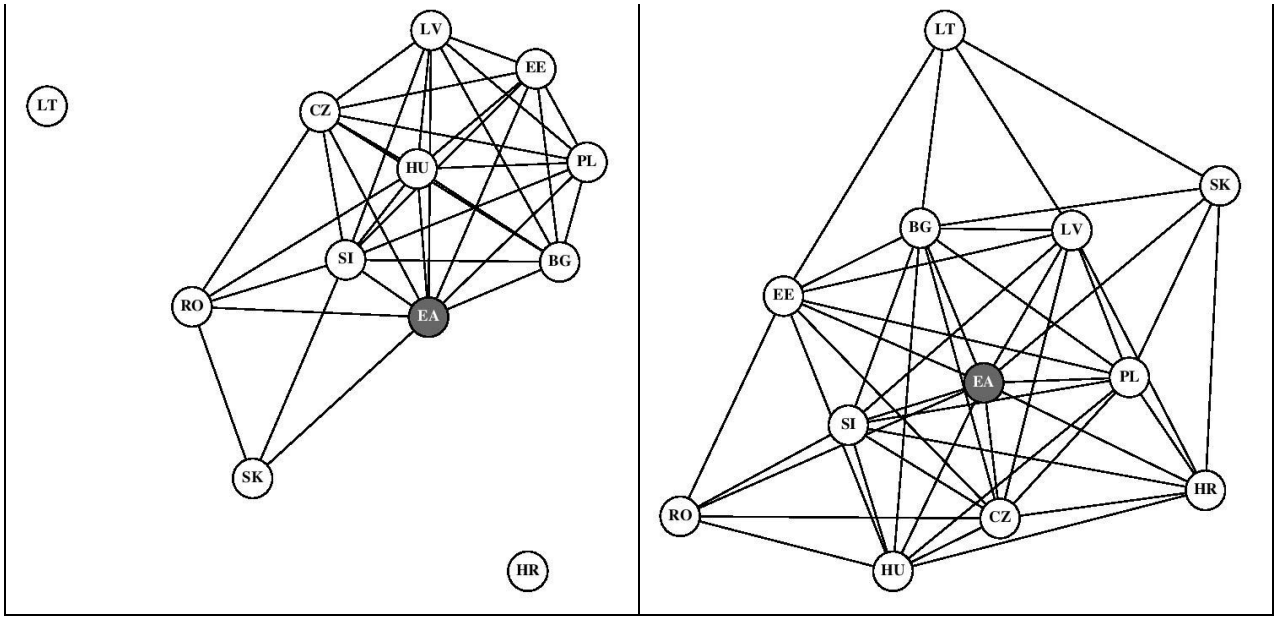

Figure 3 Threshold networks based on the correlation coefficients (TH1) and sign concordance indices (TH2)
Note: Threshold value set on 0.6.
Source: Author's own calculations based on Eurostat (2017) data

Table 4 Degree of nodes (11 CEE countries + the euro area) in the threshold networks TH1 and TH2

	EA	BG	CZ	EE	HR	LV	LT	HU	PL	RO	SI	SK
TH 1	9	7	8	7	0	7	0	8	7	5	9	3
TH 2	10	9	9	8	7	8	4	8	9	5	8	5

Source: Author's own calculations based on Eurostat (2017) data

Moreover, Croatia has isolated position in threshold correlation network (TH1) which means that the value of coefficient was lower than selected threshold value. We calculated degree of each node (country) for both networks (Table 4) and concerning other CEE countries, Lithuania seems to be less synchronized as it also has isolated position (TH1) even it is a member of the euro area; Hungary and Poland seem to be more synchronized, even if they are not euro-member countries.

5 Conclusion

The aim of the paper was to evaluate business cycles synchronization of selected Southeastern European countries (Bulgaria, Croatia and Romania) with the euro area in order to give recommendations about their suitability for the euro adoption. Classical and growth business cycles synchronization analysis based on two synchronization measures (correlation coefficient, sign concordance index) suggests that Bulgaria seems to be the most adequate candidate among these three countries to adopt the euro. Results confirmed our expectations as we assumed that due to the fact that Bulgarian currency is already pegged to the euro, business cycles might show similar patterns to those of the euro area aggregate comparing to the Romania and Croatia which is according to the OCA theory beneficial and essential for implementing common monetary policy. However, we also have to take into account other macroeconomic indicators to evaluate overall economic activity correctly. Our analysis can be completed by the lead/lag correlation analysis with regards to possible lagging position of these countries towards the euro area or an inspection of the causal relations.

Acknowledgements

The paper was supported by the project VEGA 1/0994/15.

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Analysis of Repayment Failures in P2P Lending

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Abstract

This paper investigates failures of p2p loans on US marketplace Lending Club. The aim of this paper is to quantify significant variables which can be used to predict loan status. This study analyses approximately 260000 completed loans from years 2007-2015. Because of dichotomous depended data, logistic regression was chosen to interpret data. Findings show that almost all studied variables have significant impact on loan status. In this dataset, variable term has the greatest impact from continuous variables, where loans with longer duration have higher chances not to be repaid. Significant influence was recorded in categorical variables purpose and home ownership. Using these findings, it is possible to create portfolio with lower risk profile and higher profits than using traditional financial options.

Key words: Peer to peer lending, P2P, Default, Failure in repayment, Logistic regression.

JEL Classification: G23, G11

1 Introduction

In the 20th century, many new forms of funding have emerged. Internet has created infrastructure, that can facilitate meeting of people with similar goal. But not only internet, but also society and economic development stimulated the emergence of other forms of investments. Increased confidence in the markets and decreasing profits are very important arguments influencing development of financial system.

People tend not only to use traditional forms of financing their activities using bank system and financial markets, but also seek for alternative ways to finance their interests and needs. Investors try to invest in more efficient ways, borrowers try to finance their ideas or needs with often high risk involved. Drabiková (2015) Traditional financial markets and bank systems cannot handle such a risk, and therefore other ways are used. This relative new industry is often referred as Alternative finance. Crowdfunding, equity crowdfunding, business lending and peer to peer lending, even cryptocurrencies can be included in this category and we can see they are experiencing exponential growth. According to Rubinton (2011), these categories have technology-enabled 'disintermediation', which is the main difference to traditional financial forms. Berger and Udell (1998) are talking that private equity is also part of them. The whole alternative finance industry can be characterized through higher risk profile of all transactions. While most of these ways try to finance business, peer to peer (P2P) lending can be characterized as an alternative for non-purpose loan. This category creates new marketplace, where individuals interact. The main function, money lending, is supported by other additional features.

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2 Literature review

Peer-to-peer lending is a form of borrowing money from individuals to other individuals using online marketplaces. This category excludes financial institution from the process and so achieves some pros and cons. As reported by Greiner and Wang (2009) and Leimeister (2012) this category is also called people-to-people lending or social lending, to better understand concept of this finance. From the view of crowdsourcing, model of getting sources and services from public, the term crowdlending is often used.

P2P lending is designed for individuals only, to refinance debt, to buy houses, cars, for vacations, medical expenses or other uses. It is also possible to finance business, but according to Greiner & Wang (2009) P2P loans represent help of people to people, and therefore business lending should be included into similar form of lending, debt crowdfunding.

P2P marketplace creates some form of social network, where people can gain trust of others. In this process, the marketplace plays a very important role, because it verifies information provided by applicants for a loan. It also evaluates credibility of borrower to repay the loan. P2P marketplaces create win-win situations for borrowers and lenders. (Duarte, Siegel, & Young, 2012) P2P lending allows access for borrowers to finance, and on the other side creates way to invest for lender with higher rates. Using P2P marketplace, lenders can choose loan they want to invest in and so create their own portfolio. Because the data is not shared between the participants, lenders must rely on results of credibility generated by marketplace.

Marketplaces works as online services and so have much smaller costs than bank. Loans provided by marketplaces have lower interest rates than bank products. On the other side, they allow to invest money at higher rates than usually banks offer in traditional savings products. This form of borrowing money has some cons too. Direct relationship between lenders and borrowers make this process much slower, because every loan project must address potential investors to convince them to provide money for this plan (Derco & Šoltés, 2015; Lee & Lee, 2012).

In P2P lending, there are three stages where we can talk about success:

- Fulfilling the conditions for creating a loan application,
- Reaching the required amount on the marketplace from the lenders,
- Repayment of the loan to borrowers. (Dujčák & Gavurová, 2013)

As was already mentioned, p2p lending have higher risk profile than other forms of finance. Bank saving products are almost totally protected from default of borrowers, and therefore we can say the risk is almost zero. On the other side direct relationships between lenders and borrowers in p2p lending creates much higher levels of risk. Lenders try to analyse risk profile of borrower using data provided by marketplace and so they can create corresponding portfolio to achieve risk premium they want. They analyse variables as credibility grade of this borrower, his yearly income, employment length, home ownership and compare it with provided interest rate. This rate is already a result from the internal calculations of marketplaces based on provided data (Emekter, Tu, Jirasakuldech, & Lu, 2015).

As stated by Klafft (2008) even at high number of loan default it is possible to make portfolio profitable by selection according to data provided by p2p marketplaces. In order to raise problem

awareness, he has suggested web-based seminars on these marketplaces. According to Klafft (2008) the best predictor is credibility grade, where borrowers from A-category are the best solution for low risk lenders. Lin, Prabhala, Viswanathan and others (2009) have identified also social networks as a predictor for default rate. Borrowers connected with lenders using their social connections showed 9 % lower chance of default rate than others. In contrast with this claim Greiner and Wang (2009) reported very weak influence of social capital for predicting default rate.

3 Methodology and Data

In this paper, loan status is used as dependent variable, but raw data have differed Fully paid, Charged off, Default, Late, In Grace Period and Current loans. We have excluded all current loans, and tried to quantify risk of failure in loan repayment. Loans in grace period were perceived as loans with repayment troubles, because postponement of loan repayment is not a common part of p2p loans. Default loans are loans, that has not been current for 121 days and charged off loans are no longer expected to be repaid. These three types were transformed as loans with failure in repayments.

Loan status is therefore dichotomous variable with two states: fully paid or failure in repayment. According to this the most suitable method is logistic regression. Probit model was also performed, but both approaches showed very similar results. According to Cramer (2003) it is practically impossible to choose between these approaches. In order to better evaluate the impacts of variables, logistic regression was preferred.

Analysed dataset contains over 266000 loans projects provided through p2p marketplace Lending Club in years 2007-2015. These loans were successfully granted for borrower, because investors raised money for their realization. Current loan projects were excluded from our research, because their future development is unknown. In this dataset were identified 16 variables with possible impact on loan status. Data were selected according to results of Lin et al., 2009; Serrano-Cinca et al. (2015), and then cleaned and transformed to usable form. The new dataset array, that contains only complete necessary observations, was created. We have excluded more than 11000 of observations, but dataset remained massive. The most missing information's were in categories related to employment, but few missing values were in variables concerning borrower's derogatory public records and his inquiries.

Table 1 Variables definition

	Meaning
annual_inc	Annual income of the borrower
delinq_2yrs	Number of incidences of delinquency (30+days) in last 2 years
emp_length	Employment length in years.
grade	Score of borrower of his capability to repaid the loan
home_ownership	Rent, own, mortgage, other.
inq_last_6mths	Number of inquiries in last 6 months
instalment	The monthly payment of borrower
int_rate	Intersect rate provided for borrower according to his risk score
issue_d	Date, when loan was issued
loan_amnt	Amount borrowed

loan_status	Determine status of loan, if loan was fully paid
open_acc	Number of opened credit lines
pub_rec	Number of Derogatory public records
purpose	Purpose of loan
sub_grade	Score of borrower of his capability to repaid the loan, expanded to multiple levels
term	Duration of loan, in case of Lending club 36 or 60 months coded as binary variable
verification_status	Indicates, if data were verified or not by Lending Club coded as binary variable

Source: Own elaboration

Histogram on Figure 1 built on issue date shows a little bit irregularity in our data. Those irregularities are the result of data cleaning, in order to make this data suitable for data analysis. Low frequencies at the end of histogram are the result of lasting loans, that were excluded from this dataset. Lending Club provides loans for two periods, for 36 and 60 months, therefore only early repaid loans and late or defaulted loans are shown.

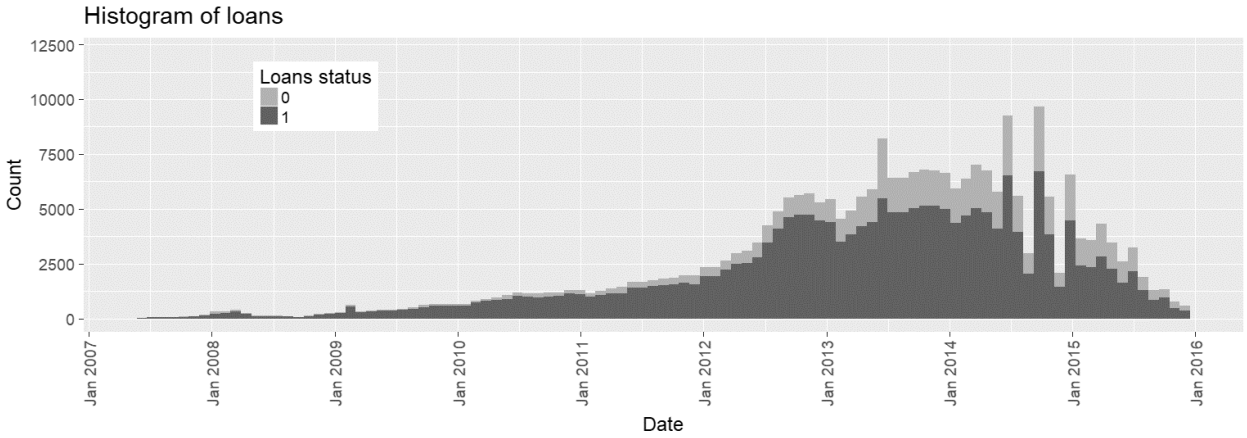

Figure 1 Histogram of loans according to issue date
Source: Own elaboration

For better picture of analysed data, descriptive statistics is provided in Table 2. There are approximately three times more fully paid projects, and therefore we will try data balancing. All loans, where annual income was over $1000000 was excluded in order to have an unbiased estimate. Table 2 also shows, there are differences in mean and standard deviation, when comparing fully paid and defaulted especially in subgrade, instalment and loan amount.

Table 2 Descriptive statistics

Variable/ statistics	Whole dataset						Loan status = 0		Loan status = 1	
	Mean	**SD**	**Median**	**MAD**	**Min**	**Max**	**Mean**	**SD**	**Mean**	**SD**
annual_inc	73126	46244	63000	29948	1896	1000000	68216	42306	74672	47311
delinq_2yrs	0.26	0.77	0.00	0.00	0.00	22.00	0.32	0.88	0.25	0.73
emp_length	5.81	3.63	6.00	5.93	0.00	10.00	5.80	3.64	5.82	3.62
inq_last_6mths	0.88	1.15	1.00	1.48	0.00	28.00	0.98	1.1	0.85	1.13
instalment	424.1	246.3	371.0	221.1	15.6	1424.5	454.3	249.9	414.6	244.4
int_rate	13.92	4.42	13.67	4.33	5.32	28.99	15.96	4.31	13.28	4.26

loan_amnt	13801	8197	12000	7968	500	35000	15074	8482	13400	8063
open_acc	11.4	4.95	10.00	4.45	0.00	58.00	11.33	5.10	10.95	4.90
pub_rec	0.14	0.44	0.00	0.00	0.00	20.00	0.16	0.49	0.14	0.43
sub_grade	12.32	6.72	11.00	5.93	1.00	35.00	15.50	6.75	11.32	6.39

Source: Own elaboration

According to Serrano-Cinca et al. (2015), there is a presumption that variable subgrade is the most significant variable for predicting future failures. Variable grade was tested in another model without significant results, therefore was from our model excluded. We also expect annual income positively affect repayment of loans. Number of inquiries, delinquencies and public records could be also a good predictor for investment decisions. As categorical variables were used purpose and home ownership, while expecting specific impact on our dataset. Purposes as credit card and debt consolidation are recognized as most risky and so increases chance for loan default. It is expected, that home ownership has on the other side positive impact on reduction of chances of loan default.

4 Empirical Study

Table 3 shows Pearson correlation for quantitative variables used in this paper. As you can see, there is strong correlation between subgrade and interest rate, and also between instalment and loan amount. These results were expected, because the main factor for calculating interest rate is grade or subgrade. On the other site, the size of instalment depends on loan amount, term and interest rate, but only loan amount and instalment showed high correlation. Categorical variables using point-biserial correlation showed no important correlation for analysed data. Due to these circumstances multicollinearity in model is expected. To avoid distorted estimates, these two pair of variables will not be used in one model.

Table 3 Pearson correlation of used variables

	sub_grade	**loan_amnt**	**int_rate**	**installment**	**emp_length**	**annual_inc**	**delinq_2yrs**	**inq_last_6mths**	**open_acc**	**pub_rec**
sub_grade	**1.00**	**0.22**	**0.97**	**0.20**	**0.02**	**-0.02**	**0.09**	**0.22**	**0.04**	**0.08**
loan_amnt		**1.00**	**0.22**	**0.95**	**0.12**	**0.42**	**0.01**	**-0.01**	**0.20**	**-0,07**
int_rate			**1.00**	**0.21**	**0.03**	**-0.03**	**0.09**	**0.20**	**0.04**	**0.08**
instalment				**1.00**	**0.11**	**0.42**	**0.02**	**0.01**	**0.19**	**-0.06**
emp_length					**1.00**	**0.09**	**0.03**	**-0.01**	**0.05**	**0.05**
annual_inc						**1.00**	**0.07**	**0.06**	**0.17**	**-0.01**
delinq_2yrs							**1.00**	**0.02**	**0.06**	**0.00**
inq_last_6mths								**1.00**	**0.10**	**0.05**
open_acc									**1.00**	**-0.01**
pub_rec										**1.00**

Source: Own elaboration

In order to analyse probability of failure in loan repayment, several models have been created. Subgrade was considered as the most important variable in our model. Because of multicollinearity all four combinations of subgrade, interest rate, loan amount and instalment have been tested, while combination of subgrade and instalment provided finest results. To analyse development of

models, we have added firstly continuous variables and then also categorical variables. Dataset contained only 23% failures of loans repayments, and therefore we tried to sample fully paid loans to create balanced dataset. Model results in Table 4 are ordered according to variable importance measured by a Random Forest.

Table 4 Logistic regression analysis

	Model 1	Model 2	Model 3	Model 4 (bal.)
(Intercept)	2.3698499 (***)	2.241e+00 (***)	2.703e+00 (***)	1.707e+00 (***)
sub_grade	-0.0912805 (***)	-7.490e-02 (***)	-7.180e-02 (***)	-7.714e-02 (***)
annual_inc		6.395e-06 (***)	5.935e-06 (***)	5.310e-06 (***)
term		-3.280e-01 (***)	-3.734e-01 (***)	-3.643e-01 (***)
home_ownership OWN			-1.501e-01 (***)	-1.587e-01 (***)
home_ownership RENT			-2.419e-01 (***)	-2.404e-01 (***)
installment		-4.691e-04 (***)	-4.919e-04 (***)	-4.520e-04 (***)
delinq_2yrs		-8.701e-02 (***)	-9.289e-02 (***)	-1.026e-01 (***)
open_acc		-1.260e-02 (***)	-1.456e-02 (***)	-1.519e-02 (***)
Purpose credit_card			-2.879e-01 (***)	-3.512e-01 (***)
Purpose debt_consolidation			-3.178e-01 (***)	-3.796e-01 (***)
Purpose home_improvement			-3.418e-01 (***)	-4.035e-01 (***)
Purpose major_purchase			-1.771e-01 (**)	-1.915e-01 (**)
Purpose medical			-3.713e-01 (***)	-4.150e-01 (***)
Purpose moving			-3.132e-01 (***)	-3.539e-01 (***)
Purpose other			-3.242e-01 (***)	-3.577e-01 (***)
Purpose renewable_energy			-3.643e-01 (*)	-4.114e-01 (*)
Purpose small_business			-6.487e-01 (***)	-6.941e-01 (***)
Purpose vacation			-3.162e-01 (***)	-3.970e-01 (***)
Purpose wedding			3.012e-01 (***)	2.602e-01 (**)
verification_status		-1.136e-01 (***)	-1.070e-01 (***)	-9.964e-02 (***)
pub_rec		-4.221e-02 (***)	-4.644e-02 (***)	-5.203e-02 (***)
Akaike information criterion	274524.3	271391.3	270615.6	161983.3
McFadden's Pseudo-R2	0.06256537	0.07331191	0.07607673	0.08320612

Source: Own elaboration

Data were balanced by creating a sample from the original data file with fully paid loans. This model has shown best results in predicting future loan status. Using this modification especially three variables, term, delinquencies in last two years and verification status showed stronger effect.

In order to better characterize this model odds ratios were created. Every worsening of subgrade of borrower lower odds ratio of loan repayment by 0.92. There are 35 levels of subgrade, therefore there is notable worsening in repayment of p2p loans in lower subgrades. Delinquencies in last two years, verification status and number of public records create negative effect on loan repayment. The most important variable was duration of loan, where 60-months loans have odds ratio only 0.6947 to be repaid against 36-months loans. Variables as instalment, variable open_acc had slightly negative effect and category annual income recorder weak positive effect on loan status.

On the other side instalment and especially annual income have wide range, therefore their effect multiplies and has much higher impacts on loan status.

In categorical variables was effect calculated against base value, in purpose for category car and in variable home ownership against mortgage category. As opposed to the assumptions, own property had negative effect and no property positive effect on repayment of loan. Negative effect can be explained by low frequency of category no property, and so lack of data for sufficient evaluation. Borrowers with rented home show the lowest odds for loan repayment. Categories as debt consolidation and credit card were according to our assumptions the high-risk carriers. Besides them, categories as medical costs, moving, other, renewable energy and vacation have a similar negative impact. On the other side borrowers with reasons of wedding and car have the most profound results when repaying the loan. Influence of subgrade is very similar to study of Serrano-Cinca et al. (2015), but we have found differences in other variables.

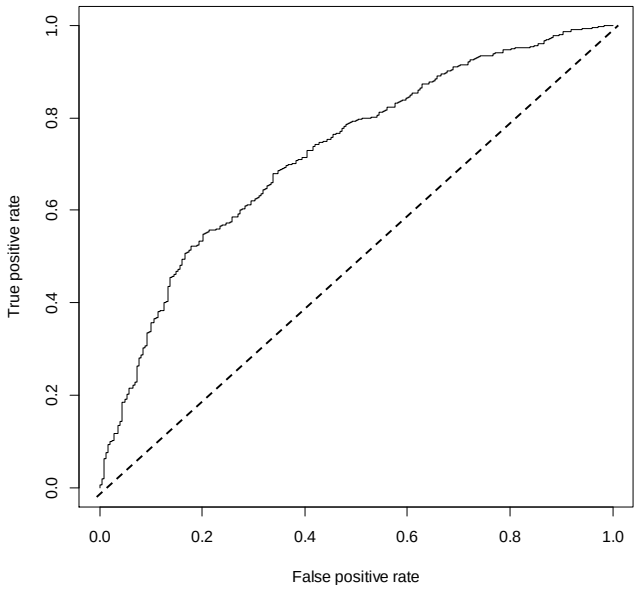

Figure 2 ROC curve for test sample using model 4
Source: Own elaboration

ROC curve was created using test data sample with 1000 observations. Using AUC, area under ROC curve, accuracy of model 4 was evaluated. This information speaks about ability of the test to correctly classify loans that will be fully paid or default. Accuracy of our model was evaluated as fair with rating AUC=0,722. Although models have only low McFadden's Pseudo R2, the almost all analysed variables are significant for predicting performance. As stated by Bartlett (2014), we need a very strong predictor to get high numbers of McFadden R2. Irrelevant variables were from model excluded and Table show only significant influences of categorical variables.

5 Conclusion

In this paper dataset of loans from site Lending Club was analysed, in order to predict failure of loans repayment. Number of P2P loans records exponential growth, because of their pros, but there is a lot of risk. We have experienced almost 25 % of loans with troubles to be repaid, therefore portfolio creating can be a challenge. Several models have been tested, while model with balanced data provided best results. Although McFadden's Pseudo-R2 point to relative weak performance of

our model, this model can facilitate decision making for investments. These models have confirmed our assumptions about continuous variables, where term, subgrade, delinquencies and public records had negative effect on loan repayment. Opened credit lines and annual income had very little effect on loan status. Categorical variables have shown also significant effect on the probability of loan repayment. Purpose categories as wedding and car has shown positive effects, but another categories negative. In contrast with our assumption, credit card repayment and debt consolidation have slightly better results than other few categories. Owning a property has surprisingly also negative effect on repayment of loan, could have been caused by high operating costs, because of age of property.

Economic profile of borrower was important in prediction of problems with repayment. For these purposes can be used subgrade, that can be understood as a standardized variable. This variable was more important than grade variable, and including other variables the prediction success of model has improved. The most important variables added to this simple model were annual income, term, home ownership and instalment. Although instalment influence seems to be very low, large data range of this variable make it statistically significant. Public records and number of open lines do not discourage investor from investment. One of the possible answers can be effort to get higher interest rates, notwithstanding the higher risk. Using these variables, it is possible to better Lending Club's basic investment strategies. Investor should consider his willingness to take risks, find corresponding profile of borrower. Ideal profile is the borrower with higher income, seeking for short term loan, with mortgage on home looking for money for wedding and car.

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Evaluation of social and economic impacts of mining industry through macroeconomic indexes

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Abstract
Mining operations are spread all over the world. In Slovakia it lasts many centuries and it is still developing. Contribution is orientated to the analysis of the influence of mining industry in Slovakia considering socio-economic indexes. The analysis shows a complex view about the development of mining in Slovakia, made by the correlation and regression analysis, which helped to find out dependence between regions in Slovakia. With the help of these analyses we concluded the influence of mining operations in Slovakia and the regions.

Keywords: Economic impact, social impact, Macroeconomic indexes, Correlation and regression analysis, Regions, Slovakia.

JEL Classification: E24, H32

1 Introduction
Mining industry in Slovakia is wide-spread from 13th Century. Mining activity is maintained till present time. Nowadays raw materials are mining almost in all Slovakian counties. Majority of mined raw materials is consumed at the territory of Slovakia. Some raw materials that are excessing in Slovakia are exported to surrounding countries and some materials, which are not occurring in Slovakia, are imported.

Considerate attention must be given mainly to the socio-economic indexes, among which belongs unemployment, GDP, average monthly wage, migration etc. Such indexes help to characterize changes that connect with living level of inhabitants in given country, as well as they contribute to the sustainable development of whole economy.

The mining industry has a major impact on society - from an economic, environmental and social perspective and due to a vast number of criteria. Which criteria should be given priority depends on where the mining operations take place. In this sense Ranängen and Lindman (2017) suggested

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as sustainability criteria corporate governance, fair operating practices, economic aspects, human rights, labor practices, society and the environment. For more than a century, the mining sector has played a crucial role in the economic development in many countries. However, it also causes immense harm to the country's people and environment. (Naidoo, 2015).

Problems related to the mining have influence to the sustainable development. In this sense, it is extremely important to encourage cooperation among the mining sectors, the society, and state and municipal governments in the process to consolidate advantages and opportunities for this industry (Macedo et.al, 2017). Also Amezaga et al. (2011) review how mining practices have evolved to consider sustainability over the last few decades and remark on what challenges still need to be overcome.

A sustained and sustainable mine development requires the collaboration with the host communities concerned, which means that it has to be developed in a process commonly termed social licensing. However, a 'social license' will not be granted once and for ever, but in fact is an evolving process, as the communities and their needs evolve. (Falck, 2016)

Owen and Kemp (2013) discussed and debated over how best to frame the industry's social and environmental obligations and how these obligations can be met by the mining sector. Where social license has contributed to raising the profile of social issues within a predominantly industrial discourse, a primary failure is its inability to articulate a collaborative developmental agenda for the mining sector or a pathway forward in restoring the lost confidence of impacted communities, stakeholders, and pressure groups.

Bridge (2004) stated four distinctive approaches to sustainability in the mining sector: (a) technology and management-centered accounts, defining the issue in terms of environmental performance; (b) public policy studies on the design of effective institutions for capturing benefits and allocating costs of resource development; (c) structural political economy, highlighting themes of external control, resource rights, and environmental justice; and (d) cultural studies, which illustrate how mining exemplifies many of society's anxieties about the social and environmental effects of industrialization and globalization.

In the mining sector, local communities have emerged as particularly important governance actors. These have been spurred by the growth of the sustainable development paradigm and governance shifts that have increasingly transferred governing authority towards non-state actors (Prno & Slocombe, 2012). Agrawal and Gibson (1999) reconsidered the role of community in resource use and conservation, exploring the conceptual origins of the community, then analyzed aspects of community most important to advocates for community's role in resource management. Bebbington et.al (2008) described different types of resistance and social mobilization that have greeted mineral expansion at a range of geographical scales, and consider how far these protests have changed the relationships between mining and political economic change.

There are interactions of the role players in the coal mining industry commencing with the government regulations, supply chain members, employees and the society who are the beneficiaries of the process underpins the socio-economic attributes of the industry. (Mathu & Chinomona, 2013). Social issues are critical to the mining industry. Michell and McManus (2013) studied highlights that local communities can be empowered through development, that benefits

can extend to both the community and the business and that the ongoing management of social issues will increasingly be critical to the success of the mining industry.

2 Methodology

Evaluation of mining impacts to the individual regions of Slovakia had been verified by correlation analysis of key indexes in mining and basic macroeconomic indexes, resulting from publicly available sources, published by statistic Office, mining annuals, etc., while analyzing data between 1970-2016.

Correlation analysis through correlation coefficient or Pearson – Bravais´ coefficient expresses quantitatively level of dependence among two random variables. Correlation coefficient is defined by equation:

$$r = \frac{\sum_{i=1}^{n}(X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum_{i=1}^{n}(X_i - \bar{X})^2}\sqrt{\sum_{i=1}^{n}(Y_i - \bar{Y})^2}} \qquad (1)$$

where $\frac{1}{n}\sum_{i=1}^{n}(X_i - \bar{X})(Y_i - \bar{Y})$ presents covariance of variables X, Y.

X_i – variable X observed in time i
$\bar{X}$– arithmetic mean of variables X in time series
Y_i – variable Y observed in time i
$\bar{Y}$ – arithmetic mean of variables Y in time series
n – scope of time series examined.

Correlation coefficient has its values from interval <-1,1>, while the closer value is to |1|, the stronger dependence. In case coefficient r = 1, among variables there is positive linear dependence. In case r = -1, it means negative dependence. If correlation coefficient equals 0, among variables X and Y there is any dependence. Correlation coefficient can have also other values, which can be classified as follows:

- $0 < |r| < 0,3$ low level of dependence among variables
- $0,3 \leq |r| < 0,5$ moderate level of dependence among variables
- $0,5 \leq |r| < 0,7$ medium level of dependence among variables
- $0,7 \leq |r| < 1$ strong level of dependence among variables.

Process of analysis had been as follows:

1. Determination of key indexes in analyzed mining sector
2. Determination of key indexes from macro environment
3. Realization of correlation analysis at the level of whole Slovakia
4. Realization of correlation analysis at the level of individual counties
5. Determination of dependences and independence of variables.

Resulting from limitation of information sources mining industry had been defined by indexes:

- Volume of mining in mil. ton,
- Raw material sales in mil. €,
- Volume of average monthly wage in mining in €,
- Number of employed persons in mining in persons.

Socio-economic development of individual counties in Slovakia had been defined through indexes:

- Total employment in Slovakia and in individual counties,
- GDP and regional GDP,
- Average monthly wage in Slovakia and in individual counties,
- Education
- Number of migration

Correlation analysis verified dependence among indexes of mining industry and macro-economic indexes at the state level in Slovakia. Results of the analysis are given in correlation map (Figure 1) that divides indexes to two sectors – blue and red one.

- Blue sector – indexes with considerable mutual dependence,
- Red sector – indexes with low level of dependence.

It is necessary to orientate to the index of employment in the mining sector that reports considerable negative dependence in relation to the majority of analyzed indexes.

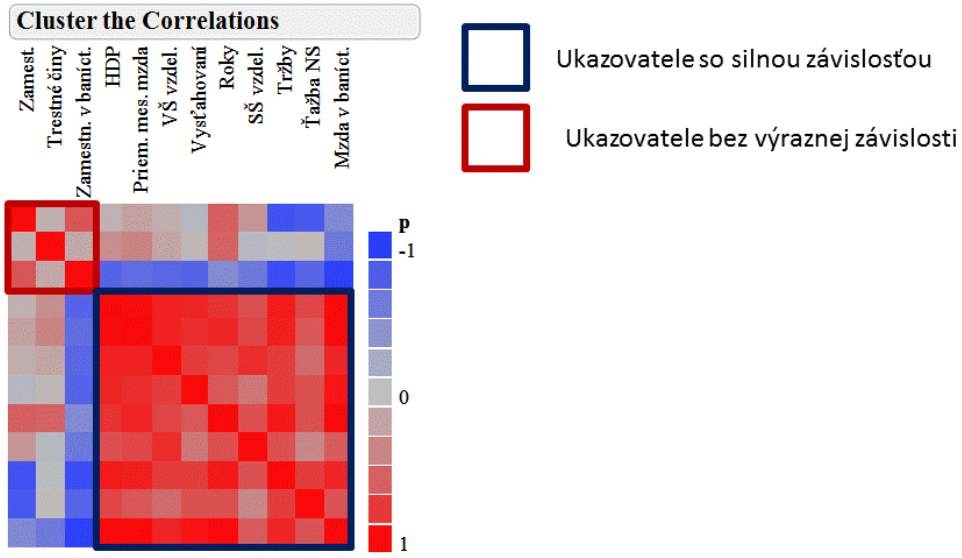

Figure 1 Correlation map – segmentation of indexes
Source: Own processing according JMP software

3 Results

During the evaluation of economic and social impacts of mining industry through macroeconomic indexes there is necessary to see relation between mining and not mining indexes, which is presented by Tab. 1. According analysis we can state that values of correlation indexes proved very considerable dependence of mining companies sales and wages in mining in relation to GDP, average monthly wage, number of evicted and number of university education graduates with values <0,78 ; 1> and on the other hand negative dependence at employment in the state at level <-0,49 ; -0,88>.

Table 1 Correlation matrix of chosen mining and no mining indexes during the period (1960-2016)

	Employment	GDP	Average monthly wage	Evicted	Crimes	University education	Secondary school	Sales	Mining of raw materials	Employment in mining	Wages in mining
Employment	1,00	0,11	0,22	-0,09	0,12	0,14	0,31	-0,88	-0,84	0,66	-0,49
GDP	0,11	1,00	0,99	0,89	0,34	0,91	0,69	0,93	0,73	-0,76	1,00
Average monthly wage	0,22	0,99	1,00	0,85	0,40	0,91	0,73	0,92	0,65	-0,69	1,00
Evicted	-0,09	0,89	0,85	1,00	0,06	0,78	0,48	0,78	0,68	-0,76	0,95
Crimes	0,12	0,34	0,40	0,06	1,00	0,19	-0,08	-0,03	0,04	0,17	-0,61
University education	0,14	0,91	0,91	0,78	0,19	1,00	0,85	0,78	0,54	-0,73	0,89
Secondary school	0,31	0,69	0,73	0,48	-0,08	0,85	1,00	0,68	0,38	-0,61	0,63
Sales	-0,88	0,93	0,92	0,78	-0,03	0,78	0,68	1,00	0,78	-0,90	0,88
Mining of raw materials	-0,84	0,73	0,65	0,68	0,04	0,54	0,38	0,78	1,00	-0,75	0,67
Employment in mining	0,66	-0,76	-0,69	-0,76	0,17	-0,73	-0,61	-0,90	-0,75	1,00	-0,98
Wages in mining	-0,49	1,00	1,00	0,95	-0,61	0,89	0,63	0,88	0,67	-0,98	1,00

Source: Own processing according JMP software

Placement of mining activity in Slovakia was and still is uneven, which is reflecting also in achieved results of followed mining indexes at the level of individual countries. Through cartograms (Fig.2), expressing volume of mining in tones and number of employed persons in mining we have chosen country with most considerable mining activity, presented with highest values of such indexes (red space of cartogram) – Trenčiansky kraj and country with lowest level of mining activity (blue space in cartogram) – Nitriansky kraj.

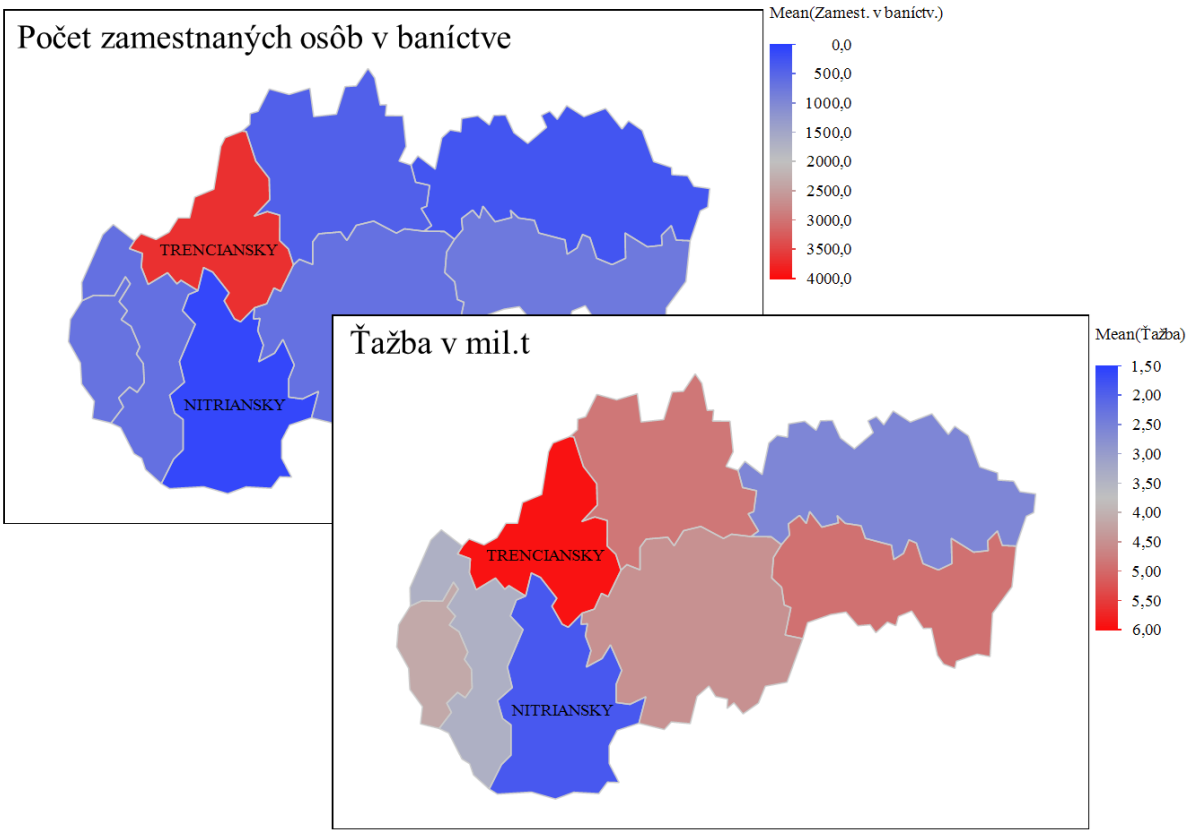

Figure 2 Cartogram of average employment in mining and average mining during last 10 years in Slovakia
Source: own processing according results from JMP software

Through comparing of this different countries from the view of the sector through correlation analysis we verified expectations (see Fig.3), while in Trenčiansky kraj there is very strong dependence, presented by correlation coefficient in interval <0,73;0,9>, index „employment in the country“ and all mining indexes (mining, employment in mining, wage in mining) and in Nitriansky kraj there was not proven statistically significant dependence of followed indexes with correlation coefficient to |0,5|.

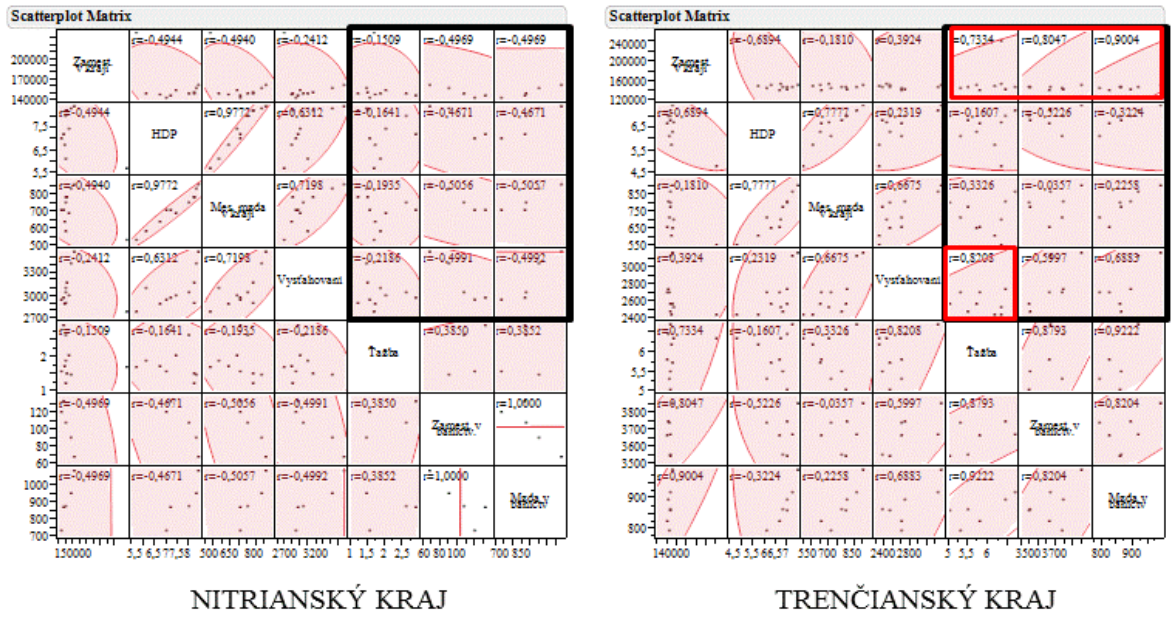

Figure 3 Correlation matrix at the level of countries - Trenčiansky, Nitriansky
Source: Own processing according results from JMP software)

High correlation of indexes in Trenčiansky kraj documents only dependence of the country at the mining, since there is acting one from the biggest mining companies in Slovakia from the view of mining volume and from the view of number of employees – Hornonitrianske bane Prievidza, Joint Stock Company. Company employs approximately 4000 employees and other 6000 employees are directly and indirectly connected with the company. In case company would finish its operation suddenly, also values of socio-economic indexes would change markedly. Number of registered applicants of employment would change from original value 6 315 to approximately 15 000 and measure of unemployment will increase from 8,13% to 21,74%, which could means third highest measure of unemployment in Slovakia. Also there will be change in indexes of average wages. Due to the mentioned mining activity has considerable impact to the Trenčiansky kraj, especially in Prievidza region.

4 Conclusion

In last period questions of society about mining activity and its influence to the inhabitants are rising, as well as questions of economic situation of the mining and the its surrounding. The goal of the contribution was to evaluate influence of mining activity to the development of socio-economic indexes of individual regions in Slovakia. Due to the comparing of dependence of individual indexes at the level of Slovakia and the countries we used correlation analysis. Its results at the level of Slovakia show the highest dependence between GDP, average wage, employment and wages in mining.

Regional correlation analysis at the level of individual countries divides countries to significantly "mining" with considerable influence of mining activity to results of indexes and "not mining", in which there was any statistically important dependence. Among countries, where influence of mining activity is the highest, belong first of all Trenčiansky kraj, then Košický, Banskobystrický

and Žilinský kraj and among countries that are typically "not mining", belong Nitriansky and Prešovský kraj.

Results of the analysis opened new tasks and areas of searching. Also other factors, except of mining activity, influence indexes as wages in industry, measure of unemployment, registered applicants for employment. In Slovakia it presents for example influence of other sectors, as automotive industry (Bratislava, Žilina, Trnava) or metallurgical industry (Košice, Podbrezová, Žiar nad Hronom) than it is linking of industries to the raw material chain, connected with mining sector in Slovakia. Subject of further searching should be therefore evaluation of other sectors influence to the countries, in which chosen sectors have dominant position and yet according such comparing it would be possible to evaluate objectively expressiveness of mining sector impact to the individual regions of Slovakia.

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Theoretical Considerations on Tax System

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Abstract

This article concentrates on the links between the creation and operation of the tax system am State's implication in the social and economic life of the country. The tax system may have a major impact over the economy, contributing to the minimisation of the possible risks, but also to the risks exposure. The tax system need to be amended when its mechanism become an obstacle in the performance of State's objective. In the same time, the amendment of the tax mechanism is dictated by the necessity to promote clear rules and procedures of tax revenues administration, rational use of the public assets, increase of own resources and of the public authorities' liability in order to insure the financial stability of the state.

Keywords: Tax system, Tax policy, Tax reform, Taxes, Taxpayers, Tax administration.

JEL Classification: E62, H2, H3, H6, J18

1 Introduction

The scope of this research is to reflect the need and role of the tax system for the insurance of a stable economic growth and of the State financial stability. In this respect, the State is concerned for community's welfare by recourse to the public budget. The public budget, on it turn, grants the necessary means to the State to protect the community (Maşca, 2001).

The financial resources of the State are created on the taxation basis and from tax collections. The level of the tax collections directly influences the volume of budgetary means. Due to this fact the definition of the tax system is absolutely necessary, as well as the emphasis of the tax system's impact over the national development and security.

2 Tax Sovereignty of the State

Nowadays, the State represents the central public decision maker, it plays a considerable role in the modern society, in general, and in our society, in particular. The State is "the factor of unity in the social formation", „authoritative distributor of values"; is „the public power" and the supreme source of ethical authority. In order to finance its activities, the State has the power to collect tax revenues from its citizens. The mechanism of revenues collections belongs to the tax system (Denleavy & Leary, 2002).

Simultaneously with the increase of the State's ower and extension of its activities, the State needed permanent and continuingly increasing revenues (Hoanţa, 2000). Thus, the redistribution of

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resources was performed through the State budget having the legitimate adding when the State started to take on new tasks when sustaining, managing and coordinating the activities in the economic field of the country (Maşca, 2001).

The public sector is characterized by the complex and diverse financial systems generated by the State's participation to the country's economy, but also from the resources acquired from other actors of the public sector. The tax revenues obtained from mandatory charges represent a significant share in the public resources and their mechanism contributed to the continued development of the tax domain. The tax domain represents the domain of social activity having as main objective the insurance of the State financing with the resources that are necessary for the State's good operation (Dinga, 2009).

From the terminological point of view, different opinions exist regarding the definition of the "fiscal" and "budgetary" concepts. Some researchers believe that the term "fiscal" refers only to the public revenues, where the term "budgetary" is more appropriate to the public expenses (Dinga, 2009). In this respect, we are of the opinion that the term "fiscal" is meant to the entire mechanism of State revenues collection and accumulation, while the term "budgetary" refers to the distribution of State revenues in order to cover the public expenses.

The revenues with tax nature represents the financial flows directed from the taxpayer to the State, which are intended for the financing of State's expenses. The State, as a supreme authority ensures its existence and operation of its institutions using the sovereign authority against its citizens that must execute their tax obligations.

State revenues intended to serve firstly for the financing of public expenses and thus participating to the achievement of economic and social policies of the public power. The continuing growth of the public expenses represents a characteristic of the contemporaneous period as well as the parallel increase of the mandatory tax payments to the State. The State covers its public expenses through the tax system, but also can create its objectives of the tax policy for the implementation of the State economic policy.

The relation of dependency between the public power of the State and its financial power needs to be emphasised. Following the logic of the authors considered as the founders of the financial science, including L. Trotabas or P. Lalumiere, „the political fact is essential, it dominates the totality of the financial relations". According to G. Dehove, „ the power of finances may not be understood outside the politics, as without a political organization the collective purpose to be satisfied would not exists to be satisfied, as well as the public expenses to be performed, and, consequently political tasks to purchase the indispensable revenues to cover the expenses, and therefore the financial activity will also be absent (Brezeanu, 1999). We are of the opinion, however, that relation is not always beneficial to the society, in particular when the distribution of public revenues is concerned, due to the fact that the efficiency is usually benefice to those with controlling powers. The governing party sometimes uses the fiscal measures in order to maintain its influence over certain social categories during elections (Secrieru, 2004).

Nowadays, in the conditions of economic integration and globalization of the existent economic exchanges, the tax system of a state may not remain neutral towards the economies of other states. The necessity of tax systems harmonization appears to the existent conditions. For instance, the

tax systems of the European Union countries have been reformed within the economic and political transformation processes. The reform was performed through synchronization and adaptation targets to the community standards. It has been decided to create the legislation of the member states in a comparable way, and the national tax systems were subject to the general objectives of European integration (Hoanţa, 2000). In the same time, the European Union having a unitary monetary policy, refused to create a fiscal union. Notwithstanding the changes at the global level, each sovereign state adopts its own tax system which is more or less perfect. In spite of the organisation principal, the modern tax systems are guided by the principals of certainty and equity. Each taxpayer needs to know his obligation to pay the charges, and the State needs to know its own tax revenues. The need of equity toward the taxpayers to pay equal taxes is stringent and the tax treatment need to consider the individuals with different revenues (Secrieru, 2004).

2.1 Definition of the Tax System

The tax system is defined as "the totality of taxes and charges instituted in a state that procures the budgetary revenues for the State, each tax having a specific contribution and a certain regulatory role in the economy" (Vintilă, 2004). According to another definition of the tax system is as follows: "the tax system includes the totality of concepts, rules, methods, processes regarding a group of elements (taxable base, rates, taxpayers, etc) regulating relations that appear as a result of the drafting, state regulation, imposing and enforcing taxes, and that are managed according to the tax laws, for the performance of the system's objectives" (Hoanţa, 2000).

From structural and functional perspective, the tax system represents a totality of tax institutions which forms a unity with its own "metabolism" (Dinga, 2009). It comprises a diversity of taxes, charges and mandatory payments affecting the revenues of all individuals and legal entities, the share of the tax effort being borne by the population, in particular through prices.

According to Article 2 of the Tax Code of the Republic of Moldova "*the tax system represents the totality of taxes and charges, of principals, forms and methods for the establishment, amendment and abolition thereof, as well as the totality of measures that insure their payment*" (Codul fiscal al Republicii Moldova, 1997).

During the course of its evolution, the tax systems were in constant development aiming in particular as follows: the number and amount of the taxes should satisfy the State's needs for funds; to simplify and facilitate the tax collection; the taxes should be tolerated by the taxpayers; the increase of the taxpayers' number to eliminate inequities in this regard (Dunleavy, O' Leary, 2002).

It must be mentioned that the structure of a tax system depends on the economic conditions where it has to be applied. The level of the economic development of the country, diversity of the was to produce the wealth, influences the distribution of the tax charges, technical evolution and the efficiency of the tax system When evaluating the tax system, the psychological and political aspects in a State need to be taken into account. The reactions of the taxpayers and the political will of a government may be determined.

2.2 Tax System's Elements

The tax system is governed by an institutional framework of administration, through legal regulations of tax nature, by the system of taxes and charges. On its turn, the system of taxes and

charges represents a form of collection of a part of revenues from individuals and legal entities, at the disposal of the State, to cover its expenses. It is important that such mandatory collections are not related to a voluntary decision and are not accompanied with an immediate or individualized direct counter performance (Brezeanu, 1999).

Taxes: "Nothing lasts longer than the tax" – this is a well-known expression in the market economy of the developed and democratic countries, which shows that at the basis of true democracy, the tax obligations are considered as a permanent institution (Brezeanu, 1999).

Under a tax system, it is important to respect the four principles outlined by Adam Smith, namely:

- Justice – equality before tax;
- Certainty – the achievement of an objective fiscal goal, eliminating arbitral regulation in the stability of the viable tax;
- Convenience – establishing of simple and clear rules, aiming to favour the social acceptability of the tax system;
- Efficiency – the financing of the public expenses at the lowest cost (Brezeanu, 1999).

The functioning of the tax system considers the economic logic of the tax burden in the spirit of the Laffer curve theory, according to which any increase in the fiscal pressure causes a decrease in the number of compulsory levies collected by the public power. In this context, the economic science supports the Pareto model - which implies the taxation convergence with optimal redistribution of resources (Chiţan, 2013).

Public actors: The public actors play the major role in the tax system mechanism. The public actors are identified by public institutions acting within the tax system, making laws, regulations, procedures, methods to collect the tax revenues provided in the state budget. The public actors are the institutions with the fundamental power to create tax law and institutions with powers in tax administration and decisions regulation.

The normative aspects by which taxes and duties are created may not be absent, representing the basic components in the presentation of the notions referring to the tax sector.

The tax measures are voted by the Parliament, however, since the tax represents a sensitive issue, the Government holds larger powers to initiate the draft of tax laws and, consequently, to issue tax decisions (Hoanţa, 2000). Thus, the Government focuses both on ensuring an adequate level of tax revenue collection and on the implementation of modern, fair, consistent fiscal management measures.

The tax administration and the decision-making process are carried out through the specialized institutional framework, which aims to assess, collect and pay the tax revenues in the State budget.

The responsibility for the development and promotion of fiscal policy and legislation in the Republic of Moldova, is within the competence of the Ministry of Finance; while the implementation of these policies and the improvement of the tax legislation lies with the State Tax Service. Thus, thought the tax authority, the taxes are collected in order to satisfy the needs of the governments for resources, and the tax collection represents their main objective.

To increase public revenues to the budget the efficient tax administration is a must, by unifying the tax administration and minimizing the physical interaction between the tax inspectors and the taxpayers.

In this respect, the basic objectives of the fiscal administration policy in the Republic of Moldova are focused on: reforming the organizational and institutional framework; to modernize the approach to complying with taxpayers' compliance; increasing the efficiency of the use of information technologies in tax administration and increasing the efficiency of human resources management (Strategia de dezvoltare a Serviciului Fiscal de Stat pentru anii 2016-2020).

At the present stage, the State Tax Service of the Republic of Moldova passes through the change of its structure created in the 90's, based on the territorial principle, to a single legal entity, which has the administration competence throughout the Republic of Moldova.

Another group of public actors is represented by the *taxpayers*. The taxpayers act under their tax obligation toward the state. Most of taxpayers acts in good faith when observing their tax obligations. The taxpayer's sensitivity is a good criterion for distinguishing between different degrees of fiscal civics. It follows that, in order to increase the degree of fiscal civics, it is necessary to involve the tax administration, which protects such sensitivity. In this respect, the relationships between the tax administration and the taxpayers are of major importance. These relationships are improved by developing a protection regime of taxpayers' rights and developing the arbitration procedures (Hoanţa, 2000).

Tax policy: The structural creation of the tax system depends on the State's fiscal policy, which establishes the sources and the methods of public revenues collection and formation.

The fiscal policy represents the process of necessary to create the tax enforcement and the public expenses to mitigate the variations specific for the economic and for the protection of the national economy from the powerful inflationary influences (Secrieru, 2004).
The fiscal policy determines the volume and origin of budgetary and extra budgetary resources that can constitute State financial funds, the collection methods used, and the objectives to be achieved by fiscal instruments (Brezeanu, 1999).
Through fiscal policy instruments, the State stimulates and facilitates the economic activity, attracts foreign investments, ensures social protection and respect of the rights of those contributing to the public revenues (Dimişca, & Moşneagu, 2003). The tax policy may contribute to the change of taxes or destination of budget expenditures (discretionary policy). The instruments used in this policy are: public works, investment programs, projects for the employment of personnel in the public sector and amendment of the tax rates (Secrieru, 2004).

Alongside the discretionary fiscal policy, the fiscal system is equipped with automatic stabilization properties. The amounts obtained from tax payments automatically change the revenues, reducing the multiplying effect and offsetting some of the negative externalities.

However, the automatic stabilization factors do not eliminate the instability of an economy. The reduction of the permanent disruptions represents a problem that the discretionary fiscal policy should solve with the monetary policy.

For the Republic of Moldova, the main objectives of the fiscal policy are based on: ensuring of the fiscal equity, stability and transparency; optimizing the fiscal pressure; systematization of national tax legislation; improving and simplifying the national tax systems; harmonization of fiscal policy and national tax legislation (Strategia de dezvoltare a Serviciului Fiscal de Stat pentru anii 2016-2020).

In relation to the above, we are of the opinion that the tax policy of each state, through the implementation of tax instruments and procedures, is developing and adapting to the needs depending on the political, economic and social objectives of the state.

Tax Reform: The concept of fiscal reform is well known in the Republic of Moldova, which holds a leading position to ensure the economic development.

The tax reform aims to increase the tax revenues to the budget in line with the increase in budget spending needs. The tax reform idea is based, in most cases, on the fact that the tax system is obsolete and inadequate.

The proposals for the tax reform made by experts are always hit by a "fiscal inertia" due to both objective and subjective causes.

The most known objective causes are: the belief that the state will not be able to collect the tax revenues at the same level as the one preceding the reform; the administration strength; the delay in the political decision-making process; changes to the tax system may have unforeseen adverse consequences, etc.

Among the subjective causes of the "fiscal inertia" is the taxpayer's psychology, which is never conducive to a change in tax matters, especially when it comes to increase the tax burden (Hoanţa, 2000).

The tax reform can be considered a kind of tax system adaptation that reflects the will to make the taxation correspondent to the complex and mobile economic and social environment.

The fiscal system of the Republic of Moldova has undergone important transformations during the transition period. By signing the Association Agreement between the Republic of Moldova and the European Union, our country has undertaken to make a number of systemic adjustments, including in the fiscal field. Currently, the main threats for the national tax system are the following: tax evasion among taxpayers; frequent amendments in the tax legislation; high level of corruption among officials.

Currently, the Ministry of Finance of the Republic of Moldova has started the debates on the fiscal policy for 2018. According to the proposed amendments, a new tax reform is to be carried out by amending the Fiscal Code, especially with regard to the regulations on the value-added tax.

According to the arguments of the Ministry of Finance in this respect, the main objective of the fiscal policy in the field of value added tax, as well as according to the commitments under the Article 57 and Annex VI of the Association Agreement between the Republic of Moldova and the

European Union and the European Atomic Energy Community and their Member States, ratified by the Republic of Moldova by the Law No. 112 of 02.07.2014, is the transposing of the EU

Directives in the field of indirect taxation, such as:

- the Directive 2006/112/CE of the Council of 28.11.2006 on the common system on value added tax;
- the thirteen directive of the Council of 17.11.1986 on harmonization of the member states legislations regarding the taxation of the turnover – arrangements for the refund of the value added tax to the taxpayers which are not established within the European Community (86/560/CEE).

Title III of the Tax Code regarding the value-added tax is to be gradually harmonized with the European Union directives, taking into account the harmonization terms provided for in the EU-Moldova Association Agreement, within following periods:

- up to 01.09.2017 – it is proposed to revise and examine the rules on the VAT objects and scope, VAT transactions (tax base), the VAT taxable events and chargeability, the review and introduction of new concepts (VAT deduction, VAT exception with deduction right, etc.);
- up to 01.09.2019 – the VAT exemptions related to the import and delivery of goods and services must by analysed.

In addition, the Ministry of Finance specified that in the framework of the revision VAT regulations in of tax regulation and of EU Directives, it was found, *inter alia*, that:

a) the VAT standard rate is within the limits recommended by the Directive 2006/112/CE;
b) the existence of zero VAT rate is against the said directive, and measures need to be taken for the harmonization purposes;
c) VAT exemptions exceed the admissible level;
d) the minimum level for an entity to become a VAT payer needs to be examined and increased;
e) the absence of any administrative requirements for the VAT tax system.

At the same time, the Republic of Moldova is opened for collaboration and transposal of the best European practices in the field, the synchronization reforms and the adaptation to the European standards. The Republic of Moldova benefits from external support in the taxation domain, for the promotion and implementation of fiscal reforms. During 2013-2015 the State implemented a number of fiscal projects in this field, namely: the Project for the fiscal administration modernisation (TAMP), financed by the World Bank (about USD 20 million). This project was focused on the following areas: Tax Policy and Evaluation; Institutional Development, Operational Development, IT Infrastructure and System Modernization. The assistance from the Swedish Tax Agency (AFS) the Swedish Agency for International Cooperation and Development contributed to the implementation of new methods of tax control and taxpayers service (Strategia de dezvoltare a Serviciului Fiscal de Stat pentru anii 2016-2020).

The State Tax Services of the Republic of Moldova is oriented to the efficient and transparent management of tax activity that would contribute to the increase of the tax payers confidence toward the tax authorities, to the increase of tax conformity which, on its turn, efficiently contribute to the tax gaps.

3 Conclusion

In conclusion, we can mention that the tax system development and modernization is necessary, because the way how the tax system operates determines the efficiency of the public power involvement in the economic and social life of a society.

Each sovereign state adopts its own tax system, which is perfect, more or less. The tax system of a state, however, may not be neutral comparing to the tax systems of other states. This is the reason why the harmonization of tax systems become necessary in the existent conditions. In spite the organization principal, the modern tax systems are oriented to the principals of certainty and equity. The tax policy of the state is improving and adapting to the needs by the implementation of the tax instruments and procedures, depending on the political, economic and social policy of the state.

For the Republic of Moldova, the main objectives of the tax policy are: insurance of the tax equity, stability and transparency; optimization of the tax procedure; systematization of the national tax legislation: improvement and simplification of the national tax systems; harmonization of the national tax policy and legislation.

Nowadays the tax systems are primarily focused on tax communication and on the general reorganization of the tax decision making process. The tax communication aims at adapting the tax administrations to a more decentralized environment, as well as improving the relations between the administration and the taxpayer, and will insure the good operation of the entire tax mechanism.
The tax reform seeks to establish a coherent, equitable and effective tax system to meet the economy demands.

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Portfolio Optimization Including Alternative Investments – With a Specific Focus on Real Estate and Commodities

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Abstract

Over the last decades investors have expanded their activities from stock and bond markets and included alternative investments like real estate and commodities into their investment horizon. This article aims to provide an overview over alternative investment opportunities and to investigate the effects on the performance that capital allocations in real estate and commodities might have had on a traditional portfolio. Historic performance data of three stock, one governmental bond and two alternative investment indices where used to analyze these diversification effects using modern portfolio theory. The empirical analysis reveals that the performance of investments in alternatives depend on macroeconomic market factors; the commodity sector especially is harmed by recent market turbulences and the aftermath of the financial crisis of 2008. Due to the extremely different performance of alternative investments, the composition of the conducted optimal portfolios is different in each time period investigated.

Keywords: Asset Management, Portfolio Management, Modern Portfolio Theory, Portfolio Optimization, Alternative Investments, Commodities, Real Estate.

JEL Classification: C12, C49, G11

1 Introduction

Over the last decades alternative investments have become more and more attractive for institutional and private investors. The rising importance can be shown by the amount of capital designated to alternative investments. In 2006 three trillion USD were allocated to alternative assets by institutional investors, spanning asset classes like real estate, private equity, commodities and hedge funds (Loeys & Panigritzoglou, 2006, p. 54). Besides institutions, also high net worth individuals allocated more capital towards alternative investment opportunities. According to the Capgemini and Merrill Lynch World Wealth Report 2014 increased these investors their share from 2013 to 2014 by 3.4 % from 10.1% to 13.5 %.

The goal of this article is to investigate the impact of adding the two alternative investment indices FTSE/NAREIT all equity REITs and S&P GSCI into a portfolio consisting of the four tradition investment indices MSCI all country weighted index, S&P 500, Russell 2000 and JP Morgan global governmental bond index. It shall be determined whether the alternative indices are adding value to the risk-return ratio of the total portfolio. Therefore the research hypothesis is: Can the risk-

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return relationship be enhanced by adding real estate and/or commodities to a traditional investment portfolio?

The remainder of the paper proceeds as follows. Section 2 provides the review of relevant literature. Section 3 deals with the modern portfolio theory. Section 4 describes the sample, the research methodology, and the results. Section 5 summarizes and concludes it all.

2 Alternative investments

More and more investors, such as endowments, pension funds or high net worth individuals, have realized the importance of alternative investments and increased the share of capital allocated to them. According to Loeys and Panigirtzoglou, this share has had a volume of three trillion USD at the end of 2006 and spanned asset classes and strategies from real estate, private equity, commodities and hedge funds (Loeys & Panigritzoglou, 2006, p. 54).

Two major influences were identified why alternative investments are rising in importance. First, investors are seeking for better diversification options in times of market turbulences such as the new economy bubble burst, the attack of the World Trade Centre in 2001 or the Financial Crisis in 2008. With their low or even negative correlation to stock and bond markets and return drivers that differ from those of the classical financial markets, alternative assets offer an opportunity for better diversification and a chance to avoid high losses (Schneewei, Kazemi, & Martin, 2001, p. 6). Secondly, due to their low correlation, they are able to keep the expected portfolio return stable while reducing the overall portfolio risk. Due to this ability they boost the risk adjusted performance of the entire portfolio (Lerner, Schoar, & Wang, 2007, p. 8 ff.).

Classical diversification, which relies on the acquisition of national or international stocks or bonds, reaches its limits with the ongoing globalization of the financial industry and the increasing correlation of the individual markets. This results in lower diversification effects of classical investments. Most of these investment classes are affected by the same macroeconomic variables, which due to globalization are no longer only limited to single markets but affect the entire world economy (Gerster, 2005, p. 39).

In order to give a better overview over alternative investments one has to define which opportunity is part of the traditional asset classes and which is part of the alternatives. Unfortunately, there is currently no universally accepted definition for the latter one (Mader, Treu, & Willutzky, 2010, p. 2). The most general and least disputable one is to define every investment opportunity, which is not a stock or bond, as an alternative one (Fraser-Sampson, 2010, p. 3).

Asset classes that are frequently included in the basket of alternative investments are real estate, private equity, hedge funds and commodities (Schweizer, 2008, p. 3). Furthermore are infrastructure investments included into the asset class. Inderst (2010) gives a subdivision of investments in infrastructure into economic and social infrastructure (Inderst, 2010, p. 72).

Bruns presented in the book ‘Windfall Profit in Portfolio Diversification’ the combination of the two classifications of Inderst (2010) and Mader et al. (2010), which is shown in Figure 1.

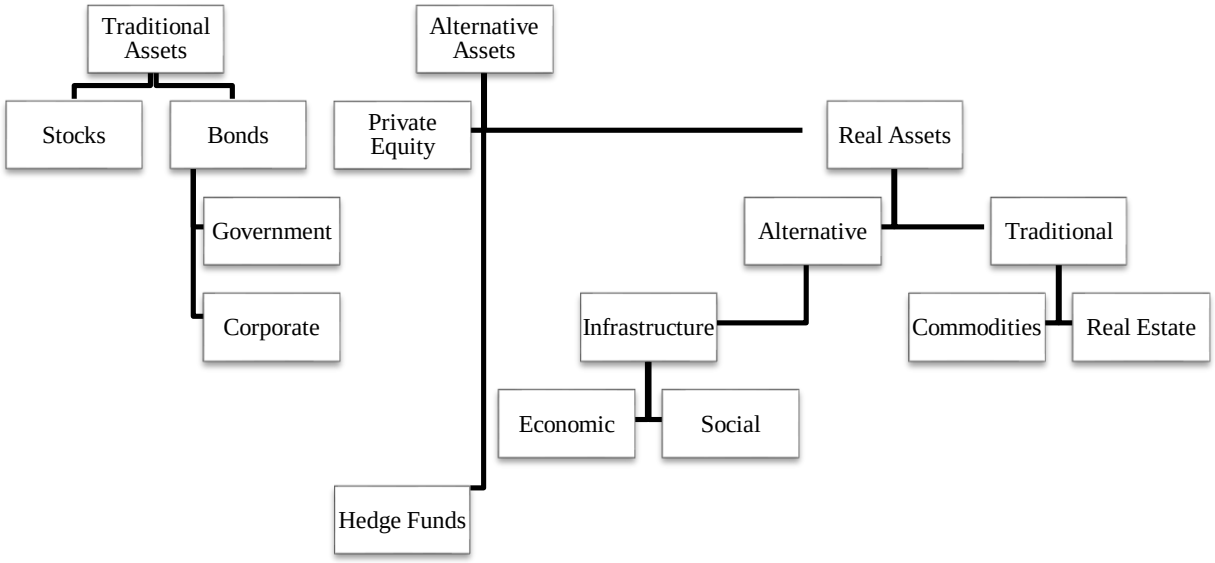

Figure 1 Classification of traditional and alternative Assets
Source: Bruns (2013), combined from Inderst (2010) and Mader et al. (2010), p. 20

3 Modern Portfolio Theory (MPT)

The history of MPT begins with the publication of the article 'Portfolio Selection' by Harry Markowitz in 1952. Markowitz introduced the concepts of risk return trade-off, correlations between assets, portfolio selection and portfolio optimization (Markowitz, 1952, p. 77-91). Prior to his work, the idea of diversification was to hold several stocks even though one might have been enough. However, Markowitz pointed out that it is not the number of different assets but rather the correlation among them that matters. Thus, for example; if an investor holds Apple and Samsung stocks, he is far less diversified than if he holds Apple and Royal Dutch Shell stocks; simply because the economic factors that affect the companies are different (Curtis, 2004, p. 16 ff.).

Markowitz's theory has had a huge impact on the world of money management, as it provides managers with the opportunity to quantify the investment risk and the expected return of a portfolio. In addition to that, MPT states that not the risk of the single asset is important but rather the one of the entire portfolio. This means that it is possible to combine risky assets to a portfolio whose expected return reflects its components but with a considerably lower risk than the single assets (Elton, Gruber, Brown, & Goetzmann, 2010, p. 58).

Due to the achieved diversification effects in a mixed-asset portfolio; Markowitz concluded that an investor, who only holds a single asset, has to consider the systematic as well as the non-systematic risk, whereas if he hold a well-diversified portfolio only the systematic risk is relevant. Hence uncertainty can be divided into two sorts of risk. The systematic, market specific risk cannot be avoided by diversification and the unsystematic, asset specific risk, which can be reduced through diversification (Markowitz, 1952, p. 77 ff.).

With diversification, one major goal of MPT is the reduction of unsystematic risk, what results in a simultaneous improvement of the risk-return ratio of the portfolio. The market specific systematic

risk cannot be reduced or even completely avoided by diversification. Which is why, it is also the only type of risk that is awarded with interest. With the simultaneous investment in a multitude of independent investment vehicles is it possible to achieve a better capital distribution which minimizes the combined risk of all investments, the portfolio risk (Kaiser & Busack, 2006, p. 9).

Using the mentioned concepts, MPT is a normative rather than a positive theory. It describes a standard norm of behavior, which investors should follow while constructing a portfolio. The mean-variance framework assumptions assume a single investment period with normally distributed asset returns. The entire model of MPT is based on the hypothesis that in a normal distribution, the mean and the variance are statistical sufficient indicators for decision making. The risk free return is known ex ante. The optimal portfolio depends on each investor's level of risk-aversion, hence by how much he dislikes risk. If two asset alternatives offer the same return but different levels of risk, the investor chooses the one with less risk, measured in standard deviation. Asset returns are fully described by their mean and covariance matrix, which leads to the assumptions that investors only care about the mean and the variance of their portfolio. Furthermore are taxes and brokerage fees not considered and investors are not able to influence the market price. Lastly, investors have the ability to borrow and lead unlimited amounts of capital at the risk free rate (Baker & Filbeck, 2013, p. 24).

In contrast to MPT, traditional portfolio theory practitioners only focused on the maximization of the expected portfolio return but failed to realize the benefits of a diversified portfolio. This resulted in the focus on the risk of the single asset, without understanding how the combination of several assets leads to a lower portfolio risk. Markowitz on the other side takes both into account, the risk as well as the return of a portfolio. He came up with the idea of a two-dimensional risk-return optimization that describes how the investor spreads his available capital to various investments in such a way that the return is achieved with the lowest possible risk or the highest return with a given level of risk (Hielscher, 1999, p. 54). In 1990 the Nobel Prize in Economics was awarded to him in order to acknowledge his work.

This original framework is called the mean-variance framework. With the given returns, standard deviations and correlations among the assets, it is possible to construct different optimal mixed-asset portfolios, depending on the investors risk preference. These portfolios can either be optimized for maximal return or minimal standard deviation. A simultaneous optimization of both, risk and return is not possible. According to Fabozzi, Gupta, and Markowitz (2002) did MPT with its focus on risk reduction initially deliver relatively low returns. However until now the theory is still the foundation for modern financial models and is constantly reinvented and redesigned to incorporate new academic findings, such as the mixed-assed diversification that includes both financial as well as real assets (Fabozzi et al., 2002, p. 7 ff.).

3.1 Real Estate as a Diversification Instrument

The potential of real estate as a portfolio diversification instrument was the object of a multitude of research papers. In 1988 Webb et al. published their article 'Diversification gains from including real estate in mixed-asset portfolios' in the journal Decision Science. They investigated the historic returns of six financial investment opportunities, New York stock exchange (NYSE) common stocks, over-the-counter (OTC) common stocks, long-term corporate bonds, commercial paper, treasury bills and long-term municipal bonds, as well as two mixed real estate funds for residential

housing and commercial real estate, and farmland. In order to measure the potential risk reduction of mixed assets, they first compared an equally weighted financial portfolio with one that included the three real assets. They found that with including the three real assets it was possible to reduce the risk from 5.63 % to 4.09 % for 1947-1983. Next they investigated different optimal portfolios for different time horizons and came to the following conclusions:

1. The optimal mixed-asset portfolio consisted out of two-thirds of capital allocated towards real estate.
2. All the real estate media were included in the optimal portfolios while only three of the financial media were included.
3. The efficient mixed asset portfolio outperformed the efficient one purely consisting out of financial assets.

However, the authors also pointed out that their findings were based on before tax data. This might be irrelevant for institutional investors which are exempt from taxation but it might be important for private investors who are depending on their tax status (Webb, Curcio, & Rubens, 1988, p. 434 ff.).

Due to the focus on indices in this article, it is not possible to include direct real estate investments into the calculation. As a substitute, Real Estate Investment Trusts (REITs) are chosen. Though, before adding REITs to the model, it shall be investigated whether REITs are a possible proxy for direct real estate investments.

Like stocks, REITs are publically traded and might offer diversification benefits, if they have a similar movement as stock markets but a different risk/return ratio. Previous research has investigated whether REITs are a potential proxy for direct real estate investments. This is given when common factors affect both time series. In their 1992 published article Gyourko and Keim investigate the relation between investments in real estate stock portfolios and estimated returns of direct real estate investments. They conclude that stock markets reflect information about direct real estate investments which later affect the estimated real estate returns (Gyourko & Keim, 1992, p. 457 ff.). Barkham and Geltner (1995) find evidence for a lagged transmission of price information from REIT markets to direct real estate markets and Clayton and MacKinnon (2003) showed an increasing relationship between REITs and direct real estate markets in the 1990s (Barkham & Geltner, 1995, p. 21 ff.). They even concluded that it is possible to include both REITs and direct real estate investments in an optimal portfolio in the short-run. In the long-run on the other hand, one is the substitute for the other. In addition to that, they find a significant decline in sensitivity of REIT returns to stock markets during the 1990s; this is attributed to the increasing and maturing REIT market. Due to this evidence it can be concluded that REITs have a similar movement to stock markets, subsequently it shall be presented whether they have a different risk-return ratio or not (Clayton & MacKinnon, 2003, p. 39 ff.).

In 2002 Chiang and Lee extended the work of Liang and McIntosh (1998) and find that it is not possible to replicate the price behavior of REITs by combining stocks, fixed income securities and direct real estate investments, due to the unique price behavior (Chiang & Lee, 2002, p. 496 ff.). Additionally Clayton and MacKinnon (2003) point out that the correlation between stock markets and real estate is not constant over time; hence it is additional evidence that it can be seen as a unique asset class (Clayton & MacKinnon, 2003, p. 47).

Due to the evidence of prior research it is concluded that REITs are a proxy for direct real estate investments and that they offer beneficial diversification opportunities. The used REIT index in this article is the FTSE/NAREIT all equity REITs index which covers US REITs and publicly-traded real estate companies. The index provides investors an overview over a large variety of REITs and spans the entire US commercial real estate sector. These sectors cover apartment, health care and offices, but also regional malls infrastructure RETISs and timber REITs (FTSE, 2015).

3.2 Commodities as an investment alternative

One of the first researchers who suggested investing into a portfolio containing commodity futures and stocks was Robert J. Greer. He published his article 'Conservative Commodities: A key inflation hedge' in 1978 in the Journal of Portfolio Management, he showed that between 1960 and 1974, a portfolio of equities and commodity futures delivered higher returns and was less volatile than a portfolio consisting of equities only (Greer, 1978, p. 26 ff.). His paper laid the foundation for an increasing interest in commodity futures. Since then, a large variety of researchers have investigated the benefits of commodities in terms of portfolio management and diversification. In this article the focus lays on the equity-like performance and diversification benefits. Additionally is their ability to hedge against inflation later briefly described.

Equity-like Performance

Again Greer (2000) describes commodity futures return characteristics as similar to those of equities (Greer, 2000, p. 45 ff.). This assumption is supported by the findings of Gordon and Rouwenhorst (2006) who also find that they have a similar performance as equities (Gorton & Rouwenhorst, 2004, p. 47 ff.). In their paper they constructed an equally weighted index of monthly returns of commodity futures for the time period July 1959 to December 2004 and found that fully collateralized commodity futures have offered the same return and Sharpe ratio as US equity. In 2007 Demidova-Menzel and Heidorn performed a similar study but also analyzed sub-samples. They came to the conclusion that equity-like performance is dependent on the given macroeconomic market conditions in that time (Demidova-Menzel & Heidorn, 2007, p. 39 ff.), as more discussed in line with chosen macroeconomic phenomena e.g. by authors Siničáková and Gavurová (2017) and Siničáková, Šuliková, and Gavurová (2017). Erb and Harvey (2006) on the other side came to a different conclusion as they find that that the performance of commodities in a portfolio context depends on the investigated index and its composition (Erb & Harvey, 2006, p. 69 ff.).

Diversification benefits of Commodities

One well known reason for adding commodities to a portfolio is due to the low or even negative correlation to stock and bond indices. Several researchers have published papers focusing on the diversification benefits of adding commodities to a diversified portfolio. Gorton and Rouwenhorst (2006) for example investigated a time horizon from 1959 to 2004 and found strong diversification benefits from even negative long term correlation between commodity futures, equities and bonds (Gorton & Rouwenhorst, 2004, p. 7 ff.). Most recently, Conover, Jensen, Johnson, and Mercer (2010) found benefits from adding commodity futures to equity-only portfolio strategies (Conover, Jensen, Johnson, & Mercer, 2010, p. 10 ff.).

However, there are also several researchers who question the diversification benefits of commodities. Demidova-Menzel and Heidorn (2007) and Cheung and Miu (2010) discovered that

the proportion of commodity futures in the optimal portfolio mixture depends highly on the investigated time period and that the realized profits came mostly from short time periods of strong performance. In addition to that, the previous findings of diversification benefits by other researchers do not hold in out of sample settings (Daskalaki & Skiadopoulos, 2011, p. 25).

4 Empirical data analysis

The following chapter will focus on the research hypothesis of this article: Is it possible to optimize the risk-return relationship of a traditional investment portfolio by including real estate and commodities into the asset mix. The MPT model is applied to the dataset and the obtained empirical results are interpreted.

First the general descriptive statistics of the dataset are described and the historic performance of the individual indices analyzed. This lays the foundation for the following distribution analysis of the historic performance which tests whether Markowitz's assumptions hold that historic performance is normally distributed. Afterwards, the relationship among the indices is discussed, therefore the Pearson correlation is calculated which describes the dependence among variables. The entire dataset contains data over a period of 25 years from January 1990 to October 2015. Therefore, the data is analyzed over the entire period and individually in two sub-sectors which are from January 1990 to December 2002 and January 2003 to October 2015. The first sub-sample covers the market turbulences during the burst of the new economy bubble and the second the financial crisis of 2008.

With the completion of the general data analysis it is possible to base the portfolio construction on the resulting outcomes. The portfolio construction is divided into the described time periods to discover how the performance would have changed if an investor had included alternative investments into the traditional investment portfolio. In addition to that is the author able to investigate how the composition of the optimal portfolio changed due to different market conditions. Finally, some recommendations for further research are given.

4.1 Descriptive Statistics and historical performance

The presentation of the general summary statistics lays the foundation for the following distribution analysis, Table 1 summarizes all findings. At first glance, one can see that the risk-return ratios of the three stock indices are comparable, but also that the S&P 500 outperformed the MSCI ACWI and the Russell 2000. The JPM GGBI shows as expected a low mean return, but also the by far lowest risk of all indices. For the alternative indices one can clearly see that the FTSE/NAREIT all equity REITs index has a better risk-return ratio than the GSCI. With a mean return of no more than 1.21% shows the GSCI the lowest return of the entire group and the second highest risk with 22.08 %.

Table 1 Summary statistics of the indices

	Mean	Standard Deviation	Minimum	Maximum	Skewness	Excess Kurtosis
MSCI ACWI	6.20%	16.36%	-21.57%	14.59%	-0.8082	2.1661
S&P 500	8.71%	15.41%	-18.20%	14.83%	-0.7531	2.1306
Russel 2000	8.71%	20.66%	-25.38%	18.26%	-0.7477	2.0106
JPM GGBI	5.80%	6.45%	-5.28%	6.26%	-0.0101	0.6156
FTSE/NAREIT REIT`s	10.19%	22.35%	-43.92%	36.71%	-1.7612	16.7200
GSCI	1.21%	22.08%	-34.99%	17.84%	-0.7134	2.9222

Source: Own presentation based on Index data

In order to show the historical distribution of the analyzed indices, all 309 monthly returns have been sorted by size. The gradation reached from less than -10% to more than 10% return per month. Table 2 comprises the results of the sorting.

Table 2 Sorting of the historic returns

	MSCI ACWI	S&P 500	Russell 2000	JPM GGBI	FTSE/ NAREIT REIT`s	GSCI
>(-10%)	11	6	13	0	7	18
(-7,5%)-(-10%)	8	11	11	0	5	13
(-5%)-(-7,5%)	12	10	24	1	15	24
(-2,5%)-(-5%)	31	26	33	15	33	34
0%-(-2,5%)	55	61	34	110	59	58
0%-2.5%	91	88	69	143	80	55
2,5%-5%	63	65	59	35	57	45
5%-7,5%	24	30	39	5	31	32
7,5%-10%	10	7	17	0	12	18
>10%	4	5	10	0	10	12
sum	309	309	309	309	309	309

Source: Own presentation based on Index data

After sorting the data points, traditional and alternative investment indices will be analyzed separately. The created data was plotted in bar diagrams to show the distribution of historical returns. Figure 2 shows the distribution of the traditional investment indices which illustrates clearly that most of the returns fluctuate around -2.5% and 5%. This0 is even more the case for the returns of the JPM GGBI, which shows the relatively low volatility of bond returns and therefore the low risk associated to this asset class. Another indicator for this assumption is the complete abstinence of data points far away from the mean. In addition to that are only investment grade governmental bonds included in the index, which makes the abstinence of extreme observations even more plausible.

The stock indices on the other side show the impact of market turbulences during the times of macroeconomic crises. Several outliers that indicate losses bigger than 10% demonstrate that the index has lost great value in a short period of time. On the other side is the presence of returns greater than 10% an indicator that great profits were possible too.

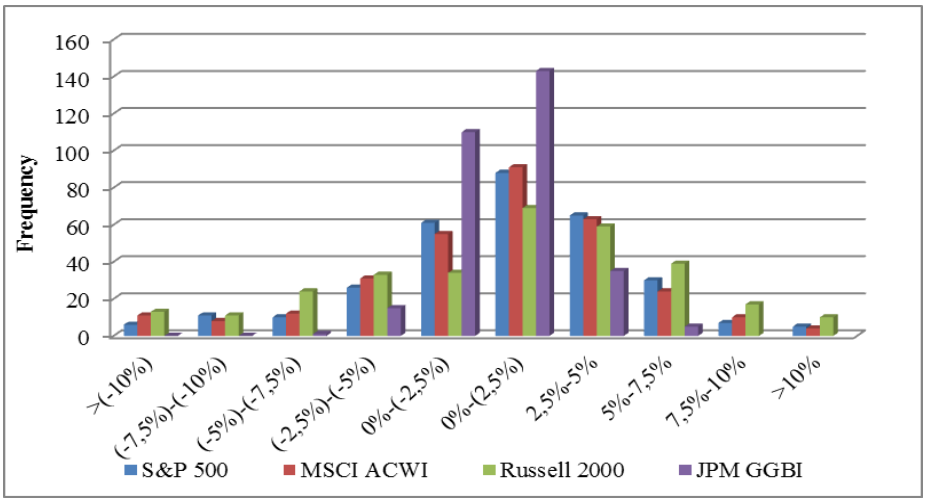

Figure 2 Distribution of historical returns of the traditional investment indices
Source: Own presentation based on Index data

The distribution of historic returns of the alternative investment indices, which are shown in Figure 3, present the same pattern as the traditional ones, most of the returns fluctuates around -2.5% and 5%. However, the performance of the GSCI is the one with the most outliers on the left side of the distribution, hence losses greater that 10% were not unlikely. These findings are in line with the ones drawn from Figure 6, that several extreme down- and upturns where present during the investigated time period. The FTSE/NAREIT index on the other side has less extreme outliers on both tails of the distribution.

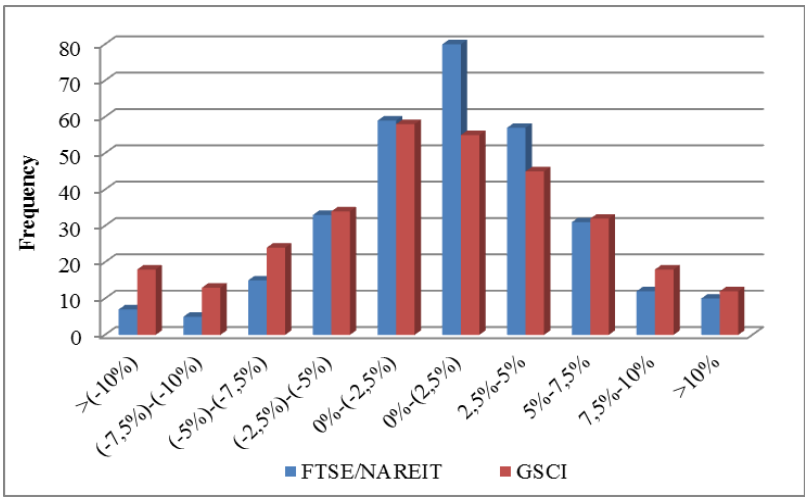

Figure 3 Distribution of historic returns of the alternative investment indices
Source: Own presentation based on Index data

Next the correlation among all indices is investigated from January 1990 to October 2015 and the two sub-sectors. The calculated correlation matrix is presented in Table 3.

Table 3 Correlation matrix 01.1990 – 10.2015

	MSCI ACWI	S&P 500	Russel 2000	JPM GGBI	FTSE/ NAREIT REIT`s	GSCI
MSCI ACWI	1.000	0.906	0.790	0.176	0.615	0.344
S&P 500	0.906	1.000	0.834	0.072	0.630	0.290
Russel 2000	0.790	0.834	1.000	-0.010	0.685	0.304
JPM GGBI	0.176	0.072	-0.010	1.000	0.155	0.113
FTSE/ NAREIT REIT`s	0.615	0.630	0.685	0.155	1.000	0.245
GSCI	0.344	0.290	0.304	0.113	0.245	1.000

Source: Own presentation based on Index data

Over the entire 25 years, one can see that almost all correlations are positive, but fluctuate from close to zero to close to one. The highest one can be observed between the stock indices. The correlation of the JPM GGBI with the other indices is to lowest observable in the entire table; it even shows the only negative correlation with the Russell 2000. A relatively high correlation of 0.906 can be observed between the global stock proxy MSCI ACWI and the American S&P 500. The small cap proxy Russell 2000 is higher correlated to the S&P 500 than to the MSCI ACWI.

The investigation of the correlation of the two alternative investment indices with the traditional ones already indicated that coefficients might not be stable over time. Now it is analyzed whether the remaining, traditional coefficients are changing too. In Table 4 the correlation matrix of the first sub-sector is presented.

Table 4 Correlation matrix sub-sector 1 (1990-2002)

	MSCI ACWI	S&P 500	Russel 2000	JPM GGBI	FTSE/ NAREIT REIT`s	GSCI
MSCI ACWI	1.000	0.835	0.660	0.183	0.322	0.018
S&P 500	0.835	1.000	0.715	0.058	0.318	0.014
Russel 2000	0.660	0.715	1.010	-0.051	0.469	0.109
JPM GGBI	0.183	0.058	-0.051	1.000	0.026	0.096
FTSE/ NAREIT REIT`s	0.322	0.318	0.469	0.026	1.000	-0.036
GSCI	0.018	0.014	0.109	0.096	-0.036	1.000

Source: Own presentation based on Index data

The comparison of the two matrixes shows that all correlations have been lower in sub-sector one in comparison to the entire time period. Due to the decreased coefficients, one can assume that the diversification benefits from adding the two alternative indices to a traditional portfolio would have been higher. This already indicates that the composition of the optimal portfolio will change over time.

Finally the correlation matrix of sub-sector two presents the complete opposite results of the previous sub-sample. In Table 8 one can observe a clear increase in correlation among all assets. Especially the alternatives show a notable increase in comparison to the previous Table 5, the correlation of the GSCI and the MSCI ACWI increased by more than 0.5 and the one of the FTSE/NARETI REITs index to the S&P 500 by 0.4. Due to the rapid increase in correlation one can assume that the financial crisis of 2008 had a huge impact on all market movements, regardless

of the asset class. These results will also be represented in the following portfolio construction and result in another change of composition.

Table 5 Correlation matrix sub-sector 2 (2003-2015)

	MSCI ACWI	S&P 500	Russel 2000	JPM GGBI	FTSE/ NAREIT REIT`s	GSCI
MSCI ACWI	1.000	0.963	0.888	0.174	0.770	0.549
S&P 500	0.963	1.000	0.926	0.082	0.796	0.462
Russel 2000	0.888	0.926	1.000	0.022	0.809	0.422
JPM GGBI	0.174	0.082	0.022	1.000	0.216	0.122
FTSE/ NAREIT REIT`s	0.770	0.796	0.809	0.216	1.000	0.336
GSCI	0.549	0.462	0.422	0.122	0.336	1.000

Source: Own presentation based on Index data

The unstable correlation over time is again not in line with the original assumptions of Markowitz. However, only a small sample was investigated and not the entire basic population. Prior to the construction of the optimal portfolio according to MPT, the Sharpe ratio, which works as a performance measurement, will be presented.

4.2 Optimal Portfolios and the efficient frontier

Finally, after the analysis of the historic performance of the indices and the calculation of the key input factors, the portfolios can be constructed. The optimal portfolio according to MPT will be presented and in the end the efficient frontier for each period will be analyzed. The efficient frontier contains all possible asset combinations and is plotted in a risk-return diagram. It enables the investor to compare the performance of different portfolio compositions, in this case the total portfolio contains all assets of the model, the traditional only stocks and bonds and the alternative only real estate and commodities.

Table 6 Mean Variance Portfolio 1990 - 2015

	Mean Return	Standard Deviation (σ_n)|	w_n	$w_n \sigma_n$
MSCI ACWI	6.20%	16.36%	0.00%	0.00%
S&P 500	8.71%	15.41%	9.41%	1.45%
Russel 2000	8.71%	20.66%	2.34%	0.48%
JPM GGBI	5.80%	6.45%	86.12%	5.56%
FTSE/ NAREIT REIT`s	10.19%	22.35%	0.00%	0.00%
GSCI	1.21%	22.08%	2.13%	0.47%
			100.00%	
Portfolio Return	6.047%			
Portfolio Variance	0.368%			
Portfolio Standard Deviation	6.069%			
R(f)	2.989%			
Sharp Ratio	0.504			

Source: Own presentation based on Index data

In Table 6 the optimal portfolio for the time period 1990 to 2015 is presented. It is evident that with a weight of 86 %, governmental bonds are the main component of this portfolio. The stock component is divided between the S&P 500 and the Russell 2000, hence as already mentioned

earlier has the S&P 500 outperformed the MSCI ACWI which is not included at all. Because of the significantly higher risk, the Russel 2000 is only included in a smaller portion of 2.3 % while to S&P 500 makes 9.4% of the portfolio investments. Within the alternative investments it can be obtained that the GSCI is included with 2.1 % while the FTSE/NAREIT REITs index is not comprised, even though real estate offered a higher return.

The optimal portfolio for the entire time period investigated gives an expected return of 6.05% associated with a portfolio standard deviation of 6.07%. This is less risk and more return than a total investment into governmental bonds which would have offered 5.8% return and 6.45% risk. Mixing different asset classes implies the opportunity to achieve higher returns and reduce the overall risk of the investment. However, if one compares the optimal total portfolio with the one that includes only traditional investments, it is clear that no diversification benefits came from the alternative investments. This traditional optimal portfolio offers a return of 6.17% and a standard deviation of 6.085%. This is a slightly higher return with a marginally lower risk. Furthermore is the Sharpe ratio of the optimal traditional investment portfolio with 0.523 higher than the one of the optimal total portfolio (0.504). Hence it can be said that under the above assumed timespan, investing in real estate and commodities would not have been beneficial for the portfolio performance.

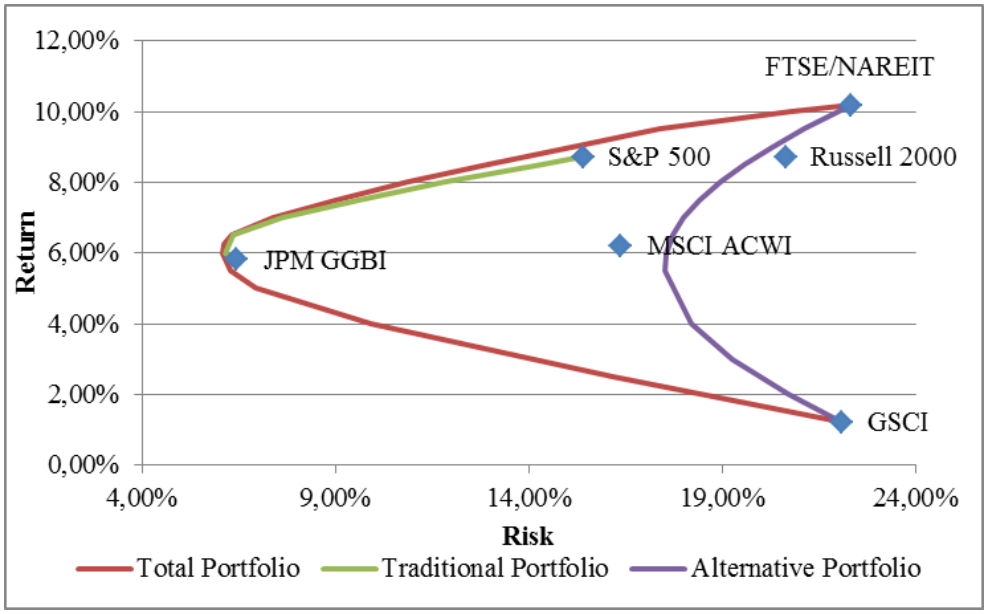

Figure 4 Efficient Frontier 1990 - 2015
Source: Own presentation based on Index data

Figure 4 presents the efficient frontiers of the three investment portfolios constructed. It is evident that the combination of the two alternative indices is the most risky one. Even though due to the low correlation between commodities and REITs is it possible to reduce the risk of the portfolio by mixing both assets. See Appendix C for the different compositions of the efficient frontier portfolios. Due to the correlation the risk can be decreased to 17.5 % when 49 % of REITs and 51 % of commodities are combined in a portfolio. This is comparable to the situation within the traditional investments. However due to the huge differences in terms of risk and return, are the lower risk portfolios dominated by bond investments. Only if investors are willing to be less risk averse more stocks are added to the portfolio. The total portfolio shows a combination of both

characteristics; those with a low risk are dominated by governmental bonds and only include small portions of alternative investments and stock. With increasing risk, more and more stocks and alternatives are added. While low risk portfolios consist out of a mixture of commodity investments and bonds are more risky ones a combination of stocks and real estate. Figure 4 shows that it is possible to achieve higher returns with a mixture of traditional and alternative investments than just traditional ones.

This leads to the conclusion that it is was not possible to reduce risk by including alternative investment into a traditional portfolio but it would have been possible to increase the portfolio return.

Next it is investigated whether it would have been favorable to invest into the two alternative investment opportunities in the sub-sectors. Due to the different macroeconomic influences the indices have behaved differently over time. In addition to that, has the correlation not been stable over time what gives investors additional diversification opportunities.

Besides a lower volatility, a reduced return is characteristic for this time period. The included stock, bond and real estate indices show a lower risk but also return, solely the GSCI has a significantly higher return with 4.7 % and a lower risk of 17.7 % in comparison to the overall time period. Furthermore, the correlations among the indices are also lower what indicates that the portfolio weights will be different to the ones in Table 7.

Table 7 Mean Variance Portfolio 1990 - 2002

	Mean Return	**Standard Deviation (σ_n)|**	**w_n**	**$w_n \sigma_n$**
MSCI ACWI	4.80%	15.29%	0.00%	0.00%
S&P 500	9.75%	14.47%	7.34%	1.06%
Russel 2000	8.40%	18.97%	0.00%	0.00%
JPM GGBI	6.89%	6.05%	71.59%	4.33%
FTSE/NAREIT REIT`s	9.89%	12.47%	14.41%	1.80%
GSCI	4.71%	17.77%	6.66%	1.18%
			100.00%	
Portfolio Return	7.392%			
Portfolio Variance	0.275%			
Portfolio Standard Deviation	5.247%			
R(f)	4.670%			
Sharp Ratio	0.519			

Source: Own presentation based on Index data

The optimal portfolio for the first sub-sector shows again a dominant role of the governmental bonds. However, the composition of the remaining part is different. The S&P 500 has again outperformed the MSCI ACWI and the Russell 2000 and is the only stock index included in the optimal portfolio. Additionally, 21% of the portfolio is invested in alternatives. This share increased from only 2.1% in table 12. The FTSE/NAREIT REITs index is included with 14.4% and the GSCI with 6.6%. These shares are an indicator that due to the better performance and lower correlation, investors were able to profit from diversification benefits by including alternatives into their investment portfolio. This becomes even more obvious in Figure 5 that presents the efficient frontier of the three portfolios.

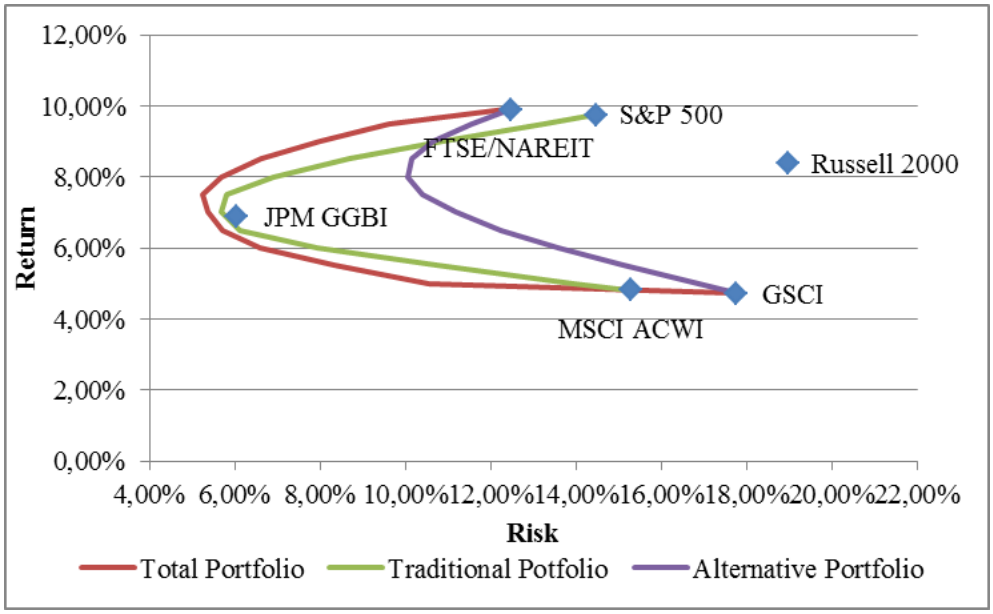

Figure 5 Efficient Frontier 1990 - 2002
Source: Own presentation based on Index data

According to the investigated data, it would have been possible to reduce the overall portfolio risk with an investment in an asset-mix of traditional and alternative investment opportunities. The efficient frontier of the mixed portfolio outperforms the one of the separate traditional and alternative portfolios in terms of risk as well as return. Hence investors would have been able to realize diversification benefits and reduce their portfolio risk by mixing alternative assets in their portfolios. In addition to that, higher risk mixed asset portfolios which include alternative investments outperform those consisting solely of traditional assets.

These findings are contrary to the ones made in the previous analysis of the entire time horizon where no diversification benefits were observable. However the better risk-return ratio of the two alternative investments and the lower correlation to the traditional investments enable investors to either increase portfolio returns or decrease portfolio risk.

Table 8 shows the optimal portfolio for the second sub-sector. As already assumed earlier, the portfolio is heavily influenced by the financial crisis and the resulting market turbulences. It is the only portfolio that consists of only two investment opportunities, governmental bonds and the S&P 500. In addition to that is the share of low risk government bonds with 87.2% the highest of all thee optimal portfolios. The remaining 12.8% are invested in the S&P 500 which shows the second to lowest correlation to the JPM GGBI but a lower volatility than the Russell 2000, which had the lowest correlation.

Table 8 Mean Variance Portfolio 2003 - 2015

	Mean Return	Standard Deviation (σ_n)|	w_n	$w_n \sigma_n$
MSCI ACWI	7.60%	17.42%	0.00%	0.00%
S&P 500	7.67%	16.34%	12.75%	2.08%
Russel 2000	9.02%	22.29%	0.00%	0.00%
JPM GGBI	4.70%	6.84%	87.25%	5.97%
FTSE/ NAREIT REIT`s	10.49%	29.13%	0.00%	0.00%
GSCI	-2.31%	25.73%	0.00%	0.00%
			100.00%	
Portfolio Return	5.082%			
Portfolio Variance	0.420%			
Portfolio Standard Deviation	6.479%			
R(f)	1.286%			
Sharp Ratio	0.586			

Source: Own presentation based on Index data

With an expected portfolio return of 5.08 % offers the optima portfolio of the second sub-sector the lowest portfolio return of all portfolios constructed and additionally, none of the alternative investment opportunities are included. Furthermore is it with a standard deviation of 6.48% the most risky one. This shows again the huge impact of the financial crisis and the increased market volatility. However, the Sharpe ratio of the optimal portfolio is with 0.586 the highest of all portfolios.

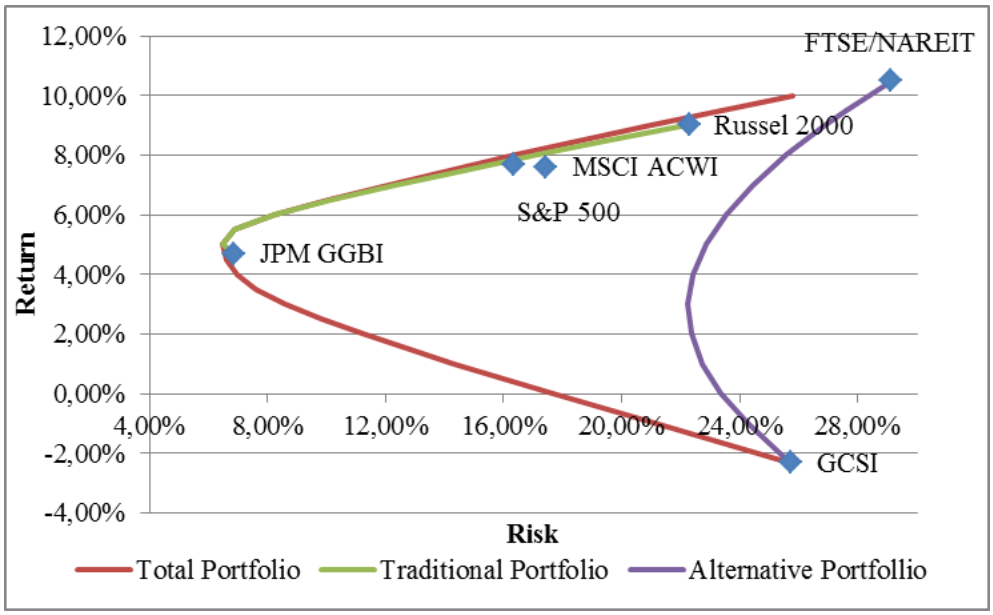

Figure 6 Efficient Frontier 2003 - 2015

Source: Own presentation based on Index data

Figure 6 presents the efficient frontiers of the three different portfolios constructed in sub-sector two. It clearly indicates the poor performance of commodities with a high risk and a negative return. It also shows that almost no diversification benefits would have been realized with an investment in alternative investments. The efficient curve of the total portfolio is almost equal to the one of

the traditional portfolio for most of the time, only with increasing riskiness; real estate becomes attractive due to the high return opportunities.

5 Conclusion

The low interest environment in most developed countries and the rising correlation among financial markets have required investors to search for new investment opportunities. Due to this market conditions they started to search beyond the classical stock and bond markets and opened the door for alternative investments such as hedge funds, venture capital investments, commodities or real estate. This article focused on the latter two investment opportunities and pointed out several of their most attractive characteristics.

The main goal of this article was to examine whether it was beneficial to add alternative investments to a traditional investment portfolio over the last 25 years. Hence the main hypothesis was: Can the risk-return relationship of an investment portfolio be enhanced by adding real estate and/or commodities to it?

The basic theoretical foundation was laid in chapter one with the literature review. Additionally, due to the fact that no common definition of alternative investments is existent, several definitions of different researchers were presented and compared. Furthermore the potential benefits of adding real estate and commodities to an investment portfolio were given. The first chapter closes with a presentation of several shortcomings of the underlying model regarding its assumptions and the dispute between behavioral and traditional finance.

In the second chapter the general model and its statistical basis were explained. Moreover, the used indices and the data source, Thompson/Reuters Datastream, were described.

The empirical data analysis is presented in chapter three and starts with the investigation of the historic performance of the indices and the calculation of the input factors of the final portfolio construction. Due to the division of the dataset into three different time periods, the author was able to examine whether the input factors were constant over time or affected by macroeconomic events and therefore volatile. Afterwards the optimal portfolio for each time period was constructed and the efficient frontier discussed.

The optimal portfolio for the entire time period contained only a very low share of 2.1 % of alternative investments. Even though this share increased with rising risk levels, the underlying hypothesis whether it was possible to enhance the risk-return ratio of an investment portfolio by including alternative investments, has to be negated. The investigation showed that over the entire 25 years almost no diversification effects where achieved by the two alternative indices. However, the analysis of the first sub-sample indicated differently. Here significant enhancements of the risk-return ratio where observable, this resulted in an increase in the share of alternative investments to 21 %. Yet in the second sub-sector no alternatives where included in the optimal portfolio at all. Yet these where offset by the changes that happened in the second sub-sample.

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Determination of Financial and Economic Implications of Air Accident at the Airport

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Abstract

Crisis situations become a part of our common life. These situations pose a threat not only to individual processes in our lives, but also to business processes, even the existence of businesses. For this reason, it is very important for businesses to anticipate these situations and have been prepared beforehand. Effective handling of this crisis situation is based on a well prepared plan for managing emerging crisis phenomena. Airline companies, especially airports must pay close attention to the preparation and development emergency plans, under which they are prepared various scenarios for crisis management of all possible types of emergency crisis situation. However, this plan does not address the issue of the impact of the crisis situation. The range of material, but especially financial, impacts of individual emergency crisis may vary. However, it is possible to estimate the minimum financial cost limit in the event of a given crisis situation.

Keywords: Cost, Crisis, Crisis situation, Air accident, Financial analysis.

JEL Classification: G01, G30, Z3

1 Introduction

Airport surface safety and in particular runway and taxiway safety is acknowledged globally as one of aviation's greatest challenges. Aurtors usually write studies about airport safety, but they don´t calculate the financial cost of accident at airport. Wilke et al. (2015) introduces a novel methodology for risk and hazard assessment of airport surface operations, and models the relationships between airport characteristics, and the rate of occurrences, the severity of occurrences, and the causal factors underlying occurrences. All airports are required to have an emergency plan drawn up. Part of this plan is the development of the procedures for defining the

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activities of all aeronautical services, including their responsibilities, for which an extraordinary event has occurred. Emergency plan for airports processed to minimize the consequences of emergencies, not only materially but also personnel and financial terms. The emergency plan is developed on the basis of an airport need, whose role is to manage the crisis situations arising within its scope.

Previous studies (Shangyao & Chung-Gee, 1997; Government of Canada, 2002; Rupp, Holmes, & DeSimone, 2003; Balvanyos & Lave, 2005; Gordon, Moore II, Park & Richardson, 2007) have produced estimates of the economic implications of terrorism on commercial aviation and the cost of a shutdown for a specific stakeholder. Pejovic, Noland, Williams and Toumi (2009) simulated and assessed the effects of a short-term shutdown at London-Heathrow for some stakeholders (airlines and passengers). Maertens (2012) used this research to assess more in depth the interruption losses of a shutdown for the airport and airlines. Therefore, the objectives of this research are to determine all economic effects and costs of a temporary shutdown of an airport for different stakeholders, and this both in the short and long run.

Another study (De Langhe, Struyf, Sys, Van de Voorde, & Vanelslander, 2013) determine all economic effects and costs of a temporary shutdown of an airport for different stakeholders, and this both in the short and long run.

The cost of providing security in airports, especially in facilitating passenger throughput, has risen despite efforts to upgrade training and technology. The classic measure of passenger throughput assumes passengers are passive cogs in a carefully designed security matrix to optimize output. This perspective does not take into account passenger behavior. (Kirschenbaum, 2013)

The term "extraordinary event" refers to all events whose accompanying feature is threatening human life and material damage. Aviation terminology distinguishes eight types of extraordinary events. The individual extraordinary events are shown in Figure 1.

Among the entities that provide security and are involved in recognizing and dealing with any emergency situation occurring in civil aviation mainly include:

- Ministry of Transport and Construction of the Slovak Republic,
- Ministry of the Interior of the Slovak Republic,
- Ministry of Defence of the Slovak Republic,
- Ministry of Finance of the Slovak Republic,
- State administration bodies within their competence,
- Police force,
- Airport operator,
- Air ground equipment operator,
- Airline operator,
- Air traffic service provider.

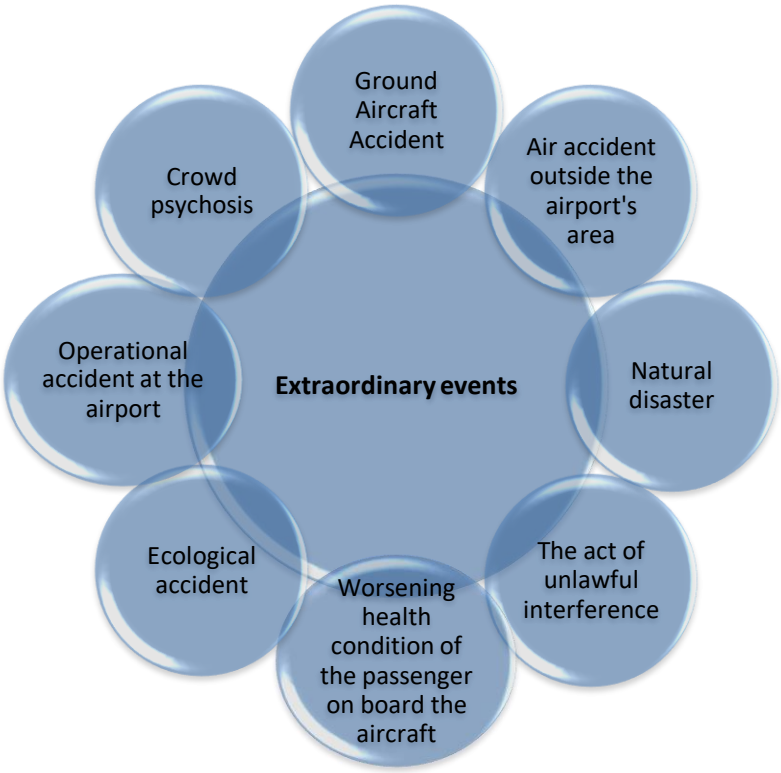

Figure 1 Extraordinary events
Source: Authors

For analysis needs in terms of content intensity the article discusses selected crisis situations, including ground aircraft accidents and air accidents outside the airport's periphery, which are also categorically similar. The above-mentioned emergencies was also created simulated accident at the airport in order to highlight the impact of such an incident to the financial costs of the airport. As a prerequisite for the realization of the simulated extraordinary event, the conditions of the international airport were chosen - Airport Košice, a.s., while the simulation of the accident was based on the organization of this airport. Simulation is also applicable to airports of a similar type and character.

2 Ground Aircraft Accident

Air accident at the airport is defined as an occurrence associated with the operation of an aircraft which takes place at the time of boarding the first person with the intention of flight until time as all persons have left the aircraft and that has resulted in death or injury to any of the persons or damage aircraft. (Rozenberg & Szabo, 2009)

Announcement of the occurrence of an emergency incident in the form of air accident at the airport receive the leading shifts at the airport control tower. The head of shift at the airport control tower is then obliged to inform:

- Regional Control Centre,
- Airport Protection Department,
- Department of Air Dispatching.

The Regional Control Centre launches an Integrated Emergency Coordination System that includes calling:

- Rescue fire service,
- Emergency Medical Service if located at the airport.

Department of airport dispatching is subsequently obliged to report an air accident to notify the following components:

- Chairman of Emergency Management,
- An aircraft operator affected by an emergency at the airport,
- The Transport Authority of the Slovak Republic,
- Airport spokesperson,
- Border Police Department.

All of these steps are illustrated and described in each Airport Emergency Plan. When occurrence of an emergency of any kind is necessary that all components, which are listed event relates to adhere assembled emergency plan and to follow up effectively.

Ground accident - an incident, is an event other than an accident, associated with the preparation of an aircraft to flight, its operation, treatment, maintenance, repairs or the state, resulting in damage to health or death of the person or damage or destruction of the aircraft. (LAA SR, 2001)

3 Modeling of Financial Costs of Air Accident at the Airport

The individual process steps are differently valued financially and also are valued on the basis of different parameters. For this reason, it is necessary to analyze financial expenses gradually take into account and process all the parameters that enter directly into the process of solving the given extraordinary event.

For more effective and clearer view of the individual cost items it was created scheme, which takes the form of Figure 2.

Figure 218 Components affecting the amount of financial costs of an extraordinary event
Source: Authors

In case of ground aircraft accident costs are quantified on the basis of the total consumption of extinguishing agents. The current price list for the most basic extinguishing agent, Stahmex class-A, is approximately € 5 per litre (actual price list of Pyrotex s.r.o., January 2017). The percentage of admixing using a pen that is available to the Fire Rescue Service is 3%. For 100 litres of water, it is 3 litres of foam. It is estimated that about 34 m^3 of water and 1,000 litres of foam are consumed to eliminate the consequences of an accident at the airport. The total cost of fire fighting agents may range from € 5,100 or more depending on the severity of the emergency situation.

The prices of fire extinguishers used for the elimination of extraordinary events range from € 11 to € 40 for a powder fire extinguisher depending on size. Snowflakes from € 30 to € 40 depending on size. (This price is from actual price list from Pyrotex s.r.o., January 2017.)

The fire extinguishers also use fire extinguishers ranging from € 130 to a burglar hook, €120 for a fire brigade, € 70 per shovel, € 120 per fire brig, € 230 per crank, € 100 per hammer and € 80 for a fire axe. All these prices are only approximate, depending on the type and size of firefighting equipment. (This prices are from actual price list from Pyrotex s.r.o., January 2017.) The approximate fuel consumption of the fire and rescue vehicle is 50 litres per 100 kilometres. The total cost of fuel consumption, using one fire truck, can range from € 70 (This price is calculated from actual price list fuel consumption, January 2017).

If the airport does not have its own ambulance on its premises, the injured person injures the injured nest. In the nest of the wounded, the Emergency Health Service take over these people. The price for one fast medical assistance with the Mobile Intensive Unit equipment is about € 50. The price for one kilometre of the aforementioned ambulance is € 0.79 (Price list from Košická záchranka).

When a ground air accident occurs, it is also necessary to provide an alternative transport for passengers for the purpose of moving to a hospital and a place of substitute accommodation.

Refuelling with one bus for approximately 50 passengers is estimated to be between € 200 and € 300 (Price list from Interbus).

Table 1 shows the approximate sum of individual components in the event of a ground air accident. This amount is only indicative and shows the amount needed to hit a single component of the rescue component.

Table 1 Financial analysis of ground aircraft accident.

Rescue unit	Performance	Amount per performance (EUR)
Rescue and fire brigade:	Extinguishing agents (foam)	from 5 100
	Fire extinguishers	from 40
	Fire fighting tools	from 100
	Fuel consumption (100km)	from 70
Emergency Medical Service	Quick medical service	from 50
	Price per km	0,79
	Replacement transport	from 200

Source: Own elaboration

The resulting amount, after counting all the items in Table 1, is equal to € 5 560. This amount is not final. It is an amount that should be considered, at a minimal cost, for the elimination and destruction of a ground aircraft accident. In fact, these amounts can grow up to several 10 times. It all depends on the scale, size, severity of the emergency, and the rescue component.

4 Discussion

The issue of security and crisis management in air transport and, in particular, in the airport's territory is dealt with by many authors and practitioners. The problem of these studies is that they are elaborated from a procedural point of view and there is a minimal scope of the financial field. It is very difficult and problematic to obtain specific financial data in the form of cost items that are needed to eliminate a given crisis event or, eventually, which items is airport forced to incur in such an event. Airports use reserve funds to fund such events as well as using funds gained from insurance contracts. It is because of these facts the airport uses these data for internal purposes only and the public has no access to them. At the same time, the airports do not even quantify either the estimated or minimal funds that are associated with the individual crisis events occurring in the airport's territory. This is where we see the problem, because by such a prediction, which would point to the minimum costs of the crisis situation, the airports would be able to prepare for the event not only on the procedural side but also on the financial side. For this reason, this contribution, which is part of this financial study, points to the minimum financial cost needed to overcome the crisis situation.

5 Conclusion

The financial cost of individual aviation crisis situations and its quantification is relatively complex. Each airport maintains its own pricelists and financial headings, setting out the exact amount of the financial costs of this aviation crisis. This quantification depends on a number of factors, including, the quantity of rescue and other equipment used and not least the scope of

cooperation with other parts of the airport. Many airports currently do not even create a financial reserve that they could use in the event of an extraordinary crisis situation. For this reason, airports have no idea what the costs arising from the intervention of rescue forces. This role is mostly left to external companies, such as insurance companies, which are responsible for the liability for damage caused by airport operations.

The financial analysis described in the article represents only a simulated situation, provided the minimum and basic means of solving the accident at the airport are used. With this amount, international airports of similar magnitude could be considered as the minimum financial costs required for the performance of individual rescue units. It should be noted that every exceptional emergency situation can give rise to other emergency situation. On the basis of such a financial assessment of the minimum cost of an accident, the airports could produce forecasts of individual extraordinary events to ensure the stability and smooth development of the airport.

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Is There Relationship between Financial Performance of Shared Services Centres in Slovakia and Their Parent Companies?

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Abstract

Shared services centres in Slovakia were established as separate legal entities and as subsidiaries of foreign entities. The number of centers in Slovakia exceeded thirty and employs over thirty thousand employees. Founders of shared services centres are parent companies and this article deals with hypothesis if subsidiary companies bring any value to their parent companies. We compared indicators - Earning per Share, Return on Investment within parent company, and with Return on Equity within subsidiary company. For analysis, we used data from10-K forms and annual reports of both types of companies. We led research through companies which have at least seven years domestic business activity. We have established the hypothesis that there is dependence between the EPS and ROI indicators of the parent company and the ROE of the subsidiary located in Slovakia. The hypothesis was verified by statistical analysis based on the values of indicators.

Keywords: Shared Service Centres, Earning per Share, Return on Investment, Return on Equity, Correlation Coefficient.

JEL Classification: C12, G39, M21

1 Introduction

Shared services entered the corporate lexicon in the early 1990s as large decentralized companies sought to combine basic transactional processes such as payroll, purchasing and accounts payable, and sell back those services at cost to the individual business units (Cacciaguidi-Fahy et al., 2002). In the past twenty years there has been a trend for replacing the traditional model of organizing service activities in business divisions with an outsourced model. The importance for outsourcing was that it allows put attention on core activities and it engages the expertise into special activities. Shared services centres (SSC) have an advantage over outsourced model due to the fact that they contribute to the firm's intellectual property. According Herbert and Seal (2013), a core competency of the company is in managing a bundle of engineering projects, while support activities such purchasing, accounting, billing, cost analysis, debt collection, controlling and others are enabled by the SSC. Although the SSC have a back-office function, they are not seen as a peripheral activity. The SSC differentiated the company from the independent contractors and contingent workers, who could do the engineering work only on a much smaller scale because they did not have the central administration and project management skills to maintain the infrastructure, manage the business and deal with the regulator (Herbert & Seal, 2013, 2014). A company through

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centralizing project management activities around the SSC acquires significant competitive advantage, in spite of outsourcing those functions. Schulman et al. (1999) define shared services as the concentration of company resources performing like activities, typically spread across the organization, in order to service multiple internal partners at lower cost and with higher service level, with the common goal of delighting external customers and enhancing corporate value. Longwood and Harris (2007) made simple definition of shared services: „Shared services involve the aggregated provision of a business process." Goold et al., (2001) called shared services as centralized services provided to the business. Companies' policies concerning shared services differ widely. Some centralize most or all services to the business, believing that centralized services are seldom truly cost effective and responsive to business needs. SSC can be highly effective, whether due to focused management attention, economies of scale, or opportunities for standardization. The services may be standard, process-driven activities, such as payroll or payments processing, or they may be more complex, professionally-driven expert services, such as applications software development or business intelligence. The divisions or businesses, which would have to carry out or buy in the services themselves if they were not provided by the centre, normally have some control over the work done (Goold et al., 2001). The shared services are provided by organizationally distinct, business-like units, separated out from other functional or departmental activities, and often run by someone in general management role. Wagenaar (2006), Janssen and Wagenaar (2004) explored the concept of the SSC by analyzing the motives for starting a SSC and management issues determining success and failure. According these authors, the main motivation for SSC founding is to cost reduction and concentration of expertise. McIvor et al. (2011) claimed shared services centres have been viewed as a strategy for achieving efficiencies and improved service in back-office functions such as finance and accounting, human resource, and procurement. Organizations have been increasingly turning to vendors to implement and manage outsourced shared services arrangements. Borman (2008) considers that SSC should aim to realize economies of scale by providing a broad range of transaction processing services using a standardized IT platform. Additional factors associated with successful SSCs include the SSC being held accountable for its results and there being an emphasis on managing the cultural change associated with the introduction of shared services. Davenport (2005, 2009), Stašová and Bajus (2015) dealt with setup and testing processes in organizations.

Gill and MacCormick, (1999) distinguished between two types of shared services providers:

- Shared service centres: they undertake generic, high-volume, repetitive activities, generally relying on established databases and decision rules. Economies of scale can come from peak-flow management, specialized equipment, and concentration at a single site.
- Centres of excellence: they concentrate specialists with skills and knowledge that are required only occasionally or on a project basis within a single unit. Economies of scale are achieved through reduced replication, a lot of talent and knowledge.

Potential benefits of SSC include reduction in the cost of providing administrative services, improved performance, and a better focus on core business. Potential disadvantages include high implementation costs; reduced control of administrative services for participating departments, support services may be less accessible to or appropriate for departmental staff.

The following table summarizes the types of functions of both types of providers.

Table 1 Types of functions for SSC and Centres of Excellence

Type of provider	Human resources	Accounting	Information Systems	Other
Shared Service Centres	Payroll Records Management Leave Processing Training	Monthly Accounts Time-Cost Systems Accounts Payable Invoicing	Help Desks Records Management Library Services Media Training	Customer Call Centres Security Facilities Management
Centres of Excellence	Development Plans Restructuring Job Sizing Recruitment Performance Appraisal	Tax Audit Systems Design Finance	Systems Design Software Development Archiving	Legal Communications Public Relations Health and Safety

Source: Gill & MacCormick (1999)

2 Research and results

2.1 Research methodology

The purpose of the article is to examine whether there is a dependency between the values of the EPS and ROI indicators of the parent company and the value of the ROE indicator of the subsidiary. The source of the data was annual reports of parent companies (or their 10-K forms) and data from the financial statements register of domestic subsidiaries. The annual reports of parent companies do not contain detailed segmented data on investments and results of operations by individual subsidiaries. For this reason, we have selected indicators that are related to each other, such as:

- Return on investment of parent company (ROIp) – measures the firm's overall performance in using its assets to generate earnings.
- Earnings per share of parent company (EPSp) – shows how much of the company's total earnings accrue to each share. In order to remove the different tax burden and interest expense, the EBIT indicator was used (Earning before Tax and Interest).
- Return on equity of subsidiary company (ROEs) – this measure relates the firm's profitability to common stock shareholders (Brownlee et al., 2001).

$$ROI = \frac{Earning\ before\ interest\ and\ tax}{Average\ total\ assets} \quad (1)$$

$$EPS = \frac{Net\ Income - Preferred\ dividends}{Weighted\ average\ number\ of\ common\ shares\ outstanding} \quad (2)$$

$$ROE = \frac{Net\ income}{Average\ total\ owner's\ equity} \quad (3)$$

The ROI indicator evaluates the profitability of the company's total invested assets, including financial investments in subsidiaries. The financial investment of the parent company appears in the subsidiary's equity. Subsidiary SSCs usually have only one shareholder, which is the parent company. The return on investment in subsidiary could be measured by the ROE indicator. The EPS is another indicator that brings to the shareholder of the parent company information how much the company generates profit in terms of the number of shares defined in the denominator of

the indicator. We can conclude that the value of the parent company's EPS indicator is related to the results (profit or loss) of the SSC subsidiary.

Figure 1 The relationship between the indicators of ROI parent, ROE subsidiary, EPS parent
Source: Own elaboration

Whether there is relationship between ROI_p and ROE_s and between ROE_s and EPS_p, we displayed line charts of analyzed pairs of variables. After that we made calculations of rank correlation coefficients to measure how well the relationship between two variables is.

2.2 Parent and subsidiary companies

We have selected twelve parent and subsidiary companies, from which we have gathered data from years of 2008 – 2016. Data of parent companies were taken from the annual reports or 10-K forms, and data of subsidiaries were taken from the financial statements register. Parent companies and subsidiary companies with activities described are shown in Table 2.

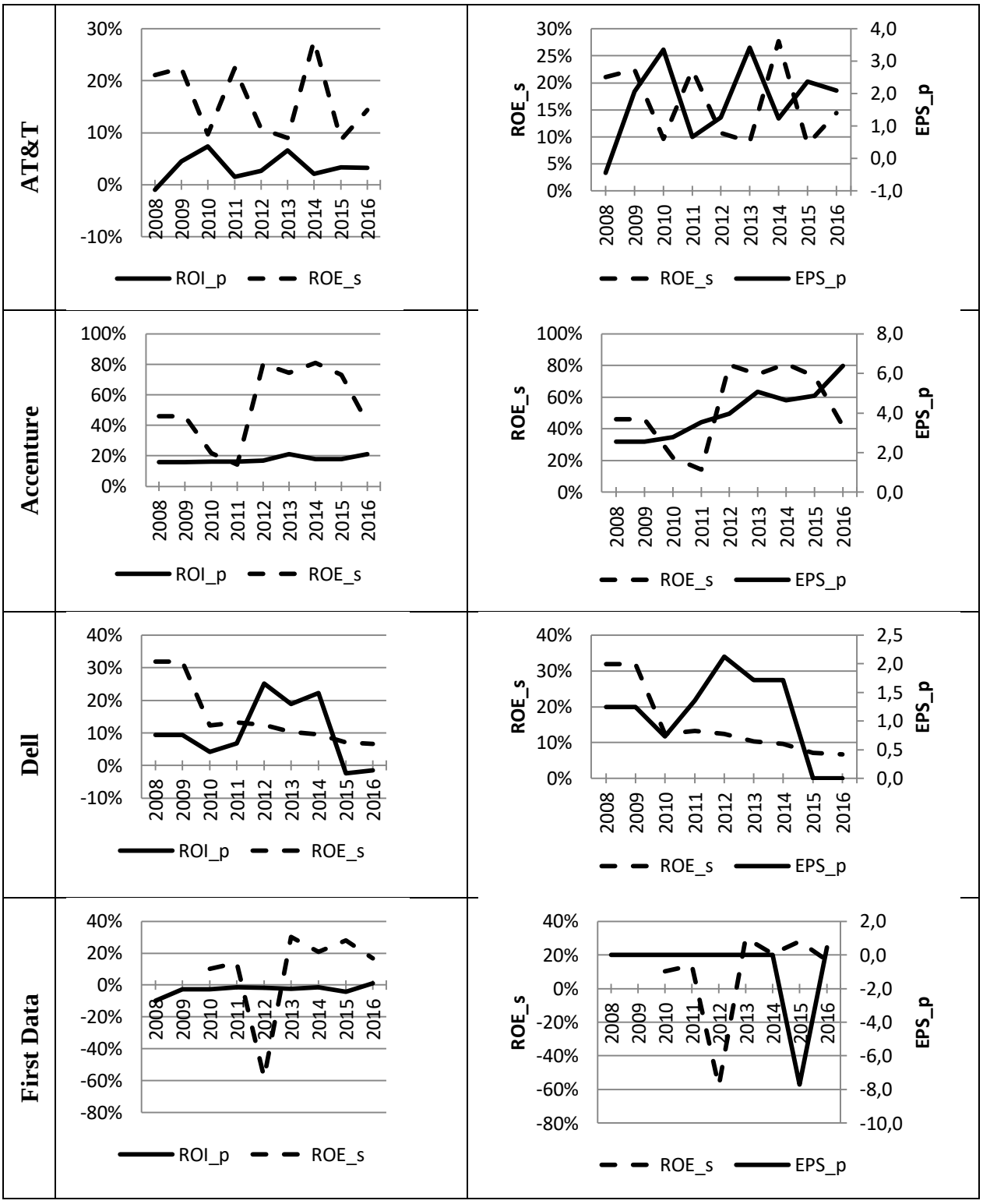
Table 2 Parent companies, subsidiary shared services centers, and their activities in Slovakia

Parent company	Subsidiary SSC	Activity of SSC
AT&T Inc., Texas	AT&T Global Network Services Slovakia, s.r.o.	Customer support and network engineering
Accenture plc., Ireland	Accenture Technology Solutions-Slovakia, s.r.o.	IT development and maintenance
Dell Technologies Inc., Texas	Dell, s.r.o.	EMEA region customers support
First Data Corporation, New York	First Data Slovakia, s.r.o.	ATM and POS payment systems services in EMEA region
Henkel AG & Co. Germany	Henkel Slovensko, s.r.o.	Financial services, IT, HR services, purchasing, marketing and business
HP Inc. California	Hewlett-Packard Slovakia, s.r.o./Enterprise Services Slovakia s.r.o.	Support and services for EMEA customers, development of services solutions
IBM Slovensko, s.r.o.	IBM International Services Centre, s.r.o.	Financial, administrative and IT services, customers' support
Johnson Controls International, plc. Ireland	Johnson Controls International, s.r.o.	Controlling, internal audit, HR, IT, purchasing, sales, for EMEA, Asia, North America regions
Lenovo Group Limited, Hong Kong	Lenovo (Slovakia) s.r.o.	Providing services to EMEA region customers
T-Systems International GmbH, Frankfurt/Main, Germany	T-Systems Slovakia, s.r.o.	Services for global corporate customers of Deutsche Telecom
Deutsche Telekom AG, Bonn	Deutsche Telekom Services Europe, Slovakia, s.r.o.	Finance and accounting, operational purchasing, ERP hub
UNIQA Insurance Group AG, Wien	Uniqa Group Service Center, s.r.o.	Administrative management of the portfolio of commercial insurance companies in the UNIQA Group

Source: Own elaboration

2.3 Graphical display

To see possible dependence between ROI of parent company (ROI_p) and ROE of its subsidiary (ROE_s) and between EPS of parent company (EPS_p) and ROE_s we displayed line charts of these pairs of variables (Figure 2).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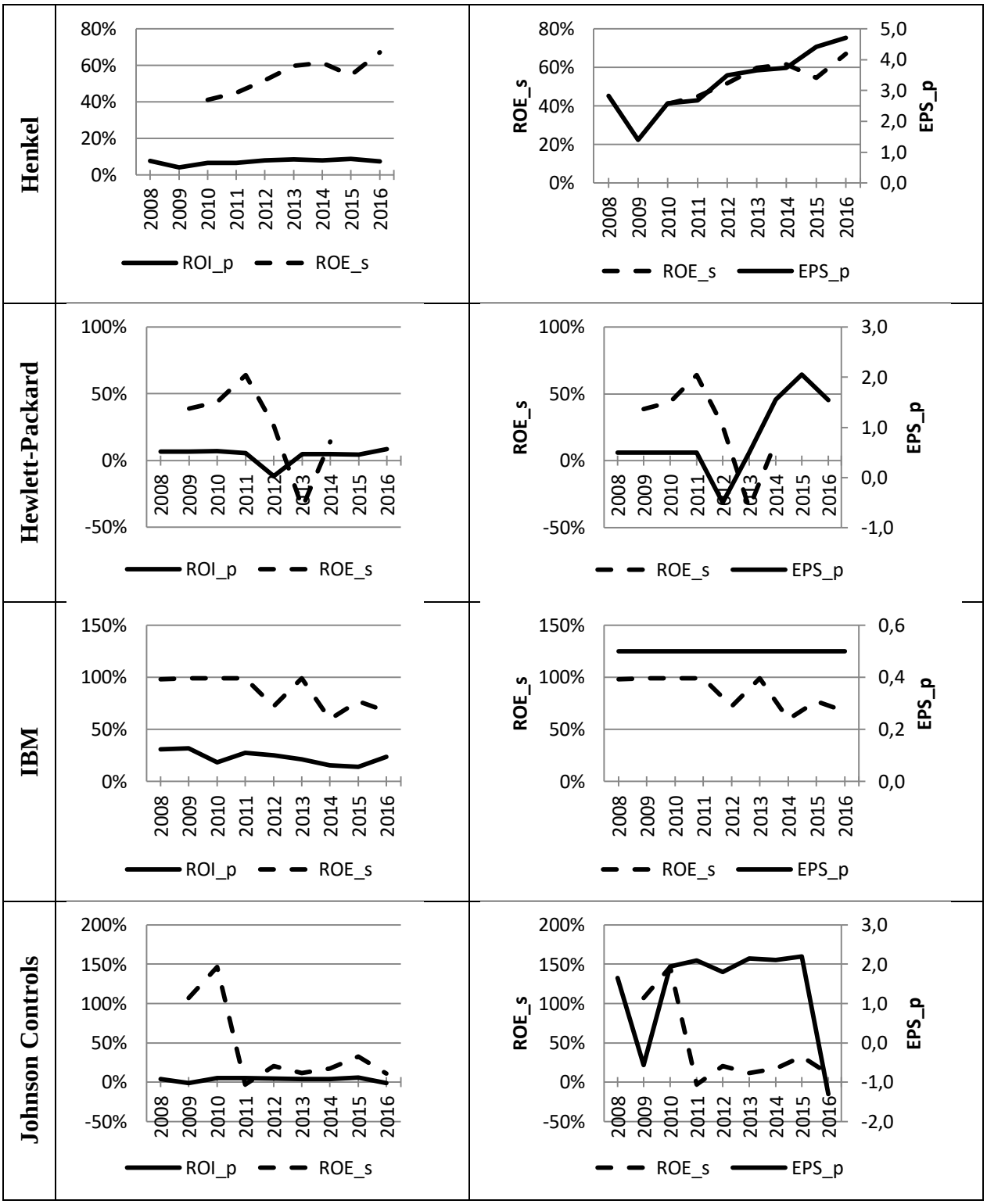
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ROE_s
EPS_p

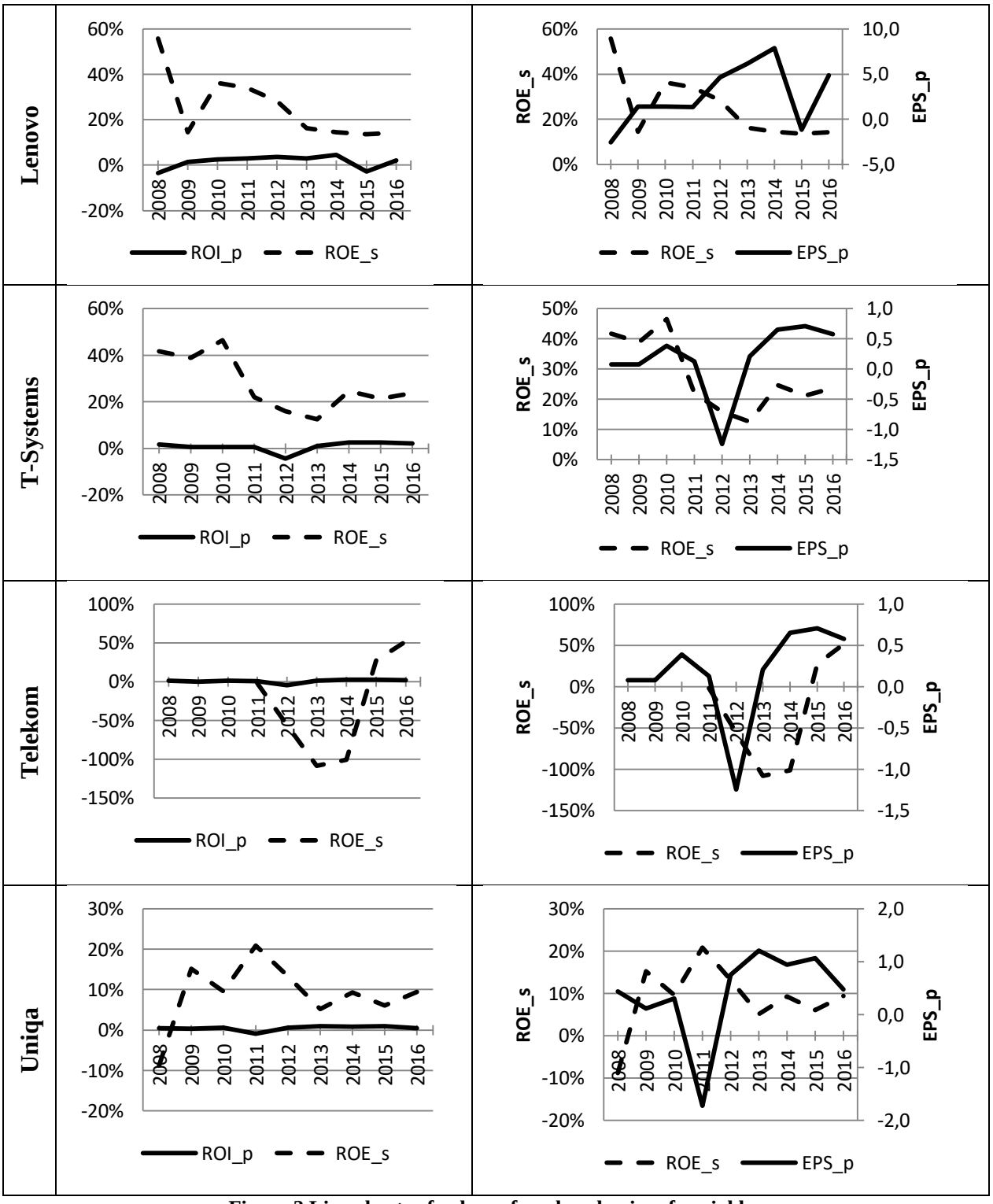

Figure 2 Line charts of values of analyzed pairs of variables
Source: Own elaboration

Resulting from graphs, there is no evident dependence between pairs of variables in most cases. AT&T, Henkel and T-Systems are exceptions, where the stronger dependence between variables could be expected. AT&T demonstrates evident negative dependence.

2.4 Coefficients of rank correlation

By reason of small number of pair observations (year data for 9 years), we used rank correlation coefficients namely Spearman's rho correlation coefficient and Kendall's Tau b correlation coefficient; for detection of strength and tendency of dependence between variables of ROI_p and ROE_s and between EPS_p and ROE_s. The Spearman correlation as well as Kendall correlation between two variables will be high when observations have a similar rank between the two variables, and low when observations have a dissimilar rank between the two variables. Spearman's coefficient and Kendall's tau coefficient is appropriate for both continuous and discrete variables, including ordinal variables.

Spearman's correlation or ***Spearman's rho*** (greek letter ρ) is the most popular nonparametric measure of rank correlation - statistical dependence between the ranking of two variables. It assesses how well the relationship between two variables can be described using a monotonic function. Spearman's correlation assesses monotonic relationships (whether linear or not). If there are no repeated data values, a perfect Spearman correlation of +1 or −1 occurs when each of the variables is a perfect monotone function of the other.

Calculation of Spearman's rho: A sample of size n: first, the n raw scores X i , Y i are converted to ranks *rg Xi* , *rg Yi* . Only if all n ranks are distinct integers, it can be computed using the popular formula (Spearman, 1904):

$$\rho = 1 - \frac{6 \sum d_i^2}{n.(n^2-1)} \qquad (4)$$

where: $d_i = rg\ (Xi) - rg\ (Yi)$ is the difference between the two ranks of each observation, n is the number of observations.

Kendall's correlation or ***Kendall's tau*** (greek letter τ) is another statistic used to measure the ordinal association between two measured quantities (Kendall, 1938). It is a measure of rank correlation: the similarity of the orderings of the data when ranked by each of the quantities. Calculation of Kendall's tau: Any pair of observations (x_i, y_i) and (x_j, y_j), where $i \neq j$ are said to be concordant if the ranks for both elements (more precisely, the sort order by x and by y) agree: that is, if both $x_i > x_j$ and $y_i > y_j$ or if both $x_i < x_j$ and $y_i < y_j$. They are said to be discordant, if $x_i > x_j$ and $y_i < y_j$ or if $x_i < x_j$ and $y_i > y_j$. If $x_i = x_j$ or $y_i = y_j$, the pair is neither concordant nor discordant.

The Kendall's τ coefficient is defined as (Nelsen, 2001):

$$\tau = \frac{(number\ of\ concordant\ pairs) - (number\ of\ discordant\ pairs)}{n(n-1)/2} \qquad (5)$$

Calculated values of correlations between ROI_p and ROE_s are shown in Table 3. As we can see the strongest positive rank correlation is in company Hewlett Packard (rho = 0,6), next are firms with stronger negative correlations between observed variables, namely Uniqa (rho = -0,57) and AT&T (rho = -0,53). Another observed firms reported weak dependence. However, dependence is not statistical significant in three mentioned firms, what is given by small number of statistical sets (year data for 9 years).

Table 3 Correlation between ROI_p (ROI of parent company) and ROE_s (ROE of subsidiary)

ROI_p and ROE_s	AT&T	Accenture	Dell	First Data	Henkel	Hewlett Packard
Spearman´s Rho	-0.5333	0.2941	0.3613	-0.2143	0.3571	0.6000
Prob > |r| under H0: Rho=0 p-value	*0.1392*	*0.4424*	*0.3393*	*0.6445*	*0.4316*	*0.2080*
Kendall´s Tau b	-0.3333	0.1428	0.2571	-0.1428	0.1428	0.3333
Prob > |tau| under H0: Tau=0 p-value	*0.2109*	*0.5982*	*0.3429*	*0.6523*	*0.6523*	*0.3476*
ROI_p and ROE_s	IBM	Johnson Controls	Lenovo	T-Systems	Telekom	Uniqa
Spearman´s Rho	0.4000	0.1904	-0.0333	0.1000	0.0857	-0.5667
Prob > |r| under H0: Rho=0 p-value	*0.2861*	*0.6514*	*0.9322*	*0.7980*	*0.8717*	*0.1116*
Kendall´s Tau b	0.3333	0.1428	-0.0555	0.0556	0.0667	-0.4444
Prob > |tau| under H0: Tau=0 p-value	*0.2109*	*0.6207*	*0.8348*	*0.8348*	*0.8517*	*0.0953*

Source: Own calculation in statistical software SAS EG

Correlations between EPS_p and ROE_s are shown in Table 4.

Table 4 Correlation between EPS_p (EPS of parent company) and ROE_s (ROE of subsidiary)

EPS_p and ROE_s	AT&T	Accenture	Dell	First Data	Henkel	Hewlett Packard
Spearman Correlation	**-0.7166**	0.2941	0.3305	-0.2672	**0.8928**	-0.1690
Prob > |r| under H0: Rho=0	***0.0298***	*0.4424*	*0.3850*	*0.5623*	***0.0068***	*0.7489*
Kendall Tau b Correlation	**-0.6000**	0.1428	0.2059	-0.1973	**0.8095**	-0.0860
Prob > |tau| under H0: Tau=0	***0.0406***	*0.5982*	*0.4558*	*0.5684*	***0.0107***	*0.8216*
EPS_p and ROE_s	IBM*	Johnson Controls	Lenovo	T-Systems	Telekom	Uniqa
Spearman Correlation	---	-0.0238	-0.3682	-0.0083	0.2571	-0.6833
Prob > |r| under H0: Rho=0	---	*0.9554*	*0.3296*	*0.9830*	*0.6228*	*0.0424*
Kendall Tau b Correlation	---	0.0000	-0.3098	-0.0281	0.2000	-0.6111
Prob > |tau| under H0: Tau=0	---	*1.0000*	*0.2489*	*0.9165*	*0.5730*	*0.0218*

Source: Own calculation in statistical software SAS EG
*The value of IBM´s EPS_p was constant during the whole period, so the rank correlation couldn´t be calculated
Note: Statistical significant correlations are bolded

Henkel reported the strongest positive dependence between observed variables (rho = 0.89), AT&T reported the strongest negative dependence (rho = -0.72). Both dependencies are statistical significant. Strong negative dependence has Uniqa, where correlation coefficient rho = -0.68. Other dependencies are small or none.

3 Conclusion

Shared services centres appeared in economy from early of nineties. SSC were based as decentralized companies which combine basic transactional processes such as payroll, purchasing and accounts payable, and sell back those services at cost to their parent companies. Various authors confirmed that SSC undertake generic, high-volume, repetitive activities, generally relying on established databases and decision rules. According these authors, the main motivation for SSC founding was the cost reduction and concentration of expertise activities. Our contribution explored the relationship between parent companies and subsidiaries located in Slovakia based as shared services centres using the financial indicators. We established the hypothesis that there is dependence between the EPS and ROI indicators of the parent company and the ROE indicator of the subsidiary company. We selected twelve parent and subsidiary companies, from which we gathered data from years of 2008 – 2016. Whether there was relationship between ROI_p and ROE_s and between ROE_s and EPS_p, we displayed line charts of analyzed pairs of variables. After that we made calculations of rank correlation coefficients to measure how well the relationship between two variables was. No evident dependence between pairs of variables in most cases was seen in graphs. AT&T, Henkel and T-Systems were exceptions, where the stronger dependence between variables was expected. AT&T demonstrated evident negative dependence. We used Spearman's rho correlation coefficient and Kendall's Tau b correlation coefficient for detection of strength and tendency of dependence between variables of ROI_p and ROE_s and between EPS_p and ROE_s. The strongest positive rank correlation between ROI_p and ROE_s was in company Hewlett Packard (rho = 0.6), next were negative in the firms as Uniqa (rho = -0.57) and AT&T (rho = -0.53). Correlations between EPS_p and ROE_s was strongest positive in Henkel (rho = 0.89), AT&T reported the strongest negative dependence (rho = -0.72), strong negative dependence was confirmed in Uniqa (rho = -0.68). Resulting this we can conclude that our hypothesis was not fully confirmed. The limitation of our research was small number of statistical sets (year data for 9 years). Another limitation was the size of the observed companies. Another direction of research may be the dividend policy of subsidiaries towards parent companies.

Acknowledgements

This paper has been elaborated within the project VEGA 1/0967/15: Approaches for fiscal imbalance solution in terms of the EU and in the context of the systemic crisis.

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Fiscal and real convergence in the EU-28: a panel data approach

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Abstract

The paper aims to test fiscal and real convergence in the EU-28 over the time from 1995 to 2015 and the linkage between them. Our approach consists of the estimation of the speed of real (i.e. GDP per capita) convergence and fiscal (i.e. ratio of government fiscal revenue to GDP) convergence. To compute it, we use dynamic panel data models of β-convergence concept. We use Bayesian Shrinkage estimator and Iterative Bayesian procedure, which permit to consider countries' heterogeneity and estimate the rates of real and fiscal convergence for each country in the sample. A positive linkage between fiscal and real convergence is revealed in Croatia, Slovenia and Spain, having ones of the highest rates of fiscal convergence as well as real convergence: high rate of fiscal convergence is associated with high rate of real convergence. The opposite result is obtained for Southern EU countries (Portugal, Greece, Italy and Cyprus) having high rates of real convergence, however small rates of fiscal convergence, which has been probably reduced during debt crisis in Europe. New EU members record similar high rates of fiscal convergence connected with similar medium-high rates of real convergence. Finally, a speed of fiscal convergence is globally higher than a speed of real convergence, which could lead to more synchronized business cycles in the future.

Keywords: Beta-convergence, Speed of convergence, Fiscal convergence, Real convergence, Dynamic panel model, Bayesian shrinkage estimator.

JEL Classification: O47, E60, F43, C11, C23

1 Introduction

The question of the real convergence and international business cycle synchronisation is still very topical. Many studies have already tested whether the business cycles in Europe are synchronised or not and which factors lead to real convergence between countries. As far as the determinants that stimulate business cycles synchronisation, we can cite an international trade intensity (e.g. Inklaar et al., 2008; Antonakakis & Tondl, 2014), a financial integration (e.g. Kose et al., 2003) and finally a fiscal policy and/or a fiscal convergence (e.g. Darvas et al., 2005; Degiannakis et al., 2016; Agnello et al., 2016). Darvas et al. (2005) conclude that higher fiscal convergence between countries leads to closer business cycles. Degiannakis et al. (2016) show an important effect of fiscal policy on business cycle synchronisation in EMU countries. Moreover, Furceri (2009) adds that a fiscal convergence is associated with smoother business cycles, which stimulates an economic growth. Inspired by these studies, the ambition of this paper is to contribute to the

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existing empirical research on the impact of fiscal convergence on business cycle convergence by the estimation and comparison of the rates of real (i.e. gross domestic product per capita) convergence and the rates of fiscal (i.e. government fiscal revenue-to-GDP ratio) convergence in the European Union over the time from 1995 to 2015. Our objective is to show whether higher rates of fiscal convergence are associated with higher rates of real convergence. For this purpose, we estimate dynamic panel data models of β-convergence using Bayesian procedure.

2 Beta convergence: theoretical background and empirical research

The concept of β-convergence is developed from the neo-classical growth models (Solow, 1956), which conclude that, in the long run, the economies should grow at the same exogenous rate of per capita income. In initial cross-section model of β-convergence (see e.g. Barro, 1991; Barro & Sala-I-Martin, 1992), the β-convergence assumption is accepted if the regression of the average GDP per capita growth rate of countries *i=1,…,N*, i.e. $\log(y_{iT}/y_{i0})$, on the initial value of the GDP per capita, i.e. $\log(y_{i0})$, shows a significant negative coefficient:

$$\log(y_{iT} / y_{i0}) = a - (1 - e^{-\beta T})\log(y_{i0}) + u_t \qquad (1)$$

According to β-convergence hypothesis, if the speed of convergence is positive (i.e. $\beta > 0$), then, whatever the per capita income gap between their economies, all the countries will converge towards the same level of per capita income in the long run. However, this cross-section model of β-convergence has three limits: firstly, the data cover only the first and the final period (i.e. y_{i0} and y_{iT}); secondly, the model does not permit to consider the countries' heterogeneity; and thirdly it provides only the average behavior of the sample as the estimated speed of convergence is the same for all the countries from the sample (Maddala, 1999) and results depend on the choice of countries in the sample (Maddala and Hu, 1996).Consequently,the authors (e.g. Tykhonenko, 2005; CrespoCuaresma et al., 2008; Vojinović & Oplotnik, 2008; Bonetto et al., 2009; or Próchniak & Witkowski, 2013) test the β-convergence hypothesis using dynamic panel data models, which take into account countries' heterogeneity. This is the reason why we use in this paper the Iterative Bayesian procedure, which permit to consider countries' heterogeneity and estimate, for each country in the sample, the Bayesian Shrinkage estimator for the rates of real and fiscal convergence.

2.1 Fiscal convergence and business cycles synchronisation

Empirical studies focusing on determinants of business cycles synchronisation reveal that an increase in similarity in fiscal positions affects positively a similarity in real growth rates. Darvas et al. (2005) analysed a panel of 21 OECD countries over 40 years and concluded that a fiscal convergence, i.e. smaller inter-country differences in government budget positions lead to higher business cycle synchronisation. Further, Furceri (2009) tested the effects of fiscal convergence on economic growth and business cycle volatility on the sample of 21 OECD countries over 40 years. According to his results, a fiscal convergence, measured by ratios of government surplus / deficit to GDP, leads to smoother business cycles, which even stimulates an economic growth. Artis et al. (2008) tested the determinants of business cycle correlation in enlarged European Union and revealed that divergent fiscal policies are connected with idiosyncratic cycles, i.e. more desynchronized business cycles. Antonakakis and Tondl (2014) estimated a simultaneous equations model in order to test the impact of economic policy coordination on bilateral business cycle correlations in the European Union over the time 1995 - 2012. They concluded that a poor fiscal discipline is a strongbarrierto business cycle synchronisation. Degiannakis et al. (2016) used

time-varying approach and revealed the important effect of fiscal policy on business cycle synchronisation for all analysed 10 EMU countries. Agnello et al. (2016) alsoconcluded that synchronized fiscal stimuli in advanced countries led to closer linkage between business cycles.Finally, Lukmanova and Tondl (2017) estimated simultaneous equations model covering the euro area countries over the time 2002 - 2012 and concluded that gaps in government deficit and public debt have contributed to the reduction in business cycle synchronisation in the euro area.

3 Data and methodology

3.1 Data

Our panel data analysis focuses on the sample of the European Union member countries. Overall, all 28 countries of the EU-28 have been selected. We testβ-convergence for two variables. Firstly, in order to test a real convergence, we use the annual data of GDP based on purchasing-power-parity (PPP) per capita GDP (Current international dollar). Secondly, to test a fiscal convergence, we use the annual data of general government fiscal revenue (% of GDP). Data are observed over the period from 1995 to 2015 (data source: WEO Database, IMF, April 2017).

3.2 Panel data model: Bayesian Shrinkage estimators

Thanks to the time series, the initial β-convergence cross-section regression model (see eq. 1) is transformed into dynamic panel data model(see e.g. Islam, 1995), which enables to estimate the cross-country heterogeneity in growth dynamics. In order to test a speed of real convergence, we estimate a dynamic panel data model:

$$\log(y_{it} / y_{i0-1}) = a - (1 - e^{-\beta})\log(y_{it-1}) + \varepsilon_{it} \qquad (2)$$

wherey_{it} is GDP per capita based on PPP for country *i* in time *t*;β is a speed (i.e. rate) of real convergence and ε_{it} is an error term.

Similarly, in order to test a speed of fiscal convergence, we estimate:

$$\log(REV_{it} / REV_{it-1}) = a - (1 - e^{-\beta})\log(REV_{it-1}) + \varepsilon_{it} \qquad (3)$$

where REV_{it} is a general government fiscal revenue (% of GDP) for country *i* in time *t*;β is a speed of fiscal convergence and ε_{it} is an error term.

Maddala et al. (1997), who research the specificities of heterogeneous panel estimations in dynamic models,state that "the parameters are not exactly the same, but there is some similarity between them. One way of allowing for the similarity is to assume that all the parameters come from a joint distribution with a common mean and a nonzero covariance matrix". The authors showed that the estimated parameteris then a weighted average of the overall pooled estimate and the separate time series estimates based on each cross-section. Therefore, each individual cross-section estimate is "shrunk" toward the overall pooled estimate (i.e. "shrinkage estimator"). Maddala et al. (1997) argued that this "shrinkage estimator"is preferred if the model contains lagged endogenous variables, which is the case of dynamic panel dataβ-convergence models.Inspired by Maddala et al. (1997), in our dynamic panel data model of β-convergencewe usethe Bayesian Shrinkage estimator (Hsiao et al., 1999) to compute the speeds of β-convergence for each individual country of the EU-28. We use the Iterative Bayesian procedure(see Appendix) and estimate the distribution for the rates of real and fiscal convergence.

4 Results

4.1 Bayesian Shrinkage Estimators for rates of real convergence

Table 1 Bayesian Shrinkage Estimatorsfor rates of real convergence

Shrinkage Estimators state by state: 4 iterations				
Country	**Half-life**	**Beta**	**Std. Errors**	**T-Stat**
AUT	6.2	0.0487	0.0082	5.9675
BEL	6.2	0.0488	0.0082	5.9823
BGR	6.5	0.0462	0.0093	4.9716
CYP	5.8	0.0521	0.0088	5.9418
CZE	6.3	0.0476	0.0088	5.3973
DEU	7.5	0.0403	0.0077	5.2573
DNK	6.1	0.0492	0.0084	5.8605
EST	6.0	0.0503	0.0092	5.4502
ESP	5.6	0.0533	0.0086	6.2208
FIN	5.8	0.0518	0.0086	6.0407
FRA	6.1	0.0494	0.0082	6.0294
GBR	6.1	0.0492	0.0083	5.9191
GRC	5.6	0.0535	0.0090	5.9271
HRV	5.7	0.0530	0.0091	5.7976
HUN	6.1	0.0491	0.0089	5.5431
IRL	6.5	0.0462	0.0087	5.3221
ITA	5.7	0.0528	0.0087	6.0778
LTU	6.3	0.0477	0.0092	5.2033
LUX	6.6	0.0454	0.0079	5.7307
LVA	6.1	0.0493	0.0093	5.2980
MLT	7.0	0.0431	0.0087	4.9708
NLD	6.0	0.0500	0.0082	6.0658
POL	6.5	0.0464	0.0084	5.5038
PRT	5.5	0.0552	0.0087	6.3330
ROU	6.3	0.0478	0.0094	5.0728
SWE	6.3	0.0478	0.0084	5.6980
SVN	5.9	0.0514	0.0088	5.8100
SVK	6.5	0.0462	0.0088	5.2409

Notes: tested hypothesis: absolute real (GDP per capita) convergence, period: 1995-2015.
Source: Authors' calculations

Table 1 presents the results of Bayesian shrinkage estimators for rates of real (GDP per capita) convergence (see "Beta" in Table 1) and the calculated "half-life", which indicates the number of years needed while GDP per capita gap will be halved. The results show that less advanced countries of the EU-28 have higher rates of β-convergence (i.e. Portugal: β=0.0552; Greece:β=0.0535; Spain: β=0.0533; Croatia: β=0.0530) than the richest ones (e.g. Germany:β=0.0403). This result is in accordance with the theory of β-convergence, which states that the rate of β-convergence decreases with an increase in GDP per capita level. Bayesian shrinkage estimators show that Portugal has the highest rate of β-convergence (β=0.0552, i.e. 5.52% per year, with "half-life" = 5.5 years) and Germany has the smallest rate of β-convergence (β=0.0403, i.e. 4.03% per year, with "half-life" = 7.5 years).

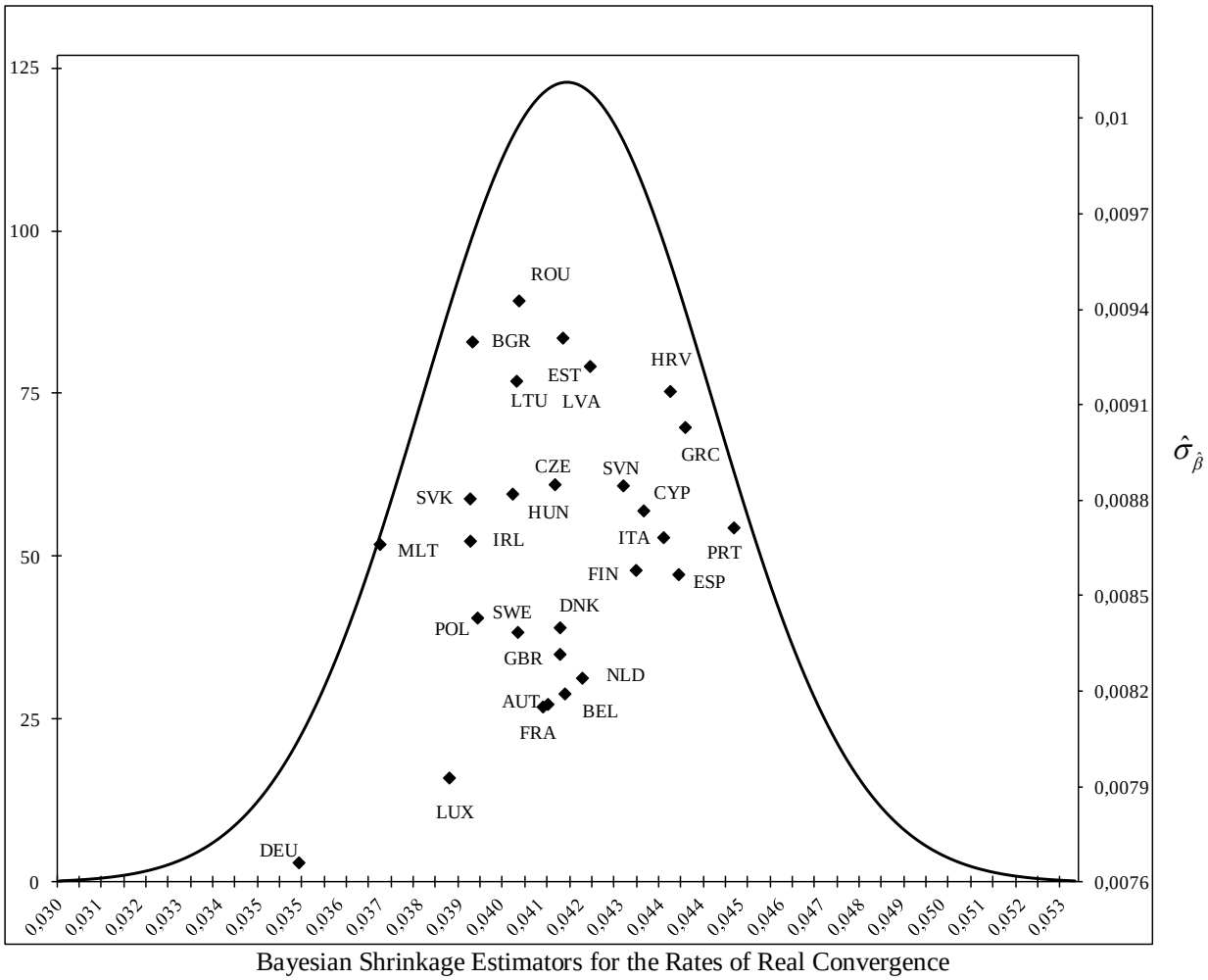

Figure 1 Distribution of Real Convergence Rates for EU-28 over the period 1995-2015.
Source: Authors' calculations

Figure 1 shows the distribution of the estimated rates of real β-convergence for each EU-28 member country. The richest and the most advanced economies of the EU-28, i.e. Germany and Luxembourg, with the smallest rates of β-convergence are situated in the first part of the distribution (from left to the right, see Figure 1). Old EU members (i.e. core EU countries) are found in second part of the distribution as their average rate of convergence is 4.8% - 4.9% per year (e.g. Austria: β=0.0487, Belgium: β=0.0488, France: β=0.0494, Sweden:β=0.0478, Denmark: β=0.0492; see also Table 1). Finally, southern European countries with high fiscal deficits such as Portugal (β=0.0552), Greece (β=0.0535), Spain (β=0.0533), Italy (β=0.0528)and Cyprus (β=0.0521) are found in the third part of the distribtion having the highest rates of real convergence.

4.2 Bayesian Shrinkage Estimators for rates of fiscal convergence

Table 2 presents the Bayesian Shrinkage Estimatorsfor rates of fiscal convergence, measured as β-convergence ofgeneral government revenue (% of GDP), which enables to show whether the countries make towards more similar values in long run (even though there is no optimal size of the measure).The highest rates of β-fiscal convergence are documented in non-euro area countries such as Poland (β=0.2391), Croatia (β=0.2387), the Czech Republic (β=0.2371) but also in euro area countries e.g. Spain (β=0.2384), Estonia (β=0.2383). The smallest rates of fiscal convergence are observed in countries with already relatively high government fiscal revenue (% of GDP) and/or small fiscal deficits: Sweden (β=0.2064), Finland (β=0.2216) or Belgium (β=0.2188).

Table 2 Bayesian Shrinkage Estimatorsfor rates of fiscal convergence

Shrinkage Estimators state by state: 5 iterations			
Country	**Beta**	**Std. Errors**	**T-Stat**
AUT	0.2292	0.0305	7.5079
BEL	0.2188	0.0297	7.3737
BGR	0.2350	0.0316	7.4471
CYP	0.2225	0.0304	7.3117
CZE	0.2371	0.0318	7.4618
DEU	0.2318	0.0309	7.5014
DNK	0.2220	0.0297	7.4805
EST	0.2383	0.0319	7.4753
ESP	0.2384	0.0318	7.4918
FIN	0.2216	0.0297	7.4506
FRA	0.2116	0.0295	7.1849
GBR	0.2369	0.0317	7.4770
GRC	0.2239	0.0308	7.2575
HRV	0.2387	0.0317	7.5266
HUN	0.2271	0.0307	7.3848
IRL	0.2343	0.0320	7.3262
ITA	0.2246	0.0305	7.3630
LTU	0.2350	0.0317	7.4115
LUX	0.2353	0.0312	7.5372
LVA	0.2352	0.0318	7.4017
MLT	0.2352	0.0316	7.4469
NLD	0.2366	0.0312	7.5942
POL	0.2391	0.0316	7.5599
PRT	0.2252	0.0306	7.3702
ROU	0.2333	0.0319	7.3161
SWE	0.2064	0.0285	7.2509
SVN	0.2371	0.0316	7.5047
SVK	0.2343	0.0312	7.5026

Notes: tested hypothesis: absolute fiscal convergence, tested variable: General government revenue (% of GDP), period: 1995-2015.
Source: Authors' calculations

However, small rates of fiscal convergence are also documented in countries with high fiscal deficits in last years: Greece (β=0.2239), Italy (β=0.2246) and Portugal (β=0.2252). Here, we can state that the crisis, which caused an increase in fiscal deficits and a decrease in fiscal revenues in these countries, led to decrease in fiscal convergence. Countries with the smallest rates of fiscal convergence (Sweden, France, Belgium but also Denmark and Finland) are situated in the first part

of the distribution of fiscal convergence rates (see Figure 2). It should be pointed out that these countries have already relatively high fiscal revenue (% of GDP) in comparison with other EU countries and very small or no fiscal deficits. As we have already explained, Greece, Portugal, Italy and Cyprus have also relatively small rates of fiscal convergence and are found in the second section. The highest rates of fiscal convergence are estimated in case of new EU members: Poland, Croatia, Slovenia, the Czech Republic and Hungary; and these countries are situated on the right side of the distribution (see Figure 2).

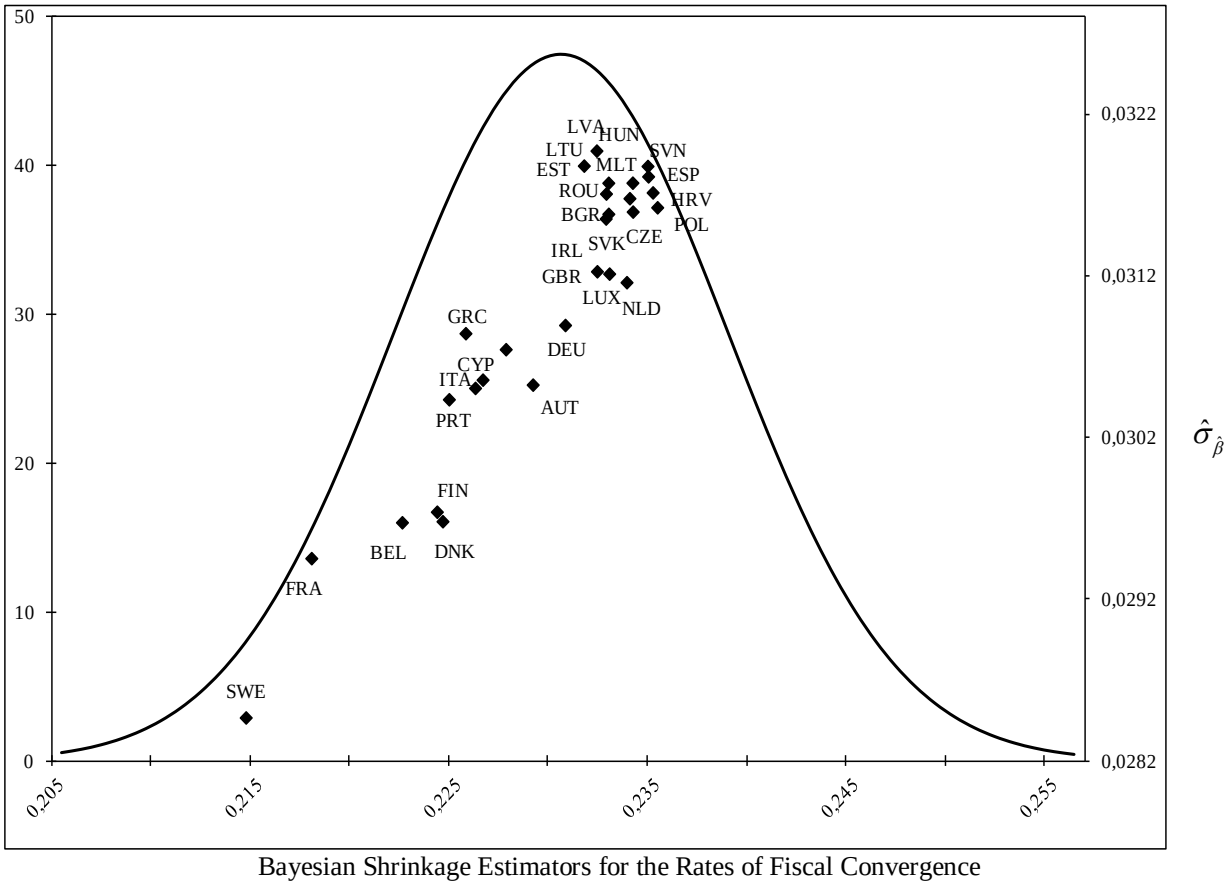

Figure 2 Distribution of Fiscal Convergence Rates for EU-28 over the period 1995-2015.
Source: Authors' calculations

If we compare the positioning of countries from the point of view of real and fiscal convergence, Croatia, Slovenia and Spain have ones of the highest rates of real convergence as well as fiscal convergence (see Figure 1 and Figure 2). Here, we can confirm the assumption that fiscal convergence is positively associated with real convergence. Our result is in accordance with other studies (Degiannakis et al., 2016; Agnello et al., 2016), which concluded a positive effect of fiscal synchronisation on business cycle synchronisation.On the other hand, Portugal, Greece, Cyprus and Italy have also ones of the highest rates of real convergence among the EU-28 countries (see Table 1 and Figure 1) but relatively small rates of fiscal convergence (see Table 2 and Figure 2). It can be explained by the fact that although their GDP per capita converges fast, but a fiscal convergence has been reduced due to increase in their fiscal deficits and decrease in ratios of fiscal revenue to GDP. Moreover, some new member countries of enlarged European Union, such as

Latvia, Lithuania, Estonia, the Czech Republic, Hungary, Romania and Bulgaria have relatively similar rates of real convergence (Figure 1) and their positioning in terms of fiscal convergence is also closed enough, with relatively high rates of fiscal convergence (Figure 2). Here, there is a certain positive linkage between fiscal and real convergence: high and almost the same rates of fiscal convergence contribute to similar rates of real convergence, which supports the idea that higher fiscal convergence leads to closer business cycles (see e.g. Darvas et al., 2005).

5 Conclusion

The paper aimed to contribute to the existing empirical research (see e.g. Darvas et al., 2005; Degiannakis et al., 2016; Agnello et al., 2016; Lukmanova & Tondl, 2017), which conclude apositive linkage between fiscal convergence and business cycle synchronisation. Our approach is slightly different and consists of the estimation of the rates (i.e. speed) of real (GDP per capita) convergence and fiscal (ratio of fiscal revenue to GDP) convergence for the sample of the EU-28 countries over the period 1995 - 2015. In order to estimate rates of real and fiscal convergence, we applied dynamic panel data model of β-convergence. We used Bayesian Shrinkage estimator(Hsiao et al., 1999)and Iterative Bayesian procedure, which estimated the rates of fiscal and real convergence for each individual country from our panel data sample. Strong positive linkage between fiscal and real convergence is confirmed in Croatia, Slovenia and Spain, which have ones of the highest rates of real convergence as well as fiscal convergence among countries from our sample. However, in indebted southern European countries (Portugal, Greece, Italy and Cyprus), their GDP per capita converges at one of the highest rates but their fiscal convergence records relatively small rates in comparison with other countries from the sample. In this case, there is no positive contribution of fiscal convergence as their fiscal convergence has been reduced in times of recent debt crisis in Europe. Furthermore, a certain similarity between fiscal and real convergence in new member countries of the EU-28 (Latvia, Lithuania, Estonia, the Czech Republic, Hungary, Romania and Bulgaria) is evident: these countries record ones of the highest and very similar rates offiscal convergence, which are associated with similar and medium-high rates of real convergence. Finally, our results revealed that a speed of fiscal convergence is globally higher than for real convergence, which can contribute to more important business cycle synchronisation in the future.

Acknowledgements

The paper was elaborated within the project VEGA 1/0994/15 and VEGA 1/0559/16.

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Appendix

In the random-coefficient model, a single equation model in matrix notation for the i^{th} individual can be written as : $y_i = X_i \gamma_i + u_i$, with $i=1,\ldots,N$ where y_i is a (T,1) vector, X_i is a (T,k) matrix of observations for the ith cross-section, and γ_i is a (k,1) vector of parameters. Unlike pure cross-section data, panel data allow us to take the dynamic structure into account.

The model is thus assumed to be dynamic: X_i includes the lagged values of y_i . If all the parameters are treated as fixed and different for cross-sectional units and time periods, there are NTk parameters to estimate with only NT observations. Obviously, we cannot obtain any meaningful estimates of vector γ_i . Alternatively, each regression coefficient can be viewed as a random variable with a probability distribution. The random-coefficients specification substantially reduces the number of parameters to be estimated, while still allowing the coefficients to differ from unit to unit and/or from time to time.In the Bayesian framework, the prior distribution of γ_i is given by : $\gamma_i \sim N(\mu,\Sigma)$. Since the parameters μ (average of γ_i), Σ (variance of γ_i) and σ_i^2 (residual variance) are unknown, some assumptions should be made on the prior specification of these parameters. One can then derive the posterior distribution for the γ_i parameters. If μ , Σ and σ_i^2 are known, the posterior distribution of γ_i is normal and given by :

$$\gamma_i^* = \left[\frac{1}{\sigma_i^{*2}} X_i' X_i + \Sigma^{*-1}\right]^{-1} \left[\frac{1}{\sigma_i^{*2}} X_i' X_i \hat{\gamma}_i + \Sigma^{*-1}\mu^*\right] \quad (1)$$

where $\hat{\gamma}_i$ is the OLS estimate of γ_i^*. The posterior distribution mean of γ_i and its variance are given by:

$$\mu^* = \frac{1}{N}\sum_{i=1}^{N} \gamma_i^* \quad (2)$$

$$V[\gamma_i^*] = \left[\frac{1}{\sigma_i^{*2}} X_i' X_i + \Sigma^{*-1}\right]^{-1} \quad (3)$$

Because in general Σ and σ_i^2 will not be known, one needs to specify priors for them. Smith (1973) took the conjugate Wishart distribution for Σ^{*-1} and the independent inverse χ^2 distributions for the σ_i^2 (Lindley and Smith, 1972). The author suggested using the mode of the posteriordistribution :

$$\sigma_i^{*2} = \frac{1}{T+\varsigma_i+2}\left[\varsigma_i \lambda_i + (y_i - X_i\gamma_i^*)' (y_i - X_i \gamma_i^*)\right] \quad (4)$$

$$\text{and } \Sigma^* = \frac{1}{T-k-2+\delta}\left[R + \sum_{i=1}^{N} (\gamma_i^* - \mu^*)(\gamma_i^* - \mu^*)'\right] \quad (5)$$

where ς_i , λ_i , δ and R are parameters arising from the specification of the prior distributions. in the prior distributions. Smith (1973) proposed to approximate these parameters by setting $\varsigma_i = 0$, $\delta = 1$ and R to be a diagonal matrix with small positive entries (e.g., 0.001).The estimators are then :

$$\sigma^{*2}_i = \frac{1}{T+2}\left[(y_i - X_i \gamma_i^*)' (y_i - X_i \gamma_i^*) \right] \quad (6)$$

$$\Sigma^* = \frac{1}{T-k-1}\left[R + \sum_{i=1}^{N} (\gamma_i^* - \mu^*)(\gamma_i^* - \mu^*)' \right] \quad (7)$$

$$\gamma_i^* = \left[\frac{1}{\sigma^{*2}_i} X_i' X_i + \Sigma^{*-1} \right]^{-1} \left[\frac{1}{\sigma^{*2}_i} X_i' X_i \hat{\gamma}_i + \Sigma^{*-1} \mu^* \right] \quad (8)$$

$$\mu^* = \frac{1}{N} \sum_{i=1}^{N} \gamma_i^* \quad (9)$$

The equations (6) to (9) have to be solved iteratively, with the initial iteration using the OLS estimator $\hat{\gamma}_i$ *to compute* μ^*, Σ^* *and* σ_i^2. *The second iteration is based on the empirical iterative Bayes' estimator* γ_i^*. *The third iteration and the next ones are identical to the second. The empirical Bayes' estimator was proposed by Maddala, Li, Trost, Joutz (1997). The only difference with Smith's estimator is in the computation of the parameters* σ_i^2 *and* Σ^**:*

$$\sigma^{*2}_i = \frac{1}{T-k}(y_i - X_i \gamma_i^*)' (y_i - X_i \gamma_i^*) \quad (10)$$

$$\Sigma^* = \frac{1}{N-1}\left[R + \sum_{i=1}^{N} (\gamma_i^* - \mu^*)(\gamma_i^* - \mu^*)' \right] \quad (11)$$

Preferences of Young Electronic Banking Users in Slovakia

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Abstract

New technologies of the banking services provision have dramatically changed the retail banking. Electronic banking in its various forms has emerged as one of the most profitable e-commerce applications. The certain level of digital literacy is necessary for usage of electronic banking, but young potential clients the most often have high levels of digital literacy. The preferences of distribution channels of financial and banking services and the differences between customer groups are still important topics for investigation. The contribution is aimed at the investigation of preferences of young electronic banking users in Slovakia. Self-administered electronic survey was used for data collection with 373 gathered answers. The respondents were sampled using convenience sampling method in the age group of 15 to 25 years old users. The results show very high penetration of electronic banking services with the mobile banking and electronic card payments usage on the rise. Further results showed no statistically significant differences between genders in average usage and satisfaction with electronic banking services in the particular age group in Slovakia. Young clients adopt electronic banking at high rate without differences between genders, what encourages the banks in Slovakia to provide them all electronic banking services available.

Keywords: Electronic banking, Internet banking, Mobile banking, Young users, Gender, Slovakia.

JEL Classification: G29, L86

1 Introduction

Multiple new ways of provision of financial and banking services emerged in recent decades. The formation of digital economy brought also changes in this area and the electronic banking emerged. Several new technologies of the banking services provision have dramatically changed the banking. Electronic banking in its various forms, like internet banking or mobile banking, developed into the most important distribution channel for certain types of services, while it can significantly reduce costs (mainly staff and operating) of financial services provision and quickly serve high numbers of clients. Mainly, the financial transfers are now provided via electronic channels. Also some other financial services are being integrated into e-banking applications and their provision becomes more cost efficient for both clients and banks. Electronic banking has emerged as one of the most profitable e-commerce applications along the recent years (Yuen et al., 2010).

Despite relatively significant initial costs to implement new technology in the area of electronic banking, it is important for banks to intercept new trends. For example, when clients were moving from personal computers usage to mobile devices, it was necessary for banks provide mobile versions of their electronic services to serve their clients at this new platform. Clients of electronic

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banking seek more comfort, almost unlimited availability and speed of banking services usage (Ernst & Young, 2016).

On the other hand, clients might initially fear to use new modern technology if they do not have any experience with it and distrust the security of it. The question of trust in electronic banking safety and security must be addressed by financial service providers both on the technical side (authorization methods, communication encryption etc.), but also by non-technical aspects of this issue. Banks must cover all aspects of building trust in electronic banking to promote its usage by clients without fear of abuse, while maintaining ease of use (Bucko, 2017).

However, a certain level of digital literacy is necessary for usage of electronic banking. The levels of digital literacy are quite different between various age groups (Institute for Public Issues, 2015), what can influence the adoption of electronic banking services at particular age group. According to the latest available results of the research of digital literacy in Slovakia, the young people (15 to 25 years old) are using the information and communication technologies (ICT) with the highest intensity (Institute for Public Issues, 2015). This fact suggests that young ICT users should adopt also electronic banking services at very high rate. However, even in this age group some differences in preference might occur between genders.

2 Literature review

Multiple studies investigate the adoption acceptance of electronic banking among users based on various attributes. Many of these studies use the Technology Acceptance Model (TAM) for electronic banking developed by Davis (1989). It is based on factors of perceived usefulness, perceived ease of use and awareness of given technology, but it was further changed and extended by some specific aspects and used for electronic banking adoption research. Cheng et al. (2006) and Qureshi et al. (2008) investigated the acceptance of internet banking and showed that TAM predicted customers' intention to use it. Pikkarainen et al. (2004) detected also that web information on electronic banking services positively influences its acceptance. Similarly, Howcroft et al. (2002) detected positive effects perceived usefulness and perceived ease of use on consumer usage and adoption of electronic banking. Polatoglu and Ekin (2001) indicated importance of awareness of electronic banking technology for its adoption by users.

Other factors such as security and privacy of electronic banking were also investigated. For example, Geetha and Malarvizhi (2011) observed that good security and privacy level supported the adoption of electronic banking services among customers in India. The influence of safety of electronic banking and its privacy was investigated by Grabner-Kräuter and Faullant (2008) and their results confirmed influence of privacy on risk perception and customer attitudes towards internet banking. Similarly, the results of Suh and Han (2002) also indicated that trust in security of internet banking has positive a significant impact on its adoption. On the other hand, the results of Widjana and Rachmat (2011) and Pikkarainen (2004) showed that security does not affect the usage of e-banking service. Alsajjan and Dennis (2010) investigated managerial side of electronic banking acceptance by potential users. Users' perception of electronic transactions as easy and safe is crucial for electronic banking adoption and for building the trust in this technology. Moreover, banks should build up an innovative reputation to enhance their positive perception and also improve perception of banks' trustworthiness using of electronic media (e-mails, blogs and social networks).

Akinci et al. (2004) remarked differences between various segments of customers when adopting internet banking. Black et al. (2002) also investigated preferences of distribution channels of financial services and the differences between customer groups and detected lower level of adoption in higher age groups. Ramón-Jerónimo et al. (2014) indicated the existence of a gender gap in the frequency of use of electronic banking, although the level of autonomy in the preference for personal contact diluted gender differences for some services within e-banking. Yuen (2013) investigated gender and age effects across different cultures and detected significant differences. Young adults were more likely to be influenced by their social environment when using e-banking services and females had higher behavioral intention to e-banking services. Li and Lai (2011) did not detect that younger and more IT competent individuals are more inclined to accept an innovative IT. Furthermore, they detected that females perceive electronic banking as more useful and easier to use.

Ameme (2015) found that gender do not have significant effect on customers in adopting and using internet banking services. The study further concluded that there is a strong correlation between employment status, educational level and customer adoption and usage of internet banking. Investigation of electronic banking services adoption based on the age or gender was conducted around the world. In Slovakia the investigation of some forms of electronic banking services was conducted (Vejačka, 2015) before, however the study of particularly young users' preferences and differences between genders in all forms of electronic banking services is not available up to now. Therefore, the investigation of preferences in area of electronic banking of young users between 15 and 25 years old and compare them between genders will be conducted in this paper.

3 Research Methodology and Results

Self-administered survey method of a data collection was used to gather data as it was suitable for our intended analysis in our research. There was gathered 373 usable answered questionnaires in our survey. The respondents were sampled using convenience sampling method in the particular age group. All respondents from Slovakia above 15 years of age and below the age of 25 years were addressed by electronic forms of the questionnaire during the early 2017. This age group was also selected because its members are starting to be economically active in this age and their habits in area of electronic banking might become trend-setting in future (Ernst & Young, 2016). The survey questionnaire investigated the basic demographic information and the usage of bank services of a respondent. The following Table1 contains basic demographic data gathered from our survey respondents.

Table 1 Demographic data of survey respondents

	Frequency	**Percentage**
Number of respondents	373	100%
Gender		
Male	184	49.33%
Female	189	50.67%
Residence		
Smaller municipality (under 5000 cit.)	146	39.14%
Small town (5000 - 30 000 cit.)	77	20.64%
Middle sized town (30000 - 100000 cit.)	68	18.23%
Big city (over 100000 cit.)	82	21.98%

Source: Own survey

Male respondents constituted 49.33 percent and female respondents 50.67 percent of the sample. This proportion of genders in our survey roughly reflects proportion of genders in given age group according data of Statistical Office of the Slovak Republic (2015). The most of respondents (39.14 percent) was from smaller municipalities, almost 22 percent resided in big cities with over 100 000 citizens, above 20 percent of respondents were from small towns with size between 5000 and 30 000 citizens and finally more than 18 percent of our respondents resided in middle sized town between 30 000 and 100 000 citizens. Furthermore, the use of banking services on Slovak retail banking market was investigated. The respondents might indicated more banks if they use services of more than one bank. The following Table 2 shows frequency of retail banks used by our respondents.

Table 2 The use of services of banks on Slovak retail banking market

Bank	Frequency	Percentage
Slovenská sporiteľňa	147	39.41%
Tatrabanka	139	37.27%
VÚB	92	24.66%
ČSOB	41	10.99%
mBank	28	7.51%
OTP banka	24	6.43%
UniCredit	24	6.43%
Fio banka	14	3.75%
Prima	2	0.54%

Source: Own survey

Up to 125 respondents (33.51 percent) indicated usage of services of two banks and 13 respondents (3.49 percent) even services of three banks. This is the reason of higher total number of banks used than number of overall respondents. Ranking of banks usage by our respondents reflects basically nationwide usage of banks (Slovak Banking Association, 2016). However, few banks with reputation of more profound electronic banking (e.g. Tatrabanka, mBank) are slightly higher in the ranking than in the ranking of all banks in Slovakia without age restrictions. This suggest that young users might seek more advanced electronic banking when choosing a bank. Following Figure 1 illustrates which services and bank products are used by our respondents in percentage of all.

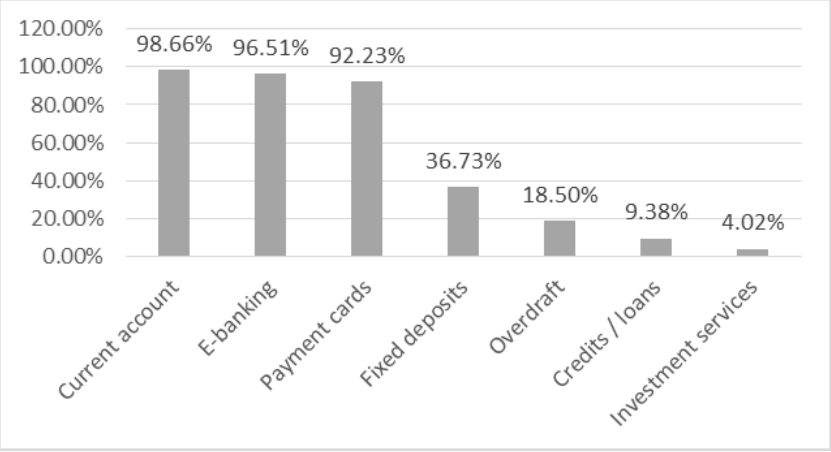

Figure 1 Bank services and products used
Source: Own survey

The most used bank product in our sample was current account (98.66 percent), followed by electronic banking (96.51 percent) and all kinds of payment cards (92.23 percent). Fixed deposits (with 36.73 percent) and overdrafts (18.5 percent) were also significant even when we consider conditions of young bank clients. Relatively low representation had loans (9.38 percent) and investments (4.02 percent) what is understandable due to lower economic activity of these age group. This fact induces lower savings and credibility of our respondents by banks. When using mobile banking, it is interesting to investigate operating system (OS) of smart device, on which mobile banking (or in Slovakia often used term of smartbanking) application is used. Google's operating system Android confirmed its dominant role with 73.46 percent followed by iOS by Apple with 32.44% and Microsoft's WindowsPhone with 4.83 percent. Percentage exceeds one hundred percent because of the fact that respondents could indicate more than one smart device. Another interesting finding is that every single respondent in our age group has some smart device, where mobile banking can be used (again detected usage was at 61.66 percent). This remarks the importance of mobile banking in the near future. Following Table 3 states overall and gender-distinguished percentages of answers in particular areas investigated by our survey.

Table 3 Overall and gender-distinguished percentages of answers in particular areas

E-payments usage	Total percentage	Males percentage	Females percentage
Purchases in e-shops	83.65 %	91.85 %	75.66 %
Card payments on the Internet	83.91 %	90.22 %	77.78 %
Alternative e-payments	53.35 %	64.13 %	42.86 %
e-Banking active forms			
Internet banking	95.71 %	95.65 %	95.77 %
Mobile banking	61.66 %	66.30 %	57.14 %
P2P direct e-payments	7.24 %	12.50 %	2.12 %
Intensity of usage			
Very often	31.64 %	35.87 %	27.51 %
Often	30.29 %	30.98 %	29.63 %
Sometimes	24.66 %	20.11 %	29.10 %
Once in a while	12.06 %	13.04 %	11.11 %
Rarely	1.34 %	0.00 %	2.65 %
Satisfaction with e-banking			
Very satistified	48.53 %	45.11 %	51.85 %
Satistified	34.05 %	36.96 %	31.22 %
Neutral	5.36 %	4.35 %	6.35 %
Unsatistified	8.04 %	11.96 %	4.23 %
Very unsatistified	4.02 %	1.63 %	6.35 %
Payment preference			
Using payment card	64.88 %	64.67 %	65.08 %
Cash	30.56 %	30.43 %	30.69 %
Electronic transfer from account	4.56 %	4.89 %	4.23 %
Security failure cause expectation			
Hackers	41.29 %	32.07 %	50.26 %
Client	40.21 %	53.26 %	27.51 %
Bank	11.26 %	4.89 %	17.46 %
Imperfect technology	7.24 %	9.78 %	4.76 %

Source: Own survey

Overall results are as follows. Over 83 percent of our respondents uses card payments on the internet in e-shops and over 53 percent uses some other forms of e-payments. From active forms of electronic banking the most used was internet banking (95.71 percent) in form of website-based communication with banks, followed by mobile banking (61.66 percent) in form of application-based communication. Over 7 percent of respondents uses also direct peer-to-peer electronic payments. Usage of payment card as preferred payment method in brick and mortar shops was indicated by 64.88 percent of respondents. Cash was preferred by 30.56 percent of our respondents and other electronic transfers only by 4.56 percent.

Frequency of electronic banking usage was also investigated by self-assessment question with five point Likert scale. Almost 62 percent of respondents indicated frequent or very frequent usage of any form of electronic banking. Low frequency of e-banking usage was adduced by 13.40 percent and moderate frequency by 24.66 percent of respondents. Self-assessment of satisfaction with electronic banking used was investigated (also with 5-point Likert scale answers) with result of 82.58 percent satisfaction, precisely 48.53 percent was very satisfied and 34.05 percent of respondents was satisfied with electronic banking used by them. This result represents very high level of satisfaction with electronic banking provided by banks in Slovakia. Neutral satisfaction was detected in 5.36 percent of answers, 8.04 percent of respondents were unsatisfied and 4.02 percent very unsatisfied with their electronic banking. Fears of e-banking insecurity, possibilities of money thefts and inconvenience of usage were adduced as main reasons of dissatisfaction with electronic banking.

Opinion of respondents on the cause of any potential security failures of electronic banking was further investigated. It was detected that 41.29 percent of our respondents is afraid of hacker attacks. Security failure on the client's side of electronic banking was adduced by 40.21 percent and only 11.26 percent expects security failure on the bank's side. Cause of the potential security failure in imperfect technology sees only 7.24 percent of our respondents. Table 3 contained also percentages distinguished by gender, which in some cases suggested differences mainly in areas of electronic banking usage and satisfaction with e-banking services. Therefore, a comparison of the electronic banking acceptation between genders in our age group was conducted. Independent sample mean t-test will be used to test whether males use electronic banking at the same rate as females. The independent two-sample t-test is used to test whether population means are significantly different from each other, using the means from randomly drawn samples. The methodology is common statistic method, widely used in similar studies (e.g. Akinci et al., 2004; Dandapani, 2004; etc.).

Firstly, the test hypotheses should be formulated. The aim was to compare, whether male respondents in our sample are using electronic banking services at the same frequency in average as our female respondents do. Also rate of satisfaction was interesting to compare between the genders.

So our test hypotheses will be as follows:
H1: Male respondents between 15 and 25 years old use electronic banking services at the same average frequency as female respondents between 15 and 25 years old.

H2: Male respondents between 15 and 25 years old are satisfied with the electronic banking services in average at the same rate as female respondents between 15 and 25 years old.

Following Table 4 contains the results from the independent two-sample t-test conducted on these two hypotheses in IBM SPSS statistics software.

Table 4 Electronic banking usage frequency and satisfaction statistic results

Item	Gender	N	Mean	Std. Deviation	F	Sig.(2-tailed)	t
E-banking usage frequency	Males	184	2.10	1.038	0.943	0.051	-1.958
	Females	189	2.32	1.074			
Satisfaction	Males	184	1.88	1.054	0.561	0.596	0.531
	Females	189	1.82	1.139			

Source: Own survey data processed by IBM SPSS Statistics software

When testing hypothesis H1, the p value for F test (0.943) was above the alpha value of 0.05 so equal variances can be assumed. Two tailed significance for the test of e-banking usage frequency comparison was detected at value 0.051. This value is very close to the alpha value (0.05), but still it is higher. Therefore, we cannot reject H1 hypothesis and we conclude, that differences in the frequency of electronic banking services between genders in our sample are not statistically significant.

The p value for F test (0.561) was above the alpha value of 0.05 so equal variances can be assumed for the testing of hypothesis H2. Two tailed significance for the test of e-banking usage frequency comparison was detected at value 0.596. This value is significantly higher than the alpha value of 0.05, we cannot reject H2 hypothesis and we conclude, that differences in average satisfaction with electronic banking services between genders in our sample are not statistically significant.

It can be concluded that no statistically significant differences between genders preferences in electronic banking were detected.

4 Conclusion

The contribution aimed at the investigation of preferences of young electronic banking users in Slovakia. Very high penetration of electronic banking services was detected in target age group of 15 to 25 years old users. Especially, mobile banking usage is on the rise, what is connected with very high penetration of smart devices in our sample. Also, the usage of electronic card payments is at high rate and is still rising. These payments are used also intensively used in e-shops in our sample. These results correspond with our previous results (Vejačka, 2015) and also with worldwide reports (e.g. Ernst & Young, 2016).

Further, the investigation of electronic banking usage and their average satisfaction with electronic banking services was conducted. Our results show that there no statistically significant differences between genders in average electronic banking usage and satisfaction with e-banking services in age group of 15 to 25 years old users in Slovakia. These results correspond with results achieved at other markets (e.g. Yuen et al. 2010; Ameme, 2015; Yuen, 2013), but are in contrast with some partial results of Ramón-Jerónimo et al. (2014) or Li and Lai (2011). Moreover, the result of insignificance of gender differences in a frequency of electronic banking usage was very close to the border of significance, so it could be confirmed in the case of conducting study with bigger and more representative sample. The size and the composition of sample definitely limits the validity of our results. However, it can be concluded, that young users are intensive users of electronic

banking services and they adopt electronic banking at high rate without differences between genders. This might imply for the banks in Slovakia to provide to the young clients all electronic banking services available.

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Innovative companies and human resources in knowledge-based economy

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Abstract

Knowledge has become the major source of economic growth and social development. Innovative companies and human resources are among the most important actors of the knowledge-based economy development. Business R&D expenditures in Slovakia are only 25% compared to the EU average. Low R&D contributes to the assessment of Slovakia as moderate innovator. The cooperation of research institutions and industry in R&D is weak. Joint interests lead companies, research institutions, and universities to collaborate on cluster platforms. The world technology companies with their subsidiaries in Slovakia have the potential to develop domestic R&D. Adequate human resources and their mobility is the necessary precondition for R&D and innovation. Slovakia is among the countries with the highest share of students studying abroad. It leads to the lack of high-quality students and university graduates in Slovakia. The dissatisfaction of researchers with the situation in the R&D sector is the risk of sustainability of the research system quality. Geographic and cross-sectoral mobility of researchers increases the transfer of knowledge. Insufficient motivational environment faces the problem of leaving talented people abroad. Limited research capacities must be concentrated on selected areas. Every country has own system of supporting economic development based on knowledge and innovations.

Keywords: Knowledge-based economy, Competitiveness, Cooperation, R&D, Globalization.

JEL Classification: F23, F63, O30

1 Introduction

Competitiveness in economically developed countries is based on knowledge and modern technologies. The economic development factors are substituted by new factors such as highly qualified employees, universities and research institutions, informatics infrastructure etc. The most important factors for the development of knowledge-based economy are companies and human resources. Knowledge has become the major source of economic growth and social development. However, Global Competitiveness Index (GCI) shows the progress in building an enabling environment for innovation remains the advantage only in a few economies (WEF, 2016).

The actors of the knowledge-based economy are companies, research and development (R&D) organizations, educational organizations and institutions. Innovation is one of the most important competitive advantages of companies. Innovations are conditioned by sufficient human resources for R&D and science-based infrastructure. Investing in education, research and innovation will enable the development of knowledge potential and sustainable growth. The creative potential is determined by the country economic performance and the motivational environment.

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The development of human potential in the field of research and innovation is influenced by people, businesses, research and education organizations and policies. Every country has a competitive relationship with other countries in its own human potential. Prior to 1990, the environment was in favour of innovation due to the isolationism of political-economic blocs and the preference of the import substitution by the development and production of domestic production, respectively by the trade among the former COMECON countries (The Council for Mutual Economic Assistance, RVHP). The research potential was weakened mainly during the transition to a market economy. Eastern European countries have begun to focus on the EU and economic reforms have led to open economies exposed to global competition.

The Slovak economy belongs to the most open economies. Since 1995, when the share of exports respectively imports to GDP was 55%, the shares exceed 80% during the last years (Graph 1). Companies with foreign ownership, especially from the automotive and electro technical industries, have a high share of exports from Slovakia. These companies export a large majority of their production (Vokoun, 2016a). High export performance reflects the competitiveness of companies in the Slovakia. High import intensity highlights the import intensity of exports and the limitations of domestic supply. The significant decline in 2009 points to the vulnerability of the economy with present structure oriented only in few industries.

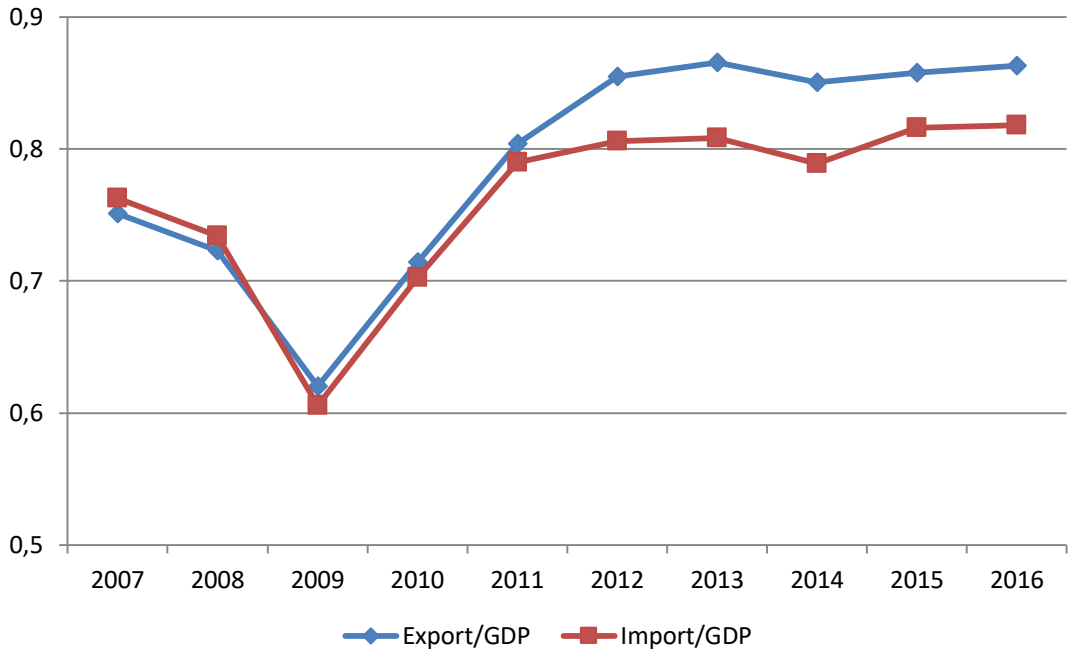

Figure 1 Development of the export and import share of GDP in 2007 - 2016 (Slovakia, index, current prices)
Source: ŠÚ SR http://www.statistics.sk, own calculations

Slovakia is a moderate innovator according European Innovation Scoreboard 2016. Performance relative to the EU is at 68% of the EU average (EC, 2016). Innovative performance is conditioned by the economic development of the country (Vokoun, 2015). Therefore, the development of domestic R&D base and innovation will also depend on future economic growth and the development of economic structures. Other issues are mentioned above.

2 Innovative Companies

Transfer of knowledge in the global economy takes place through FDI flows, trade, licenses, patents and international technology and scientific cooperation. Slovakia as an industrial country has the strong base for development and belongs among the countries with the highest GDP growth in EU. This is contribution of a high degree of globalization of the Slovak economy influenced by the foreign corporations.

EU Industrial R&D Investment Scoreboard analyses economic and financial information on the world's leading 2,500 companies that have invested 607.2 bil. EUR in R&D (fiscal year 2014). Most of the world's leading companies which are investing heavily in R&D is from USA (829 companies), followed by the rest of the world (703), the EU (608) and Japan (360). In EU, most of these companies are located in Germany (136), the UK (135) and France (86) (EC, 2015). The research concentration in EU countries is the potential for participation of the Slovak researchers in international research.

The world's largest R&D expenditure has corporation Volkswagen. It is the only company from EU among the five companies with the highest R&D expenditure. The presence of such companies in the country supports the development of innovative and research potential. World technology companies with their subsidiaries in Slovakia, such as Volkswagen, Samsung and Siemens, have the potential to develop domestic R&D. Foreign companies represent an opportunity for domestic SMEs to become suppliers of these companies and thus to reach foreign markets and the newest technologies.

The parent companies of some largest companies in the Slovakia are among the world's leading innovation leaders. R&D support policy should aim to increase their research capacities in Slovakia. Volkswagen is the world leader in R&D with investments in R&D of 13.1 bil. EUR (2014). Corporation employs 46,000 R&D personnel and more than 10,000 IT experts. Research is focused on the future of the automotive industry linked to electromobility and vehicle digitization. Samsung is also one of the world's leading innovation leaders. Annual research spending reached $ 12.2 bil. EUR in 2014 (EC, 2015).

The companies in Slovakia are getting the best technologies thanks to the transfer of foreign technology. The competitiveness of most companies is strengthened by innovative solutions that have been developed abroad. Transnational corporations generally do their research at their headquarters. It weakens the potential of domestic research in Slovakia.

The share of total R&D expenditures of GDP in Slovakia reached 1.18 % (2015). The financing of R&D from public sources is predominant. The high portion from the public sources is from the EU funds (Graph 2). The share of business R&D expenditures to GDP is 0.3 % (EC, 2017). Business R&D expenditures are only 25 % compared to the EU average. However, business R&D expenditures have 54.8 % portion of gross domestic expenditure on R&D in Finland. This shows the close cooperation between companies and research institutions.

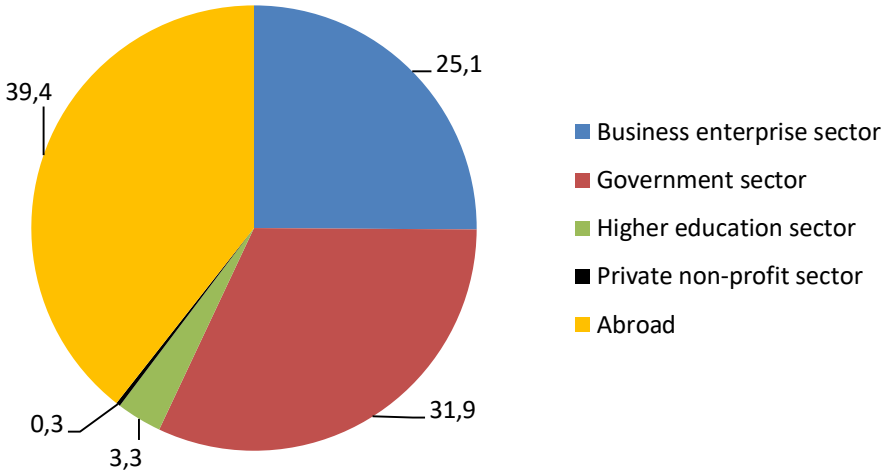

Figure 2 Gross domestic expenditure on R&D by source of funds (%, 2015)
Source: EC (2017)

Slovakia achieves a high degree of integration into global networks of goods and services. The development of the Slovak economy is influenced by the high competitiveness in the field of foreign direct investment and transfer of technology and export performance. The competitive advantage of Slovakia is based more on price and cost factors (labour costs, tax incentives) than on qualitative factors (education system, domestic innovation, legal system, quality of institutions). The low degree of cooperation of the companies with the research organizations and the small share of domestic research is the lack of an innovative system in Slovakia. However, companies are competitive by importing technologies and engaging in global value chains of corporations.

The low cooperation between actors of innovation development is a weakness. The vast majority (79.0 %) of researchers in Slovakia do not cooperate with companies (Table 1). On the other hand, this finding also reflects the low present potential of companies to cooperate with research organizations. Slovakia ranks 65th among the 138 countries in the GCI. The cooperation of universities and industry in R&D (rank 82) and the availability of engineers and scientists (rank 98) partly explaining the position of Slovakia in international comparison (WEF, 2016).

Table 1 Question: If you are solving a domestic research project, the results will be applied in a company in Slovakia? (Responses of researchers from technical and natural sciences, 2014)

Answer	Frequency	Percent
no	565	79.0
yes	150	21.0
total	715	100.0

Source: Brzica, Kačírková, Košta, Vokoun (2014)

The potential of domestic R&D useful for companies is concentrated in the domestic scientific research base - in SAS and universities of technical and natural sciences. New scientific centers built in 2015 create conditions for the knowledge transfer. Business R&D potential in subsidiaries of foreign companies in Slovakia gradually develops. Some foreign companies established in Slovakia created own R&D centres - Johnson Controls, ON Semiconductor, Leoni, BSH,

ThermoSolar, Sauer Danfoss, Krauss Maffei, Ness, Siemens, Alcatel-Lucent, Mühlbauer, Continental Automotive Systems, Elastogran and others.

Long-term growth is only possible if conditions for technology-based growth are created. Support policy should focus on the origin and development of creative companies that are able to push through unique technologies. In addition to existing companies are emerging new small firms - start-ups. By creating the right conditions, start-ups can bring solutions that appeal to large companies. Supporting infrastructure for start-up SMEs consists of business and technology incubators. This infrastructure is gradually created in Slovakia.

The probability of innovation activity varies by sector. The highest innovation activity is in sectors that provide knowledge and technology-intensive services. The most innovative are companies in the ICT sector. The probability of innovation is up to three times higher in large companies than in small businesses. This correlates with the fact that export oriented companies are more innovative. A typical innovative corporation is a large joint-stock company with foreign owners, which is part of a business group (Stankovičová, 2011).

Joint interests lead companies, research institutions, and universities to collaborate on cluster platforms. Cluster policy is therefore an important part of innovation policy. Successful clusters promote competitiveness and collaboration, increase productivity, attract investment, support research, strengthen industrial base, etc. Factors such competition, cooperation, specialization, sophisticated demand, human resources, financial capital and infrastructure are important for the cluster development. The clusters are associated with various big companies. Such diversity allows smaller firms to become more specialized, and thus compete with larger firms. Participation in the cluster can also bring disadvantages in terms of the risk of leakage of confidential information and the risk of more subordinate dictatorship of dominant companies. If there are not sufficient conditions (many companies, research capacities, existence of joint activities) clusters cannot build up even with the intensive support of the public sector (Duman et al., 2009). Technological clusters in Slovakia are small compared to foreign clusters.

3 Human resources in knowledge-based economy

Competitiveness based on knowledge is determined by human resources. Intellectual capital is the most valuable corporate asset. Education is important, since it affects both supply of and demand for innovations. Adequate human resources and their mobility are the necessary precondition for R&D and innovation. Effective innovation support must be linked to an education system that promotes talent and creativity.

The conclusion of international survey Programme for International Student Assessment (PISA) is that the Slovak 15-year-old students from primary schools are significantly worse than the average OECD countries in the field of reading, mathematics and science (OECD, 2015). The deterioration of the level is subsequently reflected in the quality of secondary and university students.

The Programme for the International Assessment of Adult Competencies (PIAAC) conducts the survey of adult skills for identifications how citizens of individual countries are prepared to respond to new challenges of the knowledge society. This research reflects how education systems are successful in mediating the necessary competencies. The status of the Slovak adults in the

international comparison of the population ability to solve the problems in a technically advanced environment lags behind the average of the OECD countries. Irrespective of the attained education level, there are many people who have a very low level of ability to solve problems in a technically advanced environment and are not ready to use new information and communication technologies. There is the recognizable intergenerational difference because older people have problems with using ICT (Bunčák et al., 2013).

Slovakia is among the countries with the highest share of students studying abroad. At foreign universities are studying over 33,000 Slovak students, mainly in Czech Republic. This great mobility affects the Slovak education system. The optimistic view at high student mobility highlights the benefits of quality education and experience that foreign graduates will bring. The pessimistic view focuses on the loss as a result of not returning students back to Slovakia or the decline in the quality of students remaining in Slovakia (Vokoun, 2016b).

Creative people find use in countries where are favourable conditions for research and innovation. Geographic and cross-sectoral mobility of researchers increases the transfer of knowledge. Both international and structural mobility between research and business are key to the acquisition and use of new knowledge and skills. Globalization is an opportunity for scientists to participate in world research, but also an opportunity to leave Slovakia. Insufficient motivational environment faces the problem of leaving talented people abroad. Other high imbalance is in the number of students from Slovakia studying abroad and foreign students studying in Slovakia.

The creative professionals prefer countries where are favourable conditions for research and innovation. The Common European Research Area supports cross-border cooperation and action anywhere in the EU. In this process have loses those countries from which researchers and students leave and together countries are not attractive to researchers from abroad. Many Slovak researchers (41,8%) are considering work abroad (Table 2). However, the implementation of this intention is more complicated. The predominant view is a reflection of the dissatisfaction of researchers with the situation in the R&D sector.

Table 2 Question: Do you think about the research abroad because there are better conditions for research? (Responses of researchers from technical and natural sciences, 2014)

Answer	Frequency	Percent
no	416	58.2
yes	299	41.8
total	715	100.0

Source: Brzica, Kačírková, Košta, Vokoun (2014)

Research capacities depend on the size of the country and its economic power. For example, in 2014 China has registered 3,710,580 R&D personnel (FTE), Russia 829,190 Germany 601,406 Czech Republic 64,444 and Slovakia 17,954 R&D personnel. Relatively it was 4.6 per 1000 employees in China, 10.9 in Russia, 14.2 in Germany, 12.1 in the Czech Republic and Slovakia 6.4 (UNESCO, 2016). The Slovak research system in has the low capacity. Small country cannot have a wide range of research. Limited research capacities must be concentrated on selected areas.

Finland is an example of country which has transformed into a knowledge-based economy. Developmental priorities of economic policy are based on knowledge and modern technologies.

The country's expenditure on science and research are among the highest in the international comparison (3.03 % of GDP in 2015). Finland has the effective system of supporting economic development based on knowledge and innovations and its economy is among the most competitive countries.

4 Conclusion

There is the competition about talented people in a globalized world. Countries are creating an incentive environment for talents and high-quality researchers. However, Slovakia is losing in this competition. The risk of the human potential weakening needed for the development of the knowledge society is growing. Sometimes only the pressure from the EU is the initiator of the changes in Slovakia's policies.

International comparisons PISA and PIAAC show the long-term problems of the education system in Slovakia. This is worsened by the high number of students studying abroad. Many adults have a low level of ability to solve problems in a technically advanced environment and are not ready to use new information and communication technologies.

Economic policy must be focused towards creating conditions for investors looking for the quality domestic educational, research and innovation potential. We need to create conditions for excellent domestic research and for international cooperation, in which researchers from Slovakia will be equal partners to others. Insufficient motivational environment faces the problem of leaving talented people abroad.

The companies spending on domestic research and development are low. The competitiveness of most corporations in Slovakia is based on innovative solutions which have been developed abroad. A small country cannot have a wide range of research and limited research capacities have to concentrate only on selected areas and to mobilizations of existing resources.

Transfer of knowledge from foreign corporations is a channel through which local companies have the opportunity to compete in the global economy. The Slovak economy can grow in the long run only if conditions for technologically based growth will be created. It is necessary to support the creation and development of creative companies which can be successful with own unique technologies.

Acknowledgements

This paper was supported by Grant Agency VEGA [nr. 2/0086/15].

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Behavior of Heterogeneous Secondary Users in Agent-based Model of Secondary Spectrum Market

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Abstract

For centuries the main focus of economics has been redistribution of scares resources. In the recent years, frequency spectrum has become one of the most demanded scare resources, which utilisation was subject of analysis from technical point of view. Only little attention has been drawn to economic aspects, especially to area of dynamic spectrum access. In our paper we consider frequency channels as investment instrument and secondary market resembles financial market. Generally, in the market are heterogeneous investors with various preferences, which lead to different patterns of behaviour. One of the most suitable tools for analyzing heterogeneity of market participants is Agent-based modeling. We analyzed behaviour of five distinguished types of investors, who are differentiated by parameter settings in Roth-Erev Reinforcement Learning algorithm. Results show that each type of investors converges to different proffered strategy. Interest rate is also take into consideration of investor and according to the results has significant influence on decision process.

Keywords: Cognitive radio network, Agent-based modeling, Heterogeneity, Reinforcement Learning, Investor.

JEL Classification: C63, G11, L96

1 Introduction

Cognitive radio technology represents new innovative solution allowing increase of frequency spectrum usage. Spectrum management, based on open market approach, called Dynamic Spectrum Access removes barriers and creates possibility for anyone to entry the frequency spectrum market (Song, Xin, Zhao, & Cheng, 2012). Organization of spectrum trading between licensed primary users and unlicensed secondary users seems to be very similar to a traditional trading defined as a process of exchanging goods or services in the market. Main idea is to create a compromise deal between seller and buyer while they have contradictory goals. The aim of seller is to maximize profit by setting optimal price for frequency channels, while the buyer is trying to minimize costs for bought channels and simultaneously maximize his utility of spectrum usage.

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2 Literature overview

The purchasing of frequency spectrum can be considered as a trading instrument and secondary spectrum market as replica/imitation of financial market. Xu, Jin and Li (2010) view each frequency channel in the secondary market as a stock and agents, represented as users, assess its characteristics and decide, which channels to buy or sell and at what price based on portfolio optimization solution.

Buddhikot and Ryan (2005) create their model of secondary spectrum market according to analogy to the financial market. Financial market is one of the most developed markets and serves as inspiration for other types of market, the spectrum market is not an exception. For both types of market is characteristic dynamically changing number of participants in the market leading to frequent change in demand and supply, thus the price adaptation has to be prompt and relatively exact. Purchasing of frequency spectrum is considered as risky investment because of potential inability to sell all bought channels and exposure to the risk of loss. Investor tries to allocate his resources in various assets or market while maximize his portfolio return and minimize risk (Epstein & Zin, 1989). Typically, all investors are risk-averse but they differ in the propensity to risky investment. Authors Alsulamian and Khashanah (2015) defined objective function of agents based on risk-aversion as preference of certain outcomes over uncertain ones. Therefore, also impact of risk-free interest rate on investor´s behavior is taken in the consideration.

Increasing complexity in financial markets led to application of novel analytical tools. Agent-based modeling proved to be viable tool for analyzing complex dynamics arising from interaction among large number of heterogeneous agents. On the contrary to neoclassical theory, which considers each economic subject as representative one, in complexity theory is emphasized heterogeneity of agents (Arthur, Holland, LeBaron, Palmer, & Tayler, 1996). Local interactions of heterogeneous agents lead to emergent non-linear results, which cannot be obtained by standard numerical/analytical tools for solving optimization problems or system of equations. Agent-based modeling focuses on computer models and simulations to analyze complex dynamic models. Agent is defined by attributes and methods, such as memory, resources, neighbors, and behaviors and so on. Advantage of Agent-based modeling is possibility to take into account different settings of attributes, thus create heterogeneous set of agents. Attributes might enter decision-making process of agents, which influences learning and overall behavior of agents (Macal & North, 2010). Authors Nicolosi, Peng, and Zhu (2009) presented evidence that individual investors learn from their trading experiences because additional investment experience helps investors obtain better investment performance.

Problem of decision-making process in trading in heterogeneous market environment with decentralized information has received little research attention so far. This seemingly formidable problem can be tackled by a Reinforcement Learning framework, which essentially adopts a systematic trial-and-error way to derive the optimal decision policy (Xu et al., 2010). Reinforcement Learning (RL) is one of the most used learning techniques in economic modeling, where agent find optimal strategy by trial-end error process instead of predefined optimal strategy by external teacher (Sutton & Barto, 1998). Typical RL economic problem is agent buying and selling decision. The agent gains a reward/punishment for selected actions and agent maps different states to probabilities of selecting an action while is trying to maximize his reward for a long time. It is obvious that according its experiences agent adapts choosing of strategies.

3 Model description

Agent-based model of secondary spectrum market, which was used for simulations, involves both the wholesale and the retail market. In the case when spectral holes emerge, primary users (PU) in the role of owner licensed spectrum channels, have possibilities to reduce loss by selling unoccupied channels in the secondary spectrum market. For simplicity there exists only one PU in the market. Secondary users buy channels for providing services to end-users in the retail market. In our model, thanks to 5G mobile network, purchasing frequency channels can be interesting not only for standard operators but also for investors with speculative motive. We assume two options for investors - secondary users (SU): risk-free investment in form of term deposit in the bank with one-year maturity period or risky investment in form of bought frequency channels. The key element in our model is open access network that allows anyone to enter the market.

Frequency spectrum is divided to frequency channels and each channel can be used only by one end-user.

3.1 The wholesale market

In the wholesale market PU sells licensed unoccupied frequency spectrum at constant wholesale price p^w per one frequency channel. Contracts in the wholesale market are forwards, thus secondary users buy channels at wholesale price but sell them one year later for end-users in the retail market. In our model $L = \{1,2,\dots,l\}$ represents set of investors. At the beginning of every business day has each i-th investor constant disposable amount of money I and has to decide about the portion of his budget w_i^{ref} for bank deposit (risk-free investment) and about portion w_i^F for investment into frequency spectrum (risky investment), while $w_i^{ref} + w_i^F = 1$. Investor's decision is influenced by revenue from risk-free investment given as $R_i^{ref} = w_i^{ref} Ir$, where r represents annual interest rate and also profit from risky investment given as the difference in income from providing connectivity to end-users in the retail market and the costs associated with purchasing the frequency spectrum $R_i^F = \sum_{j \in C} p_{i,j} - w_i^F I$, where C is the set of end-users connected to the i-th investor and $p_{i,j}$ is the price for one-hour connection paid by j-th end-user to the i-th investor. Second element in this equation represents amount of money invested by the i-th investor in the risky investment. Number of bought frequency channels is calculated as $K_i = \left\lfloor \frac{w_i^F I}{p^F} \right\rfloor$. The whole profit of i-th investor is given as sum of revenue from the risk-free investment R_i^{ref} and revenue from the investment in frequency spectrum R_i^F.

In our model investors are able to learn by their own experiences how to divide whole budget efficiently. For this learning was used Roth-Erev Reinforcement Learning Algorithm. The strategy space involves 21 possibilities of potential shares invested in the spectrum market. Initial propensity for each possible pure strategy (before any experience has been acquired) for each investor is set equal to $q_j(0) = 1$ and afterwards is accommodated as follow:

$$q_{i,j}(t+1) = [1 - r^{RE}] q_{i,j}(t) + E_{i,j}(e^{RE}, S, k, t) \quad (1)$$

$q_{i,j}(t)$ represents the propensity to choose action j at time t and r^{RE} is the recency (forgetting) parameter which slowly reduces the importance of past experiences. The reinforcement element $E_{i,j}(e^{RE}, S, k, t)$ is the function, which determines how the experience of playing k-th strategy and receiving reward $R_{i,k}$is generalized to update each strategy j and is calculated:

$$E_{i,j}(e^{RE}, S, k, t) = \begin{cases} R_{i,k}(t)[1 - e^{RE}] & if\ j = k \\ R_{i,k}(t)\left[\frac{e^{RE}}{S-1}\right] & if\ j \neq k. \end{cases} \quad (2)$$

$R_{i,k}(t)$ represents the income gained by playing k-th strategy at time t, e^{RE} is experimentation parameter and S represents the number of possible strategies. Investors choose strategy j with the probability given:

$$p_j^{RE}(t) = \frac{q_j(t)}{\sum_{i=0}^{S-1} q_i(t)} \quad (3)$$

In our model are investors heterogeneous and this characteristic is demonstrated by different values of experimentation and recency parameter. The experimentation effect in the Roth-Erev algorithm ensures that not only the most successful choices in the past are employed in the future, but similar choices will be employed more often and player does not become locked in the one choice (Erev & Roth, 1998). With the higher value of this parameter increases the desire of trying new strategy, which may not be verified yet and may be riskier. The learning process of agents with higher experimentation parameter takes more time. It does not converge to the one strategy very quickly. In our model through mentioned parameter was demonstrated the effect of different speed of learning as one of the many forms of agent heterogeneity.

Recency parameter lowers the power of past experience to influence future actions and reduces the growth of the propensities over time. Agents with higher value of recency parameter have less perfect memory and react more impulsive to the current situation. On the contrary agents with low recency parameter remember efficiency of given strategy for a very long time. Heterogeneity of agent memory is demonstrated through this parameter.

3.2 The retail market

Retail market is adopted from Gazda, Kováč, Tóth, Drotár, and Gazda (2017). In the retail market secondary users provide connectivity of end-users by utilizing frequency channels bought in the wholesale market and try to maximize their profit by dynamically retail price setting. Investors adapt their price strategy due to approach of Successful-Ratio (S-R). In each time instance investor observes acceptance ratio $\psi_{i,t-1}$ of his price from the previous period calculated as follows:

$$\psi_i = \begin{cases} 1/2 & (BW_{avail,i} = 0) \wedge (S_i = 0) \\ 0 & (BW_{avail,i} > 0) \wedge (S_i = 0) \\ \frac{S_i^{idle \to conn}}{S_i} & (BW_{avail,i} > 0) \wedge (S_i > 0), \end{cases} \quad (4)$$

where S_i represents number of end-users trying to connect to i-th investor, $S_i^{idle \to conn}$ is the number of end-users successfully connected (change state from *idle* to *connect*) to i-th investor and BW_{avail} is total number of channels gained by i-th investor in the wholesale market. The investor´s retail price is adapted (μ is the price change shaping parameter):

$$p_i = p_{i,t-1} + (\psi_{i,t-1} - 0.5)\mu \quad (5)$$

Simultaneously the end-users try to satisfy their needs by connection to the network while maximize quality of service but minimize their costs. Here the microeconomic utility approach was

applied and utility function $U_{i,j} = e^{-\alpha d_{i,j}^{\beta}}$ is represented by the quality of i-th end-user's connection depending on the distance from the j-th investor $d_{i,j}$. End-user's decision is also influenced by the price for connection p required by investor, thus we assume an acceptance probability $A_{i,j}$ according which each end-user tries to find the best satisfaction of his needs $A_{i,j} = 1 - e^{-cU_{i,j}^{\delta}(1-p_{i,j})^{\gamma}}$.

Agent-based simulations were conducted in NetLogo. Each of them consists of 200 000 simulation rounds (1 tick = 1 trading day) and each combination of parameters was run ten times. The revenue from bank deposit represented by interest rate takes value of 101 different values. Heterogeneity of five investors is simulated by combinations of learning parameters designed to describe different characteristics and preferences of investors. The recency parameter $r^{RE} = \{0.1,0.3,0.5,0.7,0.9\}$ represents perfection of agent memory and the experimentation parameter $e^{RE} = \{0.1,0.3,0.5,0.7,0.9\}$ influences duration of learning process. In our model is only one PU in the role of owner of base transmission station located in the middle of a line, where the end-users are uniformly distributed. The settings of all parameters are shown in Table **1**.

Table 1 Simulation parameters with default values

Parameter	Symbol	Value
Number of investors	l	5
Number of end-users	-	700
Wholesale price	p^f	10
Utility function parameter	α	0.01
Utility function parameter	β	0.8
Acceptance probability function parameter	γ	3
Acceptance probability function parameter	δ	0.5
Acceptance probability function parameter	c	8
Roth-Erev experimentation parameter	e^{RE}	$\{0.1,0.3,0.5,0.7,0.9\}$
Roth-Erev recency parameter	r^{RE}	$\{0.1,0.3,0.5,0.7,0.9\}$
Budget of investor	I	1 000

Source: Own elaboration

4 Results and discussion

The studies dealing with cognitive radio networks pay a little attention to heterogeneity and prefer the system of large number homogenous agents. There are only a few studies concerning with heterogeneity of agents. Heterogeneity can be implemented and understood in different ways. Chen and Liu (2015) assumed heterogeneity of end-users in term of their demands of spectrum and modeled it through different values of willingness-to-pay parameter. Another type of secondary users' heterogeneity represented as different maximum transmission power levels and channel gains and simultaneously, the heterogeneity of primary user in term of different spectrum leasing costs were implemented by Duan, Huang and Shou (2013) to determine the optimal pricing strategy. Jiang, Zhang, Wong, Kim and Edwards (2013) divided multiple heterogeneous classes of end-users each with the specific grade-of-service requirements representing their tolerance. Tóth (2017) demonstrated effect of agent heterogeneity in term of different wealth that can be invested in the market. Cognitive radio network represents the complex system consisting of different hierarchical parts where heterogeneity can be applied. However we find crucial role of heterogeneity in relationship between primary user and unlicensed secondary user that can lead to

significant consequences. From the perspective of economic theory, the heterogeneity of investors is subject of many studies.

In our simulations, we distinguished five types of investors with different values of experimentation and recency parameter of Roth-Erev RL algorithm. Each combination of parameters represents different type of investor from the perspective of their memory and speed of learning. Similarly, Hellthaler (1996) included the heterogeneity of investors by the length of memory as an important determinant in the model of market stock price. Heterogeneity of investors in term of speed of learning depending on the number of trading experiences was introduced by Seru, Shumway and Stoffman (2010). In our model, the first investor with the lowest values of both parameters ($e^{RE} = r^{RE} = 0.1$) plays almost always the most successful strategy and does not want to try another one, thus this player converges to one strategy rapidly and continues playing it because he is also equipped with the almost "perfect" memory. It means that he emphasizes past experiences and remembers them for a long time. This type of investor can be characterized as a conservative one that tries to minimize risk. With the increase of experimentation/recency parameter slows the speed of convergence to one strategy and also the weight associated with the past experiences is reduced. Thus the fifth investor with the highest values of both parameters ($e^{RE} = r^{RE} = 0.9$) tries all options from the strategy space and changes his decision frequently. This type of investor can be characterized as "explorer" and his behavior is very similar to "trial-and-error" strategy.

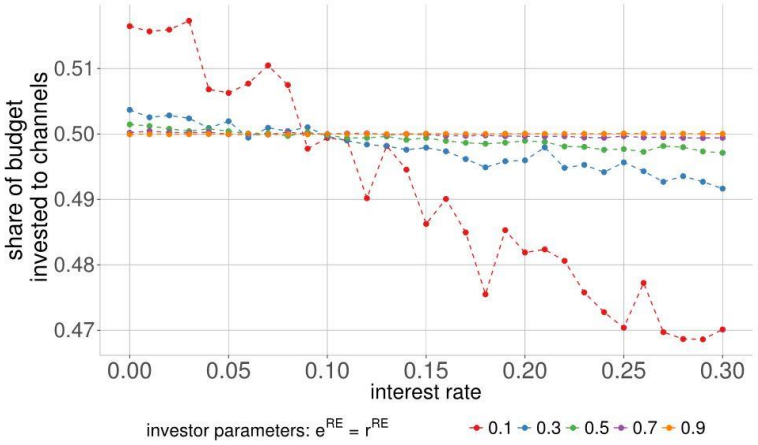

Figure 1 Relationship between interest rate and budget share
Source: Own elaboration

Results of our simulations can be distinguished to two different regimes:

1) **The regime of low interest rate ($r \leq 0.1$)**
   In this regime the revenue from bank deposit is very low and not attractive for investors. According to results of our simulations in Figure , the first investor invests the highest share of his budget in the risky investment. This fact is not consistent with the setting of learning parameters that indicate conservative behavior of investor. It is a result of being locked in one strategy fast at the beginning of a simulation and unwillingness to change it for a long time caused by long memory. This fact can be considered as shortcoming of this learning parameters' setting (very low values). On the other hand, the fifth investor with the highest values of both parameters ($e^{RE} = r^{RE} = 0.9$) is not capable to learn the best strategy during the simulation time because he is trying different strategy almost each time instance.

Moreover, he has very short memory and reacts very impulsive to the current situation, thus he invests 50 percent of his budget into risky investment and 50 percent into risk-free one and tries to diversify the risk. Regarding to mean daily profit of investors, the differences among investor types are not very significant in presented regime as is showed in Figure . Particularly interesting is the behavior of the first investor. The setting of reinforcement parameters leads him to invest the highest share of his budget but he gained the same profit like the other investors. Moreover, according to Figure , the standard deviation of his profit is the highest one which indicates his low risk-aversion in this regime, although he is the most conservative investor in our simulation. Compared with the "trial-and-error" strategy of the fifth investor, conservative investor is not able to be more successful and get higher profit in case of low interest rates.

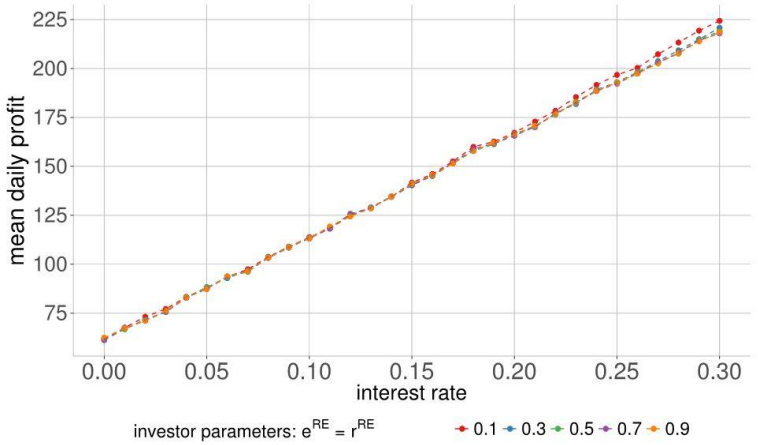

Figure 2 Relationship between interest rate and daily profit of investor
Source: Own construction

2) The regime of high interest rate ($r \geq 0.1$)

In the regime with interest rate ≥ 0.1 the rank of investors is exactly opposite to the first regime. Potential revenue from bank deposit becomes more interesting for investors, thus they start to learn to buy less frequency channels. Differences in mean of investor profit start to grow slightly in this regime. The learning process is the slowest and almost not visible in the case of fifth investor that still plays the "fifty-fifty" game. On the other side the first investor ($e^{RE} = r^{RE} = 0.1$) invests the lowest share of his budget to purchase channels, which corresponds to his characteristics. Moreover, he is able to gain a little higher profit than the rest of investors and even his risk represented by the standard deviation of profit is the lowest one. This fact confirms his high risk-aversion given by setting of learning parameters. The lowest risk-aversion is observed in behavior of the fifth investor ($e^{RE} = r^{RE} = 0.9$). Differences in behavior of others investors are not significant, but in general, they invest more money in frequency channels with increase of both of learning parameters and are also willing to invest at higher risk.

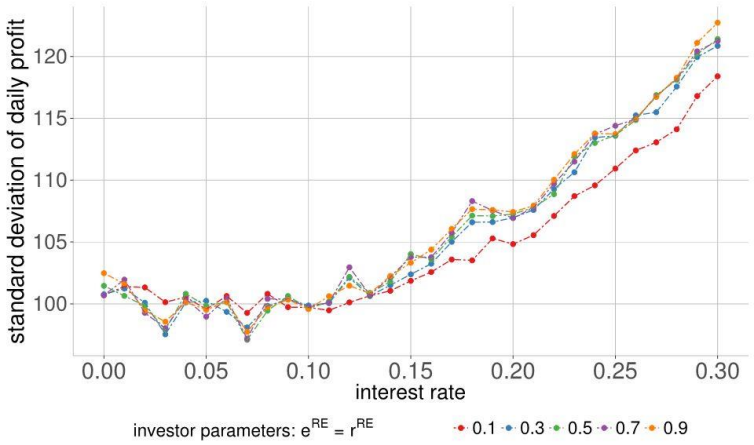

Figure 3 Relationship between interest rate and standard deviation of daily profit
Source: Own elaboration

5 Conclusion

In this paper we analyzed impact of agents' heterogeneity on their behavior in model of dynamic spectrum allocation. Heterogeneity in this case define agent attitude toward risk. In the simulation were defined 5 types of agents by different parameters of Roth-Erev learning algorithm from conservative to aggressive types. Investors had opportunity to choose between safe investment option in form of bank deposit and risky one in form of buying frequency channels to providing services to end users. Results show interesting behavior of the most conservative investor. Counterintuitive to conservative nature, the investor prefers risky investment to channels instead of bank deposit in case of low interest rate. Although investment to channels seems to be riskier, in low interest rate case investor learns to prefer this option instead of bank deposit due to its comparable profitability. However, with increasing interest rate investor shifts to less risky option of bank deposit, which provides higher profit. Aggressive investor obtains relatively stable profit even though he changes strategies often. His short-term memory and high level of experimentation lead to underperforming with rising interest rate, where he is not able to identify and remember optimal strategy. Conducted research showed us interesting insights in behavior of investors with different risk attitudes, which could be pursued further by analyzing different types of investor (different settings of R-E parameters) and prolong simulation time in order to magnify differences among investor types.

Acknowledgements

This work was supported by the Slovak Research and Development Agency, project number APVV-15-0358.

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From unemployment to social economy on the example of Siemianowice Slaskie

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Abstract

The article was based on studies and analyzes of phenomena and social problems, which were conducted since 2000 in Siemianowice Śląskie. The considerations related to the essential issue of unemployment and the lack of social and social security of the unemployed and their families in the social assistance system. Thanks to the statistical data obtained from the Social Welfare Center in Siemianowice Śląskie, it was possible to answer the question of who the unemployed person is in the city. The ideas and tasks of the social economy were also shown and it could be an alternative form of activation of the unemployed. The analysis of the problem of unemployment in the city has made it possible to point out the effectiveness of the social economy.

Keywords: Unemployment, Social assistance, Social economy.

JEL Classification: E24, R11

1 Introduction

The social and economic changes that took place in Poland at the end of the 20th century contributed to a change in the traditional functioning of Polish families. As a result of these transformations, families in Poland had to deal with new and different phenomena and individual dysfunctions and social problems. One such problem is unemployment, which often becomes the basis for other phenomena and social problems, both in unitary and group dimensions. One can therefore say that one of the ways of responding to the problem of unemployment is the social economy. The more so, that the idea of social economy promotes the principle of leaving cash benefits for other forms of activation, whose benefits are visible not only in employment opportunities but also in other areas of social life. Siemianowice Śląskie belong to this group of Upper Silesian cities where unemployment is a significant problem, such activities have a good chance of success. All the more so since every support should be given to restore the independence and the subjectivity of people in need of help and support. Such an effect can be achieved, inter alia, by the work, ie activation of the unemployed to join in the process of creating their place of work and its further development. Of course, it is important to remember that the actions taken by social economy actors are primarily oriented towards meeting the needs of those who take and develop a particular initiative. In this way it is possible to attain, not only the development of social bonds in local communities, but above all the strengthening or rebuilding of the economic and social security of individuals, families and others threatened with the exclusion of social groups.

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Another benefit that comes from this type of solution is the transition from the redistributive model to a model based on more active forms of help and support.

2 Unemployment and its effects

The social and economic changes that took place in Poland at the end of the 20th century contributed to a change in the traditional functioning of Polish families. As a result of these transformations, families in Poland have had to face many new and different phenomena and dysfunctions of individuals and social problems. One such problem is unemployment, which often becomes the basis for other phenomena and social problems, both in unitary and group dimensions. Talking about the problem of unemployment and unemployed people, these two concepts need to be defined, because different definitions can be found. The most important document, which appears to be the Law on Employment and the prevention of unemployment in Article 2, defines who the unemployed person is. Namely "unemployed person" means a person (...) who was immediately employed before being registered as an unemployed person for a continuous period of at least 6 months in the territory of the Republic of Poland, and a person (...) unemployed or otherwise unable to work, capable and ready to work To undertake full-time employment in a given occupation or a given service or other paid work, or if he or she is disabled, capable and ready to take up employment at least half of that working time, not attending school except for learner Adult or extracurricular examinations in the curriculum of this school or higher education where he or she studies on part-time studies, registered at the place of permanent or temporary residence of the poviat labor office and seeking employment or other gainful employment, (…).[2] Thus, in the light of the Act, the unemployed person is on the one hand a person of working age who is actively looking for work, and above all is ready to accept and take up the job. The lexicon of social policy refers, inter alia, to the common understanding of an unemployed person who "is looking for paid work, lacking the opportunity to do so because of the lack of job offers."[3] From the economic point of view the unemployed is a person who wants to work, is looking for work and is ready for immediate Take it.[4]

Looking at the unemployed in a subjective perspective, further analyzes can be made through the prism of social and demographic characteristics, as will be the case for unemployed residents of Siemianowice Slaskie. From the perspective of subject matter, unemployment as a phenomenon is a state in which "every person who is able to work and wants to work can find a job in a relatively short period of time under conditions regulated by labor law; But this is also the state of involuntary inactivity of the individual due to the difficulty of finding employment."[5] Such a look at unemployment allows us to point to economic and sociological elements. These elements are related both to the size but also to the consequences of being unemployed. Unemployment, therefore, is perceived as one of the typical social risks that result in a lack of social security. And yet, the sense of social security is one of the important variables that affects the functioning of the individual in society. And lack of it, can contribute to the taking by individuals or groups, but also entire communities of activities that will be a threat to order and social order.

[2] Ustawa o promocji zatrudnienia i instytucjach rynku pracy z dnia 20 kwietnia 2004
[3] B. Rysz – Kowalczyk (red.), Leksykon polityki społecznej Warszawa 2002, s. 22
[4] E. Kwiatkowski, Bezrobocie. Podstawy teoretyczne, Warszawa 2002, s. 18-20
[5] B. Rysz – Kowalczyk (red.), Leksykon…,dz. cyt., s 20-21

When talking about unemployment, it should also point to its phases, which in particular can contribute principally to the disorganization of the individual's social life and, consequently, to the disorganization of whole communities. Mieczysław Jahoda distinguishes five phases of unemployment, which are related to the factor of time spent without work and psychosocial reactions to the state of affairs. The first phase is the phase of anticipation of unemployment, accompanied by a strong stimulus to work aimed at finding a job quickly. The unit is accompanied in this situation, frequent mood changes and emotional lability. Phase two, a shock after losing work. In this phase, individuals who have lost their jobs feel a sense of defeat, of harm, of humiliation, and above all of fear of the future, which causes despair. The next, third phase is getting into the situation of unemployment and optimism. During this period, lack of employment is considered as a transitional time, often equated with leave. At the same time, this situation is accompanied by increased activity in the search for employment and the belief that the actions undertaken will be successful. Since many of the activities undertaken are often chaotic, they are conducive to prolonging the period of unemployment. And this in turn is conducive to the appearance of the fourth phase, the phase of pessimism and resignation. Another cause for such feelings and attitudes is emerging financial problems, the persistence of which contributes to the development of negative emotional reactions and health problems. The last of the phases presented is adaptation to the situation, the stage of fatalism and apathy. An individual who can not find a job, despite the various activities involved, is accompanied by a feeling of hopelessness. Thus, such individuals often isolate themselves from their wider and closer social environment. Also making a reduction in life expectations as well as past interests. In turn, the reactions of people affected by unemployment can be divided into three stages. The first is a shock or optimism phase that lasts a maximum of two months. At the end of this period there is a stage of pessimism, which experts estimate for the next four months. In turn, in a longer period of time, this stage transforms into a phase of fatalism.[6] Consequently, such a state of affairs contributes to the disorganization of individuals and their families, leading to their exclusion and marginalization on the one hand, and, on the other, the disorganization of the whole community.[7]

Remember that unemployment triggers further social issues, including poverty and poverty. In this way, the spiral of problems begins, as poverty brings with it other social issues such as educational difficulties, issues related to the care of one's own health and family members, especially children. Consequently, these issues lead to the development of pathological phenomena, leading to a deepening of the sense of uncertainty and threat to the social and social security of individuals, families, social groups, and finally the entire local community.[8] In the case of local communities, the situation is often also exacerbated by demographic factors that aggravate a number of unfavorable trends in contemporary cities, including Siemianowice Śląskie.

3 Demographic analysis in Siemianowice Śląskie

The demographic situation of Siemianowice Śląskie is unfavorable for the city, whether or not they provide unequivocal data in the table below. The first point to note is that over the past fifteen years the population has declined. The fact that about seven thousand people have left the city clearly indicates that it is a city of immigration, which also adversely affects the unemployment rates. The depopulation of the city creates a disadvantageous situation for the human and social capital of the

[6] Por. K. Kmiecik – Baran, Bezrobocie czynnikiem marginalizacji i ubóstwa, Gdańsk 2009, s. 32-33
[7] Tamże, s. 33
[8] A. Skrabacz, Bezpieczeństwo społeczne. Podstawy teoretyczne i praktyczne, Warszawa 2012, s. 124

city, which is severely weakened, and in the longer time perspective causes further social and structural degradation of the city. It is obvious that leaving the city involves looking for better prospects for getting a job, professional development, and thus earning better pay. This may indicate that this part of the Migrant did not find satisfactory living conditions in his city. This is also confirmed by the negative indicators of the migration balance, which in 2013 reached the highest value of -5.9 jak. Actually the behavior of the inhabitants of Siemianowice Śląskie should not be a surprise if you refer them to the rate of unemployment in the city. In the last eight years the unemployment rate in Siemianowice Śląskie was as follows: in 2008 - 10.3 %, 2009 - 13.6 %, 2010 - 12.5 %, in 2011 and 2012 - 14.3 % 2013 - 15.1 %, 2014 - 13.6 %, 2015 - 11.8 %. And according to data from the Provincial Statistical Office in Katowice, the District Labor Office in Siemianowice Śląskie in 2010 only had one hundred and nine job offers. No wonder that families in this city do not see any chance for themselves. Although the number of job offers increased in subsequent years, it did not bring about any change that would have been expected. WUS data also show that over 16 % of the unemployed in Siemianowice Śląskie are persons who are under the age of twenty-five. It should be noted that this indicator shows a downward trend and by 2015 it has decreased by about four percentage points. This does not change the fact that the problem concerns people who, after completing education, have no chance of finding a job. Without having their own families, children are potential candidates for seeking and taking up work not only outside the city but also in the country.

Table 1 Indicators of natural increase and migration balance in Siemianowice Śląskie

Year	POPULATION	INDIAN NATURAL INDICATOR INDEX ‰	SALAD OF MIGRATION ‰
2000	75 645	- 1.97	- 3.70
2001	76 136	- 2.6	- 2.2
2002	73 536	- 2.4	- 2.4
2003	73 383	-2.9	- 2.8
2004	73 155	-1.6	- 2.9
2005	72 869	-2.7	- 5.1
2006	72 247	- 3.2	- 3.6
2007	71 621	- 2.68	- 4.6
2008	71 118	- 1.88	-3.28
2009	71 712	- 2.5	- 3.29
2010	70 291	- 2.0	- 3.93
2011	69 992	- 1.2	- 3.1
2012	69 539	- 2.21	- 4.7
2013	68 844	- 4.2	- 5.9
2014	68 634	- 1.5	- 2.4
2015	68 231	- 3.2	- 3.4

Source: Own elaboration based on the data of the Provincial Statistical Office.

The analysis of the next indicator, which concerns natural growth, is only a kind of complement and confirmation that Siemianowice Śląskie is a city whose demographic situation can be described as regressive.

By analyzing the data on natural growth, it is worth noting that it was at its lowest level in 2008, amounting to 1.88 ‰ and 2014 with the level of - 1.5 ‰. These indicators in the indicated periods are not the lowest comparing it with the previous and subsequent years. Nevertheless, they may signal a change, as in 2014, they can be linked to the 500+ family government policy. It does not

change the fact that, without the certainty of employment, the same fixed income, the prospects of getting a self-contained apartment, city dwellers are cautious about setting up families, and those who live in marriages are also cautiously approaching to grow their families. Hence, there are still negative natural growth rates with a tendency to deepen this process. In order for the social capital of Siemianowice Śląskie to leave the city, local authorities should take steps to create such conditions to improve the functioning of families.

4 Image of an unemployed person in Siemianowice Śląskie

The analysis of the socio-demographic characteristics of the unemployed and the effects of unemployment based on the data of the Municipal Social Assistance Center in Siemianowice Śląskie will include a group of applicants who sought help in resolving the problems of their families caused by being unemployed. However, one must remember that there is yet another family, namely members of their families who are indirect beneficiaries of the social support system, and often also have their own dysfunctions and problems, including those who are unemployed, which furthermore contributes to lowering the functioning of unemployed families.

Analysis of the data of the Municipal Social Assistance Center in Siemianowice Śląskie indicates that over the eleven years of research, the most common motive for seeking help among the applicants was the problems of being unemployed. Only in 2012, 44 % of the population surveyed identified the problem as the main reason for applying for help and support. It should be noted that this was the lowest, in the history of these studies, an indicator.

Table 2 The bulk of applicants seeking support because of Unemployment in MOPS in Siemianowice Śląskie in the years 2000 – 2012

Year	Number of applicants	The unemployed		Women`s		Men`s	
		L.B.	%	L.B.	%	L.B.	%
2000	2 918	1 645	56.4	1 044	63.5	601	36.5
2003	3 463	1 839	53.1	1 191	64.8	648	35.2
2004	3 157	1 907	60.5	1 281	67.2	626	32.8
2005	3 224	2 020	62.7	1 317	65.2	703	34.8
2006	3 393	1 999	58.9	1 314	65.7	685	34.3
2007	2 833	1 546	54.6	1 068	69.0	478	31.0
2008	2 916	1 433	49.1	982	68.5	451	31.5
2009	2 895	1 359	46.9	907	66.7	452	33.3
2010	2 951	1 355	45.9	873	64.4	482	35.6
2011	2 732	1 243	45.5	808	65.0	435	35.0
2012	2 845	1 255	44.0	802	63.9	453	36.1

Source: Own elaboration based on the data of the Municipal Social Assistance Center in Siemianowice Śląskie

The data presented show that this dysfunction is declining among residents of Siemianowice who seek institutional support and support. However, data from the Poviat Labor Office indicate that in 2012 there were 3 017 registered and in 2013, their number increased to 3 213 unemployed in the city.9 Thus, the MOPS statistics show a decrease, and the data of the PUPs - an increase in the number of people unemployed in the city. Among this total number of unemployed 55.2 % were women and 16.5 % were under 25 years old.[10] In turn, without work more than a year remained 19.3 % of the Migrants. However, if you refer to the data in the table, the number of people who

[9] Powiatowy Urząd Pracy w Siemianowicach Śląskich, www.pup.siemianowice.pl [data dostępu 25.07.2017]
[10] Wojewódzki Urząd Statystyczny w Katowicach, www.stat.gov.pl [data dostępu 25.07.2017]

emigrated permanently, it turns out that they were according to statistics two hundred and forty three. So, these people decided to look for work outside Poland.

Of the total number of applicants for the social support system in Siemianowice Śląskie, 1 255 people sought help because of the effects of being out of work in 2012. Of the analyzed population 63.9 % were women and 36.1 % were males. The most numerous (29.0 %) of the population in this category turned out to be people born in the penultimate decade of the last century, so the study time was thirty years old. The share of women (35.7%), who suffered from lack of employment and its consequences, was twice as common in this population. The next generation in terms of age were people born in the nineties - 26.8% of the unemployed beneficiaries of the social assistance center in Siemianowice Śląskie. Among the forty-year-olds, women were more likely to seek help than men. Fifty-year-olds are 19.8% of the population in question, among whom men are more likely to be affected by unemployment than women. Similarly, indicators are formed for the sixty-year-olds. Also pay attention to the youngest beneficiaries of the center affected by the problem of lack of work. They represent 5.8% of the presented population. Slightly more often this problem affects women than men. It is also significant that twenty- and thirty-year-olds together account for a third of all those who applied for social assistance in 2012 in Siemianowice Śląskie.

Another feature that answers the question of who is an unemployed person who benefits from social support is family and civil status. The analysis further confirms that unemployment as a social problem more often affects women. It turns out that 29.4 % of the total population of women was free and the majority of them (12.4 %) did not have children. The indicators for men who were free were significantly better. They accounted for 56.1 % of their total population, but 51.5 % of them also did not have children. Marital relationships were 29.4 % of the female population and 11.5 % of the male population. The aspect of parenting played an important role in the case of women, who in 26.9 % had dependent children. It should be noted that for several years there has been a systematic decline in the ratio of women who are also unemployed mothers that work in matrimonial relationships. In the married men's population, only 4.4% of them had at least two children. The high rates also refer to women who, because of the effects of being out of work, sought support but were divorced or separated. They accounted for 23.6 % of the analyzed population, and half of them had at least two children. Men with marriage experience were described by an almost identical index (24.9 %), and one in four had children in their care.

It is worth noting that among the total population of women seeking employment, 12.7 % are non-union members and 11.3 % have at least one child. Men in the same situation were nearly four times lower, although they also maintained at least one child in 1.9 %. The widest category was the group of widows and widowers who sought social support for the effects of being unemployed. Women who were in this situation were 4.9 % of their total population, and 3.2 % of them were children. Among widowers who made up 4.1 % of the surveyed population, 1.5 % had children.

The above analysis indicates that being unemployed is not only a problem for a person who has lost or has not taken up or has no employment. This is a situation which equally affects all family members, and in particular children who often take over the life pattern of a person who does not take up employment and is based on various forms of support in the form of social benefits. As a result, there is a deepening of the intergenerational transmission of helplessness and poverty. These phenomena, further leading to marginalization and social exclusion.

Education is the next feature that not only complements the image of the unemployed benefiting from social support but, to some extent, explains the situation. Of the non-employed 84.5 % have the highest vocational education. This population accounts for 44.0 % of people with basic vocational education and 37.7 % of people with basic education. The basic occupation is occupied by half of the analyzed male population and forty per cent of women. For people with primary education, the indicators for both sexes show no significant difference (38.3 % for women, 36.6 % for men). Nearly twice as often, women had a lower education level than men, although only 14.1 % and 1.4 % had higher education. The presented data points to at least two essential issues. Namely, women in Siemianowice Śląskie have a more difficult situation on the labor market despite being better educated. This may be due to the traditional division of social roles in Silesian families. Where, the tasks of the woman belonged to the birth and education of children and care over the home fire. On the other hand, the economic sphere, that is, earning a living for a family, belonged to a man. However, the social transformations in which the second half of the twentieth century had taken place made women, not only young, want to have an education that would support their self-fulfillment. On the other hand, the magnitude of the phenomenon clearly indicates the need to undertake such actions, which will start to reduce the adverse social and individual phenomena. Such actions can be seen in the social economy and its assumptions.

5 Social economy as an alternative to unemployment

Can it really be said that social economy can be an alternative to people who are unemployed? If you look at the ideas and principles of social economy, then the answer seems to be yes. Stigmatizing that the social economy strives to work out a model that departs from the idea of a welfare state and turns to the various forms of activation that are meant to give work instead of benefit. It is dedicated to people and social groups who are at risk of social exclusion due to long-term unemployment, homelessness, addiction or social isolation. It is a combination of management with the building or rebuilding of social bonds, which aims to create economic and social security for individuals and social groups, and even entire communities. On the one hand, it seeks to fulfill the purely economic criterion of economic efficiency but also pursues many other goals and social values. Confidence in strengthening social cohesion, building confidence, enhancing economic security and employment of the majority of individuals, but also social groups, strengthening local and group identity, participating democracy and belonging to the community can be assured.[11] In this context, institutions operating in the field of social economy are perceived by the prism of economic activity. But such activities, whose market instruments are used to achieve social goals. So the most important thing here is the person and the work that he performs, ie the common actions of people who market certain goods or services, especially those that are not supplied by the market, the state, and there is a high demand for it.[12]

Thus, social economy actors can be and are a significant tool for socio-economic development at local level, as they contribute to the creation of new services, and above all to new jobs in the local environment, and at the same time combine the economic and social aspects of civic participation. Therefore, social economy is treated on the one hand as a sector because it includes defined entities and institutions that have specific characteristics and principles of action. But it is also perceived as a method of action, because certain social goals are achieved through economic methods, and social economy actors are active in all sectors, ie government, local government and non-

[11] A. Grzybowska, J. Ruszewski, Ekonomia społeczna w teorii i praktyce, Suwałki 2010, s. 13-14
[12] Tamże, s. 14

governmental organizations.[13] So this is an area of activity that is a kind of response to the need to achieve social objectives that can not or not be met primarily by state institutions but also by the market. While maintaining the basic objective of preventing social exclusion of individuals and groups living under the conditions of material poverty, or possessing features that impede them or prevent them from using social resources to the extent of others. Such groups include people with physical or mental disabilities, the unemployed and the long-term unemployed, addicts, the homeless, and even those leaving the penitentiary.[14] The social economy assumptions are as coincident with social assistance, as the Social Welfare Act contains a provision that imposes social workers as a special obligation "to stimulate social activity and to inspire self-help efforts to meet the vital needs of individuals, families, groups and social groups; Co-operation and interaction with other professionals to counter and reduce pathologies and negative social phenomena; mitigate the effects of poverty; Initiating new forms of assistance to disadvantaged people and families and inspiring the establishment of institutions providing services to improve the situation of such persons and families; To participate in the inspiration, development, implementation and development of regional and local social welfare programs aimed at improving the quality of life."[15] This is nothing more than motivating to engage in a variety of activities that will help individuals and families to become independent from the social assistance system. All the more so, that the unemployed are a category that can be described as unused social capital or unused potential for human work. The activity of social economy institutions is strongly influenced by limiting the development of poverty zones and the related poverty culture, which is passed on to the next generations as a way of life, and the development of claiming attitudes towards those who remain especially in long-term unemployment. In addition, it is possible to reduce the costs of maintaining institutions servicing the unemployed, paying for benefits, or organizing a variety of training and other forms of employment adjustment for the unemployed.

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[14] Tamże, s. 17
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Pilot fatigue as one of the factors causing air accidents

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Abstract

The aim of the article is to highlight the issue of human factor and topicality of risks arising from the analysis of aviation accidents and recently conducted surveys. Despite the fact that human being is the most important, most adaptable and most effective element of the system, contributes to a high proportion of air accident. The average significantly exceeds the pilot's profession, as the most error-prone component. Fatigue that occurs in crews has recently become major factor endangering the safety of flight operation. Effects of fatigue not only disturb the functions of the human body, but they greatly influence pilot's performance during the flight, as confirmed by measurement results.

Keywords: Human factor, Fatigue, Performance, Pilot error, Safety

JEL Classification: L93

1 Introduction

The causes of air accidents and incidents in the history of civil aviation were mostly serious structural and system errors, or underestimation of the impact of meteorological conditions. Established technology and overall reliability of the aircraft systems haven't always been sufficient at this time. However, the 70's of the 20th century brought significant changes. During this period there is a huge expansion of the commercial air transport by jet airplanes. At the same, the newly implemented technology has reached such a level of reliability that the causes of air accident due to technological failures have been gradually declining. Nevertheless, the number of air special events has risen constantly. Therefore, it was necessary to ask a question, what a role plays human factor in flight operation or flight safety.

Air accident analyzes in 1970 - 2010 showed, that 70-80 % of air accident were caused due to human error. Although the human factor is considered to be crucial, the most adaptable and the

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most flexible component of the aviation system, it is also the most vulnerable to impact adversely affecting its performance. Pilot failure due to a disruption in harmonization of its activities with other components of the system (man – machine – environment), when its psychological and physical reserves are not sufficient to compensate the fail of one of its components, is referred to as a human factor failure. Pilot error is considered to be one of the most common causes of air accident with a significant proportion of up to 60 %. Errors can occur at all stages of activity such as perception, assessment of the situation, choice of reaction, performance of task, evaluation of result. The main purpose of applying the findings of human factor in aeronautical practice is to know predictable human capabilities and limitation and to use this knowledge in flight operation subsequently.

The table below shows range and causes of air accidents in percentage in the decade format from 1950 to 2010. It was completed from the Plane Crash Info database and represents 1015 fatal accidents of commercial aircraft. Statistic data doesn't include planes with less than 18 passengers on board, military aircraft and private aircraft and helicopters.

Table 1 Accidents by cause

Cause	1950 - 59	1960 - 69	1970 - 79	1980 - 89	1990 - 00	2000 - 10	Average
Pilot error	42	36	25	29	29	34	32
Pilot error (related to weather)	10	18	14	16	21	18	16
Pilot error (mechanical fault)	6	9	5	2	5	5	5
Total pilot error	**58**	**63**	**44**	**57**	**55**	**57**	**53**
Other human errors (caused by other person)	3	8	9	5	8	6	6
Weather	16	9	14	14	8	6	12
Mechanical fault	21	19	20	21	18	22	20
Sabotage	3	5	11	12	10	9	8
Other	0	2	2	1	1	0	1

Source: http://www.planecrashinfo.com

The results of an air accident investigation confirm the existence of several casual factors. Failure may be caused by any element in the system or by their interaction. Most often, air accidents are result of a series of faulty tasks, while separate errors don't cause a high level of risk. The European Aviation Safety Agency provides each year a statistical overview of air safety in the EASA Member States, as well as identifying the most common safety risks that lead to air accident in different aviation operational areas. Based on the analysis of the investigations in recent years, EASA has established pilot fatigue as one of the five contributory factors, which is significantly contributes to the occurrence of air accidents.

2 Current state

Experts estimate that pilot fatigue contributes to 15-20 % of all fatal air accidents associated with human factor failure. Between 1990 and 2013, Aviation Safety Network recorded 22 air accidents that were caused by crew due to insufficient rest or fatigue. These accidents resulted in 595 fatalities and several tens serious injuries. Recent events constantly emphasize the importance of fatigue that occurs among flight crew. It is understandable that in the case of longer duty period, a relatively higher risk of accidents appears than in comparison to short ones. The longer the pilot's wakefulness is, the more they tend to make mistakes, especially cognitive, such as decision making. These "minor errors" also confirm many of air accident. We can mention some from more serious accident such as:

- **Korean Air** (1997),
- **Colgan Air** (2009),
- **Air India Express** (2010).

For better understanding of fatigue and its most likely causes and consequences, were realized by members of the European Cockpit Association several studies related to pilot fatigue. Surveys were carried out between 2010 and 2012 in Austria, Denmark, France, Germany, the Netherlands, Norway, Sweden and the United Kingdom of Great Britain and Northern Ireland. Pilots involved in the survey should assess the level of fatigue they experience during the flights. Surveys have revealed remarkable, alarming results. Pilot fatigue has become a reality in European cockpits. It is currently common than expected and significantly under-reported by pilots.

In the following graph (Figure 1) we can see percentage of pilot fatigue that pilot are experiencing during their flight duty in different European countries. Grey scale represents percentage of pilot fatigue and red scale shows percentage of pilots who state that they have been fallen asleep or experienced moments of micro-sleep in the cockpit.

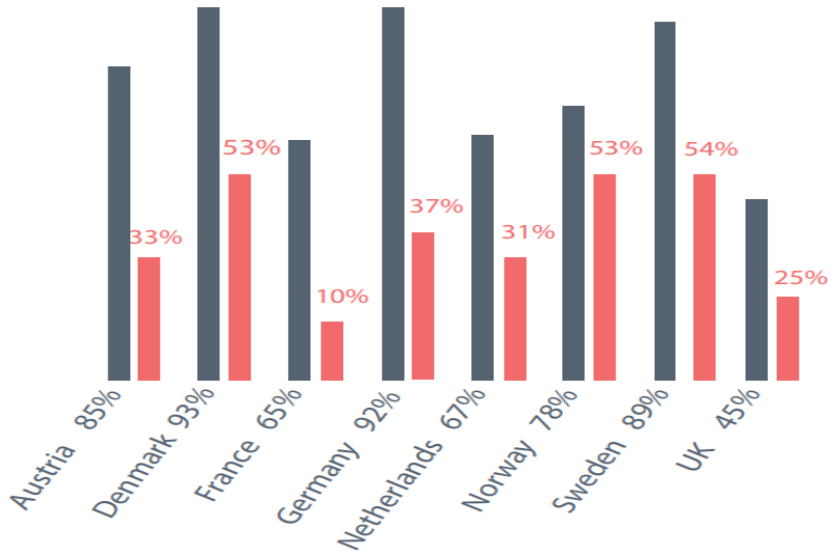

Figure 1 Percentage of pilot fatigue and dozing off or micro-sleep episodes
Source: https://www.eurocockpit.be/sites/default/files/eca_barometer_on_pilot_fatigue_12_1107_f.pdf

More than 50 % of surveyed pilots experience fatigue as a weakening of their ability to perform duties during flight duty. 92 % of German pilots admitted that they feel too tired or not capable for

duty on board at least once in the last 3 years. Similar results in other European countries show that is not an isolated case. In Austria, 85 % of pilots reported that they were too tired during their flight duty, while two thirds of them having this experience more than once. Similarly, 89 % in Sweden, and 93 % of Danish pilots admitted their claim. The lowest percentage of serious fatigue in flight crews was recorded in the Netherlands "only" 67 %. It follows that two of the three pilots suffer from fatigue to extreme exhaustion. More than a third of the surveyed people said that they have slept or took naps during the flight without agreeing of their colleague.

The results of the survey point to the key aspects of the operation (long duty, standby hours, night flights and often changing flight schedule), for which the pilots are insufficiently rested. This study largely confirms what scientific and medical research has identified as particularly tiring factors of air operation that require particular attention and risk management.

3 Experimental measurement for assessment of fatigue effects

Fatigue reduces the physical and mental ability to safely perform a flight. A tired person can lose 80% of his attention and 70 % of his ability to respond. Pilot fatigue leads to increased reaction time, short term memory loss, impaired judgment, incorrect decision making and reduced visual perception and so on. It is true that pilots often aren't aware of these effects. The main cause of fatigue is lack of sleep and disturbance of biological rhythms in the body.

Since fatigue can be considered as one of the aspect causing changes in pilot performance and increased vulnerability to errors, which significantly affects the safety of air operation, an experiment was conducted at the Faculty of Aeronautics to observe these changes. The basic assumption was to find adequate novices, create a flight task (flight track), determine the parameters of measurements, use the appropriate type of flight simulator and adequately generate the effects of fatigue. In the study two 24-hour flying intervals were completed during which two pilots were shifted. The number of flights depends on the staying power of the research sample of pilots, while with individual pilots repeating the task 11 or 12 times. The main aim of the experimental measurement was to observe errors made by pilots as a result of fatigue, deflections in the flight track and intervals or track points in which mistakes occurred. The purpose of the experiment was also assessing of the pilot performance and determination impacts on safety of air operation. For the purposes of this contribution we will take a closer look at the measurement results for one of the sample pilots. The following graph shows the deflections from the reference values set for altitude, as one of the parameters used to assess crew performance and correct piloting of the aircraft.

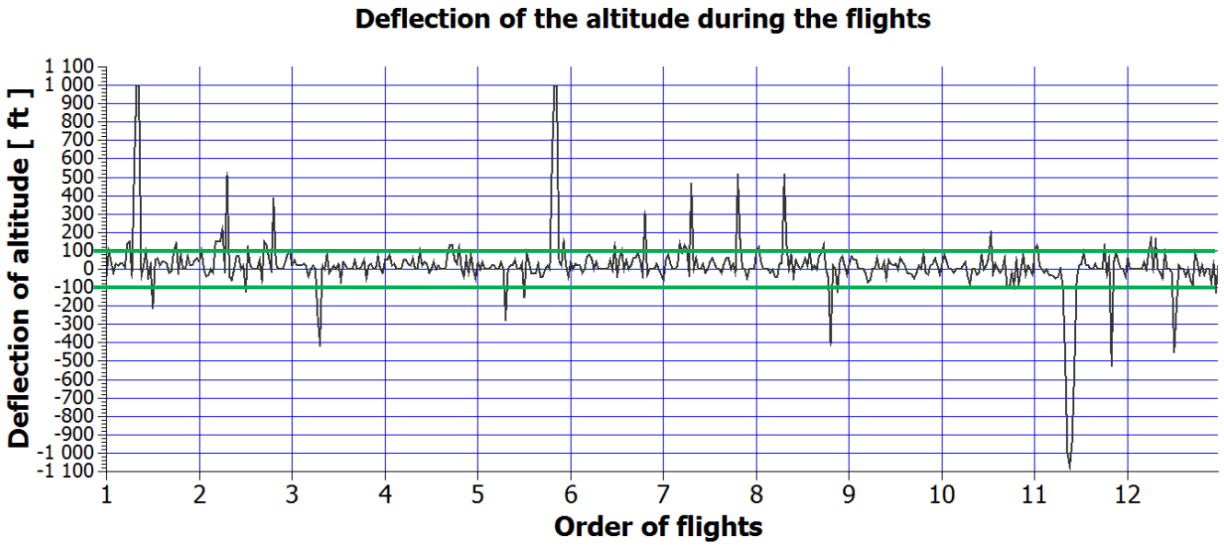

Figure 2 Deflection of the altitude during the flights
Source: Own elaboration

In the graph you can see 3 significant deflections of altitude that were recorded during 24 hours at the first flight (time 09:25), 5th flight (time 18:30) and 11thflight (time 07:00). Maximum deflection from the reference value was identified at 7 o'clock in the morning with value -1070 ft at point P. Pilot began to descend before turn left on heading 053 ° at the point N and O when he should fly in altitude 3500 ft, he flew about 1000 ft below. Pilot continued in the descent also at approach (at the points P, Q, and R) when he reached altitude 1430 ft (instead 2500 ft). This led to exceeding safety range that represents +/- 100 ft (highlighted on the graph with the green lines). A mistake has been probably caused by fatigue and limited alertness. Pilot stopped to monitor all instruments comprehensively and he concentrated only on localizer and glideslope of ILS. Preoccupation with one task at the neglect of other tasks leads to loss of situational awareness. At the first and 5th flight the same maximum deflections were found out at the points N and O, that value was +1000 ft. It wasn't so high safety risk as during the 11thflight.

From the measurement results of the selected pilots, considerable variability was found out in the performance. Several deflections of altitude in both positive and negative values were observed for all pilots. Exceeding the permitted safety limit in negative values was a greater safety risk for a pilot than in positive values. In comparison to other tested pilots, deflection of the mentioned above pilot significantly exceeded the maximum permitted values, especially at the phase of final approach of landing. Despite exceeding maximum permitted deflection, the pilot didn't make maneuver "go around" in one case, but continued to approach. Although for all pilots, greater negative deflections were recorded (-700 ft, -250 ft, -300 ft, -310 ft, -350 ft,-360 ft), these mistakes didn't make in the final approach, when is required to pilot the aircraft as accurately as possible.

The error observed with each of the pilots, was found out at the M and N points, when the pilots forgot to descend to the required altitude 3500 ft on the heading 204° during several flights. Severe errors in the form of more marked negative deflections from the specified values mostly began to appear in last flights at dawn. As a result of fatigue, the safety limits have been exceeded what was most likely caused by decreasing in performance, what also meant safety risk.

4 Conclusion

Fatigue represents a potential risk to flight crew and air operation. The severity of this phenomenon is constantly increased in last years. This fact is confirmed not only by database of air accident the Aviation Safety Network and surveys of the European Cockpit Association, but even the European Aviation Safety Agency considers fatigue to be one of the factors leading to the occurrence of air accidents and incidents. Effects of fatigue cause reduced alertness, increased reaction time, influenced judgement, logical reasoning, short term memory loss, or increased occurrence of errors.

For observing the effects of fatigue and possible changes in pilot performance caused by fatigue, an experiment was realized. Its aim was to observe errors and their intensity during 24-hour flying intervals. Serious errors were found out by measuring, which occurred mostly in last flights, when effects of fatigue on the human body were more marked. The results cannot be ignored, because even a small mistake can lead to catastrophe and loss of human life.

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Reviews and Citation Analysis of Tax Competition Literature

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Abstract

Tax competition is a topic of many scientific papers, which has been studied over 50 years. Opinions on tax competition, weather it is harmful or useful, its causes and effects have developed over these years. Increasing trend in number of papers on this topic suggests it importance. Although there are many review papers concerning with this topic, there is still a space for relatively novel approach to analyze literature. It is citations analysis and keyword analysis, which offer to assess large number of articles in relatively short time and identify most important and influential ones. Creating co-citation networks shows most citied and co-cited papers. Result of keyword analysis is division of keywords to separate clusters by occurrence based on which it is possible to analyze related topics.

Keywords: Tax competition, Citation analysis, Literature review.

JEL Classification: H20, Y90

1 Introduction

Providing public goods is one of the key roles of governments all round the world. Therefore, sufficient funding is ongoing topic of both academic and public debate. Tax revenues are main source of income for almost all countries. There are many factors influencing tax revenues, depending on particular tax. According to (Clausing, 2007) most significant determinants for corporate tax revenues are economic growth, unemployment, GDP per capita and tax rate. In general, tax rate is a key determinant regardless of analyzed tax revenues. Not only statutory tax rate but also effective tax rate has impact on tax revenues. Finding optimal tax rate has been subject of interest for politics and academics. Aim for government is to ensure as much as possible funding without discouraging firms or people to stop working. Setting tax rate, however, should be seen in bigger picture, and take into account fiscal policies of other countries. Phenomenon called *Tax Competition* is subject of many papers for decades. Countries compete for sources of taxation – mobile tax bases. Tax competition has many forms, is visible on many levels and is unorganized. There are many opinions on presence and effects of tax competition. Competition, in general, is viewed as positive force leading to optimal results. However in context of taxation, evidence of harmful effects on public finances of countries are analyzed and proved in some cases. The main issue regarding tax competition is phenomenon called race to the bottom. This phenomenon occurs when countries compete for mobile tax base by gradually lowering tax rates, which has significant negative impact on tax revenues. As the consequence is insufficient level of provided public goods. On this subject were written many papers, which has contradictory results and some authors disproved existence of such phenomenon, although process of lowering statutory tax rate across

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OECD countries is visible for over two decades. Tax competition might occur on different levels, such as cities, municipalities, states or regions. European Union has recognized tax competition as a problem and proposed multiple measures to decrease or totally eliminate its effect. Opposite process to tax competition is tax coordination or in some cases tax harmonization. Tax coordination is highly formalized process, where participating countries negotiate regarding their tax policies or even set central rules for all participating countries. Effects of tax competition is therefore compared to tax competition in papers. From the previous text it is obvious, that tax competition is complex issue, which is possible to analyze from many different perspectives and contexts. There is 400 papers in Web of Science Core Collection (WoS CC) between years 1986 and 2017, in which one of main topics is tax competition or is explicitly mentioned in title. There are several surveys and reviews of papers concerning tax competition. Among most important ones belong Wilson (1999), Bruckner (2003), Fuest (2005) and Deveraux (2012). Heterogeneity of papers on analyzed topic offers to review it from different perspectives and performed review articles illustrates how general perception of topic developed in time. Subject of analysis in this paper is comparison of findings in mentioned review papers. Although there are many review papers on this topic, none of them concerns with meta-analysis of published articles. In addition to comparison of review papers, also bibliometric information analysis of mentioned 400 papers from WoS CC is conducted. The aim of this paper is to compare existing review papers on given topic and to contribute to the existing list of performed review papers with bibliometric analysis of the topic.

2 Methodology

Modern age offers authors innovative tools for work with countless of sources. Bibliometrics is becoming more and more important in order to assess ever-increasing count of papers not only for companies such as Thompson Reuters, but also for individual authors in their everyday research. Lancaster (1977) defined bibliometrics as application of various statistical analyses to study patterns of authorship, publication, and literature use. In this paper we applied three different methods of analysis – descriptive statistics, co-citation network and keywords clustering. Used methods offer overall view on analyzed topic and may highlight trends over time. Descriptive statistics of analyzed papers provides basic information regarding timespan and number of published papers on given topic. Also possible results are list of journals by number of publish papers on given topic, list of most active/influential authors, countries or institutions. Co-citation network shows pairs of authors who are frequently cited in the same document. Another possible angle of analysis is from the point of keywords, which are clustered by how frequently are used together. Mentioned methods are useful especially in the early stages of research, when they can provide general overview of trends, most important authors and works on specific topic. Results from such analysis can provide general framework of published papers and suggest possible “white spots”, where is opportunity for further research. Though, it is not possible to assess detailed aspects of individual papers, and thus it is better to combine it with traditional review papers. To combine benefits from bibliomectrics and research papers, it is possible to apply text mining techniques on larger set of papers, however this is not subject of analysis in presented paper.

3 Selected review articles comparison

Aim of any review article is to offer how perception on given topic develops in time. Existence of multiple review articles on the same topic indicates its importance and relevance. Comparison of review articles offers us to look at specific topic from multiple perspectives and point trends and areas on which was aimed little or none focus so far. Four review articles mentioned in Introduction were selected to draw general development in topic of Tax Competition. In Table 1 are presented basic statistics regarding analyzed review papers. From titles it is obvious, that three out of four papers analyzed specific area of tax competition. Exception is first paper, which offers broader look on tax competition. Interesting is negative relationship between number of citation and number of equations in articles. One explanation might be, that almost all papers on that topic offers new model of tax competition or at least slight modification of existing one. Review papers with higher number of citations tend to focus on innovative ideas and results, rather than analyzing in depth models and methods used in reviewed papers.

Table 1 Basic statistics of analyzed review papers

Title	Author(s)	Year	Number of		
			references	equations	of pages
Theories of Tax Competition	John Douglas Wilson	1999	112	6	36
Strategic Interaction Among Governments: An Overview of Empirical Studies	Jan K. Brueckner	2003	25	19	15
Capital Mobility And Tax Competition: A Survey	Clemens Fuest Bernd Huber Jack Mintz	2005	93	52	64
What do we know about corporate tax competition?	Michael P. Devereux Simon Loretzy	2012	121	0	59

Source: Own construction

Review papers incline to one of two main goals – either subject of analysis is construction of models or theoretical framework/implications from selected papers. This is supported also by Table 1, where is shown that longer papers assess rather theoretical aspects with mentioning many sources, without explicitly defining models by equations. On the other hand, there are review papers, which goal is comparison of model construction among analyzed papers.

Wilson (1999) compares in his review paper shift in opinion on tax competition from its harmful effects to beneficial ones. Tax competition was seen as threat to ensure sufficient public finance. However in later research it was pointed out that tax competition could reduce wasteful behavior of governments. In this context was also analyzed competition for mobile factors. Main topic of review paper is comparison of Tiebout model (1956) with newer ones.

Subject of analysis in review article from Bruckner (2003) was comparison of different models of interaction among governments. Author identified two different groups of models: spillover models and resource-flow models. Subjects of analysis was also a comparison of reaction functions of governments to developing situation. He stressed importance of choosing appropriate tax rates.

Fuest (2005) focused in his review paper on relationship between corporate income taxes and international capital flows. He stated that increasing mobility of capital and other reasons make pressure to diminish capital taxes. Governments on the other hand are interested in keeping their revenues from these taxes.

Devereux (2012) offered detailed comparison of works on topic of tax competition. He states that in studies is distinguished between common shock and strategic interaction among governments. Also some studies point out that certain countries are slow in adapting their tax rates and only react on their neighbors with significant delay. He stated that there is a pattern of evidence in tax competition, mainly in European Union.

4 Citation analysis of selected articles from WoS CC

For analysis of articles from WoS CC we used several tools, to assess trends and development in given topic. Bibliographical records of each paper were downloaded from Web of Science website and consists of 28 items. The most interesting items were: Author name(s), Title, Source, Abstract, Cited References, Keywords, Cited Reference Count. For description statistics was used statistical software R (R Core Team, 2017), in which was used mainly package bibliometrix (Aria, Massimo, Cuccurullo, & Corrado, 2016). Clustering analysis of keywords was conducted in VOSviewr (van Eck & Waltman, 2010).

4.1 Descriptive statistics

Subject of analysis were 400 papers between years 1986 – 2017 from 443 unique authors. Number of analyzed single author papers is 113 and 287 papers have more than one author. Number of papers average citations per article is 15.48.

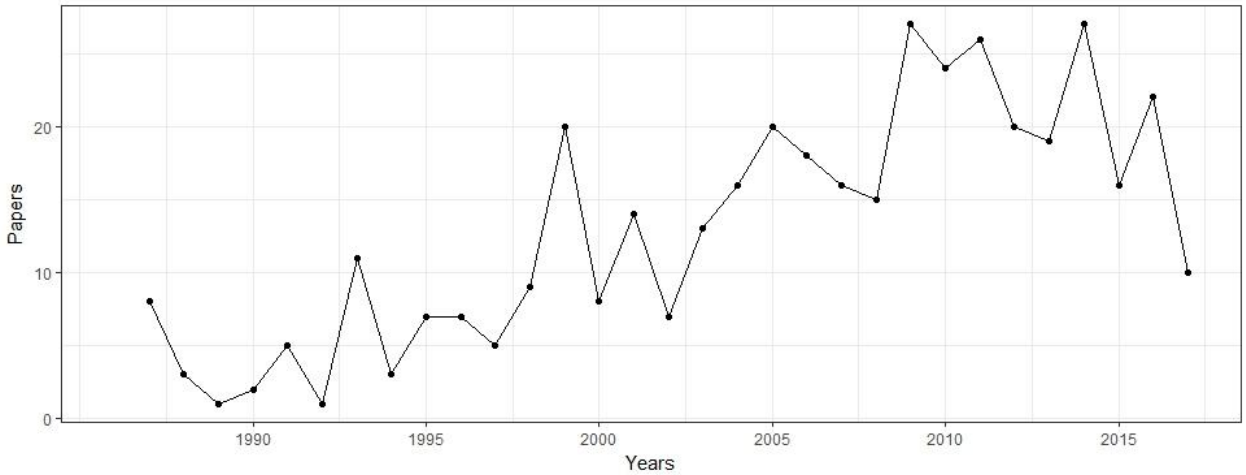

Figure 1 Papers per year on topic of Tax Competition
Source: Own construction

Figure 1 shows increasing number of papers regarding tax competition in the last decade. Only first half of the year 2017 is taken into consideration, which explains apparent decrease. Interesting is increase in the year 2007 when financial crisis has begun, which is possibly correlated. In Table 2 are listed top five journals by number of published papers regarding topic of tax competition. One point of view is from perspective of taxation and public finance and second one is regarding urban

economics and regional context. Although tax competition originated from the idea of competing jurisdictions on municipal level, later on it was analyzed in broader, international perspective in context with other factors and impacts.

Table 2 List of top 5 journals by number of published papers

Journal name	Articles
INTERNATIONAL TAX AND PUBLIC FINANCE	45
JOURNAL OF PUBLIC ECONOMICS	36
JOURNAL OF URBAN ECONOMICS	31
REGIONAL SCIENCE AND URBAN ECONOMICS	26
NATIONAL TAX JOURNAL	17

Source: Own construction

4.2 Co-citation network and keywords clusters

Number of citations can be, in general, interpreted as the acceptance of ideas and results presented in papers. In some cases, reason for more citations might be controversial or disapproved results, however. Nevertheless, citations number indicates impact of paper in particular field. There are papers, which are timeless and are cited long after they were published. Important papers used to be cited by many authors in different papers. Metrics for such properties of a paper is citation index. For two papers, which are citied by multiple papers is calculated metrics co-citation index which represents frequency of how often are two documents cited together in other ones. Based on this, co-citation network can be created, which shows connections among papers based on their joint occurrences. Example of such network for analyzed papers regarding tax competition is shown in Figure 2. Size of nodes represents co-citation strength while the larger a node is, the more frequently particular paper is cited with others. Edges represent co-citation bond between two papers. Shown network illustrates 15 papers with higher co-citation index and bonds among them. The most cited paper in analyzed set of papers is Zodrow (1986) (number of local occurrences 156), however the most cited paper in general is Wilson (1999) (number of local occurrences 104). Particularly Wilson is one of the most notable authors in presented network with the most included papers (1986; 1991; 2004). In network are also included two papers from times when tax competition only became subject of academic debate. Authors Tiebout (1956) and Oates (1972) had significant influence on tax competition research and are analyzed in review papers mentioned in previous section.

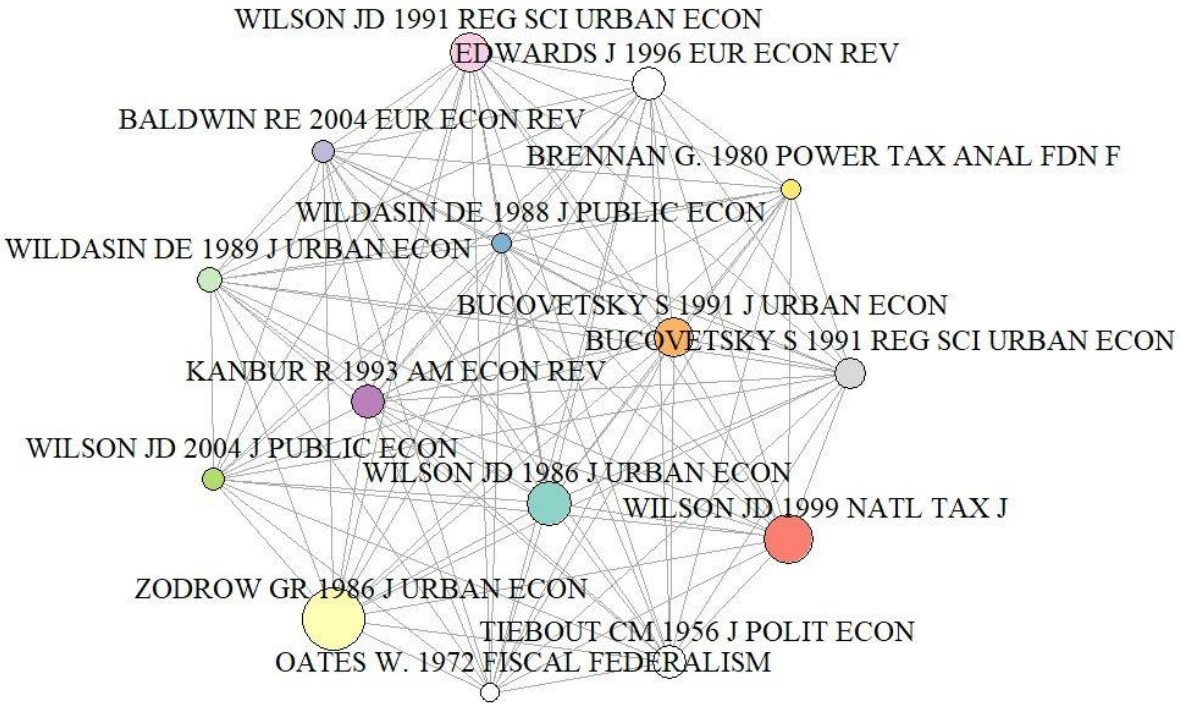

Figure 2 Co-citation network of references, top 15 authors
Source: Own construction

Integral part of every scientific paper are keywords. They briefly yet accurately summarise core ideas. Therefore, analyzing occurrences of keywords in multiple articles might reveal structures and relationships among different topics alongside the main one (in our case tax competition). Result of keywords analysis on set of articles is division of them in 7 different clusters. Background color represents belonging to particular cluster, shades of the same color means, that keyword might belong to more than one cluster. Only keywords with 5 or more occurrences were taken into consideration. The bigger a keyword text is, the more frequently the keyword appears in analyzed set of papers. The largest cluster is depicted with red color and international point of view is dominant. Articles with tax competition as keyword discuss topics such as foreign direct investment, multinational firms, international trade and international taxation. For blue cluster are fiscal aspects typical, such as fiscal competition, fiscal federalism and fiscal decentralisation. Beside fiscal aspects, the topic of equilibrium is present in articles belonging to blue cluster. Interesting is the smallest cluster consisting of keywords tax harmonisation and tax heavens. Debate on tax harmonisation is typical for European Union and might be solution to stop outflow of capital to tax havens.

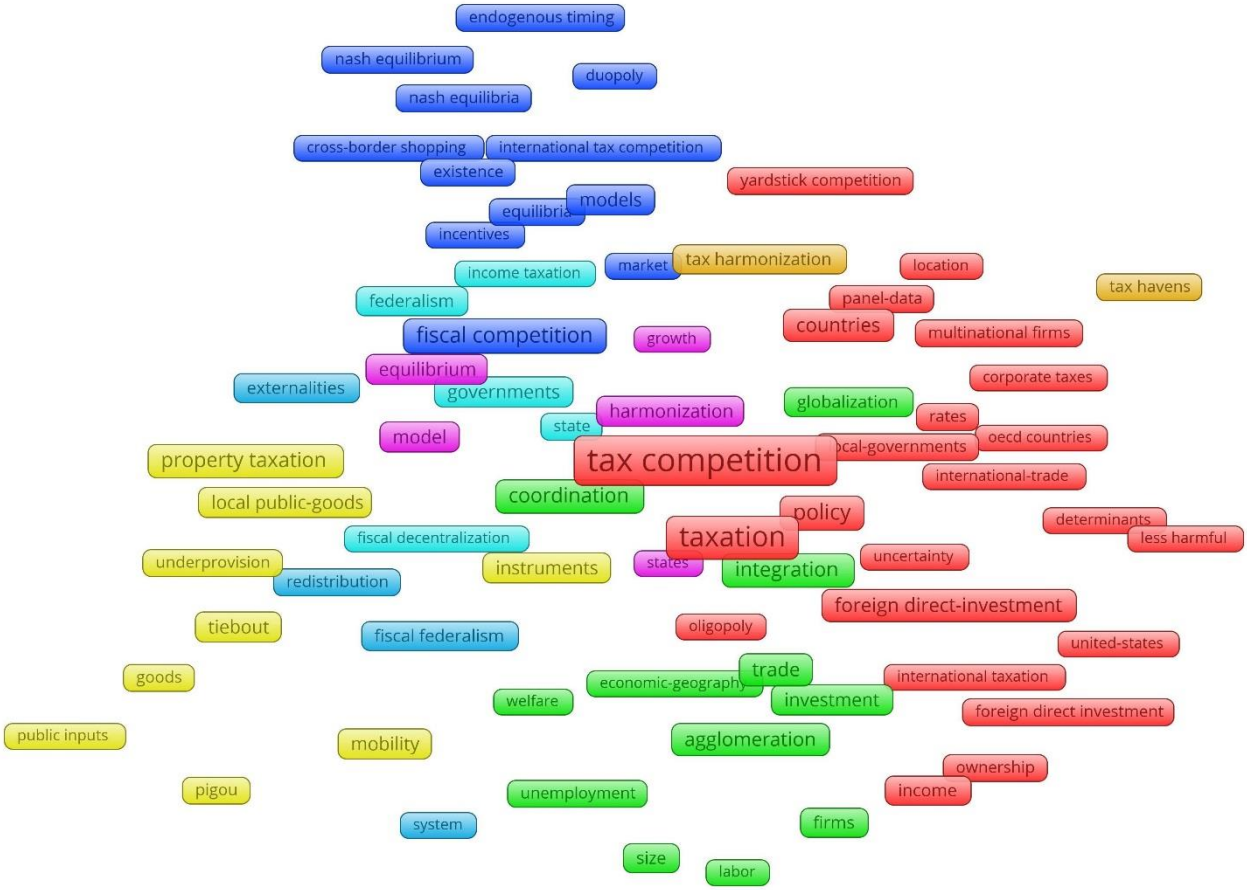

Figure 3 Keywords clusters by occurrence
Source: Own construction

5 Conclusion

Nowadays amount of information is increasing rapidly. Authors in order to keep up have to use novel methods for their work. Presented analyses in this article offer ways to outline basic status of ongoing research on topic of tax competition. Used methods offer both graphical and basic statistical overview of published articles. By analysing given topic we are able to identify the most appropriate journals for publishing, influential authors and most notable works. Presented list of journals is useful source for papers regarding given topic. Network of authors showed most influential authors for particular topic. By analyzing keywords it is possible to assess topic of tax competition from different angles which brinks better understanding to the topic. More important is ability to estimate trends in particular area and popularity of topic in general. Performed analysis, however does not take into the account semantics of analysed papers, which is probably the biggest shortcoming of used methods. For further understanding of topic we suggest to use text mining tools not only for abstracts but for whole text of articles, which might leads to identifying whole ideas important for particular topic.

Acknowledgements

This work was supported by the Slovak Research and Development Agency, project number APVV-15-0358.

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Technical University of Košice
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Central European Conference in Finance and Economics (CEFE2017)
September 20-21, 2017
Herľany, Slovak Republic

Proceedings of the International Scientific Conference
Edited by Beáta Gavurová and Michal Šoltés

Editorial Board:
Beáta Gavurová, Michal Šoltés

Published by Technical University of Košice, Faculty of Economics,
Košice 2017, 1st Edition, 2017, number of copies 300

Printed by: Technical University of Košice
ISBN 978-80-553-2906-2