Technical University of Košice Faculty of Economics

Central European Conference in Finance and Economics (CEFE2015)

September 30 - October 1, 2015 Herl'any, Slovak Republic

Beáta Gavurová - Michal Šoltés

2015

Suggested citation:

AUTHOR, A. Tittle of the paper. In: Central European Conference in Finance and Economics (CEFE2015), Technical University of Košice, 2015, pp. xx-xx. ISBN 978-80-553-2467-8

Editors:	doc. Ing. Beáta GAVUROVÁ, PhD. MBA
	doc. Ing. Michal ŠOLTÉS, PhD.

Reviewers:

doc. Ing. Beáta Gavurová, PhD. MBA, doc. Ing. Marianna Siničáková, PhD., RNDr. Libuša Révészová, PhD., doc. Ing. Jozef Glova, PhD., doc. Ing. Kristína Kočišová, PhD., doc. Ing. Anna Bánociová, PhD., doc. Ing. Radovan Bačík, PhD. MBA, Ing. Viliam Vajda, PhD., doc. Ing. Tomáš Želinský, PhD., doc. Ing. Rajmund Mirdala, PhD., Ing. Marek Gróf, PhD., Ing. Viliam Kováč, PhD., RNDr. Samuel Koróny, PhD., Mgr. Iveta Rajničová – Nagyová, PhD., Mgr. Patrycja Pudlo, PhD., PaedDr. Dana Kováčová, MUDr. Katarína Kafková, doc. Ing. Stanislav Szabo, PhD. MBA, mim.prof., Martin Smatana, MSc., Mgr. Jurina Rusnáková, PhD., doc. Ing. Hana Mohelská, PhD., PhDr. Miroslav Barták, PhD.

Published by:	Technical University of Košice, 1 st Edition (2015)
Number of pages:	794
Number of copies:	300

Grant support and project funding:

VEGA Project No. 1/0929/14 "Multidimensional economic and financial evaluation of the implementation process and the use of one day health care and quantification of the financial impact on the health care system in the Slovak Republic".

VEGA Project No. 1/0986/15 "Proposal of the dimensional models of the management effectiveness of ICT and information systems in health facilities in Slovakia and the economic-financial quantification of their effects on the health system in Slovakia"

Research Project EkF TUKE – GESITI/HOSPITALS – MZSR – NCZI (Slovakia – CTI Brasil) 2013-2015.

http://www.health.gov.sk/Clanok?dohoda-o-spolupraci-na-vyskumnom-projekte

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

© 2015 Technical University of Košice

ISBN 978-80-553-2467-8

Program Committee of the Conference

Honorary Chair:

Michal ŠOLTÉS, Faculty of Economics, Technical University of Košice, SK

Co-Chair:

Beáta GAVUROVÁ, Faculty of Economics, Technical University of Košice, SK **Vincent ŠOLTÉS**, Faculty of Economics, Technical University of Košice, SK

Members:

Viera BAKOŠOVÁ, Crif –Slovak credit bureau, Association of Finance and Treasury, Bratislava, SK Viktória BOBÁKOVÁ, Faculty of Public Administration, Pavol Jozef Šafarik University, Košice, SK Nadia CIPULLO, Campus Link University, Rome, IT Luboš ČERNÝ, National Health Information Center, Bratislava, SK Laurent DALMAS, University of Versailles St-Quentin-En-Yvelines, Paris, FR Stefan DANIEL, Petru Maior University, Targu Mures, RO Radoslav DELINA, Faculty of Economics, Technical University of Košice, Košice, SK Ihsan Cemil DEMIR, Afyonkarahisar Kocatepe University, Afyonkarahisar, TR Dejan ERIC, Faculty for Banking, Insurance and Finance, Belgrade Banking Academy, Belgrade, RS Alessandro FIGUS, Campus Link University, Rome, IT Vladimír GAZDA, Faculty of Economics, Technical University of Košice, Košice, SK Jozef GLOVA, Faculty of Economics, Technical University of Košice, Košice, SK Emília JAKUBÍKOVÁ, Faculty of Economics, Technical University of Košice, Košice, SK Katarína KAFKOVÁ, The Association of Health Insurance Companies, Bratislava, SK Martin KAHANEC, Central European University in Budapest, Budapest, HU Kristína KOČIŠOVÁ, Faculty of Economics, Technical University of Košice, Košice, SK Lumír KULHÁNEK, Faculty of Economics, VSB - TU Ostrava, CZ Helena KUVIKOVÁ, Faculty of Economics, Matej Bel University, Banská Bystrica, SK Grzegorz MICHALSKI, Faculty of Engineering and Economics, Wroclaw University of Economics, PL Rajmund MIRDALA, Faculty of Economics, Technical University of Košice, Košice, SK Patrick MUSSO, University of Nice Sophia Antipolis, Nice, FR Iveta NAGYOVÁ, Faculty of Medicine, Pavol Jozef Šafarik University, Košice, SK Jiří POLÁCH, Bussiness School Ostrava, plc., Ostrava, CZ Srdjan REDZEPAGIC, University of Nice Sophia Antipolis, Nice, FR Libuša RÉVÉSZOVÁ, Faculty of Economics, Technical University of Košice, Košice, SK Tomáš SABOL, Faculty of Economics, Technical University of Košice, Košice, SK Zsuzsana SZABO, Petru Maior University, Targu Mures, RO Marianna SINIČÁKOVÁ, Faculty of Economics, Technical University of Košice, Košice, SK Martin SMATANA, Institute of Health Policy, Bratislava, SK Juraj SIPKO, Institute of Economic Research SAS, Bratislava, SK Marek ŠOLTÉS, 1st Department of Surgery, University of Pavol Jozef Šafárik in Košice, SK Tomáš ŽELINSKÝ, Faculty of Economics, Technical University of Košice, Košice, SK

Organizing Committee of the Conference

Beáta GAVUROVÁ - Head of Organizing Committee Faculty of Economics, Technical University of Košice, SK
Jozef GLOVA, Faculty of Economics, Technical University of Košice, SK
Michal KOČIŠ, Faculty of Economics, Technical University of Košice, SK
Lucia MIHÓKOVÁ, Faculty of Economics, Technical University of Košice, SK
Marianna SINIČÁKOVÁ, Faculty of Economics, Technical University of Košice, SK
Viliam VAJDA, Faculty of Economics, Technical University of Košice, SK
Lenka VEJAČKOVÁ, Faculty of Economics, Technical University of Košice, SK

Conference website: <u>http://cefe.ekf.tuke.sk/</u>

CONTENT

Alena ANDREJOVSKÁ – Ján BULECA – Radovan DRÁB		
Impact of Macroeconomic Factors on Corporate Income Tax in the V4 Countries Using Regression Analysis		
Radovan BAČÍK – Patrycja PUDŁO		
Analysis of the Integration Components in the System Balanced Scorecard	10-20	
Radovan BAČÍK - Jaroslava GBUROVÁ – Róbert ŠTEFKO		
Impact of the Internet Marketing on the Slovak Consumer	21-28	
Radoslav BAJUS – Lenka HUDÁKOVÁ STAŠOVÁ		
Trading with Bonds in Capital Market within V4 Countries	29-35	
Anna BÁNOCIOVÁ – Ľudmila PAVLIKOVÁ – Lucia MIHÓKOVÁ		
Tax License – The Minimum Corporate Income Tax	36-44	
Ľudmila BARTÓKOVÁ – Júlia ĎURČOVÁ - Manuela RAISOVÁ		
The Effects of Demand Shocks on Old EMU Member State: Case of France	45-51	
Agnieszka BEM – Grzegorz MICHALSKI		
Hospital Profitability vs. Selected Healthcare System Indicators	52-61	
Tatiana BIELIKOVÁ		
Determinants of Corporate Distress: Assessment of the Macroeconomic Factors	62-69	
Hanne-Lore BOBÁKOVÁ – Janusz KARPETA		
Non-formal Adult Education in Contexts of Globalization	70-79	
Emilia BROŻYNA – Grzegorz MICHALSKI – Joanna SOROCZYŃSKA		
E-commerce as a Factor Supporting the Competitiveness of Small and Medium-Sized Manufacturing Enterprises	80-90	
Iozef BUCKO – Lukáš KAKALEIČÍK – Ľudovít NASTIŠIN		
Sozer De erro – Luxas Mintrillo erro – Ludovit Mis Histiy		
Use of Smartphones during Purchasing Process	91-97	
Use of Smartphones during Purchasing Process Jozef BUCKO – Dana PAĽOVÁ – Martin VEJAČKA	91-97	
Use of Smartphones during Purchasing Process Jozef BUCKO – Dana PAĽOVÁ – Martin VEJAČKA Security and Trust in Cryptocurrencies	91-97 98-107	
Use of Smartphones during Purchasing Process Jozef BUCKO – Dana PAĽOVÁ – Martin VEJAČKA Security and Trust in Cryptocurrencies Nadia CIPULLO	91-97 98-107	
Use of Smartphones during Purchasing Process Jozef BUCKO – Dana PAĽOVÁ – Martin VEJAČKA Security and Trust in Cryptocurrencies Nadia CIPULLO A theoretical Framework for the Valuation and the Reporting of Protected Areas' Biodiversity	91-97 98-107 108-116	
Use of Smartphones during Purchasing Process Jozef BUCKO – Dana PAĽOVÁ – Martin VEJAČKA Security and Trust in Cryptocurrencies Nadia CIPULLO A theoretical Framework for the Valuation and the Reporting of Protected Areas' Biodiversity Jakub DANKO	91-97 98-107 108-116	
Use of Smartphones during Purchasing Process Jozef BUCKO – Dana PAĽOVÁ – Martin VEJAČKA Security and Trust in Cryptocurrencies Nadia CIPULLO A theoretical Framework for the Valuation and the Reporting of Protected Areas' Biodiversity Jakub DANKO Structure of Capital Markets	91-97 98-107 108-116 117-124	
Use of Smartphones during Purchasing Process Jozef BUCKO – Dana PAĽOVÁ – Martin VEJAČKA Security and Trust in Cryptocurrencies Nadia CIPULLO A theoretical Framework for the Valuation and the Reporting of Protected Areas' Biodiversity Jakub DANKO Structure of Capital Markets Adriána DÚČOVÁ	91-97 98-107 108-116 117-124	
Use of Smartphones during Purchasing Process Jozef BUCKO – Dana PAĽOVÁ – Martin VEJAČKA Security and Trust in Cryptocurrencies Nadia CIPULLO A theoretical Framework for the Valuation and the Reporting of Protected Areas' Biodiversity Jakub DANKO Structure of Capital Markets Adriána DÚČOVÁ Social Disparities in Alcohol Consumption and its Financial Aspects among a Selected Target Group	91-97 98-107 108-116 117-124 125-134	
Use of Smartphones during Purchasing Process Jozef BUCKO – Dana PAĽOVÁ – Martin VEJAČKA Security and Trust in Cryptocurrencies Nadia CIPULLO A theoretical Framework for the Valuation and the Reporting of Protected Areas' Biodiversity Jakub DANKO Structure of Capital Markets Adriána DÚČOVÁ Social Disparities in Alcohol Consumption and its Financial Aspects among a Selected Target Group Peter DŽUPKA – Slávka KLASOVÁ – Viliam VAJDA	91-97 98-107 108-116 117-124 125-134	
Use of Smartphones during Purchasing Process Jozef BUCKO – Dana PAĽOVÁ – Martin VEJAČKA Security and Trust in Cryptocurrencies Nadia CIPULLO A theoretical Framework for the Valuation and the Reporting of Protected Areas' Biodiversity Jakub DANKO Structure of Capital Markets Adriána DÚČOVÁ Social Disparities in Alcohol Consumption and its Financial Aspects among a Selected Target Group Peter DŽUPKA – Slávka KLASOVÁ – Viliam VAJDA Start-up Companies – the Case of Košice Region	91-97 98-107 108-116 117-124 125-134 135-142	
Use of Smartphones during Purchasing Process Jozef BUCKO – Dana PAĽOVÁ – Martin VEJAČKA Security and Trust in Cryptocurrencies Nadia CIPULLO A theoretical Framework for the Valuation and the Reporting of Protected Areas' Biodiversity Jakub DANKO Structure of Capital Markets Adriána DÚČOVÁ Social Disparities in Alcohol Consumption and its Financial Aspects among a Selected Target Group Peter DŽUPKA – Slávka KLASOVÁ – Viliam VAJDA Start-up Companies – the Case of Košice Region Lucia FABIÁNOVÁ	91-97 98-107 108-116 117-124 125-134 135-142	
Use of Smartphones during Purchasing Process Jozef BUCKO – Dana PAĽOVÁ – Martin VEJAČKA Security and Trust in Cryptocurrencies Nadia CIPULLO A theoretical Framework for the Valuation and the Reporting of Protected Areas' Biodiversity Jakub DANKO Structure of Capital Markets Adriána DÚČOVÁ Social Disparities in Alcohol Consumption and its Financial Aspects among a Selected Target Group Peter DŽUPKA – Slávka KLASOVÁ – Viliam VAJDA Start-up Companies – the Case of Košice Region Lucia FABIÁNOVÁ The Real Option Approach to Investment Valuation	91-97 98-107 108-116 117-124 125-134 135-142 143-150	
Use of Smartphones during Purchasing Process Jozef BUCKO – Dana PAĽOVÁ – Martin VEJAČKA Security and Trust in Cryptocurrencies Nadia CIPULLO A theoretical Framework for the Valuation and the Reporting of Protected Areas' Biodiversity Jakub DANKO Structure of Capital Markets Adriána DÚČOVÁ Social Disparities in Alcohol Consumption and its Financial Aspects among a Selected Target Group Peter DŽUPKA – Slávka KLASOVÁ – Viliam VAJDA Start-up Companies – the Case of Košice Region Lucia FABIÁNOVÁ The Real Option Approach to Investment Valuation Morad FATHALLA BEN JREED	91-97 98-107 108-116 117-124 125-134 135-142 143-150	
Use of Smartphones during Purchasing Process Jozef BUCKO – Dana PAĽOVÁ – Martin VEJAČKA Security and Trust in Cryptocurrencies Nadia CIPULLO A theoretical Framework for the Valuation and the Reporting of Protected Areas' Biodiversity Jakub DANKO Structure of Capital Markets Adriána DÚČOVÁ Social Disparities in Alcohol Consumption and its Financial Aspects among a Selected Target Group Peter DŽUPKA – Slávka KLASOVÁ – Viliam VAJDA Start-up Companies – the Case of Košice Region Lucia FABIÁNOVÁ The Real Option Approach to Investment Valuation Morad FATHALLA BEN JREED Obstacles of Development in the Arab World	91-97 98-107 108-116 117-124 125-134 135-142 143-150 151-154	
Use of Smartphones during Purchasing Process Jozef BUCKO – Dana PAĽOVÁ – Martin VEJAČKA Security and Trust in Cryptocurrencies Nadia CIPULLO A theoretical Framework for the Valuation and the Reporting of Protected Areas' Biodiversity Jakub DANKO Structure of Capital Markets Adriána DÚČOVÁ Social Disparities in Alcohol Consumption and its Financial Aspects among a Selected Target Group Peter DŽUPKA – Slávka KLASOVÁ – Viliam VAJDA Start-up Companies – the Case of Košice Region Lucia FABIÁNOVÁ The Real Option Approach to Investment Valuation Morad FATHALLA BEN JREED Obstacles of Development in the Arab World Richard FEDORKO – Lukáš KAKALEJČÍK	91-97 98-107 108-116 117-124 125-134 135-142 143-150 151-154	
Use of Smartphones during Purchasing Process Jozef BUCKO – Dana PALOVÁ – Martin VEJAČKA Security and Trust in Cryptocurrencies Nadia CIPULLO A theoretical Framework for the Valuation and the Reporting of Protected Areas' Biodiversity Jakub DANKO Structure of Capital Markets Adriána DÚČOVÁ Social Disparities in Alcohol Consumption and its Financial Aspects among a Selected Target Group Peter DŽUPKA – Slávka KLASOVÁ – Viliam VAJDA Start-up Companies – the Case of Košice Region Lucia FABIÁNOVÁ The Real Option Approach to Investment Valuation Morad FATHALLA BEN JREED Obstacles of Development in the Arab World Richard FEDORKO – Lukáš KAKALEJČÍK Search Engine Optimization and its Importance in the Purchase Process	91-97 98-107 108-116 117-124 125-134 135-142 143-150 151-154 155-163	
Use of Smartphones during Purchasing Process Jozef BUCKO – Dana PAĽOVÁ – Martin VEJAČKA Security and Trust in Cryptocurrencies Nadia CIPULLO A theoretical Framework for the Valuation and the Reporting of Protected Areas' Biodiversity Jakub DANKO Structure of Capital Markets Adriána DÚČOVÁ Social Disparities in Alcohol Consumption and its Financial Aspects among a Selected Target Group Peter DŽUPKA – Slávka KLASOVÁ – Viliam VAJDA Start-up Companies – the Case of Košice Region Lucia FABIÁNOVÁ The Real Option Approach to Investment Valuation Morad FATHALLA BEN JREED Obstacles of Development in the Arab World Richard FEDORKO – Lukáš KAKALEJČÍK Search Engine Optimization and its Importance in the Purchase Process Richard FEDORKO – Ľudovít NASTIŠIN – František POLLÁK	91-97 98-107 108-116 117-124 125-134 135-142 143-150 151-154 155-163	
Use of Smartphones during Purchasing Process Jozef BUCKO – Dana PAEOVÁ – Martin VEJAČKA Security and Trust in Cryptocurrencies Nadia CIPULLO A theoretical Framework for the Valuation and the Reporting of Protected Areas' Biodiversity Jakub DANKO Structure of Capital Markets Adriána DÚČOVÁ Social Disparities in Alcohol Consumption and its Financial Aspects among a Selected Target Group Peter DŽUPKA – Slávka KLASOVÁ – Viliam VAJDA Start-up Companies – the Case of Košice Region Lucia FABIÁNOVÁ The Real Option Approach to Investment Valuation Morad FATHALLA BEN JREED Obstacles of Development in the Arab World Richard FEDORKO – Lukáš KAKALEJČÍK Search Engine Optimization and its Importance in the Purchase Process Richard FEDORKO – Eudovít NASTIŠIN – František POLLÁK On-line Reputation of the Selected Slovak Start-ups	91-97 98-107 108-116 117-124 125-134 135-142 143-150 151-154 155-163 164-170	
Use of Smartphones during Purchasing Process Jozef BUCKO – Dana PAĽOVÁ – Martin VEJAČKA Security and Trust in Cryptocurrencies Nadia CIPULLO A theoretical Framework for the Valuation and the Reporting of Protected Areas' Biodiversity Jakub DANKO Structure of Capital Markets Adriána DÚČOVÁ Social Disparities in Alcohol Consumption and its Financial Aspects among a Selected Target Group Peter DŽUPKA – Slávka KLASOVÁ – Viliam VAJDA Start-up Companies – the Case of Košice Region Lucia FABIÁNOVÁ The Real Option Approach to Investment Valuation Morad FATHALLA BEN JREED Obstacles of Development in the Arab World Richard FEDORKO – Lukáš KAKALEJČÍK Search Engine Optimization and its Importance in the Purchase Process Richard FEDORKO – Ludovít NASTIŠIN – František POLLÁK On-line Reputation of the Selected Slovak Start-ups Alessandro FIGUS	91-97 98-107 108-116 117-124 125-134 135-142 143-150 151-154 155-163 164-170	

Karol FRANK – Tomáš JECK			
Public Investments from EU Cohesion Policy in Slovakia: A Regional Perspective			
Beáta GAVUROVÁ – Vincent ŠOLTÉS			
The Importance of Health Policy for the Development of Day Surgery in Slovakia	188-202		
Jozef GLOVA			
Portfolio Selection Based on Long-Term Equilibrium Model	203-210		
Jana HAKALOVÁ – Šárka KRYŠKOVÁ– Yvetta PŠENKOVÁ			
Quantification of the Impact of Accounting Reform in the Czech Republic on Municipalities in the Moravian-Silesian Region and Their Evaluation	211-221		
Monika HARČARIKOVÁ – Martina BOBRIKOVÁ			
New Reverse Bonus Certificate Design and Pricing	222-228		
Jozef HETEŠ - Ivana ŠPIRENGOVÁ			
Trend of Savings in Slovakia from 2009	229-235		
Christian Martin HOFFMEISTER – Martin UŽÍK			
Dynamic Auctions	236-244		
Boris HOŠOFF			
Policy Solutions for the Debt Crisis and their Reflections in the Real Economy	245-253		
Veronika HVOZDÍKOVÁ – Gabriela DOVÁĽOVÁ – Kristína PETRÍKOVÁ			
Silver Economy – Emerging Business Opportunities	254-264		
František JANKE – Martin DUJČÁK			
Selected Aspects of Price Estimations within Public Procurement: Evidence from Slovakia	265-273		
Martin KAMENÍK			
Coevolution in the Samaritan's Dilemma	274-285		
Jozef KAŠÍK			
A Practical Method for Valuing Accounts and Notes Receivable	286-291		
Kristína KOČIŠOVÁ			
Concentration and Performance: Cointegration Analysis	292-303		
Gabriela KOĽVEKOVÁ – Iveta KOROBANIČOVÁ - Erika LIPTÁKOVÁ			
Decision-Making Process in Entrepreneurship Environment within the Scope of the Resilience of Regions	304-315		
Štefan KOVÁČ			
Spatial Distribution of Economic Activity - Location Quotient	316-322		
Michal KRAJČÍK			
Qualitative Characteristics of Hedge Funds	323-330		
Andrea KRALIK			
Impact of Shadow Economy on Fiscal Imbalance of V4 Countries	331-338		
Martin KUBAČKA			
From Operational through Strategic and Expert Purchasing in a Firm	339-346		
Tim LANGENSTEIN - Martin UŽÍK			
Specifics of Company Valuation of IT Companies	347-356		
Tim LANGENSTEIN			
Microfinance	357-363		
Marek LAVČÁK – Oto HUDEC			
Factors of Smart Cities Influencing Startup Performance	364-372		
Anna LEMAŃSKA-MAJDZIK			
Selected Factors of Employees' Job Satisfaction and Business Profile of Enterprises – Results of Own Research	373-381		

Ľubica LESÁKOVÁ		
Barriers to and Presumptions for Development of Innovation Activities in SME in the Slovak Republic		
Ivan LICHNER - Marek RADVANSKÝ		
Forecast of Long-term Care Employment	391-397	
Viktória LUKÁČOVÁ		
Increasing Capacity of Information Systems and Health Economics: Vision of the Modern Healthcare	398-403	
Slavomíra MARTINKOVÁ – Emília JAKUBÍKOVÁ		
Macroeconomic Imbalance of Employment in the Context of latest Crises in SR	404-412	
Nikola MEŠAROVÁ – Ján ŠEBO – Matej BALCO		
Fee Policy Analysis of Private Pension Schemes of Selected Countries	413-427	
Lucia MIHÓKOVÁ – Radovan DRÁB - Oľga KMEŤOVÁ		
Comparison of Estimated VAT Gap in the Slovak Republic	428-438	
Hana MOHELSKA – Andrea VOKALOVA		
The Use of the Internet and ICT in Business Processing in 2014: a Comparative Analysis	439-444	
Silvia MRÁZKOVÁ		
Using the Balanced Scorecard Model in Manufacturing Company	445-451	
Stefano MUSTICA		
UNIVERSITY E-LEARNING EVOLUTION - New Paradigm for New "Sharing Knowledge"	452-457	
nke Enterprises		
International Rusiness and Coaching in Woman Enterprises and Einancing Sources of Woman	158 165	
Enterprises	430-403	
Renáta NEŚPORKOVÁ – Ružena DVOŘÁČKOVÁ		
Arts and Culture in the Czech Republic: Financing, Management and Business	466-475	
Bibiána NOVAKOVA		
Assessment of Living Standards and Deprivation in the Context of Quality of Life in the EU Countries	476-485	
Vladimír NÝVLT – Terezie VONDRÁČKOVÁ – Věra VOŠTOVÁ		
Barriers for BIM (Building Information Modeling) Adoption	486-492	
Małgorzata OKRĘGLICKA		
Entrepreneurial Characteristics of the Owner and their Impact on Current Activity Management in Small Business – Literature Review	493-502	
Janka PÁLFYOVÁ		
Examination of Patents, R&D Expenditures and R&D Personnel Relationship in USA using ARDL Approach	503-509	
Damián PASTOR – Pavel KISELA – Viliam KOVÁČ		
Development of Deposits in Slovak Republic after Euro Adoption	510-517	
Ivana PERŽEĽOVÁ		
Analysis of Selected Aspects of Social Responsibility in Slovak Enterprises	518-524	
Daniela PETRÍKOVÁ - Tatiana SOROKOVÁ		
Economic and Psychological View of Spa Tourism in Perspective of Wellbeing	525-532	
Lukáš PINKA		
Introduction to Theoretical Aspects of Financial and Medical Care Benchmark Indicators	533-540	
Manuela RAISOVÁ – Júlia ĎURČOVÁ – Ľudmila BARTÓKOVÁ		
Supply Perspective of the Slovak Economic Growth	541-547	

Vladimír ROGALEWICZ – Miroslav BARTÁK – Ivana KUBÁTOVÁ			
Quality and Availability of Cost Data in Czech HTA Research			
Anna RUŠČÁKOVÁ			
The European Sovereign Debt Crisis: The Result of the Systemic Failure of the Political Project of EMU and of the Euro			
Jurina RUSNÁKOVÁ			
Livelihood of Poor Roma Families (a Qualitative Study)	572-581		
Katarína SAKÁLOVÁ – František PELLER			
Analyses of Factors Affecting the Withdrawal of Life Insurance Policyholders	582-587		
Jozefína SEMANČÍKOVÁ			
Empirical Approaches to Clarify the Causes of the Sovereign Debt Crisis	588-597		
Marianna SINIČÁKOVÁ - Barbora FARKAŠOVSKÁ – Andrea TKÁČOVÁ			
Foreign Exchange Reserves Accumulation and their Impact on Macroeconomic Situation of the OPEC Countries	598-605		
Monika SIPA - Małgorzata SMOLAREK			
Perception of the Process of Succession by Employees of Polish Family Businesses	606-616		
Hanna SOMMEER			
The Role of Business Corporations in the Globalization Process of New Economy	617-624		
Justyna STECKO			
Axionormative Aspect of Corporate Social Responsibility – Towards Practical Ethics	625-631		
Stanislav SZABO – Peter VITTEK – Andrej LALIŠ – Veronika ČERVENÁ			
Aviation Safety Investment Assessment Utilizing Return on Investment and Bayesian Networks	632-638		
Magdalena SZYSZKO			
Can the Central Bank Really Influence Inflation Expectations? A Multi Approach Analysis			
Miriam ŠEBOVÁ – Peter DŽUPKA			
The Local Economic Impact of the Technical University of Košice	647-653		
Nikola ŠIMKOVÁ			
Online Dispute Resolution Platform for B2C E-Commerce in the European Union	654-662		
Monika ŠISEROVÁ – Martina ŽUDELOVÁ			
Spatial Econometric Modelling of Internal Labour Mobility	663-670		
Ľubica STIBLAROVA			
Financial Integration Process in the EU Countries after the Euro Introduction: Position of Slovakia	671-680		
Dušan ŠTIGLIC			
Innovation Management and Intellectual Property Regimes	681-688		
Tomáš ŠTOFA			
Understanding Private Equity. Private Equity Investments in European Union	689-695		
Alena TARTAĽOVÁ			
Modelling Value at Risk of Foreign Exchange Rates with Stable Distributions			
Alica TOBISOVÁ – Andrea SEŇOVÁ – Iveta VAJDOVÁ			
Simulation of an Operational Accident at an Airport and Its Impact on the Financial and Economic Situation of the Airport Company	706-711		
Peter TÓTH – Marek GRÓF			
Simulation Model of Price Setting of Retailers under the Effect of Retail Unit Capacity			
Radoslav TUŠAN – Erika LIPTÁKOVÁ			
Analysis of the Efficiency of Shared Services Centers in Slovakia and their Impact on Parent Companies	718-728		

Mária URAMOVÁ – Alena KAŠČÁKOVÁ – Miroslava KNAPKOVÁ	
The Unpaid Work Activities Performed in the Specific Groups of the Single-Person Households	729-736
in Slovakia	
Martin UŽÍK – Christian Martin HOFFMEISTER	
Crowd Investing as a Financing Alternative for Small and Mid-sized Enterprises (SME)	737-742
Martin UŽÍK – Peter DŽUPKA – Christian Martin HOFFMEISTER	
Implementation of EURO-Currency in the V4 Countries and the Impact on the Economic Result of Companies	743-758
Viliam VAJDA	
Identification of the Needs of Start-ups Acting on University and Students Tendency forward to Entrepreneurship	759-765
Adam WĘGRZYN	
The Regulation Model as the tool in Gas Distribution Providers Value Management - Research Results on European Best Practise Solutions	766-776
Tomasz WÓJTOWICZ	
Intraday Correlations between European Stock Markets	777-786
Martin ZORIČAK	
Tax Competition Model of Three Countries	787-794

Impact of Macroeconomic Factors on Corporate Income Tax in the V4 Countries Using Regression Analysis

ALENA ANDREJOVSKÁ¹ –JÁN BULECA² – RADOVAN DRÁB³ ^{1,2}Technical University of Košice, Faculty of Economics Slovak Republic ³Pavol Josef Safarik University of Košice, Faculty of Public Administration Slovak Republic

Abstract

Taxes are an important tool of fiscal policy that primarily serve to finance state's needs. Tax systems in particular countries of European Union, as well as specific tax frameworks, have passed through the significant changes in recent decades in order to converge and unify tax rules of individual states based on the guidelines presented by the European Commission. The paper deals with the issue of corporate income taxes and with selected macroeconomic factors. We analyze and asses the linear relation between corporate income tax and independent variables such as gross domestic product, tax rates, government expenditure, total employment rate and export of particular countries. We provide mentioned analysis by multidimensional regression analysis for the year 2000 to 2013 in the V4 countries. The analysis confirmed that the tax rate is the most important determinant of the model and simultaneously statistically significant parameter that impact the most on the volume of corporate income tax in all surveyed countries.

Key words: Income Tax, Corporate Tax, Taxable Income, Tax System, Tax Rate

JEL Classification: H20, H21, H25

1 Introduction

The tax issue is highly discussed topic in these days. Taxes which are perceived as dynamic variables are impacted by various micro and macroeconomic factors that influence the formulation of the tax revenue trend estimation. This estimation is possible to provide only if the widest possible range of links and influences formulating the resulting tax revenue is considered and taken to account (Urbánek, 2005). The basic task of the forecast is to identify and to quantify these factors as the potential impact on tax revenues. In accordance with Kubátová el. at (2012), Bayer (2011), Urbánek (2005), Raisová (2012), Dráb (2015) and Široký (2012) following factors can be considered as the most important tax determinants: macroeconomic aggregates of GDP, inflation, tax rate, export, demographic trend, technological development, socio-political factors, ethics in tax as well as the intrinsic characteristics of particular taxes. Livermore (2004) is saying that the trading income of companies is basis for corporate income tax calculation and according to fact that taxes are paid only from the positive trading income, pure profit is accounted for this purpose. The author further states that GDP is one of the first factors that has large impact on corporate profit. The result of his analysis is that profit in the certain period grows proportionally

¹ Ing. Alena Andrejovská, PhD., Němcovej 32, 040 01 Košice, Slovak Republic, alena.andrejovska@tuke.sk

² Ing. MVDr. Ján Buleca, PhD., Němcovej 32, 040 01 Košice, Slovak Republic, jan.buleca@tuke.sk

³ Ing. Radovan Dráb, PhD., Popradská 66, 041 32 Košice, Slovak Republic, radovan.drab@upjs.sk

with the rate of GDP. Hagara and Gábik (2014) point out that even in the further period, particularly in the years 2014-2018, GDP growth should occur, thus also the growth of tax revenues should be noticed, in this context also growth of corporate income tax is emphasized. The tax rate is equally essential factor. In tax practice, we distinguish three types of tax rates, namely it is a fixed, a percentage and a combined tax rate (Bánociová, 2011; Andrejovská and Mihoková, 2015). Czech economists Kubátová and Říhová (2009) were concerned with the relation between corporate income tax rate and the tax revenues. They examined the effect of the tax rate itself as well as of its square on the corporate income tax. Conclusion was the higher tax rates, the higher revenues from corporate income tax. But the authors also point out that from a certain level of the corporate income tax rate taxable corporate profits begin to decline as a result of excessive taxation that smooths economic activity and also of companies' tax optimization attitude or even tax avoiding. It is also mentioned that the tax rate is statistically significant determinant and the maximum tax rate for corporate income tax should be at the level of 30%. Labour market indicators such as employment, unemployment rate, workforce structure, wages and the volume of wages paid are other important factors that can directly affect tax revenues, therefore they are often used in relation to the estimated tax revenues. As is reported by Kubátová et al. (2012), data of total employment and nominal wage growth are the main variables that enter into the model of estimated tax revenue calculation for personal income tax, corporate income tax and social insurance. Research on the labour market mainly focus on investigating the impact of taxation on wages and employment (Blundell, 1995; Dolenc and Laporšek, 2010; Bocconi, 2011). An inverse relation, meant as the impact of wages and labour market indicators on the level of income tax revenues, is also significant subject of the interest (Kennedy, McMillen and Simmons, 2015; Gupta, 2007). Another factor that is the subject of a number of studies (Cassou, 1997; Bird et al., 2008) is a factor known as the trade openness or trade liberalization and export. Gupta (2007) points out that trade openness is a significant and strong determinant of revenue performance. The trade volume measured as the sum of export and import of goods and services as a percentage of GDP was one of the explanatory tax revenues variables in research of Castro and Camarillo (2014). The results of their analysis indicates that mentioned factor is not statistically significant. The total volume of tax revenues from the selected tax type is the result of large scale of determinants. Their influence may be displayed either directly through the tax structure itself, or indirectly through the behaviour of taxpayers. The authors Kubátová, Říhová (2009), Filip (2009), Široký (2012), who deal directly with the analysis of factors affecting the corporate income tax revenues is relatively limited in terms of number of studies, as well as the number of countries surveyed or the period referenced in the surveys.

2 Material and methods

This paper deals with the influence of factors on the tax revenues flowing to the state budget. During the thirteen-year period (2000-2013) we followed the trends of the five selected factors, namely gross domestic product, tax rates, government expenditure, total employment and export and we have analysed and tested their influence on the corporate income tax volume. Whereas each country has different currency we carried out conversion of values to the single currency expressed in EUR to ensure comparability. For the conversion we used exchange rate of the National Bank of Slovakia on the date of 31.12.2014.

Initial model was a simple linear model which expresses the impact of independent variables X on the dependent variable Y. This model has the form:

 $CIT = \beta_0 + \beta_1 GDP + \beta_2 EMP + \beta_3 GE + \beta_4 EXP + \beta_5 RATE + u_t,$ (1)

where:

- explained (dependent) variable Y:
 - CIT corporate income tax expressed in EUR,
- explanatory (independent) variables X:
 - GDP gross domestic product of country expressed in EUR,
 - RATE corporate income tax rate expressed in %,
 - GE government expenditure of country expressed in EUR,
 - EMP total employment of country expressed in number of people,
 - EXP export of country expressed in EUR.

Other variables entering into the model are:

- β_{0} , β_{1} , β_{2} , ..., β_{5} regression coefficients that explain the degree of sensitivity of changes in the explanatory variable X on the explained variable Y,
- ut stochastic or random variable, random model error which includes all other nonsystematic effects that may influence the explained variable Y.

Model used would be considered ideal if it did not contain heteroscedasticity, autocorrelation, multicollinearity and if residues had a normal distribution. Data from Eurostat (2015) and OECD (2015) database was processed by using R programming (R Core Team, 2012), and analysed to determine the influence of examined factors to the volume of corporate income tax. For all V4 countries: Czech Republic (CZ), Hungary (HU), Poland (PL) and Slovakia (SK) several models were used to provide model specification. When creating these models we were using information criteria, namely the Akaike information criterion (AIC) and Bayesian information criterion (BIC). Investment creation was significantly affected by examined variables which pvalue was less than the predetermined value α =0.05. Appropriate choice of the model was approved by the coefficient of determination designating how many % of the variability in investment volume can be explained by the model. Model suitability could be agreed also by the F-test of model's statistical significance. If the p-value was less than the predetermined value $(\alpha=0.05)$, model was considered significant. In case the regression coefficients' estimates were unbiased, but the p-values were incorrect, the wrong conclusion could be made because of the heteroscedasticity load (random parts had not constant variance). If the p-value of the Jarque-Bera test was higher than determined value (α =0.05), it was considered as normal distribution of residuals. If the p-value was lower, the variable was eliminated from the model. Subsequently, the normality testing of residuals was carried out (Hušek, 1992). Another test was used for detection of heteroscedasticity. If the p-value of Breusch-Pagan test was higher than α =0.05 it was possible to confirm that the model is free of heteroscedasticity. Otherwise, the presence of heteroscedasticity was treated by elimination of the variable Ochotinský et al. (2012). For identification of multicollinearity we focused on the VIF value (Variance Inflation Factors). If individual factors were lower than 5 or lower than 10 respectively, we could state that the model is not affected by multicollinearity. If the values were higher than 10, the presence of multicollinearity was treated by removing the variable Obtulovič (2010). The last test was used to detect the occurrence of autocorrelation. If the p-value of Breusch-Godfrey test was higher than α =0.05, we considered no autocorrelation was affecting the model. If the p-value was lower presence of autocorrelation was treated by the Cochrane-Orcutt method (Hušek, 1992). In case of all V4 countries we worked with several models. Only the values of the resulting models are presented in this paper.

3 Results of linear model

The following table provides the processed results of resulting models comparison for individual V4 countries (Czech Republic: CZ, Hungary: HU, Poland: PL, Slovakia: SK).

Country	Resulting model	Resulting valued model
CZ	$CIT = \beta_0 + \beta_1 GE + \beta_2 RATE + u_t$	$CIT = -1565000,000 + 3,092 \text{ GE} + 18660,000 \text{ RATE} + u_t.$
HU	$CIT = \beta_0 + \beta_1 RATE + \beta_2 GDP + \beta_3 EXP$	CIT = 853700,000 + 21,810 GDP + 30480,000 RATE +
	$+ u_{t.}$	$3,311 \text{ EXP} + u_t.$
PL	$CIT = \beta_0 + \beta_1 EMP + \beta_2 EXP + \beta_3 GDP +$	CIT = -2448000,000 + 335.3 EMP + 3228,2 EXP +
	$\beta_4 RATE + u_t$	1107,000 GDP + 33110,000 RATE + u_t .
SK	$CIT = \beta_0 + \beta_1 GDP + \beta_2 GE + \beta_3 RATE +$	CIT = 548100,000 + 4,127 GDP + 503.5 GE + 8631,000
	u _t .	$RATE + u_t$.

Table 1 Forms of resulting models for particular countries of V4

Source: Processed by author

From analysis provided for Slovak Republic a conclusion is that GDP, government expenditure and tax rate had the biggest impact on the change of corporate income tax. The modified model met all assumptions for linear regression (residues were from a normal distribution and model was free from heteroscedasticity, multicollinearity and autocorrelation). The relation between variables was direct and positive, what we assessed as follows (Table 1): the increase by one unit in GDP led to a slight increase in the corporate income tax, thus state budget is increased by 4,127 EUR. The same relation was discovered also in the context of government expenditure and corporate income tax rate. Increase of government expenditure by one unit caused just negligible increase in volume of corporate income tax, namely by 503.50 EUR. However, this relationship of variables have to be described in opposite way because country has to have some income to be able to draw its resources. The largest part of state incomes comes from taxes. The increase in the corporate income tax rate by one unit caused the increase in volume of corporate income tax by 8631,000 EUR. This phenomenon is agreed also by the Laffer curve, which is based on the fact that a decline in taxes increases tax revenues due to higher economic activity of business entities. Nevertheless, the increase in tax rates leads to an increase in tax revenues only to a certain level. If the tax rate reaches its ceiling, the revenues will begin to fall. But it is necessary to take into account that if the rate increases significantly, it will have the opposite effect on tax revenues (tax evasion or transfer of capital abroad) what would ultimately depress the entire economic situation in Slovakia. As is evident, corporate income tax rate in 2013 (23%) compared to 2012 (19%) increased by 4% what resulted in the revenue increase by about 35 million EUR.

In Czech Republic the change in income tax volume was caused by government expenditure and the tax rate. Both variables influenced the corporate income tax directly. The growth of government expenditure by one unit caused a slight increase in corporate income tax, concretely by 3,092 EUR what we assessed as weak change of corporate income taxes. The second and also the last factor was the tax rate. The increase in the corporate income tax rate by one unit increased the volume of corporate income tax by 18.66 billion EUR (Table 1). In the case of Czech Republic, similarly to the model used for Slovak Republic, the increase in tax revenues is

processed only to some extent. However, it should be noted that due to growth of government expenditure the growth in corporate income tax was not found as significant. For the other three factors - GDP, export and employment there was no effect on the CIT – variable explained. Relation mentioned is confirmed also by the data from recent years saying that no change in corporate income tax occurred in the Czech Republic. Last change was in 2010 due to reduction of tax rate by 1% (from 20% to 19% compared to 2009) what resulted in a decrease of corporate income tax volume by about 18 million EUR.

According to the analysis the change of corporate income tax in Poland was affected by the change of GDP, exports, employment and tax rate. The model was statistically significant and was not loaded by heteroscedasticity, multicollinearity and residues were from a normal distribution. The only problem in this model was the presence of autocorrelation. Employment was the first factor that had an impact on the corporate income tax as the income of the state budget. Employment increase by one unit caused the growth of the income tax by about 335.3 EUR, this is a positive influence on CIT, but not confirmed in praxis whereas wages represent a cost for the companies, not a taxable revenue. The higher the employment, the higher wage costs for companies that reduce the tax base. It means that in praxis an indirect relationship between variables was demonstrated, so the higher employment (and thus higher costs for businesses), the lower is the volume of levy corporate income tax to the state budget. Export as another factor has influenced the increase in corporate income tax by 3,228.2 EUR. Export of the country had increased gradually during the last reporting period, but this trend was not noticed at the corporate income tax although the result of the analysis points out positive relationship, although a very little. On the other hand we found a significant impact of GDP. By the 1 unit growth in GDP there was an increase in corporate income tax on 1107,000 EUR. Result of the analysis in this country shows the direct relationship between variables. Mentioned relation is proved also by praxis because an increase in GDP displays that businesses produced more with higher profits that were the basis for calculating the corporate income tax. The last and the most important factor was the tax rate, which impacted the state budget significantly. Increasing the tax rate by one percentage increased the volume of corporate income tax by 33110,000 EUR. In the country analyzed the last change of tax rate was performed in 2004 when the tax rate decreased from 27% to 19% in comparison with 2003. This decline was significant and it was also reflected in the total amount of tax levied. In 2004, corporate income tax levied was on the level of about 2 billion EUR, while in 2003 it was 2.32 billion EUR. The only factor with no relation to the corporate income tax was government expenditure.

Resulting from the analysis of Hungary, explanatory variables have a positive influence on the CIT as variable explained, what was proved also in the previous three models. In Hungary, the change in corporate income tax was influenced by GDP, exports and tax rate. The modified model did not meet all the assumptions of linear regression because the model was loaded by the autocorrelation. The first factor analyzed was GDP. However this relation was not very significant. If there was an increase in GDP by one unit, the corporate income tax as government revenue increased by about 21,820 EUR (Table 1). This increase was considered negligible, but nevertheless it should be noted as a direct relationship between the increase in the income tax and the tax base. Export is the other factor that impacts the corporate income tax. The results of analysis say that the increase of net export by one unit caused a slight increase in the corporate income tax by only 3,311 EUR. But in the case of Hungary, even this factor is not considered substantial that would rise the corporate income tax significantly. The last factor and also the

most significant factor was the tax rate. The relationship between those variables was positive. The increase in the corporate income tax rate by one unit increased the revenues of the state budget in the form of a corporate income tax by 30480,000 EUR. For the other two variables, namely employment and government expenditure, analysis did not demonstrate any effect on the CIT as variable explained.

4 Comparison of the results observed in econometric models analysis performed

After the analysis in each country impact factors were compared, and thus it pointed out what variables in particular country affected CIT as chosen variable explained the most and in what extent.

Slovak Republic		Czech Republic		Republic of Poland		Republic of Hungary	
Factor	Value	Factor	Value	Factor	Value	Factor	Value
Tax rate	8.631e+5	Tax rate	1.866e+7	Tax rate	3.311e+7	Tax rate	3.048e+7
GDP	4.127e+6	Government expenditure	3.092e+3	GDP	1.107e+6	GDP	2.181e+4
Government expenditure	5.035e+2	Х	Х	Export	3228.2	Export	3.31e+3
Х	Х	х	Х	Employment	3.353e+2	Х	Х

Table 2 Results of impact factors analysis

Source: Processed by author

By the comparison of the results observed for all the analyzed countries we noted that the tax rate as explanatory variable had a positive impact on corporate income tax within each model. It should be also emphasized that this factor had the most significant impact on CIT in each model. The biggest impact on the corporate income tax caused by tax rate can be seen mainly in the Czech Republic and Poland, but also in Hungary. Slightly lower dependence between those variables is seen in the Slovak Republic. Positive correlation issue between the tax rate and corporate income tax is dealt in papers of many economists (e.g. Clausing, 2007; Devereux, 2006; Kubátová and Říhová, 2009) with the same conclusion that tax rate is a variable that has a positive effect on CIT what was also confirmed by analyzed models introduced in this paper. Forasmuch as positive relationship was demonstrated in each model, in praxis for the increase in tax revenues (notably corporate income tax) it is necessary to increase the tax rate. But as it was said, this increase is possible just up to certain levels, what is 30% tax rate at maximum. Otherwise raising of tax evasion could occur or businesses would transfer their capital abroad (into the countries where the tax rate is lower), which would ultimately result in weakening overall economic performance in the country. It is also necessary to point out the importance of the GDP variable. This factor was statistically significant in three models (in the Slovak Republic, Poland and Hungary). The intensity of the impact of this factor in particular countries was different but direct relation was observed in each model. That results in the fact that in a country where there was an increase of GDP, also the increase of CIT was found. In the period analyzed the most significant impact on corporate income tax was noticed by GDP in Poland. The impact of GDP on tax revenue, particularly on the tax revenue from corporate income tax is dealt by Kubátová and Říhová (2009) and Bayer (2011), who show positive impact of GDP on CIT through a panel regression analysis. There is a variable – employment that had an impact on

the corporate income tax only in one of all four countries analyzed in the period referenced. The relation between these variables was reflected only in Poland, but even within this model it was demonstrated only a small dependence on CIT by employment. Nevertheless positive correlation is proven, what means that the employment growth causes an increase in corporate income tax. Even Clausing, (2007), Mura and Buleca (2014) point out on the positive relationship between employment growth and the volume of revenue from income taxes in their work. Hereby a high unemployment rate is negatively correlated with the tax rate, indicating that governments lower tax rates to stimulate the economy during economic downturns. Campbell (2010) states that in the long term factors such as real per capita income and the rate of unemployment have a marginal effect. On the other hand, the positive relationship between employment and CIT is not confirmed by Livermore (2008) who points out on negative relation of these variables in his publication. Explanation is as follows: the higher employment, the higher the costs of companies in the form of wages reducing the net profit what is the basis for calculating corporate income tax. Export as impact factor on CIT was identified in two countries, namely Poland and Hungary. This variables also influenced the explained variable in positive way in both countries. This means that if there was an increase in export also increased tax revenues were noticed. The direct dependence of these variables is proven also by econometric model of foreign economists -Monteiro, Brandao and Martins (2011). In this model the impact of export is pointed out for all four countries of V4, but analysis processed by us demonstrates the effect of this factor only in Poland and Hungary. In two other countries, Slovakia and the Czech Republic was no evidence of the impact of exports on CIT. The last factor analyzed was government expenditure. The impact of this factor was demonstrated also in only two countries, but this time in the models for Slovak and Czech Republic. Even between government expenditure and corporate income tax a direct relationship is shown. Interestingly, the effect of this factor was demonstrated only in these two countries and in the other two (Poland and Hungary) was not identified at all. In contrast, the export as impact factor has been demonstrated just in model for Hungary and Poland and in the Czech Republic and Slovakia we have not seen any effect.

5 Conclusion

Interesting fact of overall analysis is that the only factor that had an impact on corporate income tax in each country is the tax rate and also it should be noted that a given variable has the greatest impact on the explained variable CIT in each country. Therefore, when interpreting the results new questions appear. And the most basic one concerns the tax optimization and related facts concerning the tax rate. Can be tax rate increase regarded as the right step towards the state budget fulfillment? If we look into the history of the Slovak Republic, the amount of corporate income tax rates ranged with declining trend from 45% to 23%. In the years 1993-2002 tax rates decreased from 45% to 25%. From 2004 to 2012 it was the flat tax rate in the level of 19%, and by 2013 the tax rate is 23%. The level of tax rate is not the only factor affecting the amount of tax liability and thus the overall state budget revenues. By contrast, a variable that had an impact on corporate income tax in only one of the four countries analyzed is employment, effect was beheld only in Poland. But even in this case only a weak statistical significance has been demonstrated, what means that in fact the mentioned variable has not a significant impact on the corporate income tax in the countries of Visegrad Group. When evaluating the trend of tax revenues from corporation income tax several factors that have an impact on this tax should be taken into account, not only those we have determined in analysis performed. It would be interesting to follow the impact of other less significant factors what we have not studied in the analysis.

Acknowledgements

This contribution 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 1/0607/16 and VEGA 1/0982/16.

References

- ANDREJOVSKÁ, A. and MIHÓKOVÁ, L. 2015. Developments of VAT rates in EU countries in the context of harmonization and fiscal consolidation. In: *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*. No. 2, pp. 487-498.
- BÁNOCIOVÁ, A. 2011. Aplikácia daní SR v praxi. Košice: ELFA.
- BAYER, O. 2011: Vládní daňové predikce: ex ante odhady a ex post hodnocení přesnosti v ČR. In: *Český finanční a účetní časopis*.
- BLUNDELL, R. W. 1995. The Impact of Taxation on Labour Force Participation and Labour Supply. *OECD Jobs Study Working Papers*. No. 8.
- BIRD, R. M., MARTÍNEZ-VAZQUEZ, J. and TORGLER, B. 2008. Tax effort in developing countries and high income countries: the impact of corruption voice and accountability. In: *Economic Analysis and Policy*. Vol.38, No. 1, pp. 55-71.
- CLAUSING, K. A. 2007. Corporate Tax Revenues in OECD Countries. In: International Tax and Public Finance. Vol. 14, No. 2.
- CAMPBELLA, T. D. A. 2010. Determinants of Personal Income Taxes for Barbados. In: *International Journal of Public Administration*. Vol. 33, No. 14, pp. 816-821.
- CASSOU, S.P. 1997. The link between tax rates and foreign direct investment. In: *Applied Economics*. Vol. 29, No. 10, pp. 1295-1301.
- CASTRO, G.Á. AND CAMARILLO, D. B. R. 2014. Determinants of tax revenue in OECD countries over the period 2001-2011. Vol. 59, No. 3, pp. 35-59.
- DRAB, R., MIHÓKOVÁ, L. and KMEŤOVÁ, O. 2015 The dependancy of e-market seller reputation on buyers behaviour. In: *Journal of Applied Economic Sciences*. Vol. 10, No. 3, pp. 397-408.
- DEVEREUX, M. P. 2006. Developments in the Taxation of Corporate Profit in the OECD since 1965: Rates, Bases and Revenues. University of Warwick.
- DOLENC, P. and LAPORŠEK, S. 2010. Labour Taxation and Its Impact on Employment Growth. In: *Managing Global Transitions*. Vol. 10, No. 3, pp. 301–318.
- EUROSTAT 2015. GDP and main components (Output, Expenditure and Income).
- FILIP, P. 2009. Tax competition within the European Union as an opportunity of regional development. In: *Geopolitical Studies*. Vol. 15, pp. 87-97.
- GUPTA, A. S. 2007. Determinants of tax revenue efforts in developing countries. *Working Paper* 07/184. International Monetary Fund.
- HAGARA, E. and GÁBIK, R. 2014. Vyšší výber daní aj v nasledujúcich rokoch Prognóza daňových a odvodových príjmov na roky 2014–2017. Inštitút finančnej politiky MF SR.
- HUŠEK, R. 1992. Základy ekonometrie. Praha: Vysoká škola ekonomická v Praze.
- KENNEDY, D., MCMILLEN, S. and SIMMONS, L., 2015. The Economic and Fiscal Impact of Low-Wage Work in Connecticut. *ISSUE BRIEF*.

- KUBÁTOVÁ, K. et al. 2012. Vliv daňových a výdajových nástroju na mikroekonomickou a makroekonomickou efektivnost. Praha: Woltres Kluwer.
- KUBÁTOVÁ, K. and ŘÍHOVÁ, L. 2009. Regresní analýza faktorů ovlivňujících výnosy korporativní daně v zemích OECD. In: *Politická ekonomie*, Vol. 57, No. 4, pp. 451-470.
- LIVERMORE, S. 2004. An Econometric Model of the Slovak Republic. Financial Policy Institute Ministry of Finance of the Slovak Republic
- MONTEIRO, R.M., BRANDAO, M.F.E. and DA SILVA MARTINS, V.F. 2011. A panel data econometric study of corporate tax revenue in European union : Structural, cyclical business and institutional determinants.
- MURA, L. and BULECA, J. 2014. Trends in international business of the Slovak small and medium food enterprises. In: *Procedia-Social and Behavioral Sciences*, Vol 110, pp. 905-912.
- OBTULOVIČ, P. 2010. Ekonometria. Nitra: vydavateľstvo SPU v Nitre.
- OECD 2015. HICP Miera inflácie.
- OECD 2015. Monetary and Financial statistics: Long-term interest rates.
- OCHOTINSKÝ, P. et al. 2012. *Úvod do ekonometrie pre financie*. Bratislava: Vydavateľstvo EKONÓM.
- RAISOVÁ, M. 2012. The implementation of green taxes into the economics. In: *SGEM*. Vol. 4, pp. 1153-1160.

ŠIROKÝ, J. 2012. Daně v Evropské unii. Praha: LINDE.

UNIVERSITA BOCCONI 2011. The role and impact of labour taxation policies.

URBÁNEK, V. et al. 2005. Veřejné finance II. : Soubor textů k předmětu. Praha : Oeconomica.

Analysis of the Integration Components in the System Balanced Scorecard

RADOVAN BAČÍK¹ – PATRYCJA PUDŁO² University of Prešov, Faculty of Management Slovak Republic Higher Vocational State School in Sanok Poland

Abstract

The current management theories based on the latest knowledge always come up against the established way of thinking. So far, management systems used in businesses based solely on financial indicators have proved inflexible, heavily dependent on business accounting. Creation and implementation of Balanced Scorecard (BSC) allows systematic management of strategic business performance. Particularly useful are the logical linking of concepts copying the strategic direction of the organization. BSC concept and CRM components have penetration oriented on customers. The basic principle of CRM strategy is premeditated building of relationships for the most promising and most profitable customers. The presented follow-ups are connected with these aspects. In addition to the results of its own research to implement the BSC in Slovak companies it also shows high flexibility BSC concept and implementation components.

Key words: Balanced Scorecard, BSC Implementation, Management, Customer Perspective, Customer Relationship Management, Management Information Systems, Performance Indicators

JEL Classification: M10

1 Introduction

Optimization and continuous improvement processes in the enterprise, company or organization is now becoming a necessity for the maintenance on the market. The key "technology" to achieve this goal is the enterprise information system. Experience from corporate practice declared that the main reason for the failure of the implementation of information systems and information technology (IS/IT) is excessive focus on software solutions and process automation in the enterprise (Sodomka and Klčová, 2010). On the Slovak market there are various information systems aimed at managing the business agenda of economics, human resources, logistics and production. In the absence of some important qualities, necessary scope and depth of functionality, as well as the level of technological maturity, not all have to take appropriate platform for integrating business process management. Many IT vendors misidentified all IT solutions as ERP systems, for marketing reasons. Information systems ERP is defined as an effective tool, allowing planning and management of key internal business processes and at all levels from the strategic operational (Šoltés et al., 2013; Brozyna et al., 2016; Raisova et al., 2014).

¹ doc. Radovan Bačík, PhD., MBA; Konštantínova 16, 080 01 Prešov, Slovak Republic, radovan.bacik@unipo.sk

² Patrycja Pudło; Mickiewicza str. 21, 38-500 Sanok, Poland; patrycja.pudlo@gmail.com

Internal processes are imperative to link with the processes supporting management decisions (management information reporting, creating its own analysis, using tools Corporate Performance Management). Systems such as ERP, CRM, SCM, etc. are mostly linked with transaction information systems supporting the operational management of business processes. In relation to analytical systems they are referred to as Online Transaction Processing (OLTP). Analytical data processing is carried out using tools OLAP (Online Analytical Processing). These tools enable the analysis of historical data and then create extensive statistical reports. Tools for storing data, as well as tools for their analysis, provides the data warehouse (Data Warehouse - DWH). Systematic approach of building a data warehouse allows finding relation-ships between data obtained from different sources and which the user may never reveal. Compared to the base of transactional systems the data warehouse is almost exclusively focused on searching and adding data to allow an analytical function. In the data warehouse they are stored primarily historical data, allowing a unique view of the data (not available through other IS). With the use of analytical and reporting tools is closely related Business Intelligence (BI), which through its integrated tools allow users to access data in information systems and analysis. These BI tools significantly affect the strategic direction and developing the knowledge base of the company. Using analytical methods and returning included in BI is currently considered business for granted. Performance Management Organization - Corporate Performance Management (CPM) includes technological and process component. This includes the addition to reporting and ad hoc querying, OLAP modeling, monitoring and evaluation of relevant performance indicators, planning and implementation of "What if" analysis and etc. The problem of this time is also ambiguity in various management tools. The resulting new tools are in the presence often intertwined, not always it is a totally new approach, but focused on a selected portion of the tools, or just change the name.

The problems reported significantly eliminate a modern MIS which, moreover, allows access to the results of analysis for the operational decision-making. MIS has the reasonable period of time to respond to questions regarding the processing of large amounts of data, and also on issues relating to individual records. These applications incorporate the latest knowledge about management support systems for high and middle management as well as provide sufficient support for the operational management of lower management. The solution combines the Balanced Scorecard (BSC) to support strategic management, Activity Based Costing (ABC) for the cost analysis, OLAP analysis, Business Process Management (BPM) to support process management.

2 The Balanced Scorecard and its basic principles

BSC is a strategic management measurement and communication tool allowing a simple way to point out how the company is well on track to achieve its strategic objectives. It is a multidimensional system, enabling the definition and implementation of the strategy at all organizational levels of the enterprise in order to maximize value creation. BSC is based on the basic tasks of company management through a set strategy allows the company to achieve its vision and highlighting key factors (Key Business Drivers) affecting the formation of values it through the four basic perspectives: financial, customer, employee and internal business processes. There is no theorem or guarantee the sufficient number referred to the four perspectives. Rather several years of experience of advisory and consulting firms with applications BSC in companies from different sectors. Large increase in popularity and the rise of the importance of methodology BSC (today it is already used by most consulting and integrator companies) is due to the fact that this is the first comprehensive and easy tool for correct implementation of the corporate strategy as a whole. Is the core of enterprise management system for strategic and operational levels, to define and implement the principles of MBO (Management by Objectives) to control processes with its subsequent use in operational management (MCS - Management Control System). Special literature declares potential weaknesses BSC (Sodomka and Klčová, 2010; Michalski, 2009; Michalski et al., 2015) as methodological flaws that are in concrete implementation of BSC, irrespective of the method may not be reflected. On the other hand, the apparently problem-free components BSC methodologically individual conditions may lead to failure of the respondents BSC in practice. For this reason, we consider the analysis of the process and content of applications for BSC as key system functionality. For the implementation of the BSC is important:

- 1. The establishment of a strategic management system and its link with the operational management.
- 2. Linking strategic performance management system with a system performance evaluation of employees.
- 3. The use of specialized tools for managing measurement system based on BSC.

2.1 Defining strategic objectives and indicators

Basic inputs in the design of the strategic objectives are strategic imperatives of organization and outputs of SWOT analysis. Already in developing strategic objectives, it is important to clearly define the responsibility of individual workers, allowing greatly eliminate possible confusion in the design of specific strategic indicators BSC. In the design of strategic indicators it is important to analyze the interdependencies between the proposed indicators that will be part of the strategic map. After creating the strategic map, the stage describes indicators, particularly parameters specific metrics (the calculation formula, the unit in which the metric is calculated, frequency of calculation, data sources, target values, allowable, the responsible person for the metric and so on). This phase is very challenging for the company in terms of having a structured processing of large amounts of information. Out of them is created a functional measurement system and an appropriate data model. This function is very effective to provide specialized software tools fully supporting the implementation of the BSC. Their contribution is the creation of indicators, ensuring their unequivocal structure, description hardly measurable, non-financial indicators, creating interactive strategy maps BSC, finding links between indicators and their clear display. After creating a data model BSC in specialized software tools there is ensured a regular reporting of business performance, gaining the basis for operational and strategic management, control liability of individual indicators. Importantly, the software tool prevents false operations with values clearly displays results including graphics, signals the exceeding of thresholds (traffic light system) has been analyzing trends keeps history, and allows you to attach comments to lead guided discussions achieved value indicators (comp. with Michalski, 2014; Michalski, 2015).

2.2 The disintegration of strategic indicators

In this phase of BSC there are ensured peak breakdown structure measurements at lower organizational levels. Indicators at the lower levels are defined, as well as at the top level. Each indicator has created a so-called "cascade", which contributes to the peak indicators. On the basis of valid data and the monitoring of indicators of decay it is able to quickly identify the source of problems and then propose and implement effective corrective measures.

2.3 Creation of personal scorecards, motivation and remuneration

In a similar way, decomposition takes place at the personal level indicators. Personal BSC performance indicators of individual employees contribute to ensuring the principle of accountability and targeting of the whole system performance management and enterprise are important motivating tool. At the lowest level, everyone should have a manager responsible for two to three indicators that have been allocated to the collapse of level indicators of organizational units.

Creating personal BSC and the subsequent connection of the outputs with the remuneration system represents a radical change in the functioning and performance evaluation of the majority of employees. Precisely for this reason it is necessary that stage attaches considerable attention with regard to communication to employees and the balance of the data generated. BSC must be understood and accepted by all employees. Personal scorecards help create a specialized software tools that can automate their evaluation, or to support the evaluation by arbitrarily setting up of models (Hekela and Tax, 2011).

3 Adaptability of BSC system in Slovak business practice - research results

Compared to valuable foreign studies that mapped in detail the implementation and use of systems to measure and manage performance, we do absent these studies (Davenport, 1998; Deloitte Consulting, 2000; Bem and Michalski, 2016; Gavurová, 2011, Gavurová, 2012; Michalski, 2016). Our research activities have found that by 2008 there was not implemented in Slovakia a research on the implementation of the BSC system in Slovak business practice. Therefore the ambition of our previous research in the years 2008 - 2010 was to systematize, review and evaluate the selected attributes of the application of BSC in the process of implementing the strategy in the Slovak surveyed organizations, to identify problematic areas of BSC implementation and to suggest ways to tackle them (Gavurová, 2012). Due to the content and range limitations of the article we are focused only on selected research results that correspond with focusing of the contribution.

3.1 Data and methodology

By conducting the research there were interviewed two kinds of entities: companies implementing the BSC system (hereinafter referred to as implementer BSC) and companies listed in the references as having implemented a system BSC (BSC users). When selecting the research sample we used the results of our scientific research activities (2008-2010). We found that BSC system are implemented in Slovakia by advisory and consulting companies and companies dealing with information systems and information technology (IS/IT). Given to the nature of these businesses, we got the research sample - companies implementing BSC businesses with implemented BSC by browsing the most visited websites by the number of "unique visitors". By entering keywords related to the issue we have specified companies implementing the BSC in Slovakia. On that basis it was found 40 enterprises with the alleged implementation of the BSC, of which only 20 companies actually implemented BSC. These companies have subsequently been addressed. Interest in participating in the research reflected 16 respondents (80%). In the research was used the combined method of contacting in the form of written, electronic and personal polling. Part of the research was to gather information – references about users from

businesses implementing BSC. We acquired a second research sample of companies with that implemented BSC. All businesses, 16, we visited in person (we conducted the census).

As it regards the structure of enterprises with implemented BSC, the greatest extent is represented by organizations established in the industry for 10 years (37.5%). Three-quarters of respondents have focused their activities in Slovakia and abroad. It is also influenced by the 38% share of foreign majority owner of the company. Five years' experience with establishing BSC have up to 38% of respondents, the same proportion has the enterprises with a period of use of BSC 6 and 4 years (25%). The BSC was the most commonly implemented in the field of trade and industry (71%), lesser extent is in health care (29%) (Gavurová, 2011; Gavurová et al. 2014).

3.2 Results and discussion

The survey identified the following findings:

- Most problematic deployment phase BSC is the stage of defining metrics identification and design of KPI and CSF. This corresponds with previous findings reported in domestic and foreign literature (Bassioni et al., 2004). Enterprises do not have a clearly defined methodology for determining critical success factors and key performance indicators. These are often not the result of statistical or mathematical methods, but rather the experience, intuition and improvisation negotiations.
- The most frequently used software support are the products QPR, whether it is a process management or directly to address QPR Scorecard (QPR ProcessGuide, CostControl QPR, QPR ScoreCard, QPR FactView, QPR WorkFlow), as well as products ProVision, MS Project, MS Visio, Portfolio Landscape Deloitte Enterprise Value Map. Implementation secondary support the tools like CRM, ABC, etc. Most support tools are used in the phase of KPI and CSF and at the stage of attachment to the incentive system.
- The most common cause of failure of the implementation of BSC is two areas: establishing KPI and CSF and the entanglement incentive system. The biggest risk is mainly in setting too many KPIs, their operative character, setting unrealistic targets, the absence of supporting data, their inconsistency and lack of transparency, inadequate connection to the incentive system, as well as incorrectly defined responsibilities, an imbalance in terms of the ratio of upstream and late KPI, insufficient quantities of benchmarking KPI, etc.
- BSC implementation of the system significantly obstruct the resistance to change motivation system (at the time of setting targets and KPI assignment of responsibility for them, employees begin to take the project seriously BSC), special time-consuming design and implementation of reliable measurement, lack of leadership, motivation, and resources in implementing the necessary actions.

Reported results declared by the low level of integration of BSC in the enterprise information system, which results in:

- lack of coherence of BSC with all the necessary information sources,
- lack of direct support for setting the target values of indicators and their comparison with actual results,
- inefficient transfer of strategic indicators to the lowest functional areas of management,
- subsequent lack of support process management and its entanglement with strategic objectives.

Due to the constantly growing demands on management systems, their functionality, as well as integration of their integration platform is gaining more and more importance to linking management concepts, such as system for measuring and managing performance with BSC system for customer relationship management. Economic usefulness stemming from the synergy effect of both concepts justifies the fact that one of the fundamental perspectives (areas) of the BSC is the customer perspective (Table 1).

The relationship between CRM information systems and CRM strategy is influenced by historical developments. The ambition of the developers of CRM systems was to break into sales, so far little *"concerned"* IS. Strategies of customer relationship management arose as the output of American consultants who did not reflect upon the possible implementation of IS in these areas. CRM can be defined as a form of the organization behavior in relation to the customer.

It is not just about automating business processes and transactions, but also about the ability to respond flexibly to the constantly changing competitive environment in relation to customers (Tvrdíková, 2008). The concept of CRM is based on three attributes: human resources, technological tools and process dynamic structure. CRM software systems have their basis in two basic information areas of the organization - so called, back-office and Front-Office. Back-office area is the area of ERP (enterprise resource planning) and the traditional domain of system integration containing the business activities of the organization, such as purchasing, inventory management and other internal systems of the organization, including financial infrastructure. Front-office area is a new area and it combines all three types of the external relations automation of the organization - automation of sales, customer service and marketing (formerly database marketing). Implementation and the usage of CRM mean, in addition to these aspects, the growing pressure for increased labour productivity, flexibility in adapting to changes in the external environment, timely revised strategy for hospitals, etc. Recent research has pointed to a significant percentage of CRM usage (8 out of 20 analyzed hospitals) in 20 hospitals in the Eastern Slovakia Region (Šoltés et al., 2013; Bem and Michalski, 2016).

Objectives	Metrics			
Relations with customers				
Satisfaction of customers	Satisfaction of customers			
• year 2013	• the average execution time of the contract			
• year 2014	• the number of complaints to the number of deliveries			
	 designed for precision 			
	• average reaction time to requests			
	• benchmarking			
	Loyalty of customers			
Loyalty of customers	 percentage structure of customers' age 			
• year 2013	 lost customers to the total 			
• year 2014 Acquiring new customers	Acquiring new customers			
	• the ratio of new customers to the total number			
	• the ratio of sales to new customers to total sales			
	 balancing supply contracts 			
Market segmentation				

Table 1 Objectives and metrics of BSC customer perspective

Market share in the defined segments in 2013• shares from existing customers			
Market share in the defined segments in 2014	• shares of new customers		
	 profitability by customer groups 		
	• benchmarking		
	Value offer		
Characteristics of products and services	Characteristics of products and services		
	 development of key parameters related to demand 		
	• the average time from product development to		
	commercialization		
	• benchmarking		
Image of the company	Image of the company		
	• perceived quality of the company		
	 participation in the evaluation of customer days 		
	• benchmarking		
Infraction stores development	Infrastructure development		
inirastructure development	• the reaction time of the contact area		
	 companies accessibility for customers 		

Source: Own processing (Učeň, 2008)

In creating the concept of CRM it is recommended the following steps:

- Define the key aspects of the company's business activities and sort them by priority define corporate vision,
- Make a list of customer relationship management activities which are focusing on preparing the strategy and choice of optimal instruments,
- Examination of collecting and using customer information feedback on the previous phase confirming the selection of optimum tools,
- The choice of technology tools to support CRM processes,
- The iteration, because the application of this concept is not a one-time process but cyclical requiring constant fine-tuning of the system (Figure 1).



Figure 1 COBIT adapted model of CRM. Source: Own processing (Chlebovský, 2005)

As shown in Figure 1, a comprehensive system of CRM in the enterprise allows synchronizing the CRM strategy and also the information system CRM, and constantly adapting to the current external and internal conditions and requirements. When creating a comprehensive CRM model, it is also used, the frequently featured model, COBIT (Control Objectives for Information and related Technology). It was created by the IT Governance Institute based on many years of experience in IT. Its versatility predetermines a flexible adaptation to other area (Chlebovský, 2005). Planning and organization domain in the listed model represents the area where managers of marketing, sales and IT field should work together. The entire strategic preparation should be supported by conducted analysis of internal environment (information flows and processes), as well as the external environment (business environment and market). Completed analyses must be updated to avoid the usage of outdated information. When designing the system for performance measurement based on principle BSC, objectives and strategies BSC should reflect the vision and strategy of the company. BSC should be an important tool for the transfer and implementation of CRM strategy which is differentiated according to both, customer value and customer value for the enterprise. CRM strategy also reflects the underutilization of intangible assets because they are much more crucial point for market success (Lošťáková, 2009; Michalski, 2014; Michalski, 2015).

In determining the market performance indicators is needed to bear in mind the fact that the customer needs and requirements are not static but are constantly changing and evolving. Valueoriented businesses constantly monitor the attributes of values for customers and on this basis they increase their ability to bring these values. At all stages of the value management - from detection of values for the customer, his identification with it, creating value, its delivery and improving must be present also customer feedback. At measuring and managing individual customer benefits for businesses is applied differentiated CRM strategy. Its synergy with the BSC requires partial modification of the BSC and the choice of new indicators.

- It is about creation of an integrated system of indicators of business performance with these subsystems (Lošťáková, 2009).
- Indicators of learning and growth, which are manifested in market orientation and innovation in servicing target markets,
- Indicators of internal business processes conducive to the creation, delivery and improvement of customer value compared to the competition,
- Customer Performance Indicators,
- Indicators of final results of the market and financial performance.

Selection of performance indicators in each of the subsystems of the modified BSC is based on the definition of the vision and strategy applied in the servicing of individual customers. These indicators must be synchronized so that the achievement of their targets also reaches an acquisition of greater value for the customer, higher value basis for business and higher financial performance.

4 Conclusion

Current competitive environment places high demands on the use of efficient management systems, and these develop a constant pressure against information systems, in particular from the view of reception, processing and storage of data which is necessary to business management. Organisations have to always take into account the accelerating transformation of their environment, and also to flexibly react to it. This raises the pressure to implement flexible information systems and use of wide variety of analytical methods. Against each other stand two opposing concepts: a dynamic competitive environment and pressure on the relatively stable enterprise architecture as a fundamental basis of strategic management. The aim is to achieve a synergy effect, namely the harmonious integration of management functions in the organization, activities, success factors, etc.). ICT penetrate almost in all spheres of governance, and currently its use is common, e.g. in the field of electronic commerce (e-business), communication, education (e-learning), etc. Currently, the methodology concepts, such as BSC, ABC, TQM, BPM and many others, are relatively detailed processed. It is due to the dynamics of their development, gradual improvement, as well as the implementation of the principles of so-called good practice. If we focus solely on application support within the IS/IT of these methodologies, we state their partial processing and a complete lack of comprehensive ties on the structure of systems of management, as well as a lack of common terminology. The referred deficit in the absence of a systematic methodology for implementation of the strategy fills the system BSC, which has become the central pillar of a new strategic and managerial system of management. Therefore we expect a growth of interest of its implementation also in the Slovak enterprises. BSC except transparent layout of indicators facilitating a comprehensive approach to decisionmaking is detecting also the causal relationships on the basis of their interconnections. These links allow create strategic trajectory, e.g. impact of investments in employee training, in information technology and in innovation of products and services, which operate in a significant increase of financial performance. Due to its complexity, versatility, clarity and practical functionality, implementation of BSC for enterprises means a competitive advantage, which will be increasing constantly in a globalized world.

Acknowledgements

This article is one of the partial outputs under the scientific research grant VEGA 1/0857/15 *Research of economically significant factors of perception of reputation and its dominant contexts in relation to the success in the processes of e-commerce and e-marketing on the Slovak Virtual Market.*

References

- BASSIONI, H. A., PRICE, A. D. F. and HASSAN, T. M. 2004. Performance measurement in construction. In: *Journal of management in engineering*. Vol. 20, No. 2, pp. 42-50.
- BROZYNA, E., MICHALSKI, G. and SOROCZYNSKA, J. 2016. E-commerce as a factor supporting the competitiveness of small and medium-sized manufacturing enterprises, CEFE 2015 – Central European Conference in Finance and Economics, Technical University of Kosice, Kosice.
- CHLEBOVSKÝ, V. 2005. CRM Řízení vztahů se zákazníky. Brno: Computer Press.
- DAVENPORT, T. H. 1998. Putting the Enterprise into the Enterprise System. In: *Harvard Business Review*. Vol. 76, pp. 121 131.
- DELOITTE CONSULTING 2000. ERP's Second Wave: a Global Research Report.
- GAVUROVÁ, B. 2011. Systém Balanced Scorecard v podnikovom riadení (The Balanced Scorecard System in Enterprise Management). 2011. In: Ekonomický časopis. Vol. 59, No. 2, pp. 163-177.
- GAVUROVÁ, B. 2012. Source Identification of Potential Malfunction of Balanced Scorecard System and Its Influence on System Function. 2012. In: E+M Ekonomie a management. Vol. 15, no. 3, pp. 76-90. ISSN 1212-3609
- GAVUROVÁ, B., ŠOLTÉS, M., and BALLONI, A. J. 2014. Ekonomický význam využívania informačno-komunikačných technológií v systéme zdravotníctva (The Economic Importance of Using of ICT in the Health System). In: Ekonomický časopis. Vol. 62, No. 1(2014), pp. 83-104.
- HEKELA, J. and TAX, M. 2011. *Řízení podnikové strategie metodou BSC, vztah BSC a IS/IT*. Deltax Systems a.s. [online]. Available online: http://si.vse.cz/archive/proceedings/1999/metodika-balancedscorecard-a-jeji-vztah-k-is-it.pdf>.
- KAPLAN, R. S. and NORTON, D. P. 1993. Putting the Balanced Scorecard to Work. In: *Harvard Business Review*.
- LOŠŤÁKOVÁ, H. Diferencované řízení vzťahů se zákazníky. Praha: Grada Publishing.
- MICHALSKI, G. 2009. Inventory management optimization as part of operational risk management. Economic Computation and Economic Cybernetics Studies and Research, 43(4), 213-222.
- MICHALSKI, G. 2014. Value maximizing corporate current assets and cash management in relation to risk sensitivity: Polish firms case. Economic Computation and Economic Cybernetics Studies and Research, 48(1), 259-276.
- MICHALSKI, G. 2015. Weather risk reduction as key for financial performance of the enterprise - sustainable business framework. In: AKTUALNE PROBLEMY PODNIKOVEJ SFERY

2015, Bratislava: International Conference on Current Problems of the Corporate Sector, pp. 416-427. ISBN 978-80-225-4077-3.

- MICHALSKI, G., BROZYNA, E. and SOROCZYNSKA, J. 2015. Cash levels and its role in full operating cycle enterprises: 2005-2013 Czech, Slovak, Hungarian and Polish enterprises case. In: European Financial Systems 2015. Proceedings of the 12th International Scientific Conference, Brno: Masaryk University, pp. 382-390. ISBN 978-80-210-7962-5.
- RAISOVA, M., BULECA, J. and MICHALSKI, G. 2014. Food processing firms inventory levels in hard times. 2004-2012 Slovak, Czech and Polish enterprises case. Procedia Economics and Finance, 12, 557-564.
- SCHNEIDERMAN, A. M. 1999. Why Balanced Scorecard failed. In: Journal of Strategic Performance Management.
- SODOMKA, P. and KLČOVÁ, H. 2010. *Informační systémy v podnikové praxi*. Brno: Computer Press.
- TVRDÍKOVÁ, M. 2008. Aplikace moderních informačných technologií v řízení firmy. Nástroje ke zvyšování kvality informačných systémů. Praha : Grada.
- UČEŇ, P. 2008. Zvyšování výkonnosti firmy na bázi potenciálu zlepšení. Praha: GRADA Publishing.
- VYMĚTAL, D. 2009. Informační systémy v podnicích. Praha: Grada Publishing.

Impact of the Internet Marketing on the Slovak Consumer

RADOVAN BAČÍK¹ – JAROSLAVA GBUROVÁ² – RÓBERT ŠTEFKO³ University of Prešov, Faculty of Management Slovak Republic

Abstract

At present, information and communication technology highly impact on shopping behavior and buying decisions of Slovak consumers. Slovak and foreign companies want to attract many potential consumers (individuals and companies). Internet marketing is a powerful competitive weapon that can not only attract new consumers, but also deter them. The most effective and efficient way of attracting new consumers is to join Internet marketing with other marketing communication tools such as sales promotion and public relations. The aim of this paper is to highlight the growth of Internet commerce and the use of Internet marketing from the perspective of a young Slovak consumer.

Key words: Internet, Social Networks, Internet Marketing, Promotion

JEL Classification: M31, M37

1 Introduction

With the increasing development of the Internet, businesses gradually shift to the online form. Companies are investing in information technology and electronic commerce in order to increase the effectiveness of their operations and improve customer service (Blažková, 2005, Bem and Michalski, 2016; Šoltés and Gavurová, 2014; Gavurová et al. 2014). Currently, the Internet heavily impacts sales volumes and also the system of marketing and distribution. These three activities typically constitute 20-30% of the total cost of the goods or services, thus making the Internet potentially attractive. This means that companies can save 10-20% of these costs if they make use of the Internet instead of the traditional activities of marketing channels (Clow and Baack, 2008, Brozyna et al., 2016, Michalski, 2009). Before the advent of e-commerce consumers received leaflets about the goods in paper form. Electronic commerce prefers electronic presentation, for example through websites, e-mail and so on. Similarly, cash transactions gradually convert to the electronic form, for example credit card payments, electronic checks or direct payment from a bank account on the Internet (Delina and Vajda, 2008, Michalski, 2014, Raisova et al., 2014). Information technology has affected every area of business, thus influencing the use of marketing and marketing tools. Within the Internet marketing customers use available information to choose the right product whose price corresponds to the estimated value. Price competition puts pressure on prices, thus generating deflationary price trends. It should be noted that quality customer service is of higher importance than ever before (Gavurová, 2012). Customer loyalty becomes supplier - customer loyalty. New software systems create solutions that enable the company to plan and control the movement of

¹ doc. PhDr. Radovan Bačík, PhD., MBA, Konštantínova 16, 080 01 Prešov, Slovak Republic, radovan.bacik@unipo.sk

² PhDr. Jaroslava Gburová, PhD., Konštantínova 16, 080 01 Prešov, Slovak Republic, jaroslava.gburova@unipo.sk

³ prof. Ing. Róbert Štefko, PhD., Konštantínova 16, 080 01 Prešov, Slovak Republic, robert.stefko@unipo.sk

products from international import through the home environment to the final destination (Kita et al., 2010, Michalski, 2015).

2 The nature and importance of Internet marketing and Internet advertising

E-marketing is a prospective trend in marketing based on the use of information technology. Information technologies provide new opportunities for communication, commerce, management. E-marketing works with potential and existing customers, creates customer database, processes call-centers, processes electronic offers, and identifies customers' interests and their satisfaction with electronic communication. E-marketing is aimed at advertising, direct targeting of marketing activities, replacing expensive services and a little effective traditional advertising. Virtual marketing, which is an Internet version of classic marketing and takes the form of e-mails, mentions various other marketing actions which customers wishes to share with their friends through e-mail communication (Kita et al., 2010). According to Nondek and Renčová (2000), marketing on the Internet is "a qualitatively new form of marketing that can be described as managing the process of satisfying human needs through information, services or goods via the Internet."

Internet has changed not only the traditional model of communication, but it also offers new possibilities in the sphere of marketing and sales. Benefits of using the Internet are (Mariaš and Žák, 2005):

- reaching narrower target groups of potential customers,
- reduced spending on printing and postage,
- reaching distant markets,
- equivalent opportunities for companies,
- measuring the effectiveness of an offer,
- permanent offer,
- extension of the marketing mix,
- interaction with customers,
- strengthening the brand's image.

Internet advertising is active continuously while viewing a web site, thus everyone can watch it whenever they want. An important difference between the Internet and traditional media is that the Internet user initiates the contact and searches for information, thus creating the pull mechanism. TV and radio ads and messages are transmitted at intervals and at certain times, therefore they are effective only at the time of their broadcasting. At the time of advertising broadcasting an advertising the only that is broadcasted. Print advertising is affected by its frequency of reading, and advertising works for the time a person is reading a particular page. Unlike on the Internet, advertising in the press has its special purpose – it is not a supplement. Companies advertising in those media are mostly companies that seek to provide information, therefore applying push mechanism (Blažková, 2005). New forms of e-marketing communication that are finding their way to the forefront and represent the current trends in Internet promotion include (Dorčák, 2012, Michalski et al., 2015):

• Social networks - represent a new advertising channel. Sites like Facebook, Twitter, MySpace, Buzz, LinkedIn can have many new visitors and potential clients through eye-catching advertisements.

- **Professional portals and discussion forums-** it is a way of promoting and spreading the good name of the company through professional articles and discussions that provide information on the quality of products and services.
- **Related web sites -** are sites that post a free link to another corporate web site using a system link for the link.
- Affiliate programs are systems based on the promotion of products through the web sites of affiliate partners who in return receive some commission.
- **Microsites** their main objective is to create simple websites to promote products and services to which a company wants to pay special attention.
- Advergaming these are marketing activities that use games to spread advertising messages.
- Worth of mounth (WOM) these techniques launch a debate about a brand and create reference programs, common-interest communities such as fan clubs.
- **Blogs** are used for the regular publication of short contributions (ie. spots). The individual spots usually feature a comments section, thus creating interest communities.
- Viral marketing includes all marketing activities that spread information through users using for example all sorts of jokes and other similar messages that people send between each other.
- **Guerilla marketing** the aim is to disseminate the message among people so they will talk about it between themselves.

Internet advertising is a medium that combines the positive aspects of traditional media with positives aspects of new media. It represents a great opportunity for targeting, tracking and interactive communication, and allows communication 24 hours a day throughout the year, rapid change of information, content and style. Advertisers can choose a certain target group. As a result, the Internet has become a very flexible medium (De Pelsmacker et al., 2003). No other medium has gone through such a huge development and has had so crucial and globally important impact on sales, marketing and communication as the Internet. It can be seen not only as a communication platform, but also as an important marketing medium. Přikrylová and Jahodová (2010) list a number of benefits that the Internet offers for advertising:

- multidimensional presentation,
- the user can choose the time and extent of advertising,
- the Internet offers endless amount of products and services and the consumer can find information thanks to a free service,
- the Internet is a selective medium allows to target the desired audience through appropriately selected servers,
- advertising on the Internet is less expensive than in other media,
- response time on the Internet advertising is immediate,
- the impact of the advertising campaign is measurable.

3 Results and discussion

The aim of this paper is to highlight the growth and use of the Internet marketing with regard to Slovak consumers. For the purposes of this survey, the survey sample consisted of 109 respondents - residents of the Prešov region regardless of gender, age and education. Primary research was conducted on the basis of our own information collection. Data was collected

through questionnaires in person from January to April 2015. The selection of respondents was non-random. Table 1 presents the composition of the survey sample by age and gender of respondents. With regard to the survey, we have set the following hypothesis:

H: We assume that there is a statistically significant correlation between the impact of online advertising and the age of the respondents.

Category	Frequency	Percent	Valid Percent	Cumulative Percent
15 - 20 years	27	24.8	24.8	24.8
20 - 25 years	38	34.9	34.9	59.7
25 - 30 years	30	27.5	27.5	87.2
30 - 35 years	10	9.2	9.2	96.4
35 - 45 years	2	1.8	1.8	98.2
45 - 58 years	2	1.8	1.8	100.0
Σ	109	100.0	100.0	Х
man	73	66.9	66.9	66.9
woman	36	33.1	33.1	100.0
Σ	109	100.0	100.0	X

Table 1 The structure of the survey sample by age and gender of respondents

Source: Own elaboration

In the survey we focused mainly on young people. The largest age group consisted of respondents aged 15 - 30 years (87.2%). The second largest group consisted of respondents aged 30-35 years (9.1%). The smallest group in the survey consisted of respondents aged 35 - 58 years (3.6%). Based on the results presented in Table 1 we can see that men are a predominant group of respondents (man) - 73% (n = 73), women 33.1% (n = 36).

The aim of the next question was to find out how many respondents made purchases from January to April 2013. Survey results are processed in the Table 2 and Figure 1.

Category	Frequency	Percent	Valid Percent	Cumulative Percent
1-5 purchases	23	21.1	21.1	21.1
5 – 10 purchases	4	3.7	3.7	24.8
10 and more purchases	2	1.8	1.8	26.6
regular purchases	80	73.3	73.3	100.0
Σ	109	100.0	100.0	X

 Table 2 The amount of purchases via the Internet conducted by the survey sample in 2015

Source: Own elaboration



Source: Own elaboration

The results presented in Table 3 are processed based on respondents' answers on what type of delivery they prefer when ordering goods over the Internet. Although courier services are paid, the most respondents opted for this option - 55.1% (n = 60) because it is the fastest and most convenient method of delivery directly to the "owner's door." Another widely used form of delivery is in person right at the store - 32.1% (n = 35) which is gradually used by retail companies, especially those that have both online and stone shop. The third form of delivery is delivery by post 7.3% (n = 8) (Slovak Post). This type of delivery has been used in Slovakia for several years and is still widely used and we can claim that its growth can be attributed to the growth of the Internet. The least used type of delivery is a free city delivery 5.5% (n = 6).

Category	Frequency	Percent	Valid Percent	Cumulative Percent
delivery by mail	8	7.3	7.3	7.3
delivery by courier	60	55.1	55.1	62.4
in person	35	32.1	32.1	94.5
free city delivery	6	5.5	5.5	100.0
Σ	109	100.0	100.0	Х

Source: Own elaboration

The next question, which is processed in Figure 2, examined which forms of payment were preferred when purchasing over the Internet. Respondents were asked to choose from the following options: 1) cash payment, 2) payment by credit card, 3) payment by bank transfer.

The aim of the Hypothesis 1 is to establish a link between a pair of variables: the impact of online advertising on the consumer buying behavior and the age of the respondents. The problem was solved using the Pearson chi-square test and through the test level $\alpha = 0.05$ we examined whether there is a link between the impact of online advertising on purchasing behavior and age of the respondents. The result of the analysis is two pivot tables with the observed / expected frequency and the table with the chi-square test. Respondents were divided into three age groups.

CEFE 2015 - Central European Conference in Finance and Economics

	2 – dimensional table: Observed frequencies			
Age groups	OA' impact	OA' impact	OA' impact	
	Yes	Don't know	No	In total
15-23 years old	13	8	20	41
%	31.71%	19.51%	48.78%	
24 - 35 years old	9	4	30	43
%	20.93%	9.30%	69.77%	
36-58 years old	4	3	18	25
%	16.00%	12.00%	72.00%	
In total	26	15	68	109

Table 4 Observed frequencies

Source: Own elaboration

The impact of advertising on purchasing behavior of the examined groups is not strong enough. In the first age group (15-23 years) there were 13 respondents who claim that the Internet advertising influences their purchasing behavior and 20 respondents claim it has no effect on them. Greater difference is apparent in the second age group (24-35 years). 9 respondents expressed their positive attitude, 4 did not answer and 30 respondents expressed their negative attitude. In the smallest age group (36-58 years) 4 respondents said they are influenced by the Internet advertising, 18 respondents are not influenced by the advertising and 3 of them did not express their opinion.

Table 5 Expected frequencies

	2 r. table: Expected frequencies – H1 frequencies			
Age groups	OA' impact	OA' impact	OA' impact	
	Yes	Don't know	No	In total
15-23 years old	9.77982	5.64220	25.57798	41.0000
24 - 35 years old	10.25688	5.91743	26.82569	43.0000
36 – 58 years old	5.96330	3.44037	15.59633	25.0000
In total	26.00000	15.00000	68.00000	109.0000

Source: Own elaboration

Table 6 Results

	Results: Age (3) x OA's impact (3) – H1		
	Chi-Quadrat	SV	р
Pearson Chi-Quadrat	5.486467	df=4	p=.24095
M-V chi-quadrat	5.515045	df=4	p=.23841

Source: Own elaboration

The independence assumption is met chi-square (Pearson) statistics is equal to 5.486167 and the error of the first kind for this test is $p = 0.24095 > \alpha = 0.05$ test level. The result is a rejection of the hypothesis - there is no significant link between the impact of online advertising on purchasing behavior and age of the respondents.

4 Conclusion

Internet marketing and online shops are not unknown to Slovak companies and consumers as proven by the results of our survey. Even though we focused only on one region - Presov region. 72% of respondents said that they shop online regularly. On the Internet we can shop in Budapest or New York. This vision is very attractive, simple and convenient. Currently, there are countless online stores aimed at attracting a large number of potential consumers. This situation still favors consumers because the current use of information technology enables consumers to compare prices, products, delivery method, quality, and brand and after then proceed with the purchase of a specific product or service.

References

- BEM, A. and MICHALSKI, G. 2016. *Hospital profitability vs. selected healthcare system indicators*, CEFE 2015 Central European Conference in Finance and Economics, Technical University of Kosice, Kosice.
- BLAŽKOVÁ. M. 2005. Jak využít internet v marketingu: krok za krokem k vyšší konkurenceschopnosti. Praha: Grada Publishing.
- BROZYNA, E., MICHALSKI, G. and SOROCZYNSKA, J. 2016. E-commerce as a factor supporting the competitiveness of small and medium-sized manufacturing enterprises, CEFE 2015 – Central European Conference in Finance and Economics, Technical University of Kosice, Kosice.
- CLOW. K. E. and BAACK. D. 2008. *Reklama. propagace a marketingová komunikace*. Brno: Computer Press.
- DELINA. R. and VAJDA. V. 2008. *Teória a prax elektronického obchodovania*. Prešov: Grafotlač.
- DORČÁK. P. 2012. eMarketing. Prešov: EZO.sk.
- GAVUROVÁ, B. 2012. Source Identification of Potential Malfunction of Balanced Scorecard System and Its Influence on System Function. 2012.In: E+M Ekonomie a management. Vol. 15, no. 3 (2012), p. 76-90. ISSN 1212-3609
- GAVUROVÁ, B., ŠOLTÉS, V., and NOVÁČEK, M. 2014. Mobile Camera System for Ensuring Transport Security. 2014. In: SGEM 2014 : 14th international multidiscilinary scientific geoconference : GeoConference on Informatics, Geoinformatics and Remote Sensing : conference proceedings : vol. 1.: 17-26, June, 2014, Albena, Bulgaria. - Sofia : STEF92 Technology Ltd., 2014 P. 249-257. ISBN 978-619-7105-10-0 - ISSN 1314-2704
- KITA. J. a kol. 2010. *Marketing*. Bratislava: Iura Edition.
- MARIAŠ. M. and ŽÁK. Š. 2005. Informačné systémy marketingu. Bratislava: Ekonóm.
- MICHALSKI, G. 2009. Inventory management optimization as part of operational risk management. Economic Computation and Economic Cybernetics Studies and Research, 43(4), 213-222.
- MICHALSKI, G. 2014. Value maximizing corporate current assets and cash management in relation to risk sensitivity: Polish firms case. Economic Computation and Economic Cybernetics Studies and Research, 48(1), 259-276.
- MICHALSKI, G. 2015. Agency costs in small and medium wood industry enterprises with full operating cycle and cash levels. Procedia Economics and Finance 34, 461-468.
- MICHALSKI, G., BROZYNA, E. and SOROCZYNSKA, J. 2015. *Cash levels and its role in full operating cycle enterprises: 2005-2013 Czech, Slovak, Hungarian and Polish enterprises case.* In: European Financial Systems 2015. Proceedings of the 12th International Scientific Conference, Brno: Masaryk University, pp. 382-390.
- NONDEK. L. and ŘENČOVÁ. L. 2000. Internet a jeho komerční využití. Praha: Grada Publishing.
- RAISOVA, M., BULECA, J. and MICHALSKI, G. 2014. Food processing firms inventory levels in hard times. 2004-2012 Slovak, Czech and Polish enterprises case. Procedia Economics and Finance, 12, 557-564.
- ŠOLTÉS, V. and GAVUROVÁ, B. 2014. Innovation policy as the main accelerator of increasing the competitiveness of small and medium-sized enterprises in Slovakia. 2014. In: Procedia Economics and Finance : Emerging Markets Queries in Finance and Business : 24-27 October 2013, Tîrgu Mureş, Romania. Netherland : Elsevier, pp. 1478-1485. ISSN 2212-567.

Trading with Bonds in Capital Market within V4 Countries

RADOSLAV BAJUS¹ – LENKA HUDÁKOVÁ STAŠOVÁ² Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

In general, trading bonds and securities is becoming an increasingly attractive means of raising capital. Many investors consider trading as a safer way of raising money compared to banks and other sources while other investors would like their free funds reassessed. Stock Exchange arose to bring order to this form of trading. It is an institution of the capital market, whose main task is to organize and regulate the operation of the Exchange and protect the money of investors using market-based pricing. The article analyzes the progress and results of trading on various capital markets of the V4 countries within the period 2007-2014.

Key words: Bonds, Trading, V4 Countries

JEL Classification: G15

1 Introduction

At present, trading bonds and securities is becoming ever more attractive way of raising capital. A bond is a long-term debt security with an underlying debtor relationship between the borrower (bond issuer) and creditor. It is characterized by its maturity usually longer than one year and is fixed. The bond issuer undertakes to the amount due, the nominal value of the bond, pay practices at regular predetermined intervals or a lump sum. In addition to the outstanding amount, the issuer undertakes to repay the revenue derived from the ownership of securities (Bajus, Glova and Kádárová, 2011).

In Slovakia, the capital market was established separately from the capital markets in other countries. While other markets originated from the need of investors and issuers, the stock exchange was created as a byproduct of coupon privatization. With the ability to take over the experience of other countries, the development of the capital market in Slovakia has been growing very fast. Stock Exchange was founded 15 march 1991 and is the sole organizer of the regulated securities market in Slovak Republic. From 26 June 2001, it had operated on the basis of the authorization granted by the Financial Market of Slovakia. On 26 March 2008, this authorization was spread by decision of the National Bank of Slovakia advanced to organize a multilateral trading facility (MTF).

Bratislava Stock Exchange, Inc. (BSE) is a joint stock company whose activities are governed mainly by Act no. 429/2002 Coll. on the Stock Exchange as amended, other legislation and stock exchange rules of Stock Exchange, Inc. that works on a membership principle, which means that only its members (eventually NBS) can conclude direct stock exchange transaction. At the time of

¹ Ing. Radoslav Bajus, PhD., Němcovej 32, 040 01 Košice, Slovak Republic, radoslav.bajus@tuke.sk

² Ing. Lenka Hudáková Stašová, PhD., Němcovej 32, 040 01 Košice, Slovak Republic, lenka.stasova@tuke.sk

its inception, when substantial ownership structure of individual companies began to take shape, the stock market reached respectable numbers. This period was characterized by rapid growth in share value, which was reflected also in the historically highest value of stock index SAX. After a good start, a strong decade of fasting came, which meant a decrease in the values of all actions having an impact on no-good trading. The result of this "process" was the fact that during some trading days, the market didn't trade any titles, which could be described as unique in the world (BSSE, 2015).

Prague Stock Exchange, Inc. (PSE) is the largest and the oldest organizer of the securities market in the Czech Republic. After nearly fifty-year break caused by World War II, it was reopened in 1993. Trading on Prague Stock Exchange runs through licensed securities dealers who are members of the Exchange. The Exchange is a part of the CEESEG, FESE and the US SEC (PSE, 2015).

In 1817, Warsaw Stock Exchange was established under the name Mercantile Exchange as the first. It was trading from noon until one hour mainly in bonds and other debt securities. The capital market was different in that there was not only one major stock exchanges in Warsaw, but in addition to it, there were also smaller exchanges in other regional cities in Poland, such as Katowice, Krakow, Lodz, Poznan, etc. If compared to the stock exchange in Warsaw, the value of their financial volume was negligible. Interruption of operations due to World War II did not avoid not only Poland but also the Czech Republic. Warsaw Stock Exchange started trading again, mainly thanks to an agreement signed with France in 1990. A year later, in 1991, it renewed its activities once again and was one of the oldest stock exchanges in Europe. Since 1999, it had been a member of FESE. It applied even in the case of Warsaw Stock Exchange, there were members as the only ones in trading. In the case of membership, it was the most important to follow the stock exchange order and stock exchange rules. The Warsaw Stock Exchange is the largest, the most advanced and the fastest growing stock exchange in Central and Eastern Europe in terms of capitalization, trading value and number of listed companies. The main market has operated since 1991 and today it includes more than 400 companies. There are well known international corporations such as UniCredit Group, CEZ, MOL, Nova Credit Bank and many others. GPW is a stock company, which nearly 99% of the shares are still state-owned. The rest of the shares belong to about 35 banks and securities dealers. Just a decisive share of the state is to some traders or potential partners what discourages them from possible cooperation (GPW, 2015).

Budapest Stock Exchange has existed since 1864, when it was founded under the name Stock Exchange of goods and securities. Its role in the economy of Europe was considerably large, up to 1931, when the economic crisis had its operations suspended, those deficiencies but lasted only until 1932. Since 1999, Budapest Stock Exchange is also the member of FESE. In the case of Budapest Stock Exchange, obtaining a business license trading that is conditioned, and may be granted only by a member of Budapest Stock Exchange. Membership is equally subject to a valid business license, until six months from the resultant of membership, each member is required to obtain a business license (BSE, 2015).

2 Comparison of bond trading in the capital market V4

Capital market trading takes place via stock exchanges. In markets Bratislava Stock Exchange, Inc. at the end of 2007, it was trading with 122 bond issues (74 mortgage bonds, 22 government bonds, 17 corporate bonds, 7 bank bonds, one municipal bond and one eurobond) of which 23 issues on

the main listed market, with 93 issues on the parallel listed market and 6 issues on the regulated free market. The volume of bond transactions in 2007 totaled EUR 11.7 billion in 1,558 transactions and the total volume of bond contributed 98.78%.

In 2008, until the last trading day, it was able to trade 136 bond issues (85 issues of mortgage bonds, 20 issues of government bonds, 20 issues of corporate bonds, 9 issues of bank bonds 1 Treasury bills and one eurobond), of which on the main listed Market, there were 22 issues placed, and 106 emissions on the parallel listed market. As in previous years, also in 2008, investors favored the placement of their funds in debt securities prior to equities. This primarily reflected the pattern of trade volume, when only 99.94% of the total achieved financial volume consisted of bond trading. The amount of this share only proved the fact that the Slovak capital market was mainly debt securities market. In the monitoring period, it conducted a total of 2,301 transactions. Total trading volume reached EUR 24.6 billion, comparing to last year, when there was an increase of 52%.

Year 2009 represented the volume of bond transactions on the BSE value of EUR 11.7 billion, as in 2007, if compared to 2008, when there was a decline of 50%. It was largely due to the financial crisis, which was also evidently seen on other exchanges. On Bratislava Stock Exchange, Inc. identically with the trade development in recent years, also in 2010, investors directed their attention on debt securities. Bond trading volume was EUR 6.5 billion, which was the most significant drop were monitoring.

In the period under review in 2011 on Bratislava Stock Exchange, Inc. bond trading stabilized at EUR 18.5 billion. Compared to 2010, this was an increase of 64.8%, which since 2007, had been the largest disparity in development between years. Even in 2011, it's no surprise to be more interested in debt securities such as equity securities with respect to the long-term trend in trading on Bratislava Stock Exchange, Inc. when 98.16% of the total financial volume achieved was formed from the bond transactions.

In 2012, on Bratislava Stock Exchange, Inc. compared to the previous year, the most significant decline in financial volume of the trades in bonds was recorded. Paradoxically, however, in that year it the number of trades and traded bonds increased by around 47%.

In 2013 on Bratislava Stock Exchange, Inc., we likewise recorded a fall in financial volume of transactions, despite the fact that the number of transactions grew steadily and in 2013 there were for 700 more stores realized. Outright transactions still accounted for 99% share of the total financial volume of bond transactions, the volume was EUR 8.025 million. With the number of transactions with 2,280 pieces.

During twelve months in 2014, it was made 5.515 transactions with bonds. In comparison with the previous year, there was an increase in the number of transactions by almost 32% and also an increase in the financial capacity of 2.25%. On Prague Stock Exchange, Inc., the total volume of bond transactions reached the value of EUR 20.58 billion in 2007. The volume of trading was mostly affected by government bonds with 85.15%, mortgage deeds reaching 11.16%, corporate bonds with 1.60%, bank bonds 1.95% and municipal bonds 0.14% of the total annual volume of bond transactions.

The total volume of trading on Prague Stock Exchange, Inc. in bonds in 2008, totaled EUR 26.1 billion, while the year 2007 amounted to an increase of almost 21%. As in the previous year, the trading volume accounted for most government bonds (95.86%). On Prague Stock Exchange, Inc. in 2009, it was trading in bonds in the amount of EUR 23.68 billion. Year 2009 scored a loss of 9% if compared to the previous one. The volume of transactions in 2010 totaled EUR 21.43 billion, which was a decrease of 10.3% if compared to the previous year. The financial volume of bond transactions on the Czech capital market was relatively constant during the years between 2011-2013 despite fluctuations in the number of transactions which were significant. In terms of the structure of total trade, trade with bonds largely exceeded over the shares. In 2011, the number of trades stood at 6.025 trades on a monetary volume of EUR 25 423.6 million. In 2012, there was an increase in trade volume, the number increased by 1,240 units. Despite this fact, we recorded a decline in financial volume in comparison to the previous year by EUR1 244.7 million. Between 2013 and 2014, we can see a significant drop in the number of concluded deals in bonds and the number of traded bonds, the number of trades dropped by up to 81%. Again, as in the years 2013 and 2014, inverse relationship between the number of completed transactions and volume in EUR millions occurs.

In 2007, on the Warsaw Stock Exchange, the volume of bond transactions was EUR 0.42 billion, which the V4 states represented the minimum amount. In 2008, there was an increase in the volume of transactions by 30% compared to the previous year. In 2009, on the Warsaw Stock Exchange, it closed on a volume of EUR 0.35 billion, compared to previous bond exchanges that were the least negotiable securities. The Warsaw Stock Exchange, compared to last year had strengthened by 5.8%, but it was the least in comparison with other exchanges. The financial volume of bond transactions in the period 2011-2013 had significant growth potential in the three years increased by up to 97%. In 2013, the volume made EUR 1,653 million. Nevertheless, it can be seen that a financial volume of bond transactions in the total volume of bond transactions in the years of bond transactions in the total volume of bond transactions in the total volume of bond transactions in the total trading volume. During all the years under monitoring, share of bond transactions in the total volume was not greater than 1%. In the case of the Warsaw Stock Exchange pointing out securities, dominant part of trade constitutes trading in equity securities, shares, bonds, while trade in debt securities lags far.

In 2007, on Bratislava Stock Exchange, there was trading volume which reached EUR 0.9 billion value of bonds. A group of non-public bonds involved corporate bonds and mortgage-stop sheets. A group of public bonds inclosed government bonds and treasury bills. In 2008, on Bratislava Stock Exchange, trading volume of bonds made EUR 1.8 billion, comparing to 2007 caused an increase by half. In 2009, the volume of transactions amounted to EUR 1 billion of bonds, which was caused by the financial crisis and the decline compared to last year by 44%. In 2011, trading volume on Bratislava Stock Exchange closed at EUR 1 billion as in 2009.

Trends in the volume of bond transactions in the Hungarian capital market is very negative. Within three years, financial volume decreased to about EUR 987.02 million. In 2011, the number of transactions in 2553 were traded 30,596,324 of debt securities. In 2012, on Bratislava Stock Exchange, there was a huge drop in the volume of bond transactions recorded, but also in the number of concluded deals. In the year mentioned, only 1009 transactions were realized, which was approximately 150% drop from 2011. Similarly, the volume also decreased in EUR millions, which declined by almost EUR 983 million. In 2013, all values related to trading proportionally follow the downward trend. The financial volume of bond transactions decreased by 21% and number of transactions by 64%. In a given year, financial volume was EUR 15.14 million in the

number of transactions 366. The structure of bond transactions was very variable. In 2011, the biggest part of trading represented government bonds, which share is 91%. Conversely, the smallest share of trading represents the mortgage bonds that do not contribute even 1%.on the marketing of the bonds.

Year 2012 was from the structural point of view diametrically different. In this year mentioned, we had the strongest decline in EUR millions. which was primarily a result of a significant reduction in the volume of trading in government bonds. While in 2011, the volume of financial transactions presented in government bonds EUR 919.53 million, in 2012 it was only EUR 6.08 million. Treasury bills on the financial volume did not participate at all in a given year, there had hardly even been a store with this type of debt securities. The share of mortgage bonds increased significantly and accounted for 39% share of the financial volume of bond transactions. Corporate and government bonds accounted for nearly identically 30% share.

In 2013, there were again significant changes in the pattern of trading. The biggest difference was recorded in government bonds and Treasury bills. While government bonds accounted for the year 0% interest, the share of Treasury bills accounted for a large part, up to 91%. Trading with mortgage bonds again fell to 4% and corporate bonds as well reduced their stake to 5%. Similarly, it was also in 2014. The volume of trade on particular exchanges for the years 2007-2014 can be seen in Figure 1.



Trading volume on various exchanges for the years 2007-2014 can be seen in Figure 1.

Figure 1 Comparison of trading volume development with bond transactions V4 countries for the period 2007 to 2014 billion euros

Source: Own processing based on data available

3 Evaluation of trading development

The basic mission of the capital market is raising capital. Does it also happen in Slovakia? The answer to this seemingly simple question is not easy. It depends on optics and parameters in evaluating the stock market we chose. If we look at the capital market through entities and institutions operating in it, we can say that our capital market is a standard market with all types of entities and institutions working on it and is at least comparable to capital market V4.

In certain view, it is very modern and comfortable. We mean a fully electronic trading system on domestic stock exchange. Except for such capital market subjects such as stock exchange and central depository on domestic market, we have also represented providers and intermediaries of investment services, which are securities dealers and banks in which the volume of managed funds is steadily increasing.

In the market, we have a couple of important and attractive securities issuers, by which our imaginary capital market could operate. Unfortunately, this is not so. If we look at trading stocks, we will find out that there are not only precious few attractive titles on our market, but we also do not work with it at all.

Offering investment opportunities represented by the issuers of securities traded on the stock exchange except of refinery Slovnaft, as in the V4 countries where they are the largest domestic companies in the gas and energy sector, also service providers, we would find such issuers in vain in our country. Slovak capital market still lacks sufficient liquidity and performance, but in the period we monitor, this situation improves in terms of the arrival of investors from one year to another. Currently, Polish capital market is the most flexible emerging market in Central and Eastern Europe. Every year capitalization of the Warsaw Stock Exchange is growing, which makes its second place in Europe in 2010.

The main reason why trading in Warsaw is significantly more vivid than tradingin Prague is that the Polish government used the stock market as a privatization tool. In the Czech Republic, the state enterprises of the vast majority were sold in the form of privatization or to a strategic partner in Poland privatized through IPO. Mainly thanks to it, the Polish bourse can annually boast a much larger number of new issues than Prague, however, these issues are usually smaller.

The second reason is that Polish pension funds are legally obliged to invest 95% of their funds savers on the Polish stock exchange. Therefore, a huge amount of money flows to exchange, thus the demand for equities offered is increasing.

The final reason why the Polish stock exchange is successful, is that the Polish individual investors on the stock market trade more actively than Czech. They are also more determined to risk. Up to a third of the money on the Polish stock market comes from individual investors, while in the Czech Republic it is only a small part. Poles trade more at home. Only 1% of the Polish trade abroad, while in the Czech investor's share is to 20%.

For these reasons, there is a greater demand in Poland and more money is coming on the stock market. That's why the companies including the Czech ones prefer to enter such market where there is a better chance to sell the whole intended package and get a much better price for it.

The Budapest Stock Exchange in bond trading surpasses the Polish stock exchange, but compared to Slovakia and the Czech Republic, it lags far behind what is contrary to trade in shares, it can not be said though since 2007, it significantly worsened by 72%. Of course, this is due to the economic crisis but also by the Hungarian government. In conclusion, we can say that Hungarian, Polish and Czech markets meet a variety of assumptions characteristic for mature and developed markets. Relative development of stock exchanges and their indicators had a similar pattern, although Slovak exchange slightly deviates primarily on the bond market and stock. It can be characterized as poorly effective, it results from the low liquidity and close range in the Slovak stock market. In absolute terms, on the stock market, the Hungarian and Polish stock exchange gained a considerable advantage compared to the two others, which have again overtaken the bond market.

4 Conclusion

Each standard market economy is based on three pillars. Market of goods and services, labor and capital markets. Capital market forms an inseparable part of every market system. Although banking system plays a dominant role in Slovakia and the Czech Republic, it would be naive to believe that the economy doesn't need capital market. Development of capital market in each country depends on historical circumstances, needs and possibilities of the country. This means that trying to develop the capital market by force is totally unnecessary. Slovakia is currently one of the bank economies and it is unlikely that just capital market plays stronger role in our economy. Nevertheless, if we wanted to revive the capital market, I would expect a help only in the privatization of strategic enterprises through the stock exchange, the share issues and bonds of medium-sized domestic enterprises and emissions of shares of fast-growing innovative firms.

References

Act No. 492/2002 Z.z. o burze cenných papierov

BAJUS, R, GLOVA J. and KÁDÁROVÁ J. 2011. Manažment portfólia cenných papierov a analýza investícií. Bratislava: Iura Edition.

BSE 2015. Budapest Stock Exchange. Available online:<http://www.bse.hu>.

BSSE 2015. Bratislava Stock Exchange. Available online:<http://www.bsse.sk>.

GPW 2015. Warsaw Stoch Exchange. Available online:<http://www.gpw.pl>.

HRVOĽOVÁ, B et al. 2006. Analýza finančného trhu. Bratislava: SPRINT.

POLOUČEK, S. et al. 2010. Peniaze, banky, finančné trhy. Bratislava: Iura edition.

PSE 2015. Prague Stock Exchange. Available online:<http://www.pse.cz>.

REJNUŠ, O. 2014. Finanční trhy. Grada.

Tax License – The Minimum Corporate Income Tax

ANNA BÁNOCIOVÁ¹ – ĽUDMILA PAVLIKOVÁ² – LUCIA MIHÓKOVÁ³ Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

The important part of state budget's incomes is created by the corporate income tax, whose amount has decreased over the last years in SR, despite the year over year growing number of corporate entities. The Slovak government has therefore decided to follow other European countries and introduced an obligatory minimum tax, known as tax license, with the intention to increase the state budget incomes coming from the corporate income tax. Amendment to the Act on Income Tax established a payment of corporate income tax also for the companies which had reported a zero tax liability. This paper also describes the tax license from its material point of view and deals with the analysis of its impact on the corporate entities, some to a greater and other to a lesser extent. We also analyse the impact of the tax license on the corporate entity from different aspects, to determine whether the introduction of the tax license has changed the business situation. The analysis applies the data from the financial statements of selected companies for the years 2013 and 2014. In this paper we concentrate on comparison of expected and real incomes of the state budget deriving from the tax license, as well as on the impact of introduced license on founding and dissolution of companies.

Key words: Tax License, Corporate Income Tax, State Budget Incomes

JEL Classification: H25, H61, H71

1 Introduction

Starting on January 1st 2014, the Slovak Republic has reduced the corporate income tax rate from 23% to 22% and also implemented the tax license system. The tax licences were paid for the first time in 2015 for the tax period of 2014. The main reason due to which the Slovak government decided to use this tool, was according to the Ministry of Finance the evolution of corporate income tax liability in the latest years. The tax license is paid by the tax payer whose tax liability, stated in his/her tax return, is lower than the stipulated price of tax license, including the reported tax loss. The tax payer is allowed to deduct the paid tax license from the payable tax within the next three immediately following years, but only in the amount exceeding the tax license. Newly established companies are exempt from paying the tax license in their first year.

According to the Ministry of Finance, the reason of implementing the tax license in the SR is a fact that 25% of companies have not paid the corporate income tax within the last four years, not even one euro. The Finance office claims that the number of companies with a zero tax has increased by 40 thousand entities since 2006, which means from 52 thousand to 92 thousand entities. The most companies with a zero tax liability, and that is 79%, are from the sector of accommodation and restaurants. The Ministry reports that around 60% of legal entities do not pay the corporate income tax.

¹doc. Ing. Anna Bánociová, PhD., Němcovej 32, 040 01 Košice, Slovak Republic, anna.banociova@tuke.sk ²Ing. Ľudmila Pavliková, PhD., Němcovej 32, 040 01 Košice, Slovak Republic, ludmila.pavlikova@tuke.sk

³Ing. Lucia Mihóková, PhD., Němcovej 32, 040 01 Košice, Slovak Republic, lucia.mihokova@tuke.sk

The tax licenses in Slovakia have raised many questions related to the tax license duty of the companies that do not execute any business activity. This legislative news, applied right after the western states, represents the accelerator of company's liquidations, sales or any other ways of avoiding the tax license payments.

The Commercial Courts registered 845 motions to company's abolition in the form of liquidation within the period from January 1st 2014 until September 3rd 2014, while for the same period but in 2013, the Commercial Courts registered only 359 such motions (finstat.sk).

However, there are still many "sleeping" companies, whose amount could be reduced by the implementation of tax licenses and that would also bureaucratically relieve the state. It is only a belief that the legislators introduced the tax licenses also due to this reason.

2 Tax license rates in the SR

The tax license is obligatory for the legal entities of commercial nature. For the purpose of the tax license determination, the border amount of the annual turnover represents 500,000 EUR. The rates of tax licenses are stated in the Table 1.

Table 1 Tax License Rates in the SR

Tax payer description	Tax License	
taxpayer that is not registered as a VAT payer and whose annual turnover was lower than 500,000 EUR	480 EUR	
taxpayer that is also a registered VAT payer and whose annual turnover was lower than 500,000 EUR	960 EUR	
taxpayer who is or is not a registered VAT payer and whose annual turnover was higher than 500,000 EUR	2,880 EUR	

Source: Act No. 595/2003 on Income Tax

Besides the regular obligatory minimum tax, there is also an option to pay a lower tax license. That is in case that a legal entity employs during a tax period also persons with disabilities of at least 20 % of the total amount of employees. The amount of the tax license represents 50 % of its regular amount.

The second case of a lower tax license is a situation when the tax period of a given tax payer is shorter than 12 months. Then a legal entity pays the tax license on a pro rata base.

2.1 The reasons of introducing the tax license in the Slovak Republic

The government approves every year the act on the state budget for the next calendar year, in which sets out its planned revenues and expenditures required for the state functioning.

The following Table 2 shows the overview of planned and actually collected revenues from the corporate income tax into the state budget for the period 2004 - 2013. This period represents the period from the year when the new corporate income tax rate was introduced, until the year when the government adopted the amendment to the Act on tax license.

Year	Planned revenues from corporate income tax	Actual revenues from corporate income tax	Fulfilment %
2004	730.27	984.31	1.3479
2005	998.01	1,396.83	1.3996
2006	1,200.99	1,569.12	1.3065
2007	1,644.36	1,740.80	1.0586
2008	1,940.35	2,122.05	1.0936
2009	2,083.91	2,129.77	1.0220
2010	1,319.85	1,257.67	0.9529
2011	1,672.94	1,620.46	0.9686
2012	1,866.54	1,733.10	0.9285
2013	1,946.32	2,002.67	1.0290

 Table 2 Planned and actual state budget's revenues from the corporate income tax within period 2004-2013 (in mil. EUR)

Source: Financial Administration of the Slovak Republic



Figure 1 Percentage fulfilment of the corporate income tax revenues into the Slovak budget Source: Authors' own elaboration

The actual revenues from the corporate income tax significantly exceeded the planned revenues of the state budget in the period from 2004 until 2009, where the difference during the first three years represented almost 40%. The Table 2 shows that the real revenues steeply grew every year until 2008 and 2009, when the Slovak economy was influenced by the economic and financial crisis. Year 2010 represented a turning point, when the actual collected amount of corporate income tax was lower than planned by 5%, however compared to 2009 the tax revenues were lower by almost 1 billion EUR. The downward trend continued also in 2011 and 2012. We can summarize that the development of the corporate income tax collection in Slovakia was not favourable during the previous years and therefor it was required to introduce such measures, which would better the situation.

2.2 Entities with the zero tax liability

There is a big amount of entities that do not pay the corporate income tax. Based on the data provided by the submitted tax returns within the period 2004 - 2011, we have detected that the share of legal entities which paid the corporate income tax during these years, did not exceed 50% of all tax entities. The sector analysis showed that 80% of all entities that do not

pay taxes are in the sector of accommodation and restaurants, which represents the highest share compared to other sectors. Another high share of such entities is in the sector of real estate, which is 75%. On the other hand, the best situation is in education sector and in sector of health and social assistance, where the share of entities non-paying the corporate income tax is about 33%. The following two Figures reflect the share of companies with a zero corporate income tax liability within the period 2004 - 2011, which was a key factor when deciding on the introduction of the tax licence during 2013.



Figure 2 Share of companies with a zero corporate income tax liability within period 2004 - 2011 Source: Remeta, 2015

The left side of the Figure 2 shows that the share of companies not paying any tax has significantly grew in the last years. However, the share of companies purposely avoiding the tax payment and companies whose tax liability was zero due to deducting the loss of previous years or simply due to unfavourable business situation, is questionable. As the tax license relates to all types of business entities, many of them, whose tax license was zero, will have to pay the minimal tax.

2.3 The impact of tax license on the legal entities

The introduction of the tax license in the Slovak Republic and reduction of the tax rate by 1% have influenced many legal entities, some in bigger and other in smaller extent. In the following part we analyse the impact of the tax license on the legal entities from different viewpoints, with the intention to determine whether it has changed the situation in business. For the analysis we use data from companies' financial statements of 2013, which will be compared to the sample of 167,057 processed financial statements of 2014, as they are reported at the financial portal IndexPodnikatela.sk and www.finstat.sk.

2.4 Analysis and statistics of the corporate income tax of the Slovak companies in 2013 and 2014

The Figures below show that in 2014 54% of companies made profit, while in the previous year it was only 45%. The tax licenses are also a reason of this increased number of profitable companies. If the tax payer is obliged to pay the tax license, his motivation to optimize the expenses and make a small loss is smaller.



Figure 3 The number of companies reporting a loss and a profit in 2014 Source: www.finstat.sk



Source: www.finstat.sk

The impact of tax licenses can be seen also in the following Figure, which is showing the number of companies with a zero or negative tax in 2013 and in 2014. While in 2013 there were 95,980 companies (out of 167,057) with a zero or negative tax, in 2014 there were only 25,985 such companies.



Figure 5 The number of companies with a zero or negative tax in 2013 and 2014 Source: www.finstat.sk

The data in the figure above show that the number of companies with a zero or negative tax decreased year over year in 2013/2014 by 73 %.

The following Figure 6 illustrates that in 2014 the highest number of companies paid the tax in the amount of 960 EUR, which is the amount of tax license for the entities that are registered VAT payers with the annual turnover of up to 500 thousand EUR. The tax of 480 EUR was paid by 15.4% of companies, which represents the tax license of entities that are not registered VAT payers. The tax of 2,800 EUR was paid by 2.5% of companies, which is the tax license of entities that are registered VAT payers. The tax of 2,800 EUR was paid by 2.5% of companies, which is the tax license of entities that are registered VAT payers and their annual turnover is higher than 500 thousand EUR.



Figure 6 The share of companies by the amount of payable tax in 2014 Source: www.finstat.sk



Figure 7 The number of companies by the amount of payable tax in 2014 Source: www.finstat.sk



Figure 8 Companies with the tax liability of 960 EUR and their total taxes in 2013 and 2014 Source: www.finstat.sk

As the Figure 8 shows, 71% of companies which paid in 2014 a tax of 960 EUR, reported in 2013 a negative or zero tax. The state collected taxes from these companies in total of 16 million EUR in 2013, while in 2014 it was 41 million EUR, which is 2.5 times more.

The determination of the total amount of state budget revenues, collected from the tax licenses, has been an important part of the analysis. If the tax license had been used in 2013, the state budget would have increased by approximately 119 million EUR. Based on the actual data comprised of specimen of 167,057 companies, which filed their tax returns for 2014 as of 30th June 2015, we came to a result that one half of the planned amount of taxes has been reached and it is expected that it continues to grow and reach it in full.

3 Conclusion

The state has applied the tax license or the obligatory minimum corporate income tax to fight with a relatively high level of corporate income tax non-payment and to increase its budgets' revenues. In the short term, the Slovak Government decided to concentrate on such "noncomplying" companies by implementation of the minimum corporate income tax. Its intention is to relieve the economy from the companies that do not pay tax or pay only a small tax, as well as to clear the market from the speculative and inactive companies. The analysis of the state budgets' tax revenues, coming from the legal entities, shows that the actual revenues collected from the corporate income tax, have been in the last 4 years significantly lower than their planned amounts. Also the number of legal entities in the Slovak Republic grows every year, however the average collected corporate income tax decreases and the upward trend is reported also in the number of companies that report a zero tax liability or loss. Based on the stated findings we have proven that it was necessary for the state to start solving this situation and we expect that these facts stimulated the legislators to take required steps to fulfil the state treasury. The interim results, that are in the area of corporate income tax available in the form of state budget revenues, indicate that the implementation of tax license in the Slovak Republic can be consider to be one of the positive measure of the Slovak Government, although the business area does not see it from such perspective.

References

- ANDREJOVSKÁ, A. 2014. Categorisation of the European union countries in relation to efficiency adjustment of value added tax collection using cluster analysis and multidimensional scalling. In: *Journal of Applied Economic Sciences*. Vol. 9, No 4, pp. 580-590.
- ANDREJOVSKÁ, A. and MIHÓKOVÁ, L. 2015. Developments of VAT rates in EU countries in the context of harmonization and fiscal consolidation. In: *Acta universitatis agriculturae et silviculturae Mendelianae brunensis*. Vol. 63, No. 2, pp. 487-498.
- BABČÁK, V. 2010. Daňové právo Slovenskej republiky. Bratislava: EPOS.
- BOŠKOVÁ, M. 2014. *Daňové licencie krok za krokom*. [online]. [cit. 2015-01-25]. Available online: http://www.atsolutions.sk/blog/danove-licencie-krok-za-krokom/
- HRAŠKA, I. 2013. *Kto nemusí platiť daňovú licenciu*. [online]. Available online: <<u>http://www.akhraska.sk/?p=4558></u>
- HRAŠKA, I. 2014. *Čo urobiť s eseročkou, ak nechcete platiť daňovú licenciu*. [online]. Available online: < http://www.akhraska.sk/?p=5368>
- KRALIK, A. The shadow economy in the Slovak republic and ist decomposition by sectors. In: *Transactions of the Universities in Košice*. No. 1, pp. 41-45.
- MIHÓKOVÁ, L. and JAKUBÍKOVÁ, E.: Dopad súčasnej krízy na vývoj a štruktúru verejných príjmov Slovenskej a Českej republiky. In: *Acta Aerarii Publici*. Vol. 10, No. 1, pp. 33-45.
- MURA, L. and BULECA, J.: Trends in international business of the Slovak small and medium food enterprises In: *Procedia Social and Behavioral Sciences : CBME-2013 : Contemporary Issues in Business, Management and Education : 2nd International Scientific Conference.* Vol. 110, p. 905-912.
- REMETA, J. 2015. Po rovnej dane. Ako nezaspať na vavrínoch. Sumár spoločnej daňovej štúdie IFP a OECD. [online]. Available online: http://www.finance.gov.sk/Default.aspx? CatID=10128
- SOLÍK, J. 2013. *Daňové licencie poškodia najmä malé firmy a startupy*. [online]. Available online: https://zmps.sk/clanok/6793557607/danove-licencie-poskodia-najma-male-firmy-a-startupy.html
- VANKOVÁ, L. 2014. Daňová licencia. In: Dane a účtovníctvo v praxi. Vol. 2014, No. 4.
- VANKOVÁ, L. 2014. Odpočet daňovej straty právnickej osoby. In: *Dane a účtovníctvo v praxi*. Vol. 2014, No. 7-8.

VRAVEC, J. and BAJUS, R.: Corporate governance in the Slovak Republic. In: Accounting Reform in Transition and Developing Economies. Chapter 35. New York: Springer Science + Business Media. p. 489-492.

Act No. 595/2003 on Income Tax and its amendments

- FinStat. 2015. *Analýza a štatistiky dane z príjmu slovenských firiem za rok 2014*. [online]. Available online: < http://finstat.sk/analyzy/statistika-dane-z-prijmu-firiem-2014>.
- IndexPodnikatela.sk. 2015. *Analýza roku 2014*. [online]. Available online: https://www.indexpodnikatela.sk/analyza2014>.

The Effects of Demand Shocks on Old EMU Member State: Case of France

ĽUDMILA BARTÓKOVÁ¹ – JÚLIA ĎURČOVÁ² - MANUELA RAISOVÁ³ Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

European Union member countries are still exposed to negative implications of the economic and debt crisis. Slow recovery has clearly highlighted the differences between the performances of individual economies. France is suffering as well as some other countries from similar issues of high deficit and unemployment. Supporting aggregate demand in such a situation should contribute to stimulation of consumption, investment, and consequently employment. The aim of this paper was to observe and evaluate the economic consequences of a positive shock in aggregate demand on selected macroeconomic variables in the case of France. Effects of the demand shock on selected variables were identified by estimating the VEC model.

Key words: Demand Shocks, France, Crisis, VEC Model

JEL Classification: E20, E170, C32

1 Introduction

When the project of monetary union among European countries was being prepared it was not expected that Europe would be hit by such severe crises as occurred few years ago. "Shortcomings" of the euro area were well known even at the beginning, as well as the fact that future EMU countries were far from being the optimum currency area. However, it was not anticipated it would be necessary to address these issues and existing asymmetries in such a short time. Even after more than a decade a position of certain countries, especially of so-called former transition economies can be still described as a lagging. What is more, differences and asymmetries can be found also in the group of "founder" countries, or EMU core countries as they are often called. The project of the European Union took away a significant degree of sovereignty from member states and the common currency eliminated the possibility of using an exchange rate as an offsetting tool in case of serious economic fluctuations. That is why a persisting unequal position of individual member countries at the current rate of globalisation and interdependence together with a restricted scope of country's economic policy is still feeding debates of maintaining or improving national competitiveness or managing country's responses to various shocks in demand or supply. Strict fiscal stance and subsequent forced consolidation of budgets together with reduction of deficits rise also new questions. These issues show the limits of these measures when applied in times of high unemployment and the associated risks of launching a deflationary spiral and worsening the overall macroeconomic situation.

¹Ing. Ľudmila Bartóková, PhD., Němcovej 32, 040 01 Košice, Slovak Republic, ludmila.bartokova@tuke.sk

²Ing. Júlia Ďurčová, PhD., Němcovej 32, 040 01 Košice, Slovak Republic, julia.durcova@tuke.sk

³Ing. Manuela Raisová, PhD., Němcovej 32, 040 01 Košice, Slovak Republic, manuela.raisova@tuke.sk

This paper will be focused on analysing some of the selected macroeconomic issues in the case of France, one of large founding states. Currently, France, as well as many other EU countries, is suffering from problems of high deficit and unemployment. We would also like to look at the impact of the demand shock on selected variables in order to analyse the strength of their responses. This analysis should show whether the effects of a common European policy are favourable with regards to the evolution of French macroeconomic variables (especially high unemployment and weak economic growth). We have chosen one of the core EMU countries as they are considered to have a strong "voice" in determining common EMU policies.

In order to construct a model that will estimate the impact of the demand shock on macroeconomic variables we used the basic macroeconomic assumptions. According to basic Keynesian models, demand shock implies decrease in aggregate demand and contraction of real output in case of negative reactions or inversely, an increase in aggregate demand and real output expansion for positive shocks. These shocks are also accompanied by changes in the price level and unemployment.

Aggregate demand shocks include consumption or preference shocks, investment demand shocks, monetary policy shocks and fiscal policy shocks. While the increased consumption and investment expenditure would imply inflationary pressures, the lower lending rate implies a lower cost which could potentially respond by decreasing prices. (Gambetti and Musso, 2012) Each shock has dynamic effects on output and its components. These effects are called the propagation mechanism of the shock and they differ for various shocks. (Blanchard and Johnson, 2013) The effects of shocks are studied by numerous authors. Many of them traditionally divide EMU members to "core" countries and "new" members. A very common approach is to measure the synchronisation of economic evolution by the correlation between macroeconomic shocks (Boone, 1997; Pentecôte and Huchet-Bourdon, 2012; Fidrmuc and Korhonen, 2003). Bayoumi and Eichengreen (1993) presented a rather extensive study in which they tried to identify and evaluate supply and demand shocks from 1960 to 1988 in different countries in Europe using a vector autoregression model. Countries were compared to Germany, chosen as a benchmark country. The results of this study show that supply shocks are highly correlated in countries such as Germany, France, Denmark, Belgium, and the Netherlands, although the correlation is lower for England, Portugal, Ireland, Spain, Greece, and Italy. The correlation of demand shocks in European periphery countries with demand shocks of Germany was very low. Other authors also analysed the similarity of particular aggregate demand components within the various EU countries. (Masson, 1999 or Frenkel and Nickel, 2002) The comparison of business cycles of western EU countries to business cycles of those of central and eastern European countries is also a relatively common topic. (Boone and Maurel 1998 or 1999; Verhoef, 2002)

2 Country's characteristics

For our analysis we have selected an EMU member state - France, a large founding state. Currently, this country is suffering from issues similar to many other EMU countries, namely of deficit and unemployment. We have chosen France in order to study the reaction and economic evolution in one of the EMU core countries.

The following group of graphs (Figure 1) depicts the evolution of selected GDP components, such as household consumption (C), private savings (S), gross fixed capital formation (I, private

investments) and imports (IM) as well as overall domestic demand (DD). The time series are seasonally adjusted so as to eliminate short-term fluctuations of variables. This representation enables to compare the evolution of economic situation since 2000. As we can see, the overall trend can be described as increasing with the considerable dip caused by economic crisis. However, the following recovery was slow and even though the growth trend appeared again, for none of the variables it was as prominent as before.



We also observed the mutual relationships between these time series and calculated their ratios or differences (Figure 2). The first graph represents private savings to consumption ratio (S/C). It is obvious that the savings did not exceed the level of 50% of household consumption. We can see that while there are evident fluctuations, they remained within the range of 0.28-0.42.

The investment to saving ratio (I/S) compares the volumes of disposable financial resources of economy with the realised investment expenditures. We can see that over the analysed time period these ratios were fluctuating from 0.6 to 1.1. It is also interesting that these ratios show the highest levels around the years of economic crisis and return to former lower values later.



The import to domestic demand ratio (IM/DD) compares the volume of total imports with domestic demand. This way we can observe the level to which domestic demand was satisfied with imported goods. High ratios might signal possible future problems as country becomes strongly dependent on foreign production in order to satisfy its demand. We can observe an increasing trend, with the typical fall in the years of economic crisis. Over this period, French demand coverage by imports increased from about 65% to more than 80%. Lastly, we compared the volumes of private savings and private investment (S-I) to obtain the very general information about country's ability of financing domestic investment. We can see that French economy was

able to auto-finance its domestic investment activities and the differences varied over the observed period.

3 Model and data

In this paper we decided to verify the response of economic variables to demand shock. In order to analyse the transmission of the shock in the demand to the real economy we used the model based on vector autoregression approach. This approach is still commonly used for modelling the effects of various macroeconomic policies especially in case of shocks. For this analysis we estimated a simplified following model:

$$CY_t = A(L)Y_{t-1} + u_t \tag{1}$$

In this case, Y_t represents a N x 1 vector of the following endogenous variables: AD_t - aggregate demand, C_t -household consumption, I_t - private investment, U_t - unemployment, GDP_t- gross domestic product. C corresponds to an N x N matrix. It describes the simultaneous relations among endogenous variables of the model. A(L) corresponds to a N x N polynomial with coefficients representing relationships among endogenous variables on lagged values. Lastly, u_t , a N x 1 normalized vector of shocks to the model, is used to represent shocks.

If there are at least two endogenous variables integrated of order 1 (I (1)) mutually cointegrated, then the initial VAR model must be adjusted to VEC model. This transformation is possible if we multiply the equation (1) by $1/Y_{t-1}$:

$$\Delta Y = \mu + \Pi Y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta Y_{t-1} + \varepsilon_t$$
(2)

 ΔY_t corresponds to an N x 1 vector of stochastic variables Y_t expressed at the level of first difference, I represent an N x N matrix. After the transformation, this model is able to capture short-and long-term adaptation to changes. Once estimated, the VEC model allows determining courses of impulse-response functions for all variables. It is also possible to monitor the decomposition of variance for selected analysed variables.

However, a VEC model requires that there is at least one long-term cointegration relationship between the variables. That is why the testing of the model should start with the verification whether the standard conditions were met, i.e. testing the variables for stationarity, cointegration, residual autocorrelation, heteroscedasticity and normality.

3.1 Endogenous variables

In order to analyse the evolution in French economy we have used quarterly data from 2001Q1 to 2014Q4 (i.e. 56 observations). All data time series used in this analysis were obtained from Eurostat database. (Eurostat, 2015) Data covered the evolution of the fundamental macroeconomic indicators in constant prices, such as gross domestic product, aggregate demand, household consumption, unemployment, private investment. Time series were seasonally adjusted in order to eliminate possible seasonal factors. Our estimated model covers time period of 2001Q1- 2014Q4.

The evolution of selected endogenous variables, which were also used in our econometric model, is depicted on Figure 3. When we look at the group of graphs for aggregate demand, household consumption, gross domestic product, private investment, unemployment (AD, C, GDP, I, U), we can see the same trend – slow and steady increase in time series. French economy showed signs of a weaker growth, with the relatively stable evolution of unemployment and a slight decline in the years prior to economic crisis. The slow growth of French economy was stopped by global economic crisis, the "stagnation" period started. The global depression also stopped the favourable decrease of unemployment and caused its growth.



3.2 Results of the tests

Before estimating an econometric auto-regressive model it is necessary to look more closely on the selected time series to verify if they meet fundamental conditions. The stationarity of time series was checked by two tests: Augmented Dickey-Fuller Test and Phillips-Perron Test. As some of the variables had a unit root, we proceeded with Johansen cointegration test to verify the presence of the cointegration. Both Trace and Maximum Eigenvalue statistics indicated the existence at most 2 cointegrating equations for France. We also verified the presence of residual autocorrelation, heteroscedasticity and normality. However, with respect to the scope of the paper, overall results will not be presented in next section. They are available upon request from the authors.

3.3 Decomposition of variables - endogenous variables

Based on the estimated model it was possible to continue with a decomposition of variance of endogenous variables. This method informs about how a particular variable contributes to the evolution of other variables in the autoregression and determines how much the variables (in our case C, I, U, GDP) can be explained by exogenous shocks. In case of unexpected aggregate demand shock (sudden change of aggregate demand) the theory suggests: an output, consumption investment and unemployment change (rise or fall) with possible time lags. We focused solely on the response of endogenous variables to changes in aggregate demand. The estimated response of variables to the aggregate demand shocks is observed over the period of 10 quarters after the initial shocks. The results for French variables are reported in next Table 1.

FR	AD	С	Ι	U	GDP
1	100.0000	87.20142	14.96650	0.962418	93.47323
3	55.76451	53.67650	12.52098	2.123084	51.75810
6	20.95810	26.03400	11.18244	1.772433	26.12220
10	19.18971	20.19146	8.331464	1.144564	22.84469
Cholesky ordering: AD_FR C_FR I_FR U_FR GDP_FR					

 Table 1 Decomposition of variation of endogenous variables (2001-2014)

Source: Own calculations

Table 1 shows the different time and intensity of reactions to the exogenous demand shocks for selected variables. Unexpected change in the AD was followed by change of all endogenous variables. The decomposition of variance showed certain differences in the reactions of variables. We can observe that, the strong reaction is reported immediately in the case of household consumption (87.20%) and GDP (93.47%) as expected. The intensity of investment reaction (14.96%) and unemployment reaction (2.12%) is low. This finding shows that propagation mechanism of the demand shock weakens notably in case of unemployment. So the effects of aggregate demand stimulation as a policy tool to decrease unemployment may not be desired.

4 Conclusion

The global crisis of 2008-2009 and the subsequent slow recovery have renewed interests in studying the macroeconomic effects of shocks in case of different EMU counties. Forced consolidation of budgets and reduction of deficits rise the question whether in times of high unemployment such measures would not slow the convergence trends in member countries of EMU or whether they would be suitable for bigger and older members fighting off the sluggish economic growth or stagnation. We have chosen France to study how one of the core countries react in case of demand shock.

The economic evolution of selected GDP components since 2000 did not revealed any significant differences. The recovery following economic crisis was slow and even though a rather weak growth trend appeared again, for none of the variables it was as prominent as before. While there were evident fluctuations, they cannot be really considered as a significant. It is also interesting that French variables showed the highest levels of volatility around the years of economic crisis to return later to former lower values.

The vector autoregression analysis verified the character of individual variables' responses to demand shock. A strong reaction was reported immediately in the case of household consumption and GDP. Investments and unemployment rate show a rather low sensibility to shocks in aggregate demand. It can imply a weaker impact of external environment on the French investments and unemployment. So the effects of aggregate demand stimulation as a policy measure to decrease unemployment may not be desired.

Acknowledgements

The data and the knowledge presented in this paper were obtained as a result of the Research Project: *Impact of economic crisis on member countries of the Economic and Monetary Union from the perspective of the theory of optimum currency areas* (VEGA/1/0892/13).

References

- BAYOUMI, T. and EICHENGREEN, B. 1993. Shocking aspects of European monetary unification. Adjustment and Growth in the European Monetary Union. Cambridge Univ. Press, Cambridge/New York, pp. 193–229.
- BLANCHARD, O. and JOHNSON, D.R. 2013. *Macroeconomics*. Sixth edition, Pearson Education Inc, ISBN-13: 978-0133061635.
- BOONE, L. 1997. Symmetry and asymmetry of supply and demand shocks in European Union. *CEPII*. N°03.
- BOONE, L. and MAUREL, M. 1998. Economic convergence of the CEECs with the EU. Centre for Economic Policy Discussion Paper. N°2180.
- BOONE, L. and MAUREL, M. 1999. An Optimal Currency Area Perspective of the EU enlargement to the CEECS. *Centre for Economic Policy Discussion Paper*. N°2199.
- EUROSTAT. 2015. Time series for consumption of households, private investment, unemployment rate, aggregate demand, import, gross domestic product.
- FIDRMUC, J. and KORHONEN, I. 2003. Similarity of supply and demand shocks between the euro area and the CEECS. In: *Economic systems*. N°27, pp. 313-334.
- FRENKEL, M. and NICKEL, C. 2002. How symmetric are the shocks and the shocks adjustment dynamics between the Euro Area and Central and Eastern European Economies. *IMF Working Paper*. WP 02/222.
- GAMBETTI, L. and MUSSO, A. 2012. Loan supply shocks and the business cycle. *ECB working paper series*. N°1469.
- MASSON, P.R. 1999. Monetary and Exchange rate policy of transition economies of Central and European Countries after the launch of EMU. *IMF Policy Discussion Paper*. N°99/5.
- PENTECÔTE, J.S. and HUCHET-BOURDON, M. 2012. Revisiting the core-periphery view of EMU. In: *Economic Modelling*. N°29, pp. 2382-2391.
- VERHOEF, B.A. 2002. On the (a)symmetry of shocks in EMU: Is it that shocking? De Nedelansche Bank Research 12/2002.

Hospital Profitability vs. Selected Healthcare System Indicators

AGNIESZKA BEM¹ – GRZEGORZ MICHALSKI² Wroclaw University of Economics, Faculty of Economic Sciences Poland

Abstract

This research analyses the financial health condition of hospital operating in V4 countries. We have studied the relationship between ROA (return on assets) and selected healthcare system's indicators. We have found that the financial situation of hospitals in V4 countries, measured with ROA, is strongly diversified and there is a statistically significant relationship between ROA and the level of public and OOP spending on health and the number of curative beds. We can conclude also, that hospitals don't rely on nonpatient care activities.

Key words: Hospital, Financial Condition, Financial Analysis

JEL Classification: G17, G32, L21

1 Introduction

The health care system's functioning is one of key factors of society's health status - the socioeconomic consequences of healthcare providers' activities are legion. Hospitals constitute an important part of healthcare system due to higher level of specialization, higher cost and, of course, society's expectations.

Visegrad Group (V4) is an alliance of four Central European states – the Czech Republic, Hungary, Poland and Slovakia. A common feature of Visegrad Group is not only a geography and history, but, above all, the processes of the socio-economic political transformation, launched in the 1990s. In the context of health systems, this process means the transition from a system based on the Semashko-style model, the model built on model Siemaszko to the system of universal social health insurance (SHI) (Bryndova et al., 2009; Gaál, et al., 2011; Sagan et al., 2011; Szalay et al., 2011).

Despite the economic transition and relatively rapid economic growth, healthcare spending (expressed as % of GDP) is still relatively lower than in Western European countries and the OECD average (9.3 % GDP in 2011) and varies from 6.9 % GDP in Poland to 7.9% in Slovakia and Hungary with variation coefficient equal to 6.5%.

It should be emphasized, that hospital are, to a great extent, responsible for a lack of financial equilibrium in the healthcare systems. In-patient services consume approximately 50% of the healthcare's financial resources. In spite of this, taking into consideration relatively low level of

¹ Assistant Professor, Agnieszka Bem, Ph.D., Komandorska 118/120, 53-345 Wroclaw; Poland, agnieszka.bem@ue.wroc.pl

² Assoc. Prof. Mgr. Grzegorz Michalski, Ph.D., Wroclaw University of Economics, Komandorska 118/120, 53-345 Wroclaw, Poland, grzegorz.michalski@ue.wroc.pl

funding (in relation to GDP), the financial condition of hospitals is, generally speaking, disadvantageous.

Hospital's rentability has a great impact on the quality of healthcare services – deep financial problems prompts lower quality (Bazzoli, Chen, Zhao and Lindrooth, 2008; Gavurova, 2012; Soltes and Gavurova, 2014; Kulhanek and Uherek, 2003; Michalski, 2009; Michalski, 2014; Raisova et al., 2014; Soltes and Gavurova, 2013). It can also influence the access to health services for the population.

Epirical study shows, that the there are some factors, which are significant determinants of hospital's profitability: location, ownership (private or public), teaching status, number of employees, lenght of stay, bad capacity and occupancy rate (Younis, Rice and Barkoulas, 2001). The correlation coefficients between some of this factor and rentability will be evaluated in this paper. The findings of that paper are deeper analysis of problems reported in paper Bem and Michalski (2014).

Hospital behaviour generally depends on the ownership – public or private, and type – for-profit and non-profit. Public hospitals constite the majority of inpatient providers in V4 countries – that's way there are no incentives to generate high profits. On the other hand public hospitals are often forced to provide unprofitable services, which are demanded by patients (Horwitz, 2005; Bartak and Gavurova, 2014; Bem et al., 2014a; Bem and Michalski, 2014; Gavurova, 2011; Michalski, 2012; Svidronova, 2013).

During last decade hospital costs have grown significantly but, simultaneously, revenue growth has been constrained. Hospitals are losing billions of dollars per year caring for patients (Schuhmann, 2010). That's way empirical studies have proven, that nonpatient activities should be considered as profit centres (McKay and Gapenski, 2009; Vacekova and Svidronova, 2014; Bem et al., 2014b; Gavurova and Hyranek, 2013; Michalski, 2016; Soltes, 2010).

There are many indicators that can be used measuring the economic situation of hospital. In practice, financial analysis's tools are used, tailored to the specifics of hospital industry. One the indicator, which describes asset's efficiency is ROA (return on assets). ROA indicator, despite the fact, that it's widely used in commercial enterprises, is often applied in hospital's financial health assessment, giving an idea how efficiently management use assets to generate earnings (Cleverley, 1985; Rohleder and Cleverley, 1985; Zeller, Stanko and Cleverley, 1997; Zeller, Stanko and Cleverey, 1996; Uzik and Soltes, 2009; Bem et al., 2014c; Gavurova, Soltes and Balloni, 2014; Michalski, 2013; Mura et al., 2015; Qineti et al., 2011; Soltes and Rusnakova, 2013).

The level of assets, in case of hospital, should be perceived as relatively stable, as a result of low level of financing activities. That's way the ratio's contruction implicates the direct, strong relantionship between the level of income and ROA. The purpose of this paper is to examine the ROA ratio for hospitals in countries of the Visegrad Group (V4 Group), hand in hand with the analysis of basic indicators, describing healthcare resources (financial, human and infrastructure).

We have posed two research hypotheses:

H1: hospital's profitability is related to the level of available financial resources (both public and private); H2: financial health of hospitals do not rely directly on non-patient services.

This hypotheses have been examined using data coming from hospitals and OECD Database and Amadeus Database, for the year 2012. Research sample includes 208 hospitals from V4 Group countries – Poland (43%), the Czech Republic (26%), Slovakia (16%) and Hungary (15%). Constructed research sample is strongly dominated by Polish hospitals, due to the fact, that the number of hospitals in Poland is by far the largest – currently in Poland function, according to the accepted definition, more than 1,000 hospitals.

The research's methods comprise mainly descriptive statistic tools. The relationship between ROA and selected variables representing the resources were analysed using Pearson correlation coefficient. The significance of correlations was tested with T-student's-test. Due to the relatively low number of observations from Slovakia and Hungary, correlation coefficients were analysed only at the level of the whole sample. The analysis has been carried out using Statistica Package.

2 Method

The paper provides the analysis of selected indicators, characterizing the health care system in V4 countries. Indicators have been selected using the expert method (Table 1). Data comes from OECD Database, for the year 2012.

HE	Health expenditures (% GDP)	
TE	Total expenditures (PPP USD, per capita)	
PE	Public expenditures (% total expenditures)	
OOP	Out-of-pocket payments (% total expenditure)	
PHY	Physicians (per 1,000 population)	
HOS	Hospital beds (per 1,000 population)	
CUR	Curative beds (per 1,000 population)	
DOC	Doctors consultations (per capita)	
ALS	Average lenght of stay (days)	
HD	Hospital discharges (per 100,000 population)	

Table 1 Selected healthcare system's indicators (2012)

Source: Own study based on OECD Data

The main part of the research include the analysis of the relationships between selected indicators of health system and the profitability of hospitals in the countries of the Visegrad Group, represented by ROA indicator.

Research sample finally includes 208 hospitals located in 4 countries - Poland (91 hospitals), the Czech Republic (54 hospitals), Slovakia (31 hospitals) and Hungary (32 hospitals). Data comes from Amadeus Database for the year 2012. We have excluded from the research sample entities providing services other than health benefits. We have also removed 5% of outliers.

ROA ratio (the return on assets) is one one of rentability's rate. It's the percentage that shows how profitable a company's assets are in generating revenue of the firm, in this case hospitals. We have calculated ROA indicator using the following formula:

$$ROA = \frac{Net \ income}{Average \ Total \ Assets} \tag{1}$$

Assets are generally defined as the economic resource, that can generate some economic value - this category covers both current and fixed assets. In the case of hospital industry, we expect relatively low values of ROA due to the fact, that hospitals have to carry a relatively large asset base, comparing to other industries.

The relationship between ROA and selected indicators, characterising healthcare system have been analysed using Pearson's correlation's coefficient. Its statistical significance have been tested using T-Student's test.

3 Result

One of the most important indicator of health care financing level is health care spendings per capita (PPP USD). The analysis of per capita spendings unclothes the real potencial of healthcare financing system. It varies from 1452 USD in Poland to 1966 USD in Czech Republic with variation coefficient equal to 13.4%. Even greater variation occurs in the case of out-of-pocket spendings p. c., that varies from 289 USD in Czech Republic to 439 in Hungary with variantion coefficient equal to 20.6%.

Relatively lower spending do not reflect on health resources. The analysis have shown, that both in Czech Republic, Slovakia and Hungary, the number of beds (including curative beds), and the number of physicians per 1000 inhabitants is similar, or even higher than the OECD average. The exception is Poland, where the number of physicians and doctor's consultations is significantly lower than in other countries of the Group. The average length of stay in hospital is the shortest in Slovakia - 7.2 days and the longest in the Czech Republic - 10.2.

Tuble 2 Descriptive statistics for selected neutricare system's indeators (v i Group)					
	Average	Min	Max	Standard deviation	Variation coefficient
HE	7.55	6.87	7.94	0.494	6.53763
TE	1755.48	1452.36	1965.96	235.276	13.40243
PE	72.61	65.04	84.18	8.156	11.23254
OOP	21.43	14.74	26.03	4.765	22.24040
OPP PC	371.67	289.79	439.56	76.305	20.53014
PHY	3.02	2.19	3.64	0.622	20.59337
HB	6.66	6.06	7.17	0.471	7.07194
CUR	4.41	4.14	4.70	0.243	5.52506
DOC	10.18	6.80	11.80	2.278	22.38795
ALS	8.63	7.30	10.20	1.493	17.31060
HD	18817.03	16149.30	20554.30	2019.796	10.73387

 Table 2 Descriptive statistics for selected healthcare system's indicators (V4 Group)

Source: Own study based on OECD Data

The analysis of basic healthcare system's indicator has shown, that basic indicators for V4 healthcare system are not significantly different – the variation coefficient is generally low (below 20%) for majority of variables. Only for 4 variables: out-of-pocket spending (OOP),

spending per capita (TE), number of physicians (PHY) and number of doctors consultations (DOC) – variation could be assessed as medium.

This analysis has entitled us to adopt an assumption, that healthcare systems in V4 countries are generally similar. According to that we can suppose, that potential differences in profitability indicators might have another origin, then healthcare system's financing and organization (at least at the macroeconomic level).

ROA is an part of financial analysis as an important rentability's indicator. High return on assets creates a stable base for future development and investements. On the other hand it should be emphasised, that hospital in V4 Gruop are generally owned by public entities, like local authorities. The more important consequence of above is that hospitals usually expect investement's grants.

Basing on the characteristics of hospital's industry we have assumed, that the level of assets, in case of hospital, should be perceived as relatively stable, as a result of low level of financing activities. That's way the ratio's contruction implicates the direct, strong relationship between the level of income and ROA.

The analysis of prested data has shown, that in each country ROA is extremely diversified and it is difficult, on this stage of research, to find a common pattern of observed differencies.

	ROA_SL	ROA_PL	ROA_HUN	ROA_CZ
Number of observations	31	91	32	54
Average	-4,14501	5,39786	-5,69545	2,12302
Min	-108,163	-24,597	-83,002	-35,616
Max	27,50799	43,97003	28,55134	36,84845
25% quartile	-1,1159	0,6203	-12,0311	-2,1679
75% quartile	5,174761	8,859190	9,748356	7,388452
Standard deviation	32,44212	11,73040	26,46133	10,77886
Variation coefficient	-782,679	217,316	-464,604	507,714
Skewness	-3,12487	0,95573	-2,04146	-0,55065
Kurtosis	10,78855	2,62953	4,54851	3,43572

 Table 3 ROA indicator for hospitals in V4 Group (2012)

Source: Own study based on Database Amadeus

Average ROA was positive (above zero) in Czech Republic and Poland and negative (below zero) in Slovakia and Hungary (Table 3). The distribution of ROA for Slovakian hospitals is generally highly centered with high maximum and minimum values, despite the removal of outliers.

This is illustrated by very high variation coefficient. The slightest variation can be observed in the case of Polish hospitals (Table 3, Figure 1).



CEFE 2015 - Central European Conference in Finance and Economics

Detailed analysis of ROA distribution (Figure 2) has shown, that, regardless very serious spread of ROA, significant part of observation is centered and the spread between 1st and 3th quartiles is relatively low.



Another problem is the analysis of relationships between ROA and health system's indicators.

	ROA		
	R _{XY} Pearson's	p-value	
HE	0.1589	0.0388**	
TE	0.8980	0.0456**	
PE	0.9582	0.1548	
OOP	-0.9381	0.0327**	
OPP PC	-0.6584	0.0468*	
РНУ	0.8631	0.4236	
HOS	-0.0151	0.1621*	
CUR	0.9600	0.0056***	
DOC	0.4041	0.1542*	
ALS	0.6821	0.0376*	
HD	0.4551	0.1638	
*significance level $\alpha = 0.1$, **signifi	cance level $\alpha = 0.05$ *** significance leve	$1 \alpha = 0.01$	

Table 4 Pearson's correlation coefficients for ROA and selected healthcare system's indicators

Source: Own study

Analysis of correlation coefficients have indicate, that for the V4' countries, the strongest positive correlation occurs between ROA and the number of curative beds (0.9600), total expenditures (0.8980), the number of physicians (0.8631) and the level of public expenditure (as % of GDP) (0.9582), however, in the case of two last this relationship is not statistically significant. A significant negative correlation has been shown between the ROA and the level of out-of-pocket expenditure (-0.9381), which is statistically significant at the level α =0.05.

Other statistically significant relationships have been found for out-of-pocket payments per capita and the average length of stay, but the strength of this relationship is rather medium (Table 4). This results have allow us to adopt both the hypothesis H1 and H2.

4 Discussion and conclusions

Gloede et al. (2013) basing on resource-based theory analyze the interorganizational relationships between hospitals and hospital financial health. That relationship is a source for hospitals, that effects in better financial health. In Gloede et al. (2013) study, similar with our findings, the results document that having effective interorganizational relationships is positively associated with the hospital financial health. We do not continue but agree with claim that investment in interorganizational relationship helps in building long term financial health.

Mc Kay and Gapenski (2009), and Singh and Song (2013) also, in their studies present hypothesis that traditionally hospitals rely on nonpatient care activities. That activity is for complementation of too small revenues from patient care. Such strategy can help in strengthening financial health of hospital. That finding is in opposite to situation in Visegrad Group's (V4) countries. We have shown that ROA is strongly correlated with the number of curative beds, so financial health of hospitals do not rely on nonpatient care in V4 countries. Banduhn and Schluhtermann (2013) have presented facts that medical treatment is entailed with non homogenical risk. That is also our observation that the negative impact of that non homogenic risk on patients health is in correspondence with costs of hospital insurance and as effect with hospital financial health. It is fundamental financial truth that higher risk and great risk sensitivity should be seen in financial effects with destruction of financial health of the hospital. We agree with Banduhn and Schluhtermann (2013) that systematic hospital risk management for sure reduce costs and make the negative influence on hospital financial health less destroying. We have proved, that OOP - Out-of-pocket payments (% total expenditure) are strongly correlated with ROA in negative way in V4 countries. It is corresponding with Banduhn and Schluhtermann (2013) who demonstrate the financial health effects of implementing a hospital risk management. Presented research have several limitations due to the relatively small reserch sample, especially from Slovakia and Hungary. That's way the oulines hasn't been removed, but it limitates the possibility of drawing conclusions. In further studies some form of weightening, should be introduced. Finanlly, low correlation coefficient doesn't exclude the nonlinear's relationship between variables.

Acknowledgements

The presented work and results is part of monothematic cycle realized as part of grant supported by National Science Centre, and financed from the Polish budget resources in the years 2015-2018 as the research project DEC-2014/13/B/HS4/00192.

References

- BANDUHN, C. and SCHLUHTERMANN, J. 2013. Profitability Analysis of Clinical Risk Management, In: *GESUNDHEITSWESEN*, Vol. 75, No. 5, pp. 281-287.
- BARTAK, M. and GAVUROVA, B., 2014. Economics and social aspects of long-term care in the context of the Czech Republic and the Slovak Republic EU membership. In: 12th International Scientific Conference, Economic Policy in the European Union Member Countries, Ostravice.
- BAZZOLI, G. J., CHEN, H.-F., ZHAO, M. and LINDROOTH, R. C. 2008. Hospital Financial Condition and the Quality of Patient Care. In: *Health Economics*. Vol. 17, pp. 977–995.
- BEM, A. and MICHALSKI, G. 2014. *The financial health of hospitals. V4 countries case*. Sociálna ekonomika a vzdelávanie. Banska Bystrica. pp. 1-8.
- BEM, A., PREDKIEWICZ, K., PREDKIEWICZ, P. and UCIEKLAK-JEZ, P. 2014b. Hospital's Size as the Determinant of Financial Liquidity. In: European Financial Systems 2014, Brno: Masaryk University. pp. 41-48.
- BEM, A., PREDKIEWICZ, K., PREDKIEWICZ, P. and UCIEKLAK-JEZ, P. 2014a. Determinants of Hospital's Financial Liquidity. In: *Procedia Economics and Finance*. Vol. 12, pp. 27-36.
- BEM, A., PREDKIEWICZ, K., PREDKIEWICZ, P. and UCIEKLAK-JEZ, P., 2014c. Health System's Financing Inequalities in Selected European Countries. In: *European Financial Systems 2014*, Brno: Masaryk University. pp. 34-40.
- BRYNDOVA, L., PAVLOKOVA, K., ROUBAL, T., ROKOSOVA, M. and GASKINS, M. 2009. Czech Republic, Health system review: Health System in Transition. Vol. 11, No. 1.
- CLEVERLEY, W. O. 1986. Essentials of Health Care Finance, 2d ed. Rockville: Aspen Press.
- CLEVERLEY, W. R. 1985. Unique dimensions of financial analysis service ratios. Topics in Health Care Financing. pp. 81-88.

- GAÁL, P., SZIGETI, S., CSERE, M., GASKINS, M. and PANTELI, D., 2011. Hungary. Health system review. Health System in Transition. Vol. 13, No. 5.
- GAVUROVA, B. 2011. The Balanced Scorecard System in Enterprise Management. In: *Ekonomicky casopis*. Vol. 59, No. 2, pp. 163-177.
- GAVUROVA, B. 2012. Source Identification of Potential Malfunction of Balanced Scorecard System and Its Influence on System Function. In: *E+M Ekonomie a Management*. pp. 76-90.
- GAVUROVA, B. and HYRANEK, E., 2013. Determinants of Day Health Care Development in Slovakia. In: *Ekonomicky casopis*. pp. 134-154.
- GAVUROVA, B., SOLTES, M. and BALLONI, A., 2014. The Economic Importance of Using of ICT in the Health System. In: *Ekonomicky casopis*. pp. 83-104.
- GLOEDE, T. et al. 2013. Interorganizational relationships and hospital financial performance: a resource-based perspective, In: *SERVICE INDUSTRIES JOURNAL*. Vol. 33 No. 13-14, pp. 1260-1274.
- HORWITZ, J. R. 2005. *Does Corporate Ownership Matters? Service Provision in the Hospital Industry*. Cambridge: NATIONAL BUREAU OF ECONOMIC RESEARCH.
- KULHANEK, L. and UHEREK, D., 2003. Globalization, financial system and equity market linkages in transition countries. Ekonomska Istrazivanja. 16, 2, 55-67.
- LYNCH, J. and MCCUE, M. 1990. The effects of for-profit multihospital system ownership on hospital financial and operating performance. In: *Health Services Management Research*. pp. 182-92.
- MCKAY, N. L. and GAPENSKI, L. C. 2009. Nonpatient revenues in hospitals. In: *Health Care Management Review*. pp. 234-241.
- MICHALSKI, G. 2009. Inventory management optimization as part of operational risk management. In: *Economic Computation and Economic Cybernetics Studies and Research*, pp. 213-222.
- MICHALSKI, G. 2012. Efficiency of accounts receivable management in Polish institutions. In: *European Financial Systems 20*12, Brno: Masaryk University. pp. 148-153.
- MICHALSKI, G. 2013. Financial consequences linked with investments in current assets: Polish firms case. In: *European Financial Systems 2013*. Brno: Masaryk University, 213-220.
- MICHALSKI, G. 2014. Value maximizing corporate current assets and cash management in relation to risk sensitivity: Polish firms case. In: *Economic Computation and Economic Cybernetics Studies and Research*. pp. 259-276.
- MICHALSKI, G. 2016. Full operating cycle influence on food and beverages processing firms characteristics. In: *Agricultural Economics Zemedelska Ekonomika*. Vol. 62.
- MURA, L., BULECA, J., HAJDUOVA, Z. and ANDREJKOVIC, M., 2015. *Quantitative financial analysis of small and medium food enterprises in a developing country, Transformations in Business and Economics*. pp. 212-224.
- OECD Health Data. Available online: http://www.oecd.org>.
- QINETI, A. et al. 2011. Looking for the evidence of socio-economic convergence within the European Union. In: *Agricultural Economics-Zemedelska Ekonomika*. Vol. 57, pp. 384-393.
- RAISOVA, M., BULECA, J. and MICHALSKI, G., 2014. Food processing firms inventory levels in hard times. 2004-2012 Slovak, Czech and Polish enterprises case. In: *Procedia Economics and Finance*. Vol. 12, pp. 557-564.

- RAUSCHER, S. and WHEELER, J. R. 2012. The importance of working capital management for hospital profitability: Evidence from bond-issuing, not-for-profit U.S.hospitals. In: *Health Care Management Review*. Vol. 4, pp. 339–346.
- SAGAN, A. et al. 2011. Poland: Health system review. Health Systems in Transition, Vol. 13, No 8.
- SCHUHMANN, T. M. 2010. Can net income from non-patient-care activities continue to save hospitals? Healthcare financial management. In: *Journal of the Healthcare Financial Management Association*. Vol. 5, pp. 74-80, 82, 84.
- SEAR, A. 1991. Comparison of efficiency and profitability of investor-owned multihospital systems with not-for-profit hospitals. In: *Health Care Manage Revue*. Vol. 2.
- SINGH, S. and SONG, P. 2013. Nonoperating revenue and hospital financial performance: Do hospitals rely on income from nonpatient care activities to offset losses on patient care?, In: *HEALTH CARE MANAGEMENT REVIEW*. Vol. 38, No. 3, pp. 201-210.
- SOLTES, M. 2010. Relationship of speed certificates and inverse vertical ratio call back spread option strategy. In: *E+M Ekonomie a Management*. Vol. 13, No. 2, pp. 119-124.
- SOLTES, V. and GAVUROVA, B. 2013. Application of the cross impact matrix method in problematic phases of the Balanced Scorecard system in private and public sector. In: *Journal of Applied Economic Sciences*. Vol. 8, No. 1, pp. 99-119.
- SOLTES, V. and GAVUROVA, B. 2014. The Functionality Comparison of the Health Care Systems by the Analytical Hierarchy Process Method. In: *E+M Ekonomie a Management*. Vol. 17, No. 3, pp. 100-118.
- SOLTES, V. and RUSNAKOVA, M. 2013. Hedging against a price drop using the inverse vertical ratio put spread strategy formed by barrier options. In: *Inzinerine Ekonomika-Engineering Economics*, Vol. 24, No. 1, pp. 18-27.
- SVIDRONOVA, M., 2013. Sustainability Strategy of Non-Government Organisations in Slovakia, In: *E+M Ekonomie a Management*, 16, 3, 85-100.
- SZALAY, T., PAŽITNÝ, P., SZALAYOVÁ, A., FRISOVÁ, S., MORVAY, K., PETROVIČ, M. and GINNEKEN VAN, E. 2011. *Slovakia. Health system review. Health System in Transition.* Vol. 13, No. 2.
- UZIK, M. and SOLTES, V. 2009. The Effect of Rating Changes on the Value of a Company Listed in the Capital Market, In: *E+M Ekonomie a Management*. Vol. 12, No. 1, pp. 49-58.
- VACEKOVA, G. and SVIDRONOVA, M., 2014. Benefits and risks of self-financing of NGOS
 empirical evidence from the Czech Republic, Slovakia and Austria. In: *E+M Ekonomie a* Management. 17, 2, 120-130.
- YOUNIS, M., RICE, J. and BARKOULAS, J. 2001. An empirical investigation of hospital profitability in the post-PPS era. In: *Journal of health care finance*. Vol. 2, pp. 65-73.
- ZELLER, T. L., STANKO, B. B. and CLEVERLEY, W. O. 1996. A revised classification pattern of hospital financial ratios. In: *Journal of Accounting and Public Policy*. Vol. 2, pp. 161–181.
- ZELLER, T. L., STANKO, B. B. and CLEVERLEY, W. O. 1997. A new perspective on hospital financial ratio analysis. In: *Healthcare Finacial Management*. Vol. 11., pp. 62-66.

Determinants of Corporate Distress: Assessment of the Macroeconomic Factors

TATIANA BIELIKOVÁ¹ Matej Bel University in Banská Bystrica, Faculty of Economics Slovak Republic

Abstract

Dynamic economic environment is significantly involved in the development of the overall financial situation of enterprises. It is therefore necessary to focus on diagnostics of the corporate financial health by identifying not only internal, but also external influencing factors. The present paper focuses on the impact of macroeconomic environment on the decline of the corporate sector represented by the corporate distresses. The aim of the study is to consider the influence of several macroeconomic factors on corporate distress and to assess the possibilities and relevance of the implementation of macroeconomic aspect in to models of the corporate distress prediction. Prediction models were developed by application of the logistic regression with different specification.

Key words: Corporate Distress, Determinants of Corporate Distress, Macroeconomic Factors

JEL Classification: C53, G33

1 Introduction

It is well known fact that the success of corporate activities is conditioned by a set of several factors. According to the theory, the factors determining the success of a business can be classified into the groups of endogenous and exogenous factors. Exogenous factors are objective, uncontrollable and are represented by the situation of the economic environment and the specificities of the sector in which company operates. On the contrary, endogenous factors are subjective to each undertaking, controllable and can be associated with corporate governance fields (e.g. financial management, production and marketing).

The present paper deals with determinants of corporate success, respectively distress in the context of its financial situation. Financial nature of the corporate distress clearly guides to finding the short-term causes of bankruptcy although it is clear that the stability of the company is closely linked with the ability of the company to carry on business under economic conditions and react to fluctuations in the environment. The motivation for the elaboration of this paper is the existence of a number of bankruptcy prediction models solely based on indicators of financial situation, which abstracts from exogenous factors. The impact of macroeconomic indicators on the risk of bankruptcy can be considered as relatively less explored area in comparison to other factors. However, the need to ensure the quality and comprehensive assessment of the financial health of enterprises by assessing the endogenous and exogenous factors appears nowadays more than ever before. The aim of the paper is to consider the influence of several macroeconomic factors on corporate distress and to assess the

¹ Ing. Tatiana Bieliková, Tajovského 10, 975 90 Banská Bystrica, Slovak Republic, tatiana.bielikova@umb.sk

possibilities and relevance of the implementation of macroeconomic aspect in to models of the corporate distress prediction. Several models will be created and compared to achieve the aim of the paper. Prediction models were developed by application of the logistic regression with different specification. The rest of this paper is organized as follows. Section 2 provides close-up overview of previous research in the field of determinants of corporate distress. In section 3 the methodology and the data used in experiments is described. Results are presented and discussed in section 4. Finally, section 5 concludes main findings of the paper and outlines future research topics.

2 Literature review

This part of the paper focuses on the clarification of corporate distress determinants used in related literature, while the attention is focused primarily on macroeconomic determinants. Salman et al. (2011) states that the risk factors determining the probability of distress can be classified into three separate groups. The first group consists of the business factors that are unique to each enterprise and are influenced by the effectiveness of management and capital adequacy. The second group consists of the factors that represent the specificities of the sector in which a company operates. The last group of risk factors is represented by the overall economic environment (or macroeconomic factors). In accordance with Everett and Watson (1998), the risk factors influencing corporate activities can be classified as follows:

Firm Industry		Economy
Unsystematic		Systematic
Endogenous	Exogenous	

Figure 1 Classification of corporate risk factors

Jakubík (2007) presents the opinion that the most significant determinants of corporate distress are firm-specific characteristics such as management, marketing, etc. It can be assumed that these characteristics directly reflect in financial ratios calculated from accounting data. For this reason, the vast majority of researchers build prediction models solely based on financial ratios. Balcaen and Ooghe (2004) argue that "if researchers only include financial ratios into their failure prediction model, they implicitly assume that all relevant failure or success indicators – both internal and external – are reflected in the annual accounts". Scientific studies dedicated to examining the impact of macroeconomic factors on the corporate sector can be divided into two groups. The first group examines the impact of various macroeconomic factors on the default rate. The second group is dedicated to the implementation of macro perspective into prediction models of the financial health of businesses.

The investigating of the relationship between the number of bankruptcies and macroeconomic indicators is the object of several studies, e.g. Jakubík (2007), Salman et al. (2011). Jakubík (2007) estimated a model that allows quantifying the relationship between proportion of firms in bankruptcy and the key macroeconomic determinants in the Czech Republic. The results of the study showed the dependence of the rate of bankruptcies on interest rates, GDP, inflation and the share of loans to GDP. The aim of the study of Salman et al. (2011) was to find whether major macroeconomic factors can explain failures of manufacturing companies in Sweden.
Cointegration analysis and an Error Correction Model were used for this purpose. Authors found out possibility of the explanation of the bankruptcy rate by manufacturing output, real wages, birth rate of new companies, money supply, GNP and economic openness. Chen and Mahajan (2010) provide a unique study, which demonstrate the importance of macroeconomic factors in shaping the company's financial situation. Chen and Mahajan (2010) used a fixed-effect panel regression model for studying the impact of macroeconomic factors on the corporate liquidity in 34 countries. In addition to "commonly" used macroeconomic indicators such as GDP growth, inflation, real short-term interest rate authors take into account the credit spread, private credit and corporate tax rate.

As said before, most authors develop corporate distress prediction models on the basis of financial accounting-based ratios. However, there can be seen several attempts to include macroeconomic perspective into the models' creation. The paper of Hunter and Isachenkova (2006) examines the accounting-ratio based and macroeconomic determinants of insolvency of industrial firms in the UK. In modelling the influence of macroeconomic factors authors used lagged unanticipated changes in the interest rate and in the exchange rate. The results showed relation between the probability of failure and unanticipated changes in both macroeconomic variables. Obtained predictors suggested that unanticipated increases in the real exchange rate and rises in the nominal interest rate are associated with tendency of company to fail. Zeitun et al. (2007) developed the random effects logit regression models of corporate performance evaluation, which include a set of macroeconomic, microeconomic and ownership variables. The study considers the influence of some macroeconomic variables, e.g. delayed interest rate changes, inflation, money supply and GDP. The most significant impact has the amount of money supply, the value of exports, the availability of credit and unexpected changes of interest rates. On the other hand, inflation was identified as a variable with insignificant influence. Mishra (2013) attempts to examine the influence of GDP, interest rate, inflation and openness of the economy (expressed as the sum of exports and imports to GDP) on the corporate health. The relations are identified using panel unit root test, cointegration analysis, panel fully modified ordinary least square method and panel long-run causality tests. The findings reveal the existence of two-way causal relations. Tinoco and Wilson (2013) offer a comparison of the classification accuracy of three models using different types of variables: accounting variables, market variables and macroeconomic variables (the Retail Price Index and the real short term Treasury bill rate). Panel logit models were created for quoted companies in the UK. The results showed the utility of combining accounting, market and macroeconomic variables and also proved that market variables contain information that is not included in financial statement ratios.

Authors focusing on "extraordinary" determinants of corporate financial distress are Li and Liu (2009), which present the results of an investigation of the relationship between 13 independent variables (financial and *corporate governance variables*) and the probability of financial distress of Chinese listed companies. As an important determining factor appears agency costs and ownership structure from the group of corporate governance variables. Bottazzi et al. (2011) used bootstrap probit regressions, which confirm that variables such as corporate size, growth, productivity, in addition to standard financial indicators, play both a long and short term effect. The impact of major corporate governance attributes, such as ownership and board structure on the likelihood of corporate distress examined Polsiri and Sookhanaphibarn (2009). Logit and neural networks approaches were selected for models development. The main

finding is that in the economy of Thailand where ownership concentration is common and the legal environment is not investor-friendly, corporate governance plays important role in corporate distress prediction. Kane et al. (2003) argue about the role of *corporate life cycle* in the corporate distress prediction, but the paper lacks of practical application.

3 Data and methodology

Initial database contains of the financial statements of all Slovak companies during the accounting period of years 2009 - 2013. The database was sourced under the grant scheme of the project VEGA No. 1/0647/14. Initial database was modified for the purpose of the present paper. Analyzed dataset consists of financial statements of small companies (defined under size classification of business entities in accordance with Regulation No. 431/2002 Coll. - Act on Accounting as amended by Regulation No. 333/2014 Coll.), whose financial statements are correct and available for whole analyzed period of time. For the development of the prediction models is required to define relevant criteria of distressed company. The distressed companies are considered to be those, with the value of liabilities exceeding the value of assets in the time (t+1), it means with negative equity in the time (t+1). The criterion of negative equity is inspired by the legislation of the Slovak Republic (Regulation no. 7/2005 Coll. - Act on Bankruptcy and Restructuring). Otherwise, the company is considered to be financially "healthy". The state of distressed or financially "healthy" company represents binary depended variable DEFAULT. Financially "healthy" companies were assigned by number 0 and distressed companies by number 1. The paper provide comparison of several specific models, and so model based on financial ratios, models based on financial ratios and on two macroeconomic variables and model incorporating fixed effect (year) representing the overall economic environment indicator. All prediction models were created by application of logistic regression procedure in the statistic software IBM SPSS Statistics 20.

The model based on financial ratios is common logistic regression model predicting corporate distress one year prior to distress. Sample used for development of this model consists of 177 distressed companies in the year 2014. In the analysis the balance sample approach was used, in order to select the same number of distressed and financially "healthy" entities in sample. The training sample consists of 75 % of randomly selected small Slovak companies. The remaining 30 % constitutes the testing sample. Even, by dividing the sample into training and testing one, the portions of distressed and financially "healthy" companies remained the same. Four financial ratios calculated for the year 2013 were selected from the group of twenty considered financial ratios, specifically current ratio, operating profitability of assets, working capital to assets ratio and long-term liabilities to assets ratio. The selection of ratios was realized on the base of the results of t-test and author` own judgement.

The models incorporating macroeconomic variables are logit models on panel data. Sample used for models development consists of 6315 observations of small Slovak companies. The independent macroeconomic variables (hereinafter referred to as MV) are unanticipated changes in 3-month interbank interest rate and unanticipated changes in CPI inflation rate. The macroeconomic variables were selected in the association with the results of related studies (see section 2). In accordance with Zeitun et al. (2007) unanticipated changes can be approximated by the one-year lagged change as expressed in the equation (1).

One - year lagged change in MV = $[\ln MV_{(t-1)} - \ln MV_{(t-2)}]$ (1)

Finally, *the model with time (year) as fixed effect* was developed on panel data. The sample is the equal to the sample used in the models incorporating macroeconomic variables. The effect of time (year) was considered, because of the assumption that specific economic conditions in individual periods of time can affect the financial health of companies. The results of created models are compared in the term of its prediction ability and statistical significance of variables.

4 Results and discussion

Our empirical experiment consists of development of four specific logistic regression models. Firstly, we developed the logit model based solely on financial ratios (hereinafter referred to as Model 1). For development of Model 1, financial ratios were selected on the base of results of independent samples t-test for equality of group means. Results showed statistical significance at 1 percent level of all selected variables. Based on the results of stepwise logistic regression the following model (2) was obtained:

$$ln\left(\frac{\hat{p}}{1-\hat{p}}\right) = -0.638 - 0.225 * Current \ ratio - 2.636 * WC \ _ass + 0.027 \ * LT liab _ass \ -0.034 * oper ROA$$
(2)

The chances of the Slovak small company to become a distressed one increases with the growth of long-term liabilities to assets ratio. In the case of economic interpretations with respect to defined financial ratios, is obvious that the increase of corporate liquidity and profitability causes decrease of the chance to become distressed. As can be seen in the Table 1, prediction accuracy of Model 1 is relatively sufficient. Predictive ability of Model 1 is about 77 % on the training and so on the testing set. Model 1 classified correctly 119 companies in the group of distressed companies, and in the group of financially "healthy" 153. Overall percentage of correctly classified companies on both sets is 77 %.

Obse	erved	Predicted											
		, in the second s	Fraining Samp	le	Testing sample								
		De	fault	Percentage	Def	Percentage							
	0 1		Correct	0	1	Correct							
Default	ult 0 114 19		19	85.7	39	5	88.6						
	1	43	90	67.7	15	29	65.9						
Overall Percentage				76.6			77.3						

Table 1 Prediction accuracy of the model based on financial ratios

The next step in our experiments was consideration of influence of macroeconomic variables on corporate distress by incorporation of unanticipated changes of two macroeconomic variables into prediction models. Increase in interest rates leads to more expensive sources of financing for enterprises, and so to higher likelihood of corporate distress. Therefore, it is reasonable to assume a positive relationship between corporate distress and interest rate. However, our results showed a negative relationship but insignificant at all conventional levels of significance. One of the

explanations for this negative relationship may be the fact that businesses threatened by distress borrow at higher interest rates due to its status of high-risk borrowers. However, these loans with higher interest rates ultimately allow to companies to continue operations.

Inflation is other macroeconomic variable of which influence on the corporate distress is assumed. The unexpected increase in the price level leads to a reduction in the fair value of debt and the status of enterprises is improving. The observed negative sign of the unanticipated changes in inflation confirmed our expectations. However, the influence of inflation changes is also insignificant. The statistical significance of variables in all developed models can be seen in the Table 2. Overall accuracy of Model 2 with interest rate and Model 3 with inflation is over 92 %. The percentage of correctly classified distressed companies is only about 3%, which is unacceptable prediction accuracy. To conclude modeling the impact of two macroeconomic variables on corporate distress showed unsatisfactory results.

	Model 1	Model 2	Model 3	Model 4
Independent variables	Sig.			
Intercept	0.070	0.000	0.000	0.000
Financial variables				
Current ratio	0.049	0.585	0.577	0,293
Working capital to assets	0.000	0.000	0.000	0.000
Long-term liabilities to assets	0.000	0.000	0.000	0.000
Operating ROA	0.001	0.000	0.000	0.000
Macroeconomic variables				
Interest rate		0.734		
Inflation			0.649	
Fixed effect				
Year 2010				0.975
Year 2011				0.667

 Table 2 Logit models: Significance of variables

The last developed model (Model 4) is the model with fixed effect (year). The results showed that in 2011 ($\beta = -0.56$) has been reduced chance that the company gets into distress in comparison with the previous year ($\beta = 0.048$). The influence of the overall economic conditions represented by fixed effect (year) in panel logit regression is insignificant in accordance with analysis results. Predictive power of Model 4 with fixed time effect is over 93 %. On the contrary, the percentage of correctly classified distressed companies is about 20 %. In the Table 2 can be also seen, that the current ratio from the group of financial variables lost its statistical significance in Models 2-4.

5 Conclusion

The present paper focused on the financial distress of Slovak small companies and its determinants. Attention was drawn primarily on the influence of macroeconomic development on corporate distress. The aim of the paper was to consider the influence of several

macroeconomic factors on corporate distress and to assess the possibilities and relevance of the implementation of macroeconomic aspect in to models of the corporate distress prediction. Several models were created and compared to achieve the aim of the paper. Four prediction models were developed by application of the logistic regression with different specification. Firstly, we created model based on financial ratios. Secondly, we built panel logit regression models based on financial ratios and on two macroeconomic variables, unanticipated changes in interest rates and inflation. Finally, model incorporating fixed effect (year) representing the overall economic environment indicator was created. We assumed the relevance of the implementation of macroeconomic aspects into the prediction models in accordance with theory and related literature. However, the results showed the insignificance of two variables as well as the year as fixed factor. The explanation of unsatisfactory results can be in the unsuitability of dataset used for the development of models. For example, analyzed time horizon can be insufficient in comparison with similar studies. In addition, prediction models were developed for small companies. However, it is clear that development of macroeconomic environment has more significant influence on larger companies. Therefore, for future research can be considered verification whether the implementation of macroeconomic variables has a greater effect in models for large companies in comparison with models for small businesses. Other steps of research can lead to the investigation of the impact of previous development of financial ratios and business cycle on corporate distress.

Acknowledgements

The contribution was prepared in the framework of the projects VEGA No. 1/0647/14 - Variant methods of the financial health prediction of enterprises in terms of dynamic economic environment.

References

- BALCAEN, S., OOGHE, H. 2004. 35 years of studies on business failure: An Overview of the classical statistical methodologies and their related problems. Working paper 2004. Available at: http://www.glowstat.org/wp_04_248.pdf>.
- BOTTAZZI G., et al. 2011. Financial and economic determinants of firm default In: *Journal of Evolutionary Economics*. Vol. 21, pp. 373-406.
- CHEN, N. and MAHAJAN, A. 2010. Effects of Macroeconomic Conditions on Corporate Liquidity—International Evidence. Available at: <http://www.efmaefm.org/0EFMAMEETINGS/EFMA%20ANNUAL %20MEETINGS/2008-athens/Mahajan.pdf>.
- EVERETT, J., WATSON, J. 1998. Small Business Failure and External Risk Factors. In: *Small Business Economics*. No. 11, pp. 371-390.
- HUNTER, J. and ISACHENKOVA, N. 2006. Aggregate economy risk and company failure: An examination of UK quoted firms. Available at http://ssrn.com/abstract=1299056>.
- JAKUBÍK, P. 2007. *Exekuce, bankroty a jejich makroekonomické determinanty*. IES Working Paper 29/2007. Praha: IES FSV. Univerzita Karlova v Prahe. Available at: <http://ies.fsv.cuni.cz/default/file /download/id/7022>.
- KANE, G. D., RICHARDSON, F. M., VELURY and U. 2003. The Role of Corporate Life Cycle in the Prediction of Corporate Financial Distress. In: *Commercial Lending Review*. Vol. 18, No. 6, pp. 26-28.

- LI, D. and LIU, J. 2009. Determinants of Financial Distress of ST and PT Companies: A Panel Analysis of Chinese Listed Companies. Available at: http://ssrn.com/abstract=1341795>.
- MISHRA, S. P. 2013: Relationship between macroeconomic variables and corporate health of manufacturing firms in India. In: *Journal of Quantitative Economics*. Vol. 11, No. 1&2, pp. 230-249.
- POLSIRI, P. and SOOKHANAPHIBARN, K. 2009. Corporate Distress Prediction Models Using Governance and Financial Variables: Evidence from Thai Listed Firms during the East Asian Economic Crisis. In: *Journal of Economics and Management*. Vol. 5, No. 2, pp. 273-304.
- SALMAN, A. K. et al. 2011. The Determinants of Failure of Small Manufacturing Firms: Assessing the Macroeconomic Factors. In: *International Business Research*. Vol. 4, No. 3, pp. 22-32.
- TINOCO M. H. and WILSON, N. 2013. Financial distress and bankruptcy prediction among listed companies using accounting, market and macroeconomic variables. In: *International Review of Financial Analysis*. Vol. 30, pp. 394-419.
- ZEITUN, R. et al. 2007. Macroeconomic determinants of corporate performance and failure: evidence from an emerging market the case of Jordan. In: *Corporate Ownership and Control*. Vol. 5, No. 1, pp. 179-194.

Non-formal Adult Education in Contexts of Globalization

HANNE-LORE BOBÁKOVÁ¹ – JANUSZ KARPETA² Silesian University in Opava, School of Business Administration in Karvina Czech Republic

Abstract

The paper deals with the issue of non-formal adult education in the Czech Republic. In the introduction the issue of education is set in deeper political, cultural, philosophical, pedagogical and financial contexts, which are, together with the labour market common denominators of the changes in the field of education in the 21st century. The next part of the paper pays attention to the selection of professional literature in adult education with an emphasis on the concept of a society of knowledge and the concept of a learning society. In the next part of the paper the goal, hypotheses, and research methodology are described. The goal is to compare the total participation and average number of hours spent on non-formal education for persons between 25 and 64 years of age in the Czech Republic compared with European countries, a comparison of the participation in non-formal education according to the age, gender and education. Another part of the research deals with providers of non-formal education activities in the Czech Republic. In order to implement the above objectives the data from the Czech Statistical Office and Eurostat was used.

Key words: Education, Adult Education, The Concept of the Knowledge Society, The Concept of a Learning Society, Globalization

JEL Classification: A23, J11, M00

1 Introduction

In addition to the educational institutions, corporations face new challenges. One of them is to adapt to world globalisation processes in the area of educating their employees. The economic and educational sector, ironically, does not stand against each other, but next to each other, and both can benefit from the newly created concepts of education within lifelong learning.

For educational institutions, this means correctly grasping the opportunities for the diversification of activities, for corporations this means adapting to globalisation tendencies within the changing contexts of globalization, which create impulses for changes, in particular in education.

As reported by Fuchs (2007, 148), science is characterized by the development of the disciplines through the paradigms that are controversial, variable, and thus produce the content, theoretical, institutional and other mistakes. The specificity of the political, cultural, philosophical and pedagogical contexts yet cannot leave no doubt that the national education policy is leaving its management role and losing its national sovereignty under the pressure of the international adjustment process. At the same time, it is also significant that education and knowledge attach great importance in today's time, which is given in conjunction with the speed of change in

¹ PhDr. Hanne-Lore Bobáková, Ph.D., Na Vyhlídce, 733 40 Karviná, Czech Republic, bobakova@opf.slu.cz

² PhDr. Janusz Karpeta, Na Vyhlídce, 733 40 Karviná, Czech Republic, karpeta@opf.slu.cz

society, which requires the constant updating of knowledge and skills relevant to the labour market. Other causes may include, in particular, the structural changes in society that have highlighted the importance of lifelong learning, which include globalization, demographic changes, and change of the mentality of modern society (Süssmuth, 2014).

If we want to talk about the knowledge based potential of the population, then we have to put the concept of education in the broader context and clarify it from the point of view of competences, lifelong learning, and last but not least to justify its importance for today's globalizing society. The fears that the people will not be able to respond flexibly to changes in all spheres of life, led to the fact that they were committed to the concepts of the learning society as well as lifelong learning. However the cause needs to be looked for deeper. According to Potůček (2009) we perceive the causes of the deepening crisis in articulated interests of financial capital in the spirit of neo-liberal ideology, advocating in the political decision-making and the non-competence of social sciences in learning the character of the contemporary phase of the development of human civilization. The lack of regulation, or more aptly named, the unwillingness to this development started a mere "healing" of symptoms. In the spirit of the Lisbon strategy of lifelong learning, Europe is supposed to become a more competitive-knowledge-based economy.

In determining the vision of education by the year 2020, it is based on the lifelong learning programme focused on three kinds of learning, i.e. formal education, non-formal education and informal education. Formal education represents the institutional education, for example in the tertiary sector. Non-formal education is understood as the process of acquiring knowledge, skills and competence acquisition from everyday experiences and activities in work, family, and in spare time. In this area all the educational activities of the individual come under, which are not organized³. Lifelong learning is created in connection with the labour market. The ability of the population to succeed on the labour market has become the primary task of today's society (Lifelong learning, 2007).

2 Adult education in professional literature

Adult education belongs to the hot topics, therefore professional literature on this topic is quite extensive. Various forms of adult education and contents are dealt with by Rabušicová and Rabušic (2008), then professional adult education for example by Mužík (1999), Plamínek (2010), Veteška (2010) and Rabušicová (2013). However, there is an increasing differentiation and specification of research topics. These are for instance the issues of the target group, the professionalization of andragogy, work, andragogy competence, the emergence of the knowledge society, lifelong learning, adult education, management and marketing in education, educational policy, the consequences of integration into European structures, etc.

Adult education has several special features, which include the richness, diversity, openness and dynamism (Jedličková, 2006). Under the concept of adult education in the context of andragogy all processes associated with adult learning and education and adult education (educational reality, organised learning, the socio-economic context, self-management and cooperative learning (Průcha and Veteška, 2012) are understood.

³ Life-long strategy of the Czech Republic

In this context, the concept of knowledge society is mentioned, which is based on the theory of economy based on knowledge (knowledge-based economy), occasionally also known as a knowledge-driven economy (knowledge-driven economy) or also the knowledge economy (knowledge economy). In the framework of these terms the knowledge is seen as an economic asset that affects the price of goods and services (Rabušicová, 2013). In contrast, the concept of a learning society deals with the benefit of knowledge for individuals and society as well as the contribution to better social cohesion.

3 Goal, hypotheses, methodology

The research deals with the analysis of the statistical data focusing on the non-formal education of Czech and European populations. The analyzed data originate from the Czech Statistical Office and Eurostat and focused on the 25-64 age group⁴. The research was divided into the following thematic blocks:

- The participation of the Czech population aged 25 to 64 years in non-formal education,
- The number of hours spent on non-formal education in the Czech Republic and other European countries,
- The participation of the population in the non-formal education according to the economic status of the population aged 25-64 years in the Czech Republic and in the European countries,
- Non-formal education and its providers.

The aim of the research was to analyse these data mentioned above, evaluate their positive or negative connotations and search more determinants of these phenomena. In the context of the declared objectives the following hypotheses were laid down, whose confirmation or refutation was the subject of the completed research:

- H1: the total participation in non-formal education in the Czech Republic is lower than in Western European countries.
- H2: the number of hours spent on non-formal education in the Czech Republic is lower than in Western European countries.
- H3: participation in non-formal education in the Czech Republic is differentiated according to the economic status of the population aged 25-64 years:
 - o in the case of workers' participation is lower than in developed Western countries
 - for the unemployed, the participation is significantly lower than in developed Western countries
 - o the inactive population, participation in non-formal education is low.
- H4: the largest provider of non-formal education in the Czech Republic and other European countries are the employers.

From the standpoint of the methodology the research was in the first phase of implementation based on the research of foreign and Czech literature, further the analysis of the data and documents (in particular, the Ministry of education, youth and sports) and the analysis of the results of one's own research carried out by the research survey. In our own research, we used the method of analysis and synthesis.

⁴ Education & Training database, available at:

<a>http:epp.eurostat.ec.europa.eu/portal/page/portal/educationdata/database>

4 Determinants of social phenomena

Discussions on the educational potential take place in various ways and in different ways. In today's globalizing society they relate to the whole of European society and have an impact on the educational reality. Not only pedagogical disciplines deal with the issue (Průcha, 2014). In principle, one can divide the examination of education for example in the following areas:

- 1. From the perspective of the needs of employers and the preparedness of graduates.
- 2. In the context of the broader demographic contexts.
- 3. In terms of employability and the labour market.
- 4. In terms of management and human resources development.
- 5. From the perspective of sustainable development (e.g. The strategy of lifelong learning, 2007).

Employers' needs and preparedness of graduates were studied by Doležalová (2014). Demographic aspects of the education of the population of the Czech Republic, for example was dealt with by Kotýnek (2013). In the context of employability and the labour market Koucký and Zelenka (2013), Straková and Veselý (2013) covered this in detail.

At present, we often refer to the so-called "competence approach", which represents the direction that puts the emphasis on the formation and the development of key competencies as a tool for the conversion of an encyclopedic concept of education. As a result of using the key competences, formal education is linked with the non-formal one (Žárská, 2012). In the framework of the development of key competences Belz and Siegrist (2011) focus on the personal development of the individual and his/her properties, such as creativity, autonomy, responsibility, reliability, thinking, etc. The development of lifelong learning and the need arises as a necessity because of the increasing demands of employers. In addition to the expertise of professional knowledge increasingly language and computer skills are required as well as the ability to solve problems, a separate decision making, etc. (Lifelong learning, 2007).

5 Results

5.1 The overall participation in non-formal education

In relation to the statistical data we can observe that the population of Luxembourg, Sweden and Switzerland are among the countries whose share of the population in non-formal education is the highest. Luxembourg recorded the highest with 68% of the number of persons involved in non- formal education. Just behind Luxembourg there is Sweden with 67%, Switzerland with 63%. The countries with a higher percentage of the population in non-formal education include Norway with 57%, the Netherlands with 55%, Denmark with 53%, and Finland with 51%. The countries, whose share of the population in non-formal education lies in the range of 49 to 40%, involve France (49%), Germany (48%), Estonia (48%), Austria (46%), Cyprus (41%) Portugal (40%). It is interesting that in the Czech Republic the number of the population engaged in non- formal education is behind Portugal (40%), Slovakia (38%) and Hungary (38%), the share of the Czech population in non-formal education achieves only 35%. Comparable data is reached by Slovenia (35%), Italy (34%), Spain (34%), Malta (34%), Belgium (33%) and Latvia (30%). Lithuania, Bulgaria and the United Kingdom reported comparable results moving in the range of 26 to 24%. Among the countries with the lowest participation in non-formal education are ranked Poland (21%), Ireland (19%), Serbia (14%), Greece (10%) and Romania (7%). Synoptic data captures the following table:



CEFE 2015 - Central European Conference in Finance and Economics

Figure 1 Total participation in non-formal education and the average number of hours spent on nonformal education Source: Czech Statistical Office

5.2 The average number of hours spent on non-formal education

In addition to the overall participation in non-formal education, we have detected the average number of hours spent per month on non-formal education. The greatest number of hours was spent in this way in Spain (99). Followed by the United Kingdom (90) and Greece (89), Romania (78) and Latvia (77). Austria (73) and Portugal (73) show the same number of hours, behind them there are Denmark (71) and Germany (67). About 60 hours per year is reached by Switzerland (59), Finland (61), France (59), Slovenia (59) and Belgium (58). In the range of 60-40 hours there were the following countries, such as Luxembourg (49), Sweden (56), Norway (50), Estonia (51), Cyprus (51), Slovakia (44), Czech Republic (50), Italy (51), Malta (48), Lithuania (48) and Serbia (48). Under 40 hours a week only three countries came, the Netherlands, Hungary and Bulgaria, Bulgaria with 31 hours a year, Hungary with 31, the lowest number was recorded in the Netherlands (21). See Table 1.

5.3 Participation in non-formal education, according to the economic situation of persons aged 25-64 years

The economic status of the individuals aged 25-64 years was another monitored area that participate in non-formal education. The monitored groups of the population were the employed, the unemployed and the economically inactive population. The largest participation in non-formal education was recorded for workers, followed by a group of unemployed people, the smallest turnout in non-formal education is among the economically inactive population.

Within the analysis of the economic situation of people in non-formal education the biggest difference was recorded for the workpeople in various European countries. The margin of the

participation for this group ranged from 77.5% to 9.4%, whereas the largest participation of workers is in Luxembourg (77.5), the lowest participation in Romania (9.4%). Countries with the highest participation of workers in non-formal education are Luxembourg, Sweden (75.2%), Switzerland (68.1%), the Netherlands (66.0%) and Norway (64.9%). In the range of 60%-50% these countries range: Finland (60.6%), Denmark (59.7%), France (56,4%), Germany (55.8%), Estonia (56.7%), Hungary (53.3%), Austria (51.9%) and Portugal (50.4%). Between 50% and 40% (49,2%) there are Cyprus, Slovakia (47.3%), the Czech Republic (43.1%), Slovenia (42.9%), Italy (45, 6%), Spain (40.5%), Malta (44.5%) and Belgium (42.2 The countries with the lowest participation in non-formal education for the workers involve Latvia (37.5%), Lithuania (35.4%), Bulgaria (37.3%), United Kingdom (29.0%), Poland (29.1%), Serbia (23.4%), Greece (12.9%) and Romania (9.4%).

Moreover in the group of the unemployed significant differences can be found in the participation in non-formal education. Switzerland has the highest value (57.1%), United Kingdom the lowest (3.8%). The countries with the higher participation of the unemployed in non-formal education include Norway (48.4%), Sweden (43.4%), Luxembourg (42.1%), the Netherlands (38.6%), Denmark (41.4%), France (35.7%), Estonia (32.8%), Austria (38.3%) and Malta (30.1). The relatively low participation of the unemployed up to 20% can be seen in Finland (26.1%), Germany (26.9%), Cyprus (22.6%), Portugal (25.0%), the Czech Republic (22.8%), Slovenia (25.5%), Italy (20.7%) and in Belgium (21,0%). We recorded the minimum participation in nonformal education in Slovakia (14%), Hungary (16.7%), Latvia (19.1%), Lithuania (9.4%), the United Kingdom (15.5%), Poland (9.7%), Greece (7.9%), Romania (6.0%), while the lowest values (6.4%) are in Serbia and Bulgaria (3.8%).



Figure 2 Participation in non-formal education, according to the economic situation of persons aged 25-64 years Source: Czech Statistical Office

In addition to the inactive population one can see the differences of involvement in non-formal education, their percentage of participation lies in the range of 35, 5% to 2.9%. The highest participation of this group of the population is in Luxembourg (35.5%), followed by Switzerland

(33.3%) and Sweden (30.9%). In the 10% to 20% range there are such countries as Estonia (17.6%), Cyprus (12.3%), Portugal (11.6%), the Czech Republic (10.3%), Slovenia (16.4%), Italy (13.9%), Spain (17.9%), Malta (13.0%), Belgium (10.6%), the United Kingdom (11.8%). The minimum engagement of the inactive population is demonstrated by Slovakia (7.0%), Hungary (9.4%), Lithuania (4, 4%), Latvia (9.2%), Poland (4.3%), Serbia (2.9%) and in Romania (3.1).

5.4 Providers of non-formal education activities

European countries include the following providers of non-formal education activities:

- educational institutions providing primarily formal education,
- educational institutions providing mainly non-formal education,
- salespeople or business organisations (education is not the main activity),
- the employer,
- the Employers 'Association, Chamber of Commerce,
- trade unions,
- individual, private person,
- non-commercial institutions (education is not the main activity) such as a museum, library, the ministries.

According to Eurostat data, the largest provider of non-formal education in the Czech Republic is the employer (40.7%). However, it is interesting to note that in addition to the employer, the second largest provider of this kind of education are educational institutions providing non-formal education. The third-largest provider are educational institutions providing mainly formal education (9.1%).

If we look at the providers of non-formal education in the European context, we can see that in most European countries, the largest provider of such education is the employer, whereas the largest percentage representation is in Bulgaria (71.8%), Hungary (60.3%), Slovakia (47.5%) and in Portugal (46.6%).

Some countries with a small representation among employers as education providers, involve Estonia and Lithuania; they show a greater representation in educational institutions providing mainly formal education, which in the case of Estonia accounts for 27.9% and for 29.9% in Lithuania.

Providers of non-formal education activities in the Czech Republic	%
Educational institutions providing primarily formal education	9.1
Educational institutions providing mainly non-formal education	32.6
Salesperson or business organisation (education is not the main activity)	3.4
The employer	40.7

 Table 1 The main providers of non-formal education in the Czech Republic

6 Discussion

It is not possible to disagree with Kotásek (2003), when he is talking about the pedagogical and psychological concepts of education, training and learning, which are associated traditionally only with school and teachers' activities that penetrate to the center of reflections and efforts on the prosperity of the economy, effective management and social harmony. Education thus becomes, as stated below, a tool for the development of human resources and the creation of human capital, and it becomes a not inconsiderable part of investment in the economic development.

The main objective of the research was to specify non-formal education in the Czech Republic in connection with the European context. Set hypotheses could be confirmed only in part:

Hypothesis 1 (Total participation in non-formal education in the Czech Republic is lower than in European countries) could be confirmed only in part. The participation of the Czech Republic's population aged 25-64 years is lower than in Luxembourg, Sweden, Switzerland, Norway, the Netherlands, Denmark, Finland, France, Germany and Austria, and even lower than in Estonia, Slovakia and Hungary. On the other hand, the involvement in non-formal education, is comparable, with Italy, Spain, Malta and Belgium. However, as a country of the former Eastern bloc the Czech Republic achieves in this indicator worse results than e.g. Slovakia and Hungary, yet better than Bulgaria, Poland and Romania.

Hypothesis 2 (The number of hours spent on non-formal education in the Czech Republic is lower than in European countries) could also be partially confirmed. The number of hours spent on non-formal education is lower in the EU 28, yet comparable for example with Norway and Luxembourg, however lower than in Denmark, Germany, Austria and Portugal. For instance Slovakia and Hungary achieved the lower number of hours.

Hypothesis 3 (Participation in non-formal education in the Czech Republic is differentiated according to the economic status of the population aged 25-64 years) could be confirmed. In the partial points of this hypothesis, however, this hypothesis could be confirmed only in part. The participation of workers in non-formal education is lower in comparison with some European countries, for example with Luxembourg, Sweden, Switzerland, Norway, the Netherlands, Denmark, Finland, France, Germany, Austria, Italy, Portugal, and even with Slovakia and Hungary, however, in the Czech Republic the participation of workers is higher than for instance in the United Kingdom. The partial hypothesis, that the unemployed in the Czech Republic are involved in activities in non-formal education less than in Western European countries, could be

proved again only partially. The participation of the unemployed in the activities in non-formal education in developed countries, such as Luxembourg, Switzerland, Austria, Denmark, etc. is higher than in the Czech Republic, the lower values than in the Czech Republic were detected in Italy, Belgium and the United Kingdom. The partial hypothesis about the low involvement of the inactive population in non-formal education could be completely confirmed.

Hypothesis 4 (The largest provider of education in the Czech Republic is the employer) could also be completely confirmed. The Czech Republic lies even above the EU average of 28, which is 32%.

7 Conclusion

One can assume that in the future the importance of non-formal education will increase, as well as the participation in this form of education and the number of hours spent in non-formal education. It turned out that this form of education has a considerable potential:

- in terms of the economic situation of the population,
- from the perspective of providers of non-formal education activities.

In terms of the economic situation of the population, there are possibilities opening up for providers of non-formal education activities, mainly for the unemployed and the economically inactive population.

As for activity providers we can assume opportunities especially for the educational institution providing primarily formal education and educational institutions providing non-formal education.

There are more causes of relatively low involvement in non-formal education. It may for instance be a lack of information about educational opportunities, the current shortage of funds (Knotová 13). We believe that another problem of non-formal education is its acceptability. It can be assumed that the eligibility of the outputs from these activities lie in the interests of the individual and the state, as well as providers of such activities. At the same time it should be noted that the Czech Republic still has to do a lot in the area of non-formal education to catch up; this fact may be perceived as an opportunity for both the providers of these activities, as well as for the individual and the employer.

Acknowledgment

This paper was supported by the Ministry of Education, Youth and Sports of the Czech Republic within the Institutional Support for Long-Term Development of Research Organisation in 2015.

References

BELZ, H. and SIEGRIST, M. 2011. Key competences and their development. Prague: Publisher Portál.

BOČKOVÁ, V. 2000. Life-long learning – challenge or duty? Olomouc: Palacky University.

DOLEŽALOVÁ, G. 2014. Employers' needs and preparedness of graduates-survey in the tertiary sector. Prague: the National Institute of Education.

- FUCHS, E. 2007. Entmystifizierung und Internationalisierung: Anerkennung zur gegenwärtigen Bildungsdebatte. In: PONGRATZ, L. A., R. REICHENBACH, M. WIMMER: Bildung – Wissen – Kompetenzen. Janus software Projekte GmbH: Bielefeld 2007, pp. 136 – 154.
- HAVLÍČKOVÁ, D.and ŽÁRSKÁ, K. 2012. *Competences in non-formal education*. Prague: the National Institute of Children and Youth 2012.
- JEDLIČKOVÁ, I. 2006. Introduction into andragogy. Institute of Interdisciplinary Studies. KNOTOVÁ, D. 2013. Non-formal interest education of adults in spare time. Studia paedagogika. Vol. 54, No. 11, pp. 67 78.
- KOTÝNEK, J. 2013. The educational level of the population in the Czech Republic and its findings in broader perspectives. In: *Demografie*, 2013, Vol. 55, No. 3, pp. 220-223.
- KOUCKÝ, J. and ZELENKA, M. 2013. Context, consequences of educational explosion. Transformations of levels of education, social inequalities, literacy and graduates' employment. In J. Straková and A. Veselý (Eds.), *Prerequisites for success in work and in life. Results of an international study of adults*. OESD PIAAC, p. 195-222. Prague: MŠMT.
- Life-long learning strategy of the Czech Republic. 2007. Ministry of Education, Youth and Sports: Prague.
- MUŽÍK, J. 1999. Professional adult education. Prague: Aspi Publishing. PLAMÍNEK, J. 2010. Adult education. Grada Publishing a.s.
- PLAMÍNEK, J., Adult education, guide for lecturers, participants and contractors. 2nd enlarged edition, Publisher: Grada, 2014.
- POTŮČEK, M. 2009. Anticipations of the contexts of the parallel crisis of governance, economics and social sciences. The speech of the Centre for Social and Economic Strategies, Faculty of Social Sciences of Charles University in Prague at the International scientific conference FSF. Šlapanice, Vol. 22, No. 1.
- PRŮCHA, J. A VETEŠKA, J. 2012. Andragogic dictionary. Grada Publishing. a.s.
- PRŮCHA, J. 2014. Education of the Czechs and challenges for the theory of pedagogy. In: *Pedagogická orientace*. Vol. 24, No. 2, pp. 275 281.
- RABUŠICOVÁ, M. Place of adult education in the concept of life-long learning. In: *Studia pedagogica*, Vol. 54, No. 11, pp. 13–26.
- RABUŠICOVÁ, M., RABUŠIC, L. Do we learn through our all life? On the adult education in the Czech Republic. Brno: Masaryk University.
- J. STRAKOVÁ A., A. VESELÝ (Eds.), Prerequisites for success in work and in life. Results of an international study of adults OESD PIAAC, pp. 195-222. Prague: Ministry of Education, Youth and Sports, 2013.
- SÜSSMUTH, R. Lebenslanges Lernen– Relevanz und Stellenwert. In: K. W. SCHÖNHERR, T. ŠERÁK, M. 2012. *Lifelong-learning and social policy: bonds and overlaps*. Prague: Association of institutions educating the adults in the Czech Republic.
- TIBERIUS. 2014. Lebenslanges Lernen. Springer Fachmedien Wiesbaden, 2014. pp. 11-17.
- VETEŠKA, J. 2008. Competences in education. Grada Publishing a.s.
- VETEŠKA, J. 2013. Trends and possibilities of further professional education. Prague: Czech Andragogic Society.
- VETEŠKA, Jaroslav and Michaela TURECKIOVÁ. *Competences in education*. Publ. 1. Grada, 2008, pp. 159. Pedagogika (Grada).

E-commerce as a Factor Supporting the Competitiveness of Small and Medium-Sized Manufacturing Enterprises

EMILIA BROŻYNA¹ – GRZEGORZ MICHALSKI² – JOANNA SOROCZYŃSKA³ Wroclaw University of Economics, Faculty of Economic Sciences Poland

Abstract

Competition and competitiveness in the economy are among the most commonly used, but poorly defined concepts. Competing brought a big contribution to improving the quality of life and prosperity. In addition to competing economic life is regarded as a source of mobilization and creativity of the people in every sphere of life. As much as 99% of companies in Europe belongs to the small and medium-sized enterprises. They have the greatest impact on economic growth, employment and innovation. Small and medium-sized enterprises provide two out of three jobs in the private sector and are significant for the European economy.

Key words: E-commerce, Enterprise Competitiveness, Competitive Advantage, Small and Medium Enterprises

JEL Classification: M41, O1, P45, N5

1 Introduction

Popularity of research on the competition dates back to the seventies of the twentieth century. Then over a period of post-war prosperity and capitalist economies entered a phase of economic turbulence (Daszkiewicz, 2008). Symptoms of increase structural constraints observed in the second half of the sixties. Turning points in the global economy were the events of the first half of the seventies, such as a currency crisis and the crisis of fuel and energy. They have contributed significantly to the emergence of long-unprecedented negative phenomena: unemployment and inflation. However, it is difficult to say whether this was the cause of interest to researchers competition issues. According to other sources, is how American economists were the first to determine the degree of competitiveness of competing economies, the United States of America and Japan. The background for this research was fierce commercial battle between companies of these two countries (Olczyk, 2008).

Competition concepts were developed by such classics of economics as JS Mill, D. Richardo, or A. Smith. There are many items of literature on the research level of competition and its determinants in terms of specific countries or industries. However, the main concern of economists dealing with competition is the lack of a single, universally accepted definition of this phenomenon (Daszkiewicz, 2008). The term "competition" comes from the Latin phrase

² doc. Mgr. PhD Grzegorz Michalski, ul. Komandorska 118/120, 53-345 Wrocław, Poland,

¹ MA Emilia Brożyna, ul. Komandorska 118/120, 53-345 Wrocław, Poland, emilia.brozyna@ue.wroc.pl

grzegorz.michalski@ue.wroc.pl

³ MA Joanna Soroczyńska, ul. Komandorska 118/120, 53-345 Wrocław, Poland, joanna.soroczynska@ue.wroc.pl

concurrere, which means "run together". However, the substantive meaning of this concept is different and comes down to contest between the rivals.

Competition can be seen as a process in which market participants carrying out their agreed objectives represent better deals than other entities, due to the factors influencing the decision of the transaction. These factors can include, among others price, quality, delivery terms (Yang et al. 2010). Competition is a phenomenon characterized by certain types of relationships between entities that are covered by this phenomenon (Sosna et al. 2010). These relationships are based on competing. For despite the obstacles created by competitors achieve their goals, the organization must be competitive. Generally it can be assumed that competitiveness is a trait of participants of competition. In the literature definition of competitiveness it is rare and, when it is most common in regard to the macro-economic entities such as countries or individual sectors of the economy. None of the definition of competitiveness has not received widespread acceptance from economists studying this issue (Olczyk, 2008). Even a subject matter expert as M. Porter in his book The Competitive Advantage of Nations does not define the phenomenon of competitiveness directly, although this term is used repeatedly (Daszkiewicz, 2008).

Competitiveness is usually characterized as a feature relative, appearing by comparing products or companies. This category is seen on many levels. It is a relationship business entity and its potential, capabilities and skills to the market structure and, acting on its strategic opportunities. Competitiveness can also be understood as the ability to long-term and sustainable growth. It is also referred to as a property of the organization, which consists in maintaining high efficiency and productivity. Competitiveness is the ability to efficiently pursue the objectives on market competitiveness is the ability to cope with international competition. It is also considered that the survival and development of the organization determines the market in which products find or not their customers. There is therefore a definition that competitiveness is a permanent ability to design, manufacture and sell products whose quality, price, and other qualities are more attractive than the corresponding products offered by domestic and foreign competitors (Michalski, Brozyna and Soroczynska, 2015).

With many existing in the literature definition of competitiveness the most precise is definition proposed by the World Economic Forum in Lausanne in 1994. Competitiveness is defined as "the ability of a country or company to create greater wealth than their competitors on the world market". In a number of approaches to competitiveness does not stand out of the entity to compete and treats the phenomenon described in a relative manner. An example is the one with the OECD definition, which describes the "competitiveness means both the ability of companies, industries, nations, regions or supranational groupings to face international competition and to provide a relatively high rate of return on the used factors of production and relatively high employment on a sustainable basis".

According to Porter striving to explain competitiveness on a national level is the search for answers to the wrong question. More important is to understand the determinants of efficiency and its rate of growth. To do this, you should focus attention not on the national economy as a whole, but to specific sectors and segments. Competitiveness is created at the enterprise level, but there must be some deeper reasons which make the the country is a favorable location for companies competing on an international scale. Porter notes that the success of the competition is influenced by differences in economic structures, national values, culture, institutions and history (Porter, 1998).

Austrian perspective and resource advantage theory shows the market as a mechanism that allows firms to employ their unique resources (Hunt and Morgan, 1995) and take a series of actions to gain comparative and temporary advantages until competitors fight back (Rindova, Ferrier, and Wiltbank, 2010).

Some economists claim that in recent times, sustainability has become increasingly important for research and business practice, as well as to obtain a competitive advantage in the markets (Dao, Langella and Carbo, 2011). In turn, in the strategy literature emerged alternative to sustainable models of competitive advantage. It is creation and management of temporary competitive advantages (D'aveni, Dagnino and Smith, 2010).

The competitiveness of small and medium-sized enterprises is closely related with the possibility of introducing innovation in them. According to M. Porter's competitive advantages is only possible through innovation, and the ability of the industry to innovate and to improve the technological level determines the competitiveness of the economy. Therefore, in today's economic research as an important issue is to determine the relationship between competitiveness and innovation activities of enterprises.

2 Methodology

The test procedure is based on the method of multiple case studies. The research will be small and medium-sized manufacturing companies implementing online sales. The project will be mainly used methods of descriptive statistics and financial analysis. Empirical data are derived from the financial statements of companies operating in European countries. Selected research units will differ from each other in terms of market offer and the number of employees.

An in-depth financial analysis reports will focus in particular on measuring the effectiveness of activities. In addition, literature studies and analysis of extensive statistical data will allow for the emergence of strategic factors affecting the competitiveness of enterprises operating in the field of internet commerce. This will allow to assess the impact of factors specific to the investigated company on the relationship between the use of modern forms of sales and competitive advantage.

3 Results

To performing the studies selected 397 companies that belong to the agribusiness sector: food production, agriculture, production using animal materials. Were selected after a detailed check the 69 companies currently leading an online store. Only 53 of the selected companies belong to the sector of small and medium companies. The data obtained were compared to the values obtained by the company not carrying out on-line sales. For companies selling online was such that only lead online store or such which in addition to the traditional sales channel is also equipped with an online store. Depicted in the study division of companies leading and is not leading online store was created in 2015 on the basis of the information available in the month of April and May.

I able 1 Mean, Median, Standard Deviation, Coel	inclent of variation	for selected I	naicators (20	10-2013)
	Mean	Median	Std. Dev.	Coeff. of var.
operating profitability of assets 2013 online	30.54310	0.0940	46.7757	153.147
operating profitability of assets 2012 online	24.82298	0.0498	43.8434	176.624
operating profitability of assets 2011 online	26.72874	0.0623	44.9253	168.079
operating profitability of assets 2010 online	24.84260	0.0770	43.8321	176.439
operating profitability of assets 2013 stationery	16.88257	0.0585	37.6917	223.258
operating profitability of assets 2012 stationery	9.05275	0.0479	28.8214	318.372
operating profitability of assets 2011 stationery	10.23302	0.0490	30.4451	297.518
operating profitability of assets 2010 stationery	16.10602	0.0583	36.9729	229.560
profitability of own capital 2013 online	22.93483	0.0854	42.6449	185.939
profitability of own capital 2012 online	27.14391	0.0538	44.7909	165.013
profitability of own capital 2011 online	26.85042	0.0781	44.8613	167.079
profitability of own capital 2010 online	24.83626	0.0951	43.8360	176.500
profitability of own capital 2013 stationery	10.19992	0.0771	30.1698	295.785
profitability of own capital 2012 stationery	9.03495	0.0696	28.8452	319.262
profitability of own capital 2011 stationery	10.28951	0.0828	30.4288	295.726
profitability of own capital 2010 stationery	16.18912	0.0923	36.9411	228.185
economic viability of sale 2013 online	40.07163	0.1390	49.8300	124.352
economic viability of sale 2012 online	34.35143	0.0893	48.2536	140.470
economic viability of sale 2011 online	38.15947	0.1235	49.3895	129.429
economic viability of sale 2010 online	32.46402	0.1207	47.5476	146.463
economic viability of sale 2013 stationery	34.10470	0.1080	47.8081	140.180
economic viability of sale 2012 stationery	25.09658	0.0737	43.6813	174.053
economic viability of sale 2011 stationery	25.11138	0.0796	43.6727	173.916
economic viability of sale 2010 stationery	25.89201	0.0762	44.1216	170.406
liquidity first degree 2013 online	9.44593	0.7918	26.8120	283.848
liquidity first degree 2012 online	2.07177	0.8104	4.4532	214.945
liquidity first degree 2011 online	11.81130	0.6206	64.9613	549.993
liquidity first degree 2010 online	3.60533	0.6297	14.3924	399.196
liquidity first degree 2013 stationery	7.96342	0.3825	25.6531	322.136
liquidity first degree 2012 stationery	1.04629	0.2857	3.5134	335.798
liquidity first degree 2011 stationery	19.34936	0.2951	293.8932	1518.879
liquidity first degree 2010 stationery	1.02581	0.2943	3.5435	345.432
liquidity second degree 2013 online	27.98791	1.0495	44.5499	159.175
liquidity second degree 2012 online	14.70048	0.4277	34.2425	232.935
liquidity second degree 2011 online	4.54444	0.3893	87.6346	1928.391
liquidity second degree 2010 online	16.33624	0.5784	36.3562	222.550
liquidity second degree 2013 stationery	12.52483	0.0101	32.9778	263.299
liquidity second degree 2012 stationery	6.67337	-0.0963	24.4938	367.038
liquidity second degree 2011 stationery	11.80532	-0.0717	116.2310	984.565
liquidity second degree 2010 stationery	5.89373	-0.0920	23.0113	390.437
repayment of debts in days 2013 online	75.67913	101.0000	42.3135	55.912
repayment of debts in days 2012 online	68.93167	85.2298	46.0071	66.743
repayment of debts in days 2011 online	71.74470	99.9019	43.2886	60.337
repayment of debts in days 2010 online	74.41157	94.0994	43.1893	58.041
repayment of debts in days 2013 stationery	88.31276	89.0568	145.7760	165.068
repayment of debts in days 2012 stationery	79.68535	81.9777	59.3737	74.510
repayment of debts in days 2011 stationery	76.65118	79.4040	50.6774	66.114
repayment of debts in days 2010 stationery	81.27179	96.5367	46.1425	56.776

1 able 1 Mean, Meulan, Standard Deviation, Coefficient of variation for selected indicators (2010-20	Table 1 Mean,	Median,	Standard Deviation,	Coefficient of variation	for selected indicators	(2010-2013)
--	---------------	---------	---------------------	---------------------------------	-------------------------	-------------

Source: Own study based on data from 397 firms operating in agribusiness sector: food production, agriculture, production using animal materials reported in Database Amadeus, [date of release: 2014 DEC 10]

Depending on type of the entity, economic environment of the entity influence both efficiency and liquidity levels (Bartak and Gavurova, 2014; Bem and Michalski, 2014; Gavurova, 2011; Kulhanek and Uherek, 2003; Michalski, 2016; Qineti et al., 2011; Raisova et al., 2014; Mura et al., 2015; Soltes and Gavurova, 2013). Cash management is an answer of enterprise on the operational risk and that answer depends on type of entity (Vacekova and Svidronova, 2014; Uzik and Soltes, 2009; Bem et al., 2014b; Gavurova, 2012; Michalski, 2012; Soltes, 2010; Svidronova, 2013). If there is no risk, then is no need for maintaining cash at all. Operational risk is a result of many indicators (Michalski, 2009; Michalski, 2013; Michalski, 2014; Soltes and Gavurova, 2014; Soltes and Rusnakova, 2013). Generally, we can say, that at first is possible to list internal sources of operational risk and external sources of it (Bem et al., 2014a; Bem et al., 2014c; Gavurova and Hyranek, 2013; Gavurova, Soltes, and Balloni, 2014). Here we analyse risk and cash management influence of size of the enterprise (internal source of risk), kind of operating cycle firm uses (partially internal and external operating risk factor), and business environment in which firm operates (external risk source). Such negative influences and sources of operating risk generally can be weakened by cash management. The easiest way is to hold cash in levels that covers all future needs increased from operating risk. Additional cash levels are not free. They are not cheap even now when we have small levels cost of capital. In fact, there is a bad error or mistake in thinking that now, when uncomparative cost of capital rates are low, then cost of holding cash is small. More accurate is to use comparative cost of capital rates, referenced to risk free rates levels, which are more frequently negative ones. The study showed that companies selling online they average higher scores than those who only sell stationary. In the following years, companies selling online have a higher operating profitability of assets, profitability of own capital and the economic viability of sale than companies with only stationary shops. In the case of liquidity first and second degree, this relationship is not always correct. Repayment of debts in days in individual years lower in companies online, which is a positive because of faster debt repayment. Larger standard deviation are companies that sell online, but the coefficient of variation is lower than in enterprises selling only stationary.

The next was executed t-student test to examine whether these values differ from each other statistically. The study was conducted on 53 companies selling online and selling 258 stationaries.

Variable	Mean online	Mean station ery	t-value	df	р	Vali d N onlin e	Valid N statio nery	Std. Dev. online	Std. Dev. station ery	F-ratio Variance s	P Variance s
Operating profitability of assets 2013 online vs. stationery	30.543 10	16.882 57	2.3009 06	309	0.0220 62	53	258	46.775 73	37.691 71	1.54010 2	0.03182 4
Operating profitability of assets 2012 online vs. stationery	24.822 98	9.0527 46	3.2832 81	309	0.0011 44	53	258	43.843 37	28.821 39	2.31407 8	0.00001 8
Operating profitability of assets 2011 online vs. stationery	26.728 74	10.233 02	3.2822 14	309	0.0011 48	53	258	44.925 35	30.445 05	2.17745 6	0.00007 4

Table 2 The results of the student's t-test for operating profitability of assets (2011-2013)

Source: Own study based on data from 397 firms operating in agribusiness sector: food production, agriculture, production using animal materials reported in Database Amadeus, [date of release: 2014 DEC 10]

Operating profitability of assets calculated according to the following formula:

$$Operating \ profitability \ of \ assets = \frac{operating \ P/L}{annual \ average \ assets} \tag{1}$$

According to these results, we can say that at a significance level of 0.05 average operating profitability of assets differs significantly in companies selling Internet and those who did not run. The same relation we can see in profitability of own capital.

									,		
Variable	Mean online	Mean stationer y	t-value	df	р	Valid N onlin e	Valid N station ery	Std. Dev. online	Std. Dev. station ery	F-ratio Varianc es	P Variance s
Profitability of own capital 2013 online vs. stationery	22.9348 3	10.1999 2	2.5898 82	30 9	0.010 056	53	258	42.644 89	30.169 82	1.99796 9	0.00046 3
Profitability of own capital 2012 online vs. stationery	27.1439 1	9.03494 6	3.7421 25	30 9	0.000 218	53	258	44.790 94	28.845 17	2.41120 5	0.00000 6
Profitability of own capital 2011 online vs. stationery	26.8504 2	10.2895 1	3.2978 47	30 9	0.001 088	53	258	44.861 32	30.428 76	2.17357 9	0.00007 7

 Table 3 The results of the student's t-test for profitability of own capital (2011-2013)

Source: Own study based on data from 397 firms operating in agribusiness sector: food production, agriculture, production using animal materials reported in Database Amadeus, [date of release: 2014 DEC 10]

Profitability of own capital computed according to the formula:

 $Profitability of own capital = \frac{net income}{annual average shareholders founds}$ (2)

Profitability of own capital after testing t-student, we can conclude that the difference between the average of the sample being tested and the average is statistically significant.

Table 4 The results of the student's t-test for economic viability of sale (2011-2013	3)
---	----

Variable	Mean online	Mean stationer y	t-value	df	р	Valid N online	Valid N statio nery	Std. Dev. online	Std. Dev. station ery	F-ratio Variance s	P Variance s
Economic viability of sale 2013 online vs. stationery	40.07163	34.1047 0	0.8216 43	30 9	0.411 913	53	258	49.830 01	47.808 11	1.08637 2	0.66316 5
Economic viability of sale 2012 online vs. stationery	34.35143	25.0965 8	1.3795 47	30 9	0.168 724	53	258	48.253 61	43.681 29	1.22030 6	0.32129 9
Economic viability of sale 2011 online vs. stationery	38.15947	25.1113 8	1.9361 70	30 9	0.053 759	53	258	49.389 51	43.672 68	1.27893 9	0.22237 5

Source: Own study based on data from 397 firms operating in agribusiness sector: food production, agriculture, production using animal materials reported in Database Amadeus, [date of release: 2014 DEC 10]

Economic viability of sale =
$$\frac{operating \frac{P}{L} + amortization}{sales}$$
 (3)

Differences in economic viability of sale in company's sales online and company's sales stationery are not statistically significant. P-value is higher than 0,05. The liquidity first and second degree is not always bigger in one kind of companies and t-student test shows that there is no differences which are statistically significant.

Variable	Mean online	Mean stationer y	t-value	df	р	Valid N online	Valid N station ery	Std. Dev. online	Std. Dev. station ery	F-ratio Variance s	P Variance s
Liquidity first degree 2013 online vs. stationery	9.445928	7.96342 1	0.3802 55	309	0.704 018	53	258	26.812 05	25.653 08	1.09239 8	0.64429 8
Liquidity first degree 2012 online vs. stationery	2.071774	1.04628 8	1.8435 90	309	0.066 200	53	258	4.4531 74	3.5134 15	1.60649 9	0.01818 5
Liquidity first degree 2011 online vs. stationery	11.81130	19.3493 6	- 0.1855 73	309	0.852 902	53	258	64.961 26	293.89 32	20.4677 6	0.00000 0

Table 5 The results of the student's t-test for liquidity first degree (2011-2013)

Source: Own study based on data from 397 firms operating in agribusiness sector: food production, agriculture, production using animal materials reported in Database Amadeus, [date of release: 2014 DEC 10]

Variable	Mean online	Mean stationer y	t-value	df	р	Valid N online	Valid N station ery	Std. Dev. online	Std. Dev. station ery	F-ratio Variance s	P Variance s
Liquidity second degree 2013 online vs. stationery	27.98791	12.5248 3	2.9134 90	309	0.003 835	53	258	44.549 88	32.977 77	1.82494 8	0.00250 8
Liquidity second degree 2012 online vs. stationery	14.70048	6.67336 8	2.0170 96	309	0.044 550	53	258	34.242 55	24.493 80	1.95442 9	0.00071 4
Liquidity second degree 2011 online vs. stationery	4.544441	11.8053 2	- 0.4301 36	309	0.667 397	53	258	87.634 60	116.23 10	1.75910 9	0.01587 9

 Table 6 The results of the student's t-test for liquidity second degree (2011-2013)

Source: Own study based on data from 397 firms operating in agribusiness sector: food production, agriculture, production using animal materials reported in Database Amadeus, [date of release: 2014 DEC 10]

$$Liquidity \ first \ degree = \frac{net \ current \ assets}{current \ liabilitiess} \tag{4}$$

$$Liquidity \ second \ degree = \frac{net \ current \ assets - stock - short \ term \ prepayments}{current \ liabilitiess} \tag{5}$$

Only in 2013 and 2012, liquidity of second degree has a significant relationship. In subsequent years, these results can be repeated and prove the truth of the thesis of greater liquidity of second degree in companies selling online.

			-								
Variable	Mean online	Mean stationer y	t-value	df	р	Valid N online	Valid N station ery	Std. Dev. online	Std. Dev. statio nery	F-ratio Variance s	P Variances
Repayment of debts in days 2013 online vs. stationery	75.6791 3	88.3127 6	- 0.6248 15	30 9	0.532 553	53	258	42.313 51	145.7 760	11.8689 9	0.000000
Repayment of debts in days 2012 online vs. stationery	68.9316 7	79.6853 5	- 1.2435 0	30 9	0.214 626	53	258	46.007 08	59.37 367	1.66547 6	0.028715
Repayment of debts in days 2011 online vs. stationery	71.7447 0	76.6511 8	- 0.6571 03	30 9	0.511 604	53	258	43.288 58	50.67 745	1.37051 2	0.172510

Table 7 The results of the student's t-test for repayment of debts in days (2011-2013)

Source: Own study based on data from 397 firms operating in agribusiness sector: food production, agriculture, production using animal materials reported in Database Amadeus, [date of release: 2014 DEC 10]

$$repayment of debts in days = \frac{average \ receivables \ x \ 365}{sales} \tag{6}$$

Despite the far higher average repayment of debts in days study has shown that the differences are not statistically significant. P-value is not lower than 0.05 which is assumed critical value.

4 Conclusion

Conducted theoretical considerations lead to the conclusion that the opportunity to gain competitive advantage and achieve a favorable competitive position is identified in the literature with the ability and the ability to generate value for the stakeholders of the company. The ability to create market value, which is taking action to achieve the maximum value the company by the market, combined with a measure of competitiveness. High value generated is therefore a manifestation of the company's competitiveness relative to its stakeholders. On the other hand, to be competitive is an opportunity to create value.

It is worth underlining that competitiveness has always been an important prerequisite for the success of businesses. Therefore, the key task is to ensure the management of the desired level of competitiveness. Competitive business should be internally ability and flexibility to adapt to changing operating conditions and obtain the benefits from this process. Competitiveness does not arise spontaneously and automatically as a result of changes in the micro and macro-environment.

Acknowledgements

The presented work and results is part of monothematic cycle realized as part of grant supported by National Science Centre, and financed from the Polish budget resources in the years 2015-2018 as the research project DEC-2014/13/B/HS4/00192.

References

BARTAK, M. and GAVUROVA, B. 2014. Economics and social aspects of long-term care in the context of the Czech Republic and the Slovak Republic EU membership. In: 12th

International Scientific Conference, Economic Policy in the European Union Member Countries, Ostravice.

- BEM, A. and MICHALSKI, G. 2014. *The financial health of hospitals. V4 countries case*. Sociálna ekonomika a vzdelávanie. Banska Bystrica, 2014, pp. 1-8.
- BEM, A., PREDKIEWICZ, K., PREDKIEWICZ, P. and UCIEKLAK-JEZ, P. 2014b. Hospital's Size as the Determinant of Financial Liquidity. In: *European Financial Systems 2014, Brno: Masaryk University, 41-48.*
- BEM, A., PREDKIEWICZ, K., PREDKIEWICZ, P. and UCIEKLAK-JEZ, P. 2014a. Determinants of Hospital's Financial Liquidity. In: *Procedia Economics and Finance*, Vol. 12, pp. 27-36.
- BEM, A., PREDKIEWICZ, K., PREDKIEWICZ, P. and UCIEKLAK-JEZ, P. 2014c. Health System's Financing Inequalities in Selected European Countries. In: *European Financial Systems 2014*, Brno: Masaryk University, 34-40.
- BURGUILLO, J. 2010. Using Game Theory and Competition-Based Learning to Stimulate Student Motivation and Performance. In: *Computers and Education*. Vol. 55, No. 2, pp. 566-575.
- DAO, V., LANGELLA, I. and CARBO, J. 2011. From Green to Sustainability: Information Technology and an Integrated Sustainability Framework. In: *Journal of Strategic Information Systems*. Vol. 20, No. 1, pp. 63-79.
- DASZKIEWICZ, N. 2008. Konkurencyjność: poziom makro, mezo i mikro. Warsaw: Wydawnictwo Naukowe PWN.
- D'AVENI, R., DAGNINO, G. and SMITH, K. 2010. The Age of Temporary Advantage. In: *Strategic Management Journal*. Vol. 31, No. 13, pp. 1371-1385.
- GAVUROVA, B. 2011. The Balanced Scorecard System in Enterprise Management. In: *Ekonomicky casopis*, Vol. 59, No. 2, pp. 163-177.
- GAVUROVA, B. 2012. Source Identification of Potential Malfunction of Balanced Scorecard System and Its Influence on System Function. In: *E+M Ekonomie a Management*. pp. 76-90.
- GAVUROVA, B. and HYRANEK, E. 2013. Determinants of Day Health Care Development in Slovakia. In: *Ekonomicky casopis*. pp. 134-154.
- GAVUROVA, B., SOLTES, M. and BALLONI, A. 2014. The Economic Importance of Using of ICT in the Health System. In: *Ekonomicky casopis*. pp. 83-104.
- HARRISON, J., BOSSE, D. and PHILLIPS, R. 2010. Managing for Stakeholders, Stakeholder Utility Functions, and Competitive Advantage. In: *Strategic Management Journal*. Vol. 31, No. 1, pp. 58-74.
- HUNT, S. and MORGAN, R. 1995. The Comparative Advantage Theory of Competition, In: *Journal of Marketing*. Vol. 59.
- JUSTINIANO, A., PRIMICERI, G. and TAMBALOTTI, A. 2010. Investment Shocks and Business Cycles. In: *Journal of Monetary Economics*. Vol. 57, No. 2, pp. 132-145.
- KULHANEK, L. and UHEREK, D., 2003. Globalization, financial system and equity market linkages in transition countries. In: *Ekonomska Istrazivanja*, Vol. 16, No. 2, pp. 55-67.
- MICHALSKI, G. 2009. Inventory management optimization as part of operational risk management. In: *Economic Computation and Economic Cybernetics Studies and Research*, pp. 213-222.

- MICHALSKI, G. 2012. Efficiency of accounts receivable management in Polish institutions. In: *European Financial Systems 20*12, Brno: Masaryk University, pp. 148-153.
- MICHALSKI, G. 2013. Financial consequences linked with investments in current assets: Polish firms case. In: *European Financial Systems 2013*, Brno: Masaryk University, 213-220.
- MICHALSKI, G. 2014. Value maximizing corporate current assets and cash management in relation to risk sensitivity: Polish firms case. In: *Economic Computation and Economic Cybernetics Studies and Research*, pp. 259-276.
- MICHALSKI, G. 2016. Full operating cycle influence on food and beverages processing firms characteristics. In: *Agricultural Economics Zemedelska Ekonomika*. Vol. 62.
- MICHALSKI, G., BROZYNA, E. and SOROCZYNSKA, J. 2015. Cash Levels and its Role in Full Operating Cycle Enterprises: 2005-2013 Czech, Slovak, Hungarian and Polish Enterprises Case. In: European Financial Systems 2015. Proceedings of the 12th International Scientific Conference, Brno: Masaryk University, 2015, pp. 382-390.
- MURA, L., BULECA, J., HAJDUOVA, Z. and ANDREJKOVIC, M., 2015. *Quantitative financial analysis of small and medium food enterprises in a developing country, Transformations in Business and Economics*, pp. 212-224.
- NYAGA, G., WHIPPLE, J. and LYNCH, D. 2010. Examining Supply Chain Relationships: Do Buyer and Supplier Perspectives on Collaborative Relationships Differ? In: *Journal of Operations Management*. Vol. 28, No. 2, pp. 101-114.
- OLCZYK, M. 2008. Konkurencyjność: teoria i praktyka. Warsaw: CeDeWu.
- PAVLOU, P. and SAWY, O. 2010. The Third Hand: IT-Enabled Competitive Advantage in Turbulence through Improvisational Capabilities. In: *Information Systems Research*. Vol. 21, No. 3, pp. 443-471.
- PERES, R., MULLER, E. and MAHAJAN, V. 2010. Innovation Diffusion and New Product Growth Models: A Critical Review and Research Directions. In: *International Journal of Research in Marketing*. Vol. 27, No. 2, pp. 91-106.
- PORTER, M. 1998. *The Competitive Advantage of Nations: With a New Introduction*. MacMillan Press.
- QINETI, A. et al. 2011. Looking for the evidence of socio-economic convergence within the European Union. In: *Agricultural Economics-Zemedelska Ekonomika*, Vol. 57, pp. 384-393.
- RAISOVA, M., BULECA, J. and MICHALSKI, G., 2014. Food processing firms inventory levels in hard times. 2004-2012 Slovak, Czech and Polish enterprises case. In: *Procedia Economics and Finance*. Vol. 12, pp. 557-564.
- RINDOVA, V., FERRIER, W. and WILTBANK, R. 2010. Value from Gestalt: How Sequences of Competitive Actions Create Advantage for Firms in Nascent Markets. In: *Strategic Management Journal*, Vol. 31, No. 13.
- SHANKAR, V., VENKATESH, A., HOFACKER, C. and NAIK, P. 2010. Mobile Marketing in the Retailing Environment: Current Insights and Future Research Avenues. In: *Journal of Interactive Marketing*. Vol. 24, No. 2, pp. 111-120.
- SOLTES, M. 2010. Relationship of speed certificates and inverse vertical ratio call back spread option strategy. In: *E+M Ekonomie a Management*, Vol. 13, No. 2, pp. 119-124.

- SOLTES, V. and GAVUROVA, B. 2013. Application of the cross impact matrix method in problematic phases of the Balanced Scorecard system in private and public sector. In: *Journal of Applied Economic Sciences*, Vol. 8, No. 1, pp. 99-119.
- SOLTES, V. and GAVUROVA, B. 2014. The Functionality Comparison of the Health Care Systems by the Analytical Hierarchy Process Method. In: *E+M Ekonomie a Management*, Vol. 17, No. 3, pp. 100-118.
- SOLTES, V. and RUSNAKOVA, M. 2013. Hedging against a price drop using the inverse vertical ratio put spread strategy formed by barrier options. In: *Inzinerine Ekonomika-Engineering Economics*, Vol. 24, No. 1, pp. 18-27.
- SOSNA, M., TREVINYO-RODRIGUEZ, R. and VELAMURI, S. 2010. Business Model Innovation through Trial-and-Error Learning: The Naturhouse Case. In: *Long Range Planning*. Vol. 43, No. 2, pp. 383-407.
- SPIUTHOVEN, A., CLARYSSE, B. and KNOCKAERT, M. 2010. Building Absorptive Capacity to Organise Inbound Open Innovation in Traditional Industries. In: *Technovation*. Vol. 30, No. 2, pp. 130-141.
- SVIDRONOVA, M. 2013. Sustainability Strategy of Non-Government Organisations in Slovakia, In: *E+M Ekonomie a Management*, Vol. 16, No. 3, pp. 85-100.
- UN, C., CUERVO-CAZZURA, A. and ASAKAWA, K. 2010. R&D Collaborations and Product Innovation. In: *Journal of Product Innovation Management*. Vol. 27, No. 5, pp. 673-689.
- UZIK, M. and SOLTES, V. 2009. The Effect of Rating Changes on the Value of a Company Listed in the Capital Market, In: *E+M Ekonomie a Management*, Vol. 12, No. 1, pp. 49-58.
- VACEKOVA, G. and SVIDRONOVA, M. 2014. Benefits and risks of self-financing of NGOS empirical evidence from the Czech Republic, Slovakia and Austria. In: *E+M Ekonomie a Management*, 17, No. 2, pp. 120-130.
- WEST, J. and MACE, M. 2010. Browsing as the Killer App: Explaining the Rapid Success of Apple's iPhone. In: *Telecommunications Policy*. Vol. 34, No. 5, pp. 270-286.
- YANG, C., LIN, S., CHAN, Y. and SHEU, C. 2010. Mediated Effect of Environmental Management on Manufacturing Competitiveness: An Empirical Study. In: *International Journal of Production Economics*. Vol. 123, No. 1, pp. 210-220.

Use of Smartphones during Purchasing Process

JOZEF BUCKO¹ – LUKÁŠ KAKALEJČÍK² – ĽUDOVÍT NASTIŠIN³ ^{1,2} Technical University of Košice, Faculty of Economics Slovak Republic ³ University of Prešov in Prešov, Faculty of Management Slovak Republic

Abstract

Mobile devices represents hardware that is used by the majority of Internet users. This is the reason why mobile optimization should be in minds of web and marketing professionals. The main aim of the paper is to define the current state of mobile devices use with the primary focus on smartphones based on secondary data, and then analyse and describe smartphone use in purchasing process based on data gained from questionnaire survey. The results of study indicated that majority of users belonging to Generation Y use the combination of mobile and table devices in particular ratio. Furthermore, users use smartphones in order to execute various activities during purchasing process. There was not found significant difference in table/mobile device usage and neither smartphone usage during purchasing process between genders.

Key words: Mobile Marketing, Mobile Devices, Purchasing Process, Generation Y

JEL Classification: M31, O33

1 Introduction

Constant development of technologies and communication tools allows marketers to use new forms of promotion (Štefko, Bačík and Fedorko, 2013). In the world of World Wide Web used only via table computers or laptops, mobile devices had been underestimated. It was unimaginable to transform a page of a size of a list of paper into post stamp represented by the screen of a smartphone (Krug, 2014). Since the dilemma was broken, the opportunity for marketers has arised. As mobile devices are mobile, portable, companies can now reach and interact with their audience anywhere they have some form of Internet connection (Rowles, 2013). By 2014, 70% of adults located in the U. S. have smartphone (Orem, 2015). This is the new challenge for companies to take mobile devices into account during creation of each touch point with their potential customers. This is an important step connected to the fundamental philosophy of marketing, which discuss the efficiency of communication (Ferencová, Misencíková and Kot, 2014).

2 Review of literature and current state of discussed issue

Expansion of use of the Internet on mobile devices contributed to the development of mobile marketing. Even Google reacted to the mobile expansion by placing mobile-friendly websites to the higher positions within the search engine results page since April 21, 2015 (Makino, Jung and Phan, 2015). Mobile marketing is regarded as a form of marketing communication, which is

¹ doc. RNDr. Jozef Bucko, PhD., Němcovej 32, 040 01 Košice, Slovak Republic, jozef.bucko@tuke.sk

² Mgr. Lukáš Kakalejčík, Němcovej 32, 040 01 Košice, Slovak Republic, lukas.kakalejcik@tuke.sk

³ Ing. Ľudovít Nastišin, Konštantínova 16, 080 01 Prešov, Slovak Republic, ludovit.nastisin@gmail.com

displayed on mobile devices (Richardson, 2013). Kaplan (2012) defines mobile marketing as any marketing activity conducted through a ubiquitous network to which consumers are constantly connected using a personal mobile devices. Another view on the issue offer Becker and Arnold (2010), who define mobile marketing as the sum of practices that enable organizations to communicate and engage their audience in an interactive and relevant manner through a mobile device or network. Mobile commerce is a concept in which products are sold and purchased via mobile devices (Tan, 2013) and constitutes mobile devices usage within a business operation (Stair and Reynolds, 2014). Samuelsson and Dholakia (2003) further argue that mobile business provides opportunities to reach customers on more locations for the purpose of personalization of services offered in a new way.

Companies that want to build and promote a brand and gain pleasureable reputation are required to apply right marketing tools (Dorčák, Pollák and Svetozarovová, 2015). Under the market pressure, companies are forced to adapt their communication channels so as to be able to quickly and efficiently display information on smaller screens of mobile devices (Scott, 2013). According to Tan (2013) a mobile optimized website is the one that allows a smooth displaying on a mobile device. For this purpose, a mobile version of a website or responsive design can be created (Krug, 2014). Mobile version of a website is a simplified website customized for requirements of mobile devices. It is usually located on a separate subdomain (Firtman, 2013). It is simplified because users accessing it are usually only interested in certain parts of it, not its full contents (Hopkins and Turner, 2012). On the other hand, responsive web design means that content of a website fits the screen size of a device used (Casabona, 2013). Responsive design is usually a better choice as it performs well on all devices and requires less maintenance in the medium term (Peterson, 2014). At present, in addition to optimized websites, mobile applications reflecting content of a website are also used for B2C communication. These applications are designed to meet user requirements addressed to companies that provide these applications (Pulizzi, 2014). According to Grant and Meadows (2012) the use of mobile wallets is, mobile banking and mobile shopping is on the rise. Because many customers purchase products online, providing a mobile application can improve their experience with a result of willingnes to purchase with the use of application (Jones, 2011). Amazon, for example, provides a purchasing application for its customers (Gookin, 2014). Speaking of mobile applications, it is important to note that for advertisers they represent a new place for their advertising (Marshall and Rhodes, 2014). Advertising in a mobile application is a form of interactive promotion, which is displayed in a mobile application in various forms (Brown, 2014).

Google Shopper Marketing Council (2013) conducted a survey between October and December 2012 on a sample of 1,507 smartphone owners. 62% of standard customers using smartphones indicated that they use their smartphones as an assistant when buying at least once a month. 17% of customers using smartphones indicated that they use their smartphones for purchasing at least once a week, while agree that use their smartphones for products research. 90% of respondents said they used their mobile phones for pre-purchase activities. The survey further claims that comparing prices during purchase is the most common activity across all categories. Inmar (2014) conducted a survey of 1,091 respondents aged 18 to 69 years in January 2014. According to the survey 66% of users, who expressed an interest in digital coupon, using smartphones. 44% of respondents would like to be able to submit a coupon when buying using a mobile phone. 39% of respondents would like to receive coupons for goods which they purchase regularly, directly

on their mobile phones. Holmes, Byrne and Rowley (2014) and Wang, Malthouse and Krishnamurthi (2015) focus on the similar topic within their research interest.

3 Objectives and methods

The main aim of the paper is to define the current state of mobile devices use with the primary focus on smartphones based on secondary data, and then analyse and describe smartphone use in purchasing process based on data gained from questionnaire survey. By decomposition of the main aim, 2 partial aims were defined. The first partial aim is focused on determination of ratio of table devices use compared to mobile devices use when connecting to the Internet. Within the second partial aim, we would like to identify how users use their smartphones in order to accomplish selected activities connected to purchasing process. Based on the information in academic literature (Parment, 2011), the collection of primary data was aimed at the most active group of potential customers - generation Y customers (i.e. born between 1980-1995). Based on objective of survey two hypotheses were formulated:

H1: Gender influences the ratio of table/mobile devices use.

H2: Gender influences the use of smartphones during purchasing process.

3.1 Sample, material, procedure and data analysis

Total of 413 respondents participated on the survey, and 331 respondents were selected for further processing (members of the Generation Y group based on age). 214 women and 117 men took part. The age of respondents ranged between 20 and 28 years, while the average age was 23.21 years. The median was at 23 years and the resulting standard deviation was 1.96. For purposes of the analysis the sample consisted of full-time and part-time students of the Faculty of Management of the University of Prešov, Faculty of Economics and Faculty of Electrical Engineering and Computer Science of the Technical University of Košice who by the time of the survey owned a Facebook profile, and at the same time were members of at least one of several dozens of visible groups connected with a given faculty on Facebook. The participants formed a selected sample of potential, as well as existing customers actively using the Internet and social networks, localized on the target market.

A questionnaire survey was carried out in order to collect empirical material. The questionnaire was designed using Google Documents online platform and included a total of 9 questions, seven of which were closed questions, one was an open-ended and one a semi-open question. A digital-version of the questionnaire was distributed in January 2015. The data were analysed using the software Statistica and Microsoft Excel. Beacause the data are not normally distributed, nonparametric statistical methods were used for the analysis of data. For the detection of differences between gender, Mann-Whitney test was used. Data were also analysed using descriptive statistics (donut chart) and characteristics (mean, median).

4 Results and discussion

Based on the first partial aim, the focus of our efforts was oriented to determination of ratio between table and mobile devices usage when participants connect to the Internet. As you can see on the Figure 1, the majority of respondents (54.69%) uses mobile and table devices equally. 24.77% of respondents mostly use table devices. On the other hand, mobile devices are mostly used by 16.92% survey participants. Mobile devices only and table devices only are used by the same portion of respondents – 1.81%. As you can see from the results, 98.19% of respondents

use mobile devices when connecting to the Internet. Moreover, 96.38% of study participants use both type of devices in particular ratio. We consider this as a pain point for website analysts, who may have a problem to properly track user activities with use of digital analysis. As users might join the website from several devices, as long as the analyst cannot pair the devices (e. g. via registration), analyst see one user as several users, depending on number of devices used by user. This event can lower the quality and accuracy of gathered data and may cause false marketing decisions.



Figure 1 Distribution of usage of desktop and mobile devices among the respondents

After defining the usage of mobile versus table devices, we tested the significancy of this usage based on gender. By testing hypothesis H1 at the significance level of $\alpha = 0.05$, we couldn't reject the null hypothesis because of p-value = 0.241657. There is not significant difference in table/mobile device use when connecting to the Internet between men and women.

Table 1 Gender difference when executin	g selected activities with s	smartphone during	purchasing process
Tuble I Genuel unter ence when exceuting		smar epitone aaring	pur chusing process

Activity	U	Z	p-value
Product information search	11811.00	0.850057	0.395294
Visits of seller's website	11313.00	1.448402	0.147506
Search for reviews and recommendatitions	12403.00	0.138773	0.889630
Search for the store near by user	11093.00	1.712730	0.086763
Visit of deal site	11093.00	1.712730	0.086763
Price comparison	9866.00	3.186964	0.001438*
Online product research	9943.00	3.094449	0.001972*
Price comparison while shopping at store	8342.00	5.018042	0.000001*
Use of shopping app	10325.00	2.635478	0.008402*
Mobile coupon usage	12017.00	0.602549	0.546809
Product purchase	12149.00	0.443952	0.657077

* Significant at $\alpha = 0.01$

The next step of our observation was focused on execution of selected activities during purchasing process with the use of smartphone. We investigated that smartphones are mostly used on product information search (75.83%), visits of seller's website (70.70%), reviews and recommendations search (69.49%), search for the store near by user (50.76%), visit of deal site (50.76%), price comparison (49.55%), online product research (46.53%), price comparison while shopping at store (31.42%), use of shopping app (21.15%) and mobile coupon usage (14.50%). The most important information to notice is that 66.47% of smartphone users purchased product with the use of smartphone. This finding urge companies to improve their websites in order to provide mobile-friendly experience for user in the purchasing process. By seeing the results from Google Shopper Marketing Council (2013), we can see that Generation Y uses smartphones to purchase products in greater degree than average adult user.

When comparing genders while execution of selected activities via smartphone during purchasing process, we can see that the significant difference was exhibited only within 4 activities – price comparison, online product research, price comparison while shopping at store and use of shopping app. These activities should be part of further research. As there is not a significant gender difference in majority of activities (including purchase itself), we reject the H2 hypothesis.

Survey results:

- 1. 98.19% of participants use mobile devices and 96.38% of participants use table and mobile devices in particular ratio. This should result in improvement of mobile user experience on company's websites.
- 2. 66.47% of participants purchased product with the use of their smartphone. Moreover, smartphones are significantly used for execution of various activities connected to purchasing process.
- 3. There is not a significant difference between ratio of mobile/table device use when connecting to the Internet and smartphone use during purchasing process between men and women.

The findings of our study cannot be generalized because of sample composition (we did not use a representative sample) but they can be used for further research in the area of this topic and can help companies to adapt mobile friendly technologies in order to achieve positive outcomes from a greater part of their visitors and potential customers.

5 Conclusion

Mobile devices became an inseparable part of marketing campagin, websites and user experience optimization. The main aim of the paper is to define the current state of mobile devices use with the primary focus on smartphones based on secondary data, and then analyse and describe smartphone use in purchasing process based on data gained from questionnaire survey. Similar studies have been conducted by Google Shopper Marketing Council (2013), Inmar (2014), Holmes, Byrne and Rowley (2014) and Wang, Malthouse and Krishnamurthi (2015). Results of our study revealed that the majority of Internet users use both table and mobile devices in particular ratio. Moreover, it was proved that smartphones are substantial tools used during purchasing process. By hypothesis testing, there was not found the statistiacally significant

difference between genders in ratio of mobile/table devices usage when connecting to the Internet and neither their use of smartphone in order to execute selected activities during purchasing process. Group of users belonging to Generation Y seems to be more active in use of mobile devices compared to abovementioned studies. The results of the study might be used by web developers and marketing professionals in order to achieve best possible results from their promotional efforts in online environment.

References

- BECKER, M. and ARNOLD, J. 2010. *Mobile Marketing For Dummies*. Hoboken: John Wiley & Sons.
- BROWN, C. 2014. *App Accomplishment: Strategies for App Development Success*. Upper Saddle River: Pearson Education.
- CASABONA, J. 2013. Responsive Design with WordPress: How to Make Great Responsive Themes and Plugins. San Francisco : New Riders.
- DORČÁK, P., POLLÁK, F. and SVETOZAROVOVÁ, N. 2015. Analysis of the Current State of Online Reputation of Public Institutions and the Possibilities of Its Improvement. In: *Journal of Social Sciences (COES&RJ-JSS)*. Vol. 4, No. 1, pp. 664-673.
- FERENCOVÁ, M., MISENCÍKOVÁ V. and KOT S. 2014. An analytical view of using ecommunication tools in promoting selected pilgrim tourism sites in Slovak republic. In: *Journal of Environmental Management and Tourism*.Vol. V, Issue 2 (10), pp. 223-229.
- FIRTMAN, M. 2013. Programming the Mobile Web. Sebastopol: O'Reilly Media.
- GOOGLE SHOPPER MARKETING COUNCIL. 2013. *Mobile In-Store Research: How in-store shoppers are using mobile devices*. [online]. [Accessed on 2015-29-08]. Available online: http://www.marcresearch.com/pdf/Mobile_InStore_Research_Study.pdf>.
- GOOKIN, D. 2014. Amazon Fire Phone for Dummies. Hoboken: John Wiley & Sons.
- GRANT, A. and MEADOWS, H. 2012. *Communication Technology Update and Fundamentals*. Waltham : Focal Press.
- HOLMES, A., BYRNE, A. and ROWLEY, J. 2014. Mobile Shopping Behaviour: Insights into Attitudes, Shopping Process Involvement and Location. In: *International Journal of Retail & Distribution Management*. Vol. 42, No. 1, pp. 25-39.
- HOPKINS, J. and TURNER, J. 2012. Go Mobile: Location-Based Marketing, Apps, Mobile Optimized Ad Campaigns, 2D Codes and Other Mobile Strategies to Grow Your Business. Hoboken : John Wiley & Sons.
- INMAR. 2014. 2014 Coupon Trends: 2013 Year-End Report. [online]. [Accessed on 2015-29-08]. Available online: http://go.inmar.com/rs/inmar/images/Inmar_2014_Coupon_Trends_Report.pdf>.
- JONES, M. T. 2011. The PayPall Official Insider Guide to Mobile Profit: Make money anytime, anywhere. Berkeley : Peachpit.
- KAPLAN, A. M. 2012. If you love something, let it go mobile: Mobile marketing and mobile social media 4x4. In: *Business Horizons*. Vol. 55, No. 2, pp. 129-139.
- KRUG, S., 2014. Don't Make Me Think: A Common Sence Approach to Web and Mobile Usability. San Francisco: Pearson.

- MAKINO, T., JUNG, CH. and PHAN, D. 2015. *Finding more mobile-friendly search results* [online]. [Accessed on 2015-29-08]. Available online: http://googlewebmastercentral.blogspot.sk/2015/02/finding-more-mobile-friendly-search.html>.
- MARSHALL, P. and RHODES, M. 2014. Ultimate Guide to Google Adwords: How to Access 1 Billion People in 10 Minutes. Irvine: Entrepreneur Media.
- OREM, T. 2015. Five Tips for Staying Ahead in Mobile Retail Banking. In: *American Bankers Association.ABA Banking Journal*. Vol. 107, No. 2, pp. 42-4.
- PARMENT, A. 2011. Generation Y in Consumer and Labour Markets. New York: Routledge.
- PETERSON, C. 2014. Learning Responsive Web Design: A Beginner's Guide. Sebastopol: O'Reilly Media.
- PULIZZI, J. 2013. Epic Content Marketing: How to Tell a Different Story Break Through the Clutter, and Win More Customer by Marketing Less. New York: McGraw-Hill.
- RAHMAN, S. M. 2015. Consumer Expectation from Online Retailers in Developing E-Commerce Market: An Investigation of Generation Y in Bangladesh. In: *International Business Research*. Vol. 8, No. 7, pp. 121-137.
- RICHARDSON, S. 2013. Mobile Commerce: How to leverage B2C business value through electronic/mobile commerce for China media express holdings. Munich : GRIN.
- ROWLES, D. 2013. *Mobile Marketing: How mobile technology is revolutionizing marketing, communications and advertising.* London: Kogan Page.
- SAMUELSSON, M. and DHOLAKIA, N. 2003. Assessing the Market Potential of Networkenabled 3G M-Business Services. In: *Wireless Communications and Mobile Commerce*. Hershey, PA: Idea Group Publishing USA, pp. 283.
- SCOTT, D. M. 2013. The New Rules of Marketing & PR: How to Use Social Media, Online Video, Mobile Applications, Blogs, News Releases & Viral Marketing to Reach Buyers Directly. New Jersey : John Wiley & Sons.
- STAIR, R. and REYNOLDS, G. 2014. Fundamentals of Information Systems. Boston: Cengage Learning.
- ŠTEFKO, R., BAČÍK, R. and FEDORKO, R. 2013. Spendings on Social Media as Part of Marketing Budgets. In: *Polish Journal of Management Studies*. Vol. 8, pp. 243-250.
- TAN, S. 2013. *Ecom Hell: How To Make Money In Ecommerce Without Getting Burned*. San Francisco : ECOM HELL.
- WANG, R.J., MALTHOUSE E. C. and KRISHNAMURTHI, L. 2015. On the Go: How Mobile Shopping Affects Customer Purchase Behavior. In: *Journal of Retailing*. Vol. 91, No. 2, pp. 217-234.

Security and Trust in Cryptocurrencies

JOZEF BUCKO¹ – DANA PAĽOVÁ² – MARTIN VEJAČKA³ Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

The term of cryptocurrency is phenomenon of recent years, standing for digital currency based on principles of cryptography. General public may confuse this term with Bitcoin, but many other cryptocurrencies arose. Basic principles of all cryptocurrencies are similar and are briefly introduced in this paper. Low fees, possibility to make virtually anonymous payments without involving banks, and expected high level of protection of personal data are benefits associated with holding using cryptocurrencies. High volatility, cryptocurrency e-wallet thefts and possible anonymous criminal activities funding are mentioned as the main disadvantages of cryptocurrencies. Issues of security of cryptocurrencies mining, holding and transferring are investigated. Furthermore, basic arrangements for building trust in cryptocurrencies are discussed.

Key words: Cryptocurrency, Virtual Currency, Trust, Bitcoin, Litecoin

JEL Classification: O10, O30

1 Introduction

The term of cryptocurrencies exist in praxis only since year 2009 when the first cryptocurrency was introduced named Bitcoin by Satoshi Nakamoto (pseudonym). Cryptocurrencies represent a digital medium of exchange allowing secure, decentralized and distributed economic transactions. Cryptocurrencies integrate principles of cryptography with electronic money. Sometimes they are referred as virtual currencies, however virtual currency does not have to use principles of cryptography in general. The basic principle of cryptocurrencies is that no one may accelerate or significantly abuse their production. Certain predefined amount of cryptocurrency is produced collectively by the entire cryptocurrency distributed system and therefore rate of production is determined by a value defined in prior and publicly known. Cryptocurrency allows virtually costless transfers of coins (cryptocurrency units) between clients in a computer peer-to-peer network.

Bitcoin was first cryptocurrency introduced and still it is the most popular. All other cryptocurrencies are inferred on principle from Bitcoin with some adjustments. There are two types of Bitcoin users: basic ordinary users and so called "miners". Ordinary Bitcoin users use digital wallet similar to electronic banking for management of Bitcoin cash and transferring payments in bitcoins. Bitcoins exist only as data in a computer or mobile device. Access to these data has only the holder of cryptographic private key. If the wallet data is lost (e.g. the wallet data file is inadvertently corrupted or deleted), then the bitcoins contained in this wallet are lost forever (when file was not backed up). The public address of the wallet still exists, but it can only

¹ doc. RNDr. Jozef Bucko, PhD., Němcovej 32, 040 01 Košice, Slovak Republic, jozef.bucko@tuke.sk

² Ing. Dana Paľová; PhD., Němcovej 32, 040 01 Košice, Slovak Republic, dana.palova@tuke.sk

³ Ing. Martin Vejačka; PhD., Němcovej 32, 040 01 Košice, Slovak Republic, martin.vejacka@tuke.sk

be accessed by the private key, which has been deleted. Unless someone breaks highly secure encryption built into the cryptocurrency system, then it is not possible to recover the lost bitcoins. And breaking Bitcoin's encryption is virtually impossible using common computational force of personal computer in timely manner.

New units of Bitcoin are generated by Bitcoin network in process called mining, which is performed by so called miners. Miners are dedicating their computational power to solving artificial mathematical problem. Transactions are packed in a block that fits very strict cryptographic rules that will be verified by the network. Bitcoin uses SHA2-256 cryptographic algorithm as proof of work mechanism during transactions confirmation. These cryptographic rules prevent previous blocks from being modified because doing so would invalidate all following blocks. No individual can control what is included in the block chain or roll back own transactions.

Many other cryptocurrencies emerged since introduction of Bitcoin, but the most are derived from specifications of the Bitcoin. Some cryptocurrencies (e.g. Peercoin) include also mechanisms that allow fractions of cryptocurrency units being assigned to their holders as form reward for holding the cryptocurrency, what can be considered as analogy of interest. The most cryptocurrencies generate new units of currency up to a preset maximum amount of currency that will ever be generated. This should insure the scarcity and prevent high inflation.

Cryptocurrencies provide almost perfect anonymity of transactions, what allows avoidance of authorities' attention. This fact attracts various users to cryptocurrencies, for example several drug dealing electronic marketplaces were accepting payments in cryptocurrencies. Another issue of cryptocurrencies is their high volatility and potential for price manipulations. Some cryptocurrencies were unfairly manipulated by pre-mining, so currency was generated by its creators before mining code is released to the general public.

Interchangeability of cryptocurrencies for official currencies is in limited extent, basically only Bitcoin and Litecoin are directly changeable at virtual markets (e.g., Vircurex, BTC-e, BTC-e etc.). Other cryptocurrencies can only be traded for Bitcoin or Litecoin and then for official currencies. Banks generally do not offer services attached to cryptocurrencies and sometimes also refuse to provide services to cryptocurrency companies.

2 Literature review

The theoretical and empirical research of cryptocurrencies is no of the big extent, because this topic is recent and novel. Bitcoin as the most spread representative of cryptocurrencies is the main concern of authorities trying to regulate alternatives to official currencies. Chinese central bank forbid to financial institutions in country to offer services related to Bitcoin. Internal Revenue Service, the government tax administration authority in USA, treats virtual currencies as property (not currency) for federal tax purposes and its amount is therefore taxable (IRS, 2014). In other countries virtual currencies have also problems with acceptation. Authorities in Norway do not recognize Bitcoin (and other cryptocurrencies) as currency while it does not fulfill requirements of being currency. Buying cryptocurrencies is in Finland considered as purchase of goods Regulators in several other countries warn against use of virtual currencies, because legal
ways of acquiring the paid amount back, when some problem with object of transaction arises, do not exist (Matonis, 2013).

Krugman (2013) stated that Bitcoin is very good medium of exchange, but it does not store the value at reasonably stable level. Gold preserves value, while its value is limited by technology of its mining and its limited supply in mining sites. Federal Reserve Bank (Fed) guarantees the value of US dollar (in some limits – inflation etc.). On the case of cryptocurrencies, even though they are mainly limited in preset amount of units ever be created, but nobody guarantees their minimal value as long as they are decentralized and fully independent.

Chaum (1983) laid the theoretical foundations of cryptocurrencies, when he drafted use of cryptology for allowance of untraceable electronic payments. Nakamoto (2009) proposed the creation and then introduced Bitcoin network in early 2009. The acceptance of cryptocurrencies was investigated by Luther (2013) with conclusion that cryptocurrencies are unlikely to be widely accepted in the conditions of high volatility and absence of a government support. Morris (2014) adduced that newly introduced cryptocurrency might be manipulated by pre-mining or hidden launches for pre-selected users with high mining rewards, what might be a part of a cryptocurrency's original design.

Tucker (2013) remarked a high volatility of cryptocurrencies making the holding of cryptocurrencies very risky, while they might manipulated by artificially inflating the price of cryptocurrency through false positive statements, in order to sell the purchased cryptocurrency at a higher price (pump and dump scheme). Once the operators of the scheme sell out the cryptocurrency, the price falls and other holders of given cryptocurrency lose money. Milnes (2013) showed that the volatility of cryptocurrencies causes so called a deflationary bias. More and more people trying to acquire to a limited number of cryptocurrency increases its value. Then deflation encourages currency hoarding rather than spending or usage. For example O'Brien (2013) at this point suggests that cryptocurrency ceases to be a currency and becomes a virtual commodity.

Miller et al. (2014) adduced that the processing power used for cryptocurrency mining is wasted, rather than used for meaningful purpose. They proposed to use these computing resources more useful by archiving the meaningful data from the huge data fund, for example, backing up data from the Library of Congress (approximately 200 TB of data) in network of new virtual currency named Permacoin. The data would be stored locally, controlled by a network and the user would obtain corresponding permacoins for storing them. It would be a public archive of valuable data that could be useful for mankind. Investments in hardware and storage would actually serve to secure and distribute data in a decentralized system widely available with multiple data backups. Hayes (2015) investigated factors of cryptocurrency value and found that the most of its value can be explained by the three variables: computational power (indirectly difficulty), coins per minute and which algorithm is used. Moore and Christin (2013) investigated security of cryptocurrency accounts. Their results indicated a high risk of breaching security of popular

cryptocurrency accounts. Their results indicated a high risk of breaching security of popular cryptocurrency exchanges. Later crash of Mt.Gox marketplace in 2014 confirmed their conclusions.

3 Factors of trust in cryptocurrencies

In this paper we have identified multiple factors that affect the trust of potential users in cryptocurrency.

Deem (2015) stated that any currency system seeking successful adoption must be in want of trust. Trust that a representation of value (such as a paper note) is backed by real value or obligation to repay; trust that those representations will be accepted by others and trust that the representations of value are not counterfeit.

Early currencies contained precious metals, which people trusted to have an intrinsic value that they could use to obtain goods or services. Today, most countries use fiat currencies are not tied to any physical value such as precious metals. Instead, fiat currencies are backed by government guarantee and currency demands ultimate trust. The identity of those involved in a transaction (and the ability to verify such identity) is the basis of trust in currency used in transaction. In the case of fiat currency, the currency issuer and key players in a payment chain must be trustworthy to ensure that the currency is not counterfeit and that the currency will not be stolen before reaching its final destination. But in the case of cryptocurrencies, where value is established by algorithms and verified by the electronic transfer of data, all players in transactions are anonymous.

The trust in cryptocurrencies can be generated by the confidence in the technology which underlays the currency and the key market players have a high level of accountability. In fiat society generally trusts in the system because the banks and payment processors are regulated and enforced to retain a high level of security. Even if a security breach occurs, the parties involved will be held accountable and fiat currency users will get compensation.

However, in the case of cryptocurrencies, which are entirely decentralised, the value passes directly from payer to payee. The blockchain is extremely secure as it publically records every transaction that is ever made. Cryptocurrency system is secure in its technology, but it is marked many examples of hacking and fraud. Deem (2015) indicates that cryptocurrency trust issue lies with the gatekeepers between cryptocurrencies and their traditional fiat relations. Cryptocurrency-related businesses that act as interfaces with fiat currencies, such as exchanges and payment processors, are mostly unregulated. This is the spot where occur reported hacks, causing mistrust in the system and extreme volatility of cryptocurrency-related businesses. If fiat currency is stolen from a bank, its security is increased. Consequently, when a cryptocurrency exchange is compromised, the solution should be increasing the security of exchanges. The organisational and behavioral standards should be enforced by national regulators to increase security of the cryptocurrency industry and increase trust in cryptocurrencies.

3.1 Awareness

The awareness of cryptocurrency affects the numbers of its users and therefore also its stability. Significant role in the field of awareness play the media. High media coverage of Bitcoin's price rally definitely drew attention of numerous additional speculators. Besides the all forms of media also the word of mouth increases the awareness of cryptocurrencies and contributes to increase of cryptocurrency users' numbers.

On the other hand, negative information about cryptocurrencies in media discourages potential users, for example, the crash of Mt. Gox - former the biggest Bitcoin market (Hutchinson and Liew, 2014). It ceased its operations in February of 2014, because of big losses of Bitcoins and also official currencies. Faulty processes of market, which were known for longer period, but were not addressed by Mt. Gox management, caused multiple currency thefts. The fault subsisted in possibility to change identification of transaction on e-marketplace during its processing. Then impostor could claim that payment with original identification did not ascribe to his wallet. Mt. Gox customer care officials did not identify the payment with original identification and sent given amount again, even if such amount already has been sent there but it has only changed identification. This caused multiple losses and led to crash of Mt. Gox (Tanase, 2014). Its crash significantly influenced also prices of Bitcoin at other e-markets and caused a disruption of trust in Bitcoin.

3.2 Legislation influence

Before year 2009 national legislations around the world did not consider virtual or cryptocurrencies. However rising amount of transactions in cryptocurrencies forced policymakers in many countries prepare legislation regarding the use of cryptocurrency in given economy. Broader allowance of cryptocurrency usage definitely supports its usage and builds trust in it, but the most authorities are trying to restrict or ban usage of cryptocurrencies as currency. Therefore usage of cryptocurrencies in legal economy is limited, but in illegal economy it keeps its status of safe and anonymous medium of exchange. Cryptocurrency legislation affects illegal transaction only in minor extent, while these transactions are already part of law-violating activity.

In general, the most legislative arrangements caused decreases in cryptocurrency exchange rates and led to negative effect on the trust in all cryptocurrencies. However regulation should be aimed to provide rules for cryptocurrency-based business to support responsible and accountable behavior to prevent frauds and hacks. In this case legislation would bring impulse for increasing trust in cryptocurrency area.

3.3 Availability

Availability represents the possibility of purchasing and interchangeability of cryptocurrency for official currencies. This is mainly enabled by private electronic markets available to general public for selling and purchasing various cryptocurrencies. Number of subjects accepting payments in given cryptocurrency also increases its availability or usability. Number of merchants accepting cryptocurrencies (mainly Bitcoin) is increasing, but they are facing the problem of high volatility of cryptocurrencies. Thus, they do not keep cryptocurrency for the longer period of time at most cases but change it for standard currency. Also the speed of transaction confirmation processes makes cryptocurrency more available and suitable for electronic payments. Furthermore, higher availability brings higher and more stable exchange rate of cryptocurrency, what raises trust in it.

3.4 Anonymity

In general, the cryptocurrency payments are anonymous and hardly traceable. This is the main reason of their usage in illegal activities. Anonymity and no central guaranty of currency are main reasons legislation restrictions of cryptocurrencies. Governments and other legal authorities are afraid of virtually untraceable transactions that might be connected with illegal activities or even financing terrorist organizations. Any cryptocurrency might be financial transfer to terrorists

from their sponsors because both sides are anonymous. The lack of identification of transactions led to multiple legislation arrangements and restrictions of cryptocurrency usage in recent years. Authorities should also consider that even legal users might prefer anonymous transactions due to concerns of privacy intrusions by any third party not involved in transaction. Multiple cases of tracking of private communications make anonymity of cryptocurrencies very valuable and so anonymity of cryptocurrency affects supports the trust in cryptocurrencies.

3.5 Volatility

Volatility represents statistical measure of the dispersion of returns for a given security. Volatility can either be measured by using the standard deviation or variance between returns from that same security. In general, the higher the volatility means the riskier the security.

In order to investigate volatility of cryptocurrencies, two the most popular cryptocurrencies Bitcoin and Litecoin were selected, as long as they are direct interchangeable to standard currencies at public electronic markets. Following figures show history of exchange rates of Bitcoin and Litecoin during last two years on major e-marketplace (BTC-e, 2015).



Figure 1 Bitcoin exchange rate at BTC-e marketplace

Figure 1 shows Bitcoin historical prices at BTC-e electronic marketplace in period since August 2013 until August 2015. High fluctuations of price indicate high volatility rate of Bitcoin in given period.



Figure 2 Litecoin exchange rate at BTC-e marketplace

Figure 2 shows Litecoin historical rates on BTC-e electronic marketplace in the same period of time as in the case of Bitcoin. Both charts have very similar shape indicating both cryptocurrencies having high volatility during given period of time.

In order to measure this volatility, available data on Bitcoin and Litecoin prices on electronic markets were gathered. Price changes between the two following trading days were calculated and percentage of change was expressed. As measure of volatility then was used standard deviation of all percentage price changes available. Annualized and thirty-day volatility were calculated by adjustment with square root rules. In order to compare volatility of these two major cryptocurrencies with volatility of official fiat currencies, two money pairs were selected. Exchange rate of Euro and British pound to US dollar were used to have comparison on the same basis of price of currency in USD. Furthermore the comparison with gold price (in USD) changes was conducted to illustrate volatility to the precious that reflects non-fiat currency from the past. Following table shows us comparison of all calculated volatilities of cryptocurrencies, currency pairs and gold.

Volatility Comparison	Daily Volatility	30-Day Volatility	Annualized Volatility
Bitcoin	9.10%	49.87%	144.53%
Litecoin	14.03%	77.88%	225.71%
Gold	0.91%	4.99%	14.47%
EUR/USD	0.45%	2.48%	7.18%
GBP/USD	1.97%	10.80%	31.30%

Table 1 Comparison of volatilities

Source: Own processing

Our research showed that cryptocurrencies have extremely high volatility in comparison to major official currencies and gold. Volatilities of both investigated cryptocurrencies were incomparably higher than standard currencies or gold. High volatility therefore lowers trust in cryptocurrencies in comparison to official currency. On the other hand, even short-term speculations could bring high earnings to cryptocurrency speculators, what can paradoxically attract this type of investors. This led to big price growths and creation of price bubbles (e.g. in late 2013). Investors holding cryptocurrencies before volatile year of 2013 might have recorded above 1000% earnings when selling in at the peak of bubble. All these effects are transferred from Bitcoin and Litecoin also into other cryptocurrencies, because of their interchangeability to standard currencies only via medium of Bitcoin or Litecoin.

3.6 Security

Bitcoins are generated by mining procedures, where miners use special software to solve cryptographic hash problems and it is primary source to gain bitcoins. Miners are awarded with bitcoins only if they provide valid proof-of-work and this keeps BTC network stable, safe and secure by approving transactions. Proof-of-work is a process of verifying the block of data (transactions) in order to generate the next block by computing some random sequence (cryptographic problem), which is computed using a brute-force method employing software or hardware resource.

The first factor of cryptocurrency security is the security of block and block chains. A block of data with unverified cryptocurrency transactions has a unique key embedded. A new block cannot be submitted to the network without opening the present block of unverified transactions. When proof-of-work is found, the cryptocurrency network verifies whether the found key is correct. Every block contains a hash from its previous block and so blocks linked in this chronological order form the block. Each block in chain cannot be modified, because every block in chain after it would also have to be modified too. A valid block chain holds valid blocks and transactions only if it starts with the very first block.

Another aspect of cryptocurrencies' security is the security of generation algorithm. For example, creation of bitcoins is based on the SHA-256 hash algorithm to generate verifiably random sequences. It can be computed by using software or hardware resources and Elliptic Curve Digital Signature Algorithm, which is used for digital signing. A unique digital signature for each transaction allows a valid owner of bitcoin to spend funds from his account in secure way, while SHA-256 is used as block generation algorithm.

The third factor of security of cryptocurrencies is the network security. The possible risks of cryptocurrency networks were investigated by Reddy (2015) by network security analysis of Bitcoin. Malicious nodes can come into being with newly installed client, whose has no information of the block chain and it will always be vulnerable to attacks by connecting to attacker. Another type of attack is called packet sniffing. An attacker tracks all incoming and outgoing data during communication, then he can detect the transactions pertaining to any node and find addresses stored in the wallet and use them later to target specific machines with valuable wallets. Attacker might try to disturb the cryptocurrency protocol. Miners are encouraged to drop the connections with any node that is dealing with invalidated cryptocurrency data. This type of attack is known as Denial of service. Reddy (2015) identified also more possible disturbances of cryptocurrency networks, such as clock drifting, segmentation, dropping transactions, 51% attack, double spend attack etc.

Several initiatives are emerging to draft security framework for securing cryptocurrency systems and to address all aspects of cryptocurrency security. The standards that would help secure all information systems that make use of cryptocurrencies should be set. Draft of such standards was prepared by CryptoCurrency Certification Consortium (2014). If cryptocurrency-based businesses would retain these standards, using cryptocurrency might become more secure and trust in cryptocurrencies might increase.

4 Conclusions

Cryptocurrencies are very recent topic object in economy. Our research identified multiple factors affecting trust in cryptocurrencies. All of mentioned aspects affect trust in cryptocurrencies as long as their usage. The most of factors are interconnected others, have joint effects and together they affect trust in cryptocurrencies.

Enormous volatility of cryptocurrencies exchange rates was detected. Their high volatility causes high risk of trading cryptocurrency and is reflected in the formation of price bubbles. However, the great growths of their exchange rates attracted many speculators, but it is obvious that cryptocurrencies can only hardly retain their value. This fact can lead to change in understanding of cryptocurrencies as payment medium, but rather as specific commodities. Cryptocurrencies in comparison with commodities have advantage of easy portability thanks to their virtual character. However it makes them unusable outside of electronic environment. Cryptocurrencies are still popular medium of exchange in black economy. If potential legitimate users' trust in cryptocurrencies will rise in future, they will be used in increased scale also officially. Otherwise trust in cryptocurrencies might not reach necessary levels and their boom might sublime. Regulators around the world should create standards regarding cryptocurrency use that should be enforced by to increase security in the cryptocurrency industry and increase trust in cryptocurrencies.

References

- BITCOIN.ORG 2014. *Frequently asked questions*. [online] Available online: ">https://bitcoin.org/en/faq.>.
- BTC-e. 2015. *Historical prices BTC/USD and LTC/USD*. [online]. Available online: ">http://login.bta-c.com/.>.
- CASTILLO, A. and BRITO, J. 2013. BITCOIN A Primer for Policymakers. [online]. Mercatus Center, George Mason University. Available online: http://mercatus.org/sites/default/files/Brito_BitcoinPrimer.pdf.
- CHAUM, D. 1983. Blind signatures for untraceable payments. In: Advances in Cryptology Proceedings of Crypto. Vol. 82, No. 3, pp. 199–203.
- COHN, M. 2014. *IRS's Virtual Currency Guidance May Benefit Bitcoin Users*. [online]. Accounting Today. Available online: http://www.accountingtoday.com/debits_credits/irs-virtual-currency-guidance-may-benefit-bitcoin-users-70172-1.html.
- CRYPTOCURRENCY CERTIFICATION CONSORTIUM, 2014. CryptoCurrency Security Standard. [online]. CryptoCurrency Certification Consortium C4. Available online: https://cryptoconsortium.org/standards/CCSS>.
- DEEM, M. 2015. Can we trust cryptocurrencies? In: *Banking Tech*. [online]. Available online: <<u>http://www.bankingtech.com/280302/can-we-trust-cryptocurrencies/></u>.
- GREENBERG, A. 2011. Crypto currency. [online]. Forbes. Available online: http://www.forbes.com/forbes/2011/0509/technology-psilocybin-bitcoins-gavin-andresen-crypto-currency.html.
- HAYES, A. 2015. What Factors Give Cryptocurrencies Their Value: An Empirical Analysis, In: *Social Science Research Network*. New York: The New School for Social Research.
- HILL, K. 2013. *The FBI's Plan For The Millions Worth Of Bitcoins Seized From Silk Road*. [online]. Forbes, Available online: http://www.forbes.com/sites/kashmirhill/2013/10/04/fbi-silk-road-bitcoin-seizure/.
- HUTCHINSON, J. and LIEW, R. 2014. *Bitcoin traders hit by Mt.Gox crash*. [online]. The Sydney Morning Herald, Available online: ">http://www.smh.com.au/business/markets/currencies/bitcoin-traders-hit-by-mtgox-crash-20140311-34icp.html#ixzz2xWwbQSPS.>">http://www.smh.com.au/business/markets/currencies/bitcoin-traders-hit-by-mtgox-crash-20140311-34icp.html#ixzz2xWwbQSPS.>">http://www.smh.com.au/business/markets/currencies/bitcoin-traders-hit-by-mtgox-crash-20140311-34icp.html#ixzz2xWwbQSPS.>">http://www.smh.com.au/business/markets/currencies/bitcoin-traders-hit-by-mtgox-crash-20140311-34icp.html#ixzz2xWwbQSPS.>">http://www.smh.com.au/business/markets/currencies/bitcoin-traders-hit-by-mtgox-crash-20140311-34icp.html#ixzz2xWwbQSPS.>">http://www.smh.com.au/business/markets/currencies/bitcoin-traders-hit-by-mtgox-crash-20140311-34icp.html#ixzz2xWwbQSPS.>">http://www.smh.com.au/business/markets/currencies/bitcoin-traders-hit-by-mtgox-crash-20140311-34icp.html#ixzz2xWwbQSPS.">http://www.smh.com.au/business/markets/currencies/bitcoin-traders-hit-by-mtgox-crash-20140311-34icp.html#ixzz2xWwbQSPS.">http://www.smh.com.au/business/markets/currencies/bitcoin-traders-hit-by-mtgox-crash-20140311-34icp.html#ixzz2xWwbQSPS.">http://www.smh.com.au/business/markets/currencies/bitcoin-traders-hit-by-mtgox-crash-20140311-34icp.html#ixzz2xWwbQSPS.">http://www.smh.com.au/business/markets/currencies/bitcoin-traders-hit-by-mtgox-crash-20140311-34icp.html#ixz2xWwbQSPS.">http://www.smh.com.au/business/markets/currencies/bitcoin-traders-hit-by-mtgox-crash-20140311-34icp.html#ixz2xWwbQSPS.">http://www.smh.com.au/business/markets/currencies/bitcoin-traders-hit-by-mtgox-currencies/bitcoin-traders-hit-by-mtgox-currencies/bitcoin-traders-hit-by-mtgox-currencies/bitcoin-traders-hit-by-mtgox-currencies/bitcoin-traders-hit-by-mtgox-currencies/bitcoin-traders-hit-by-mtgox-currencies/bitcoin-traders-hit-by-mtgox-currencies/b
- IRS, 2014. *Internal Revenue Service on Bitcoin*. Available online: http://www.irs.gov/pub/irs-drop/n-14-21.pdf>.
- KRUGMAN, P. 2013. *Bitcoin is Evil.* [online]. Paul Krugman's Blog NY Times, Available online: ">http://krugman.blogs.nytimes.com/2013/12/28/bitcoin-is-evil/?_php=true&_type=blogs&_r=2.>">http://krugman.blogs.nytimes.com/2013/12/28/bitcoin-is-evil/?_php=true&_type=blogs&_r=2.>">http://krugman.blogs.nytimes.com/2013/12/28/bitcoin-is-evil/?_php=true&_type=blogs&_r=2.>">http://krugman.blogs.nytimes.com/2013/12/28/bitcoin-is-evil/?_php=true&_type=blogs&_r=2.>">http://krugman.blogs.nytimes.com/2013/12/28/bitcoin-is-evil/?_php=true&_type=blogs&_r=2.>">http://krugman.blogs.nytimes.com/2013/12/28/bitcoin-is-evil/?_php=true&_type=blogs&_r=2.>">http://krugman.blogs.nytimes.com/2013/12/28/bitcoin-is-evil/?_php=true&_type=blogs&_r=2.>">http://krugman.blogs.nytimes.com/2013/12/28/bitcoin-is-evil/?_php=true&_type=blogs&_r=2.>">http://krugman.blogs.nytimes.com/2013/12/28/bitcoin-is-evil/?_php=true&_type=blogs&_r=2.>">http://krugman.blogs.nytimes.com/2013/12/28/bitcoin-is-evil/?_php=true&_type=blogs&_r=2.>">http://krugman.blogs.nytimes.com/2013/12/28/bitcoin-is-evil/?_php=true&_type=blogs&_r=2.>">http://krugman.blogs.nytimes.com/2013/12/28/bitcoin-is-evil/?_php=true&_type=blogs&_r=2.>">http://krugman.blogs.nytimes.com/2013/12/28/bitcoin-is-evil/?_php=true&_type=blogs&_r=2.>">http://krugman.blogs.nytimes.com/2013/12/28/bitcoin-is-evil/?_php=true&_type=blogs&_r=2.>">http://krugman.blogs.nytimes.com/2013/12/28/bitcoin-is-evil/?_php=true&_type=blogs&_r=2.>">http://krugman.blogs.nytimes.com/2013/12/28/bitcoin-is-evil/?_php=true&_type=blogs&_r=2.>">http://krugman.blogs.nytimes.com/2013/12/28/bitcoin-is-evil/?_php=true&_type=blogs&_r=2.>">http://krugman.blogs.nytimes.com/2013/12/28/bitcoin-is-evil/?_php=true&_type=blogs&_r=2.>">http://krugman.blogs.nytimes.com/2013/12/28/bitcoin-is-evil/?_php=true&_type=blogs&_r=2."">http://krugman.blogs.nytimes.com/2013/12/28/bitcoin-is-evil/?_php=true&_type=blogs&_r=2."">http://kr

- MATONIS, J. 2013. How Cryptocurrencies Could Upend Banks' Monetary Role, In: *American Banker*. [online]. Available online: .">http://www.americanbanker.com/bankthink/how-cryptocurrencies-could-upend-banks-monetary-role-1057597-1.html?zkPrintable=1&nopagi nation=1.>.
- MIERS, I., GARMAN, C., GREEN, M. and RUBIN, A. D. 2012. Zerocoin: Anonymous Distributed E-Cash from Bitcoin. [online]. The Johns Hopkins University Department of Computer Science, Available online: http://spar.isi.jhu.edu/~mgreen/Zerocoin Oakland.pdf>.
- MILLER, A., JUELS, A., ELAINE, S., BRYAN, P. and KATZ, J. 2014. *Permacoin: Repurposing Bitcoin Work for Data Preservation*. [online]. University of Maryland, Cornell Tech. Available online: http://research.microsoft.com/pubs/217984/permacoin.pdf>.
- MILNES, P. 2014. *Guide to Crypto-Currencies Part* 7 *Solutions to Volatility*. [online]. traders DNA, Available online: http://www.tradersdna.com/education/guide-crypto-currencies-part-7-solutions-volatility/.
- MOORE, T. and CHRISTIN, N. 2013. Beware the Middleman: Empirical Analysis of Bitcoin-Exchange Risk, In: *Financial Cryptography and Data Security Lecture Notes in Computer Science*, Vol. 7859, pp. 25-33.
- MORRIS, D. Z. 2014. *Beyond bitcoin: Inside the cryptocurrency ecosystem*. [online]. CNNMoney, Fortune. Available online: http://finance.fortune.cnn.com/tag/cryptocurrency/>.
- NAKAMOTO, S. 2009. *Bitcoin: A Peer-to-Peer Electronic Cash System*. [online]. Bitcoin.org, Available online: https://bitcoin.org/bitcoin.pdf>.
- O'BRIEN, M. 2013. *Bitcoin Is No Longer a Currency*. [online]. the Atlantic. Available online: .
- REDDY, B. P. 2015. *A Review of the Bitcoin Network Security Framework*. [online]. Available online: https://subhask.okstate.edu/sites/default/files/prashanthcrypto.pdf>.
- SUROWIECKI, J. 2013. Cryptocurrency, In: *MIT Technology Review*. Available online: http://www.technologyreview.com/review/425142/cryptocurrency/.
- TANASE, S. 2014. *The Future of Bitcoin After The Mt. Gox Crash*. [online]. Kaspersky Lab. Available online: ">http://blog.kaspersky.com/the-future-of-bitcoin-after-the-mt-gox-crash/.>">http://blog.kaspersky.com/the-future-of-bitcoin-after-the-mt-gox-crash/.>">http://blog.kaspersky.com/the-future-of-bitcoin-after-the-mt-gox-crash/.>">http://blog.kaspersky.com/the-future-of-bitcoin-after-the-mt-gox-crash/.>">http://blog.kaspersky.com/the-future-of-bitcoin-after-the-mt-gox-crash/.>">http://blog.kaspersky.com/the-future-of-bitcoin-after-the-mt-gox-crash/.>">http://blog.kaspersky.com/the-future-of-bitcoin-after-the-mt-gox-crash/.>">http://blog.kaspersky.com/the-future-of-bitcoin-after-the-mt-gox-crash/.>">http://blog.kaspersky.com/the-future-of-bitcoin-after-the-mt-gox-crash/.>">http://blog.kaspersky.com/the-future-of-bitcoin-after-the-mt-gox-crash/.>">http://blog.kaspersky.com/the-future-of-bitcoin-after-the-mt-gox-crash/.>">http://blog.kaspersky.com/the-future-of-bitcoin-after-the-mt-gox-crash/.>">http://blog.kaspersky.com/the-future-of-bitcoin-after-the-mt-gox-crash/.>">http://blog.kaspersky.com/the-future-of-bitcoin-after-the-mt-gox-crash/.>">http://blog.kaspersky.com/the-future-of-bitcoin-after-the-mt-gox-crash/.>">http://blog.kaspersky.com/the-future-of-bitcoin-after-the-mt-gox-crash/.>">http://blog.kaspersky.com/the-future-of-bitcoin-after-the-mt-gox-crash/.>">http://blog.kaspersky.com/the-future-of-bitcoin-after-the-mt-gox-crash/.<">http://blog.kaspersky.com/the-future-of-bitcoin-after-the-mt-gox-crash/.
- TUCKER, T. 2013. *Bitcoin's Volatility Problem: Why Today's Selloff Won't Be the Last.* [online]. Businessweek. Available online: http://www.businessweek.com/articles/2013-12-05/bitcoins-volatility-problem-why-todays-sell-off-wont-be-the-last.
- WILDER, W. J. 1978. New Concepts in Technical Trading Systems. Trend Research.

A theoretical Framework for the Valuation and the Reporting of Protected Areas' Biodiversity

NADIA CIPULLO¹ Link Campus University Italy

Abstract

According to the Convention on Biological Diversity, biodiversity is the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems. The key value of biodiversity lies in its role in ensuring the functioning of ecosystems and their ability to provide services to humans and other living organisms that comprise them. For that reason, maintaining a sufficient degree of biodiversity is the key to the continued delivery of essential ecosystem services and the need to ensure the conservation of biological diversity is now widely accepted. In spite of this global sentiment, there is not a national or international convergence towards a framework to report to different stakeholders' groups the performance of organizations like protected areas and national parks, in terms of their biodiversity and the conservation activities they are achieving. After describing the concept of biodiversity, its value and the information needs of the community related to it, the main purpose of the paper is to propose a theoretical and systemic framework for its reporting by public sector organizations established for the protection of the natural capital, by means of some specific indicators deduced mainly by the literature concerning biological sciences. Following the GRI (Global Reporting Initiative) guidelines, these indicators, interpreted in terms of KPI (Key Performance Indicators), should lead to an increase in the transparency and in the accountability of Protected Areas

Key words: Biodiversity, Value, Reporting, Accountability, Protected Area, KPI, GRI

JEL Classification: Q56

1 Introduction

The term biodiversity refers to the variety of life on Earth at all its levels, from genes to ecosystems, and the ecological and evolutionary processes that sustain it. Biodiversity includes not only species we consider rare, threatened, or endangered, but every living thing —even organisms we still know little about, such as microbes, fungi, and invertebrates.

The 1992 United Nations Earth Summit defined "biological diversity" as "the variability among living organisms from all sources, including, 'inter alia', terrestrial, marine, and other aquatic ecosystems, and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems". This definition is used in the United Nations Convention on Biological Diversity.

Biodiversity is under increasing pressure. Habitats available to wildlife have undergone dramatic modifications, and significant biodiversity has already been lost over modern times. In order to

¹ Dr. Nadia Cipullo, Ph.D., Via Nomentana 335, 00162 Roma, Italy, n.cipullo@unilink.it

counter global biodiversity loss and consequent impacts on human well-being, there have been several recent high-profile international political commitments to improve biodiversity conservation. These have mainly consisted of goal setting, in the form of conservation targets to which governments, decision-makers, and the international community are committed; the most notable example of which are the targets set by the Convention on Biological Diversity (CBD; Convention on Biological Diversity, 2011). However, because of the complexity of biological systems, and a lack of long-term biodiversity data, nations are hampered not only in assessing progress towards such targets, but also in developing appropriate policy and legislative responses to reverse biodiversity declines.

Global commitments to stemming biodiversity loss have contributed to the development of methods to track changes in many metrics of biodiversity, and addressing biodiversity information requirements has become one of the fastest growing areas of research in the field of conservation biology.

It has been suggested that effective conservation requires addressing three fundamental questions (Salafsky et al., 2002), namely:

- what should our goals be and how do we measure progress in reaching them?
- how can we most effectively take action to achieve conservation?
- how can we learn to do conservation better?

The effectiveness of biodiversity conservation therefore depends on our ability to define, measure, and monitor biodiversity change, and on adaptive responses to biodiversity loss of a wide group of stakeholders and actors, including governments, local communities, and international society.

The objective of this paper is to evaluate the best way to report and to monitor the biodiversity level and conservation activities in Protected Areas, according to the GRI guidelines, in terms of different metrics that will assume the nature of *Key Performance Indicators* (KPI).

After the introduction, the first paragraph will first underline the need to consider and to value biodiversity and then the issue of its reporting to various stakeholders. The second paragraph will present the GRI approach to biodiversity reporting. The third paragraph will be focused on the presentation of some indicators, useful to assess the Biodiversity in Protected Areas. Finally, the fourth paragraph will be devoted to discussion and conclusions, with some indications for future research.

2. Biodiversity: valuation and reporting issues

The combination of unsustainable consumption in developed countries and persistent poverty in developing nations is destroying the natural world and the biodiversity they encompass. Extinction is the gravest consequence of the biodiversity crisis, since it is irreversible. The road to extinction is made even more perilous to people by the loss of the broader ecosystems that underpin our livelihoods, communities, and economies (McNeely et al., 2009). Loss of biodiversity on land in the past decade alone is estimated to be costing the global economy \$500 billion annually (TEEB, 2009). Reduced diversity may also reduce resilience of ecosystems and the human communities that depend on them.

One of the most important issue before deciding what is the best way to value and to report biodiversity, is how to identify it. How do we know whether biodiversity has changed? Scientists use different methods to assess biodiversity. Biodiversity among areas can be compared with statistical indexes of species diversity (Magurran, 1988). Most indices combine two different metrics: the total number of species and the relative abundances of all species (evenness) in a sample. The simplest measure of diversity, the number of species in a given area, is called withinarea diversity or, technically, alpha diversity. Ecologists generally call this measure species richness; they imply no economic value by using *rich* or its opposite, *poor*. Only their presence (not their abundance) is taken into consideration in counting the number of species in an area. After the identification step, it is important to recognize the value that can be attributed to the biodiversity. The starting point to take into consideration is the strict connection between biodiversity and the services provided by ecosystems. The key value of biodiversity lies in its role in ensuring the functioning of ecosystems and their ability to provide services to humans and other living organisms that comprise them. As the foundations of ecosystems and habitats, biodiversity supports the provision of basic human needs such as food, shelter and medicines. It allows ecosystems to maintain oxygen in the air, enrich the soil, provide a habitat for flora and fauna, protect them against storm damage and regulate climate. Consequently, maintaining sufficient biodiversity is key to the continued delivery of essential ecosystem services. Because most ecosystem services are provided freely by natural systems, we typically become aware of their value and importance only when they are lost or diminished. Genes, species, and ecosystems of direct, indirect, or potential use to humanity are often referred to as "biological resources" (McNeely and others, 1990; Reid and Miller, 1989; Wood, 1997). That is the reason why biodiversity can be valued in different ways. In particular, it can be attributed a biological value, deriving from the components which are the source of all our food and many of our medicines, fibers, fuels and industrial products. The direct uses of the components of biodiversity contribute substantially to the economy. But it is possible to consider even the social and cultural values: many people develop a deep aesthetic appreciation for biodiversity and its components. This appreciation has several dimensions, including an appreciation of how biodiversity reveals the complex and intertwined history of life on Earth and a resonance with important personal experiences and familiar or special landscapes. Interest in nature is manifest in many hobby activities, including bird-watching and butterfly-watching; keeping reptiles, tropical fish, and other "exotic" species as pets; raising orchids or cacti; participating in native-plant societies; viewing nature photographs and reading nature writing; and watching nature televisions shows.

It is possible to conclude that biodiversity provides a wide array of services and amenities for people who might or might not value its individual components—individual genes, species, and ecosystems—and the diversity of components. Some aspects of biodiversity are valued directly; while others are valued for their contributions to ecosystem support and, hence, to sustainable production of things that are valued directly. The economic value of biodiversity has its place in the policy-making process. Economic valuation is an attempt to provide an empirical account of the value of services and amenities or of the benefits and costs of proposed actions (projects or policies) that would modify the flow of services and amenities. Economic valuation provides a utilitarian account, that is, an account of contribution to the satisfaction of human preferences (Committee on Noneconomic and Economic Value of Biodiversity, Board on Biology Commission on Life Sciences, National Research Council, 2003).

The issue of biodiversity's identification and valuation is strictly related to the reporting and the monitoring ones. The last two gain a greater value in the case of threats to the biodiversity in a specific area (or hotspot). As a matter of fact, extinction is a global phenomenon, with impacts far beyond nearby administrative borders. More practically, biodiversity, the threats to it, and the ability of Countries to pay for its conservation vary around the world. But, in most cases, conservation is much more a local issue. People generally care more about the biodiversity in the place in which they live. They also depend upon these ecosystems the most – and, broadly speaking, it is these areas over which they have the most control. The "control issue" is of primary importance, as stakeholders (in a very broad sense) wish to know what is the biodiversity value of the areas where they live and all activities Institutions that are in charge for them are undertaking to conserve and improve the ecosystems services. In the transparency era, all Organizations and Institutions will be expected to demonstrate their proactive commitment towards a sustainable future through reporting and other disclosures, which will have to clearly explain their contributions to tackling society's real issues, such as food and water security issues, wealth distribution issues and climate change. This will be accomplished, in great measure, through regulated and non-regulated disclosure formats as well as other forms of external communication.

Aiming to prepare reports and communications that express real efforts towards concrete and sustainable solutions, new metrics will be created where there is a specific unmet need. A large number of metrics has been created in recent decades; consequently, in the next decade, companies and other players could focus on working with partners to build on what already exists to create solutions to improve the planning and decision-making processes (GRI, 2015a). All Protected Areas (Hanna K, et al., 2008), in the same way, should be accountable (Mintz S., 2014) and consider all strategically (materially) relevant issues connected to biodiversity in their reports.

The next paragraph will be devoted to the illustration of GRI guidelines for biodiversity reporting, interpreted as a useful tool in the understanding of the topic.

3. GRI Guidelines to Biodiversity reporting and Indicators

According to the GRI (GRI, 2007; GRI, 2015b), the report should be prepared according to some specific principles:

- Stakeholder inclusiveness: the organization should identify its stakeholders, and explain how it has responded to their reasonable expectations and interests;
- Sustainability context: The report should present the organization's performance in the wider context of sustainability;
- Materiality: The report should cover aspects that reflect the organization's significant economic, environmental and social impacts or substantively influence the assessments and decisions of stakeholders;
- Completeness: The report should include coverage of material aspects and their boundaries, sufficient to reflect significant economic, environmental and social impacts, and to enable stakeholders to assess the organization's performance in the reporting period.

The Guidelines contain two categories of Performance Indicators: Core (relevant to most reporting organizations) and Additional (of interest to most stakeholders). In the first category, each organization should report a description of significant impacts of activities, products and services on biodiversity in Protected Areas and Areas of high biodiversity value outside Protected Areas.

In particular, it should be important to report the nature of significant direct and indirect impacts on biodiversity with reference to one or more of the following:

- Construction or use of manufacturing plants, mines and transport infrastructure;
- Pollution;
- Introduction of invasive species, pests and pathogens;
- Reduction of species;
- Habitat conversion;
- Changes in ecological processes outside the natural range of variation.

The location and size of land owned, leased, managed in, or adjacent to, Protected Areas and Areas of high biodiversity value outside Protected Areas, and should be reported too.

Moreover, significant direct and indirect, positive and negative impacts with reference to the following should be reported:

- Species affected;
- Extent of areas affected;
- Duration of impacts;
- Reversibility or irreversibility of the impacts.

The Additional Indicators can be identified in the following:

- Habitats protected or restored;
- Strategies, current actions and future plans for managing impacts on biodiversity;
- Number of IUCN Red List species and national conservation list species with habitats in Areas affected by operations, by level of extinction risk.

In the light of the previous points, it is possible to underline the necessity to integrate the GRI Guidelines and Standards of Disclosure with some other metrics, in particular for Protected Areas. A tentative integration will be illustrated in the next paragraph. General Guidelines of reporting remain valid and represent the main conceptual framework, useful for each Organization.

4. Biodiversity Indicators: a tentative integration for Protected Area

Biodiversity reporting, by some metrics/indicators, is nowadays used mainly at a National level (for example: Department for Environment, Food and Rural Affairs, UK, 2014). But, as pointed out in the previous paragraphs, this kind of reporting is very useful for stakeholders of each organization, private or public, whose activities impact, in a direct or indirect way, on biodiversity loss and/or conservation. It is particularly valid for Protected Areas. One of the main, and more general, indicator, is the one proposed by the IUCN Red List (IUCN, 2009). The IUCN Red List Index (RLI) measures trends in the overall extinction risk ('conservation status') of sets of species, as an indicator of trends in the status of biodiversity. Extinction is a key measure of biodiversity loss that has resonance with the public and decision makers, and that has clear relevance to ecological processes and ecosystem function. The RLI is based on movement of species status through the IUCN Red List Categories. It is structured as follows:

$$RLI_{t} = 1 - \frac{\sum_{c(t,s)} W_{c(t,s)}}{W_{\text{EX}} \cdot N}$$
(1)

where Wc(t,s) is the weight of category c for species s at time t, (W_{EX}) is the weight for Extinct, and N is the number of assessed species excluding those considered Data Deficient in the current time period and those considered to be Extinct in the year the set of species was first assessed. The RLI is calculated from the number of species in each Red List Category (Least Concern, Near Threatened, Vulnerable, Endangered, Critically Endangered), and the number changing Categories between assessments as a result of genuine improvement or deterioration in status.

The RLI falls under the CBD Biodiversity 2010 Target focal area: *Status and Trends of the Components of Biological Diversity*. It is the only indicator that has been adopted for immediate testing under the CBD headline indicator: *Change in status of threatened species*. Disaggregation of the RLI is relevant to three other CBD 2010 target focal areas:

- 1. Under Threats to biodiversity and the headline indicator Trends in Invasive Alien Species, an RLI can be calculated to show trends in the impacts of invasive species and their management on biodiversity;
- 2. Under the focal area Sustainable Use, RLIs showing trends in the impacts of use and its management provide a useful measure;
- 3. Under the focal area Ecosystem integrity and ecosystem goods and services and the headline indicator Biodiversity for food and medicine, an RLI showing trends in the status of species used for food and medicine is relevant.

The CBD, in its 2010 report (CBD, 2010), illustrates some provisional indicators for assessing progress towards the 2006 targets. It is important to underline that CBD distinguishes among "measures", "metrics" and "indicators", defining:

- measure: a value that is quantified against a standard at a point in time;
- metric: a set of measurements;
- indicator: metrics presented in a meaningful way, usually by adding context.

CEFE 2015 - Central European Conference in Finance and Economics

Focal Area	Headline indicator
Status and trends of the	1. Trends in extent of selected biomes, ecosystems, and habitats
components of biological diversity	2. Trends in abundance and distribution of selected species
	3. Coverage of protected areas
	4. Change in status of threatened species
	5. Trends in genetic diversity of domesticated animals, cultivated plants, and fish species
	of major socioeconomic importance
Sustainable use	6. Area of forest, agricultural and aquaculture ecosystems under sustainable management
	7. Proportion of products derived from sustainable sources
	8. Ecological footprint and related concepts
Threats to biodiversity	9. Nitrogen deposition
	10. Trends in invasive alien species
Ecosystem integrity and ecosystem	11. Marine Trophic Index
goods and services	12. Water quality of freshwater ecosystems
	13. Trophic integrity of other ecosystems
	14. Connectivity / fragmentation of ecosystems
	15. Incidence of human-induced ecosystem failure
	16. Health and well-being of communities who depend directly on local ecosystem goods and services
	17. Biodiversity for food and medicine
Status of traditional knowledge, innovations and practices	18. Status and trends of linguistic diversity and numbers of speakers of indigenous languages
	19. Other indicators of the status of indigenous and traditional knowledge
Status of access and benefit-sharing	20. Indicator of access and benefit-sharing
Status of resource transfers	21. Official development assistance provided in support of the Convention
	22. Indicator of technology transfer

In 2010, indicators considered as ready for immediate testing and use are shown in blue, those requiring further development and taken forward are shown in yellow, and those not progressed are shown in red. It is clear that many of the previous indicators can be used also at a local level.

In the view of CBD, the current framework of global indicators should be modified and simplified into four 'focal areas': Threats to Biodiversity; State of Biodiversity; Ecosystem services; and Policy Responses. Existing indicators should be re-aligned with the new framework, as appropriate, in order to maintain continuity and enhance their use. The relationships between the focal areas and between indicators and targets should be clearly explained and documented, including their scientific basis (Armon R. H., Hanninen O., 2015) and assumptions.

Main strategic goals can be:

- Addressing the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society;
- Reducing the direct pressures on biodiversity and promote sustainable use;
- Improving the status of biodiversity by safeguarding ecosystems, species and genetic diversity;
- Enhancing the benefits to all from biodiversity and ecosystem services;
- Enhancing implementation through participatory planning, knowledge management, and capacity building.

For each of the previous goals it will be possible to identify new indicators, for both national and local levels.

5. Discussion and conclusions

Biodiversity conservation is one of the main challenges that Governments and Institutions will face in next years. The reporting of its value and of all activities that are accomplished in Protected Areas to interested stakeholders is of primary importance in the building of a public awareness of this issue. In fact, the concept of public accountability is valid also for this kind of Organizations and for their effective management. The GRI represents one of the most relevant examples of successful ventures in this sense. The general framework represented by its Guidelines is a valid tool for all Institutions interested in giving a valid picture of all Capitals (also the Natural Capital) producing value for an Organization and for the society. But this framework shall be implemented, adapted and improved, according to the specific goals fixed. In this way, the IUCN Red List Index and the CBD Indicators are very important metrics used to report Biodiversity. One of the main challenges related to their consideration is that some of them, because of the lack of available information, could suffer from difficulties of calculation.

In the future, it will be important to raise the strategic priority of biodiversity conservation. Probably, one of the best way to reach this goal, will be the communication of the fact that biodiversity underpins the delivery of ecosystem services for human benefit and that future costs of not conserving biodiversity could be even greater than the current (insufficient) investment in conservation. Moreover, it is important to present some possible criteria for useful and effective indicators. They should be:

- measurable;
- sensitive over time;
- scalable between global and national levels;
- as far as possible, based on data that already exist, or for which there are realistic and feasible programmes to bring the data together.

In conclusion, I want to point the main limitation of the paper, as it is only a theoretical one. The aim, in the future, is to integrate it with an empirical analysis based on the collection and the analysis of a sample of Protected Areas reporting activities, at the national and at the international level.

References

ARMON, R. H. and HANNINEN O. 2015. Environmental Indicators. Springer.

- CBD. 2010. CBD Technical Series n. 53. Biodiversity Indicators & the 2010 biodiversity target: outputs, experiences and lessons learnt from the 2010 Biodiversity Indicators Partnership.
- COMMITTEE ON NONECONOMIC AND ECONOMIC VALUE OF BIODIVERSITY. Board on Biology Commission on Life Sciences, National Research Council. 2003. Perspectives on biodiversity. Valuing its role in an everchanging world, National Academy Press, Washington D.C..
- CONVENTION ON BIOLOGICAL DIVERSITY. 2010. Global Biodiversity Outlook 3. UNEP. Available at: http://www.cbd.int/gbo3/.

- CONVENTION ON BIOLOGICAL DIVERSITY. 2011. Strategic Plan for Biodiversity 2011–2020, including Aichi Biodiversity Targets. Available at: http://www.cbd.int/sp/.
- DEPARTMENT FOR ENVIRONMENT. Food and Rural Affairs, UK. 2014. UK Biodiversity Indicators 2014, Measuring progress towards halting biodiversity loss.
- GRI. 2007. Biodiversity. A GRI reporting resource.
- GRI. 2015a. Sustainability and Reporting trends in 2025, Preparing for the future.
- GRI. 2015b. G4 Sustainability Reporting Guidelines, Reporting Principles and Standard Disclosures.
- HANNA, K., CLARK, D. and SLOCOMBE, D. S. 2008. Transforming Parks and Protected Areas, Policy and Governance in a changing world, Routledge, New York and London.
- IUCN. 2009. International Union for Conservation of Nature and Natural Resources, IUCN Red List Index, Guidance for National and Regional Use, Version 1.1.
- MAGURRAN, A.E. 1988. *Ecological diversity and its measurement*. Princeton NJ: Princeton Univ Pr.
- McCULLOUGH, D.R. (ed). 1996. *Metapopulations and wildlife conservation*. Washington DC: Island Pr.
- McNEELY, J.A, MILLER, K.R., REID, W.V., MITTERMEIER, R.A. and WERNER, T.B. 1990. *Conserving the world's biological diversity*. Available from: IUCN, World Resources Inst, Conservation International, World Wildlife Fund-US, World Bank.
- MCNEELY, J.A, MITTERMEIER, R.A, BROOKS, T.M, BOLTZ, F. and, ASH, N. 2009. *The wealth of nature: ecosystem services, biodiversity, and human well-being*. CEMEX, Mexico City.
- MINTZ, S. 2014. Accounting for the Public Interest. Perspectives on accountability, professionalism and role in society, Springer.
- REID, W.V. and MILLER, K.R. 1989. *Keeping options alive: the scientific basis for conserving biodiversity*. Washington DC: World Resources Inst.
- SALAFSKY, N., MARGOLUIS, R., REDFORD, K.H., and ROBINSON, J.G. 2002. *Improving the practice of conservation: a conceptual framework and research agenda for conservation science*. Conservation Biology, 16, 1469–1479.
- TEEB. 2009. The economics of Ecosystems and biodiversity for National and International Policy Makers. UNEP, Bonn.
- WOOD, P. 1997. Biodiversity as the source of biological resources. In: Envir, Val 6, pp. 251-268.

Structure of Capital Markets

JAKUB DANKO¹ Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

The article presents the method of identification of capital market structure in USA, which is based on mutual relationships between individual subindices Dow Jones Industrial Average (DJIA). Structure here is identified by R. Mantengna's (1999) methodology that is known as the methodology of minimum spanning tree. It identifies the dominant correlation relationships between individual DJIA subindices in the presented research. Minimum spanning trees are estimated on the 20-day rolling windows return of sector subindices during the period of March 2001 - September 2014 and using the dynamic conditional correlations during the same time period. These structures represent the base for next analyses, for example by using the methods of clustering distribution into groups which include similar graphical representations of capital market.

Key words: Minimum Spanning Tree, Graph Theory, Dynamic Conditional Correlations, Clustering, Dow Jones Industrial Average

JEL Classification: C58

1 Introduction

The aim of the article is to identify a specific capital market regime using different statistical and discrete mathematics methods. The market regime is defined as a certain state at the market. One of its characteristics are for instance stability and instability or, in the other words, divergence of long-term trend. Basically our goal is to identify the regime and to predict the market progress in the future.

The fundamentals of methodology of minimum spanning tree were defined by Rosario Mantegna (1999) to understand the structure of capital markets. The authors Onnela and Chakraborti (2003) worked with the calculation of minimum spanning tree. However the approach differs from previous one the function mapping correlation of vertexes distance is nonlinear. The new network structure was named as a dynamic asset graph.

Bonanno and Caldarelli (2004) dealt with the influence of the time horizon on returns of financial instruments. They found that the graph structure changes from a complex form to simple one by decreasing time horizon. The authors worked with a volatility of time series of stock prices and global financial markets.

Consequently the authors began using more advanced methods of graph theory, for instance a planar graph market representation (graphs that edges never crossed each other). The similar methodology began being used to analyze topology of foreign exchange markets (Mizuno and Takayasu, 2005; Naylor, Rose and Moyle, 2007). The authors Kenett, Tumminello and

¹ Ing. Jakub Danko, Němcovej 32, 040 01 Košice, Slovak Republic, jakub.danko@tuke.sk

Mantegna (2010) did the newest survey concerning a partial correlation analysis as an instrument to find most relevant edges of graphs. The study using the planar graphs describes a new type of dependent network, where concerning of graph connections depends on mean and standard deviation of the particular vertexes. All authors mentioned above used data from New York Stock Exchange database (NYSE) and simultaneously one analysis was based on Tel Aviv Stock Exchange data (TASE).

2 Data and introductory analysis

An analysis worked with the sector subindices of American market index DJIA (see Table 1).

Label	Name of the subindex
A1ENE	DOW JONES AMERICAS ENERGY STOCK INDEX
A1BSC	DOW JONES AMERICAS BASIC MATERIALS STOCK INDEX
A1IDU	DOW JONES AMERICAS INDUSTRIAL STOCK INDEX
A1NCY	DOW JONES AMERICAS CONSUMER NON-CYCLICAL STOCK INDEX
A1TLS	DOW JONES AMERICAS TELECOMMUNICATIONS INDEX
A1UTI	DOW JONES AMERICAS UTILITIES STOCK INDEX
A1FIN	DOW JONES AMERICAS FINANCIAL STOCK INDEX
A1TEC	DOW JONES AMERICAS TECHNOLOGY STOCK INDEX
A1HCR	DOW JONES AMERICAS HEALTHCARE STOCK INDEX

Table 1 Subindices as a sectors of the US economy

Source: Own processing using http://www.djindexes.com/globalfamily/

The time series of close prices of all nine subindices were used in time period from 27. 3. 2001 to 15. 9. 2014. Within chosen time period we gathered data of about 3,500 close prices. We counted the logarithmic daily return series of all subindices. The cumulative character of first five subindices is given in the picture below.



Source: Own processing using R

For the proper understanding you can see at the Figure 2 logarithmic return series of A1ENE subindex. It is clear from the Figure 1 that the decrease in 2008 caused high volatility of subindex profitability.



From the daily returns we created 20 - day rolling windows to see mutual cross – correlations. In conclusion we were able to collect almost 3,500 daily observations. In fact 174 rolling windows were created.

Beside the mentioned rolling windows approach we work also with the dynamic conditional correlation derived from Garch (1, 1) model using the same database. However there are more approaches the presented paperwork is devoted only to first one described in next chapters.

3 The graph theory approach

If we assumed that an imaginary portfolio consists of nine subindices, the correlation matrix would represent the standard view of this portfolio. The view is relatively simple as it is not possible to capture the complex portfolio bonds as well as the portfolio structure. As an appropriate representative of individual financial tools forming the portfolio is the graph like a tool of discrete mathematics. The graph is defined by a set of vertexes that in our case represent particular subindices and a set of edges that represent some relation between them. We would like distance between indices to be given by the edges. Considering a distance we have to define the metrics.

An approach of different authors is given by the following formula:

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

Where $\rho_{i,j}$ is Pearson correlation coefficient of i - th and j - th subindex within given window. The distance matrix was created from the correlation matrix. We made up 174 distance matrices. These matrices are symmetric and sized of 9x9 (9 subindices), on main diagonal are nulls and the value in i - th row and j - th column means distance between i - th and j - th subindex. The matrices determined in this way could be described by the complete graphs with 9 vertexes and 36 edges (each vertex is related to every others what means there are $\binom{9}{2} = 36$ edges). To sum up we created 174 complete graphs demonstrating distances between subindices in given time window. The analysis is done in program R using the igraph package to work with graphs. If the graph is represented by the distance matrix, we are able to calculate its minimum spanning tree. Therefore we need to take into account that each connected graph has a spanning tree what is called a subgraph of the graph that includes all vertexes (it is also a factor). This subgraph is also connected and there has to be no cycles (it is a tree). If the graph has some edge evaluation (length of edge in our case) then there must be at least one spanning tree consisting of the minimum sum of edge valuations. It is called minimum spanning tree. There are more algorithms how to find minimum spanning tree represented by the distance matrix for example Kruskal or Prim algorithm. The igraph package works with Prim algorithm based on weighted graphs representing by distance matrix. See the following algorithm: the first step is to choose some vertex and afterwards to add an edge that has minimum evaluation into spanning tree. In other words it means that the edge is next to vertex as close as possible. By this formula we create a tree. Subsequently in following steps we add the edge into actual tree. The new edge lies by one side in a tree and by other side out of tree. The minimum spanning tree of the connected graph has n vertexes and represents graph with n vertexes and n-1 edges (Czap, 2013).

We were able to count 174 minimum spanning trees from the 174 complex graphs. An example of the minimum spanning tree of the first time window is at the Figure 3 below. An illustration demonstrates 9 vertexes (subindices) and 8 edges (minimum distances between them).



Figure 3 Example of the minimum spanning tree of the first time window Source: Own processing using R

These spanning trees are necessary to represent because of computer processing. The first option how to represent graph is a neighborhood matrix. There are two possibilities how to understand it. Firstly it is consider for weighted matrix where length of edge is given value in neighborhood matrix. Secondly it is understood as an unweighted binary matrix expressing neighborhood (a pair of vertexes is a part of minimum spanning tree) by number one or opposite defined by zero (a pair of vertexes is not a part of minimum spanning tree). The representation is totally conclusive and it never interprets different graphs. To count number of spanning trees of spanning trees of spanning trees given by n vertexes equal to $n^{(n-2)}$.

If there is set of 9 vertexes it is possible to create $9^7=4,782,969$ minimum spanning trees. In our opinion this number is so huge to include it into our analysis. Therefore in next steps we focus

only on processing of equivalence classes of minimum spanning trees. The number of vertexes of first degree, second degree until n-1 degree should be the same considering spanning tree of one equivalence class.

Advantages of these equivalence classes are their simplicity and smaller frequency in comparison with neighborhood matrix. In the following Figure 4 we can see different examples of representation of minimum spanning trees of the first time window:



Figure 4 Possibilities of representation of the minimum spanning tree from the first time window by selected equivalence classes and binary neighborhood matrix Source: Own processing using R

The most appropriate candidate we decided to choose representative of window with n-1 sized vector that consists of frequency of vertex degrees (see right top corner of Figure 4).

4 The cluster analysis

At the beginning of clustering we worked with 174 vectors of length 8. Each vector presents one time series window. By clustering we want to identify certain amount of clusters assuming that the similar minimum spanning trees are clustered. These clusters can be considered as a market regime (for instance stability, sudden drop etc.). The cluster analysis was accomplished by Ward Method in program R. It is also known as Ward's minimum variance method and it is a criterion applied in hierarchical cluster analysis.

The similarity of clusters is measured as a sum of squares between objects of two clusters given by the all attributes. Chosen the method we try to minimalize a total sum of variance throughout new clusters. Methodology is appropriate as the designated clustering is based on maximum junction within objects of one cluster. (Ward, 1963) We chose four as an optimum number of clusters. The results of analysis are shown below.



By identification of 4 basic clusters we are able to announce the connection between time window and certain cluster. As the equivalence classes clustered into one cluster represent minimum spanning tree with the similar structure we can consider the certain cluster as a market regime. The assumption is based on empirical observations. For instance the returns of shares tends to be correlated in case of large market decreases. In terms of minimum spanning tree these positive correlations cause small distances and create the star pattern. It is a graph determined by one vertex of degree n-1 as well as by n-1 vertexes of degree one. Secondly empirical observations confirm that the trend of return of shares in case of stable market is independent. We assume long paths in minimum spanning trees.

5 The transition matrix

The results of the cluster analysis determine the cluster for each of 174 equivalence classes. Each cluster is defined by the minimum spanning tree of certain time window which it belongs to. The four market regimes were identified although there are any specified information except of the market structures represented by minimum spanning trees. The question is the time progress of cluster. If we assume that American stock exchange indices represent the effective markets because of huge liquidity at the market, then we can accept assumption of the absence of market memory. Thanks to that we can returns consider as an implementation of the Markow process. By the acceptance of this hypothesis we need to take into account the transition matrix representing a square matrix size of 4x4 (4 clusters – markets regimes were identified). The matrix is described by i – th row and j – th column by number of market regimes that were in particular time window in i – th cluster and following time window in j – th cluster. The sum of components at main diagonal of matrix means number of regimes remaining in the same cluster in next phase. The matrix is in the Table 2 below.

	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Sum
Cluster 1	13	14	5	11	43
Cluster 2	13	25	7	12	57
Cluster 3	6	10	13	5	34
Cluster 4	11	8	9	11	39
Sum	43	57	34	39	173

Table 2 Transition matrix of 174 time series windows

Source: Own processing using R

The transition probability matrix from one cluster to another was derived from the primary matrix described above. The interpretation of matrix is following: value in i - th row and j - th column represents probability that if market is in i - th regime, then it is in j - th regime in next phase. The transition probability matrix is shown at the following table.

Tuble e Transition probability matrix of 177 time series windows (own processing using it)						
	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Sum	
Cluster 1	0.302326	0.325581	0.116279	0.255814	1	
Cluster 2	0.22807	0.438596	0.122807	0.210526	1	
Cluster 3	0.176471	0.294118	0.382353	0.147059	1	
Cluster 4	0.282051	0.205128	0.230769	0.282051	1	

Table 3 Transition probability matrix of 174 time series windows (own processing using R)

Source: Own processing using R

6 Other options of analysis

An article describes results of an analysis of the capital market in the USA. It is important to say that an author could not mention the all parts of analysis although it is not done yet. In this section we would like to mention the plans for next analysis. The cluster analysis divided market into few regimes by an equivalent classes. In next step we would like to work with cluster analysis of other equivalent classes and neighborhood matrix. The results will be compared. Except of that we want to find some information about market located in particular cluster determined by the cluster analysis. We are planning to use the DJIA index as a market represent. By the time windows we will calculate the basic statistics. We would like to test the conformity of all clusters in order to find some differences specified in particular clusters. The transition probability matrix could be used to count the Markow chains that determined a probability that if market is in certain regime then it moves into particular regime in next short-term period. Additionally we would like to figure out if the market tends to converge in some regime into concrete regime in long-term or there is cyclic development.

7 Conclusion

An article is devoted to conclusion of analysis of the capital market structure in the USA. The market is represented by subindices of DJIA market index. Using appropriate statistical methods and graph theory methods we were able to identify particular market regimes that we would like to analyze in the future.

References

- BONANNO, G., CALDARELLI, G., LILLO, F., MICCICHÉ, S., VANDEWALLE, N. and MANTEGNA, R. N. 2004. Networks of Equities in Financial Markets. In: *The European Physical Journal B*. Vol. 38, pp. 363 371.
- CZAP, J. 2013. *Teória grafov (Graph Theory)*. Study materials published in MOODLE, EkF TU, Košice.
- FINANCIAL NETWORK ANALYTICS (FNA) 2012. A Short History of Correlation Networks Research. [online]. Available online: http://www.fna.fi/blog/2012/07/06/a-short-history-of-correlation-networks-research.
- KENETT, D., TUMMINELLO, M., MADI, A., GERSHGOREN, G., MANTEGNA, R. N. and BEN-JACOB, E. 2010. Dominating Clasp of the Financial Sector Revealed by Partial Correlation Analysis of the Stock Market. In: *PLoS ONE*. Vol. 5, No. 12.
- MANTEGNA, R. N. 1999. Hierarchical structure in financial markets. In: *The European Physical Journal B*. Vol. 11, No. 1, pp. 193 196.
- MISKIEWICZ, J. 2012. Analysis of Time Series Correlation. The Choice of Distance Metrics and Network Structure. In: *Acta Physica Polonica A*.Vol. 121, No. 2-B, pp. B89 B94.
- MIZUNO, T., TAKAYASU, H. and TAKAYASU, M. 2005. Correlation Networks among Currencies. In: *Physica A: Statistical Mechanics and its Applications*. Vol. 364, pp. 336 342.
- NAYLOR, M., ROSE, L. and MOYLE, B. 2007. Topology of Foreign Exchanges Markets Using Hierarchical Structure Methods. In: *Physica A: Statistical Mechanics and its Applications*. Vol. 390, No. 4, pp. 719 730.
- ONNELA, J. P., CHAKRABORTI, A., KASKI, K., KERTÉSZ, J. and KANTO, A. 2003. Asset Trees and Asset Graphs in Financial Markets. In: *Physica Scripta*. Vol. T106, pp. 48 53.
- WARD, J.H. 1963. Hierarchical Grouping to Optimize an Objective Function. In: *Journal of the American Statistical Association*. pp. 236 244.
- YINGHUA, Z. 2009. Stock Market Network Topology Analysis Based on a Minimum Spanning Tree Approach. Thesis.

Social Disparities in Alcohol Consumption and its Financial Aspects among a Selected Target Group

ADRIÁNA DÚČOVÁ¹ Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

No single variable predicts the likelihood that a person will adopt a given pattern of consuming alcohol. People with more education and higher socioeconomic status are more likely to drink alcohol, but social gradients differ in men and women for hazardous and heavy episodic drinking. Men who are less educated and have lower socioeconomic status and women who are more educated and have higher socioeconomic status, are more likely at risk to drink in many countries. However, there is a fairly strong trend for women's drinking behaviours to converge to those of men. Heavy drinking is associated with a lesser probability of being in employment, more absence from work, lower productivity and wages, and a greater likelihood of causing accidents and injuries in the workplace. The aim of this article is to look into the issue of alcohol consuming among young people – college students.

Key words: Alcohol, Consuming, Disease, Comparison, Factors, Survey

JEL Classification: I10, I15

1. Introduction

The use of alcoholic beverages has been an integral part of many cultures for thousands of years (McGovern, 2009). Prior to the modern era, fermented alcoholic beverages were known in all tribal and village societies except in Australia, Oceania and North America. In societies where there was no aboriginal alcohol consumption, the encounter with alcoholic beverages was often abrupt and highly problematic. Where alcohol was traditionally consumed, production of alcoholic beverages commonly occurred on a small scale as a household or artisanal activity, particularly when and where agricultural surpluses were available. Drinking alcohol was thus often an occasional and communal activity, associated with particular communal festivals (Gumede, 1995; Parry and Bennets, 1998; Room et al., 2002). There are many places in the world today where versions of these traditional patterns originating from tribal and village societies persist (Obot, 2000; Room et al., 2002; Willis, 2006).

2. Social disparities in any alcohol drinking habits in general

Many studies have looked at the association between socioeconomic condition and patterns of alcohol drinking. At first sight, it seems possible to explain alcohol consumption in purely economic terms – the better-off tend to drink more than people with less money because they can afford to. In that, it would be unlike other behaviors such as smoking that are both costly and more frequent in people with lower incomes. However, alcohol consumption is similar to other harmful behaviors as far as abuse is concerned. For instance, there is evidence of a positive association between education and the frequency of consumption but also of a negative

¹ Ing. Adriána Dúčová, Němcovej 32, 040 01 Košice, Slovak Republic, adriana.ducova@tuke.sk

association between education and heavy drinking (Bloomfield et al., 2006; Caldwell et al., 2008; Casswell et al., 2003).

In the analysis of 33 countries as part of the GENACIS project (Gender, Alcohol and Culture International Study), women with higher education were found to be more likely to consume alcohol than women with lower education. The same was true for men in most countries, with the exception of India (Grittner et al., 2012).

In a number of countries (the Czech Republic, Finland, France, Germany, Hungary, Sweden, Switzerland and the United Kingdom), both men and women with higher incomes were found to be more likely to consume alcohol (Gmel et al., 2005). Similar findings were found and reported based on data from Estonia, Latvia and Lithuania (McKee et al., 2000), women in the highest income group were more likely to consume alcohol compared to women in the middle or lowest income group (Figure 1). Socioeconomic status (SES) is based on occupation in Chile, England, France, Hungary, Italy, Japan, Portugal, Spain, and Switzerland, and on household income in other countries. The analysis covers people 25+ except for the Czech and Slovak Republics and for Slovenia (16+). (*) value of index is statistically significant (p<0.05). OECD estimates show a similar distribution of drinking status: for both genders, adults with higher education and higher socioeconomic status (SES) were more likely to consume alcohol in the past 12 months than their counterparts in lower-education and lower-SES group. This is observed in all countries, although the educational gradient and the socioeconomic gradient are not significant in a few cases.



Figure 1 Social disparities in alcohol drinking in the past 12 months

Source: OECD estimates based on national health surveys, most recent years, OECD (2015), Tackling Harmful Alcohol Use: Economics and Public Health Policy

The "concentration index" shown in Figure 1 is a statistical measure used to quantify the degree of inequality in a health variable (in this case drinking any alcohol in the last 12 months) that is related to socioeconomic characteristics (education or socioeconomic status here). Almost all countries display a negative index indicating that people with less education and with lower SES are less likely to consume alcohol in the past 12 months. The magnitude of these inequalities varies among countries. Education-related inequalities are marked in Switzerland among men and in Slovenia among women. SES-related inequalities are strong in Canada, Germany, and the United States in both men and women. On the other hand, virtually no inequality is detected in men in Korea (by education level) and Chile (by SES). Positive values of the index (e.g. men by SES in the Czech Republic and women by education in Korea) mean that people at the bottom of the socioeconomic ladder are more likely to drink alcohol.

Part of the explanation why people of higher SES drink more often than others may be that drinking is associated with and integrated into a wider range of activities. The fact that rates of abstinence are generally lower among higher SES groups also suggests that alcohol consumption is a more integral part of the lifestyle of the more advantaged (Giskes et al., 2011).

It is also possible that better-educated are more aware of the potential health benefits of moderate drinking, even though some studies suggest that those with the healthiest behavior profile obtain no additional benefit from moderate consumption of alcohol (Britton et al., 2008).

3. Factors affecting alcohol consumption

A variety of factors have been identified at the individual and the social levels, which affect the strength and patterns of consumption and can increase the risk of alcohol use disorders and other alcohol-related problems in drinkers and others. Environmental factors such as economic development, culture, availability of alcohol and the level and effectiveness of alcohol policies are relevant factors in explaining differences in vulnerability between societies, historical trends in alcohol consumption and alcohol-related harm (WHO, 2007; Babor et al., 2010; Nelson et al., 2013).

For a given level or pattern of drinking, vulnerabilities within a society are likely to have many of the same differential effects as those for differences among societies. Many of these differences are mitigated, but not entirely removed, by the universal availability of health care within the society (Gavurová and Hyránek, 2013; Barták and Gavurová, 2014). Where there is unequal access to treatment or other resources, the health and social consequences of a given level or pattern of drinking are also likely to be more severe for those with less resources (Shi and Stevens, 2005; WHO, 2007; Blas and Kurup, 2010).

Although there is no single risk factor that is dominant, the literature suggests that the more vulnerable a person is, the more likely the person is to develop alcohol problems (Schmidt et al., 2010). From a public health perspective, vulnerability denotes susceptibility to poor health or illness, which can be manifested through physical, mental and social outcomes (Šoltés, V. and Gavurová, 2014; Šoltés, M. and Gavurová, 2014), including alcohol-related problems.

3.1 Age

Children, adolescents and elderly people are typically more vulnerable to alcohol-related harm from alcohol than other age groups. Also, early initiation of alcohol use (before 14 years of age) is a predictor of impaired health status. That is because it is associated with increased risk for alcohol dependence and abuse at later ages, alcohol-related motor vehicle crashes, and other unintentional injuries (Hingson et al., 2000; Cherpitel, 2013). At least part of the excess risk among young people is related to the fact that, typically, a greater proportion of the total alcohol consumed by young people is consumed during heavy drinking episodes (US Surgeon General, 2007). Also, young people appear to be less risk-averse and may engage in more reckless behavior while they drink.

Alcohol-related harm among elderly people is due to somewhat different factors than alcoholrelated harm among young people. While alcohol consumption generally declines with age, older drinkers typically consume alcohol more frequently than other age groups. Also, as people grow older, their bodies are typically less able to handle the same patterns of alcohol consumption as in previous life years, leading to a high burden from unintentional injuries, such as alcohol-related falls (Sorock et al., 2006; Grundstrom et al., 2012). The alcohol-related burden of disease among older age groups is an increasing public health concern because of the rapidly ageing population in many countries (WHO, 2012).

Age-related vulnerability is the basis for age-specific monitoring of alcohol consumption and policy responses. Alcohol policies that are based on age-related vulnerability include partial or total advertising bans, restrictions on access to alcohol through minimum ages at which it is legal to purchase alcohol, and laws aimed to prevent any alcohol consumption by young people when driving vehicles.

3.2 Gender

Harmful use of alcohol is the leading risk factor for death in males aged 15–59 years, yet there is evidence that women may be more vulnerable to alcohol-related harm from a given level of alcohol use or a particular drinking pattern. The vulnerability of females to alcohol-related harm is a major public health concern because alcohol use among women has been increasing steadily in line with economic development and changing gender roles (Grucza et al., 2008; Wilsnack, 2013) and because it can have severe health and social consequences for newborns (Abel and Sokol, 1987; Lupton et al., 2004; Popova et al., 2013).

7.6% of all male deaths in 2012 were attributable to alcohol, compared to 4.0% of female deaths. Men also have a far greater rate of total burden of disease expressed in disability – adjusted life years attributable to alcohol than women – 7.4% for men compared to 2.3% for women. The increased burden of disease among men is largely explained by the fact that compared to women; men are less often abstainers, drink more frequently and in larger quantities. When the number of health and social consequences is considered for a given level of alcohol use or drinking pattern, sex differences for social outcomes reduce significantly or even reverse.

3.3 Family risk factor

A family history of alcohol use disorders is considered a major vulnerability factor for both genetic and environmental reasons (Merigankas et al., 1998; WHO, 2004a).

Heritable or genetic risk factors account for a substantial proportion of the variation in alcohol dependence. Multiple genes influence alcohol use initiation, metabolism and reinforcing properties in different ways (Clark, 2006), contributing to the increased susceptibility to toxic, psychoactive and dependence-producing properties of alcohol in some vulnerable groups and individuals. Parental alcohol use disorders have been found to negatively affect the family situation during childhood. Parents with alcohol use disorders display particular patterns of alcohol consumption and thereby increase the likelihood that their children will develop drinking patterns associated with high risk of alcohol use disorders when they are introduced to alcohol.

3.4 Socioeconomic status

Surveys and mortality studies, particularly from the developed world, suggest that there are more drinkers, more drinking occasions and more drinkers with low-risk drinking patterns in higher socioeconomic (SE) groups, while abstainers are more common in the poorest social groups. However, people with lower SES appear to be more vulnerable to tangible problems and consequences of alcohol consumption (Grittner et al., 2012). For example, manual workers seem more vulnerable to severe alcohol-related health outcomes, including mortality, than non-manual workers for a given pattern of drinking. Notably, this vulnerability is found to be handed down through the generations (Norström and Romelsjö, 1998; Mäkelä et al., 1999a, 2002; Hemström et al., 2002).

One explanation for the potentially greater vulnerability among lower SES groups is that they are less able to avoid adverse consequences of their behavior due to a lack of resources. For example, individuals with higher SES may be more able to choose safer environments in which to drink, purchase social or spatial buffering of their behavior and have better access to high-quality health care services (Schmidt et al, 2010).

3.5 Economic development

The most important of the societal vulnerability factors related to alcohol consumption, as well as to alcohol related diseases, is economic development. For the purpose of this report World Bank income groups and gross domestic product per capita based on purchasing power parity (GDP-PPP) are used as a proxy for economic wealth. World Bank income groups aggregate countries into low-income, lower middle income, upper middle income and high-income countries. In contrast, GDP-PPP is gross domestic product converted to international dollars using purchasing power parity rates for the purposes of normalizing differences among the countries. Countries' development status can be more broadly defined than just considering their economic wealth, for example by describing development in terms of levels of infant mortality and adult life expectancies.

4. Analysis of the questionnaire about students' attitude to alcohol consumption

Part of the article was a questionnaire, which focused on the attitudes of the target group to the consuming of alcohol. The target group was consisted of college students. The questionnaire followed the habits and consequences that alcohol consumption among young may lead to. The target group was selected because of the fact, that young people are often partly a risk group of habitants. It is caused by the possibility that, they are persuadable to get wrong habits for the

future, drinking habits mainly, as we were interested in this article. The questionnaire (in Slovak language) is in the attachment of the article.

The questions were distributed into four groups. The first one was aimed to find out basic information about our respondents (age, gender, college faculty, form, level and grade of study). The second group focused on drinking (the frequency, the drinker's company, the amount, possible consequences, of drinking). The third group of questions was focused on the economic aspect of consuming alcohol and the fourth group of questions was interested in the future prospects of the respondents (do they plan to drink alcohol in future – after school, are they happy and satisfied with their lives). The following part of the article consists of the analysis of some of the questions that can provide the best look into the issue of drinking among young people.



Figure 2 Gender and age ratio

The survey involved 242 respondents. 63.1% of them were females and 36.9% were males. The age ratio was the following: 68.5% were 21 - 23 years old, 21.6% were 24 - 26 years old, 5.4% were less than 20, 4.6% were more than 27.



Figure 3 Level and form of study ratio

The majority of students studied economics and other technical courses. The least number of participants in the survey were medical students. The form, level and grade of study are following: 98.3% were daily students; 47.5% were students of first level (bachelor's degree), 45.8% were students of second level (master's degree) and 6.7% were third level students (doctoral degree).

Table	1	Grade	of	study	ratio
-------	---	-------	----	-------	-------

1 st grade	41	17.2%
2 nd grade	33	13.8%
5 th grade	68	28.5%
4 th grade	51	21.3%
5 th grade	45	18.8%
6 th grade	1	0.4%

The grade of study ratio is basically equivalent (28.5% are 3^{rd} grade students, 21.3% are 4^{th} grade students, 18.8% are 5^{th} grade students).

The second group of questions interested in the habits of the respondents has the following results. 42.2% of students stated that they had their first alcohol experience between the age of 13 and 15. This fact is not really satisfying while it is obviously young age and that could lead into serious problems in the future – the person could get used to wrong habits that may be damaging to him. Only 2.1% of respondents stated that they have never consumed alcohol yet. The next question was a follow-up. 35.1% of respondents stated that for the first time they were drunk between the age of 16 and 18 and 26.8% of respondents between the age of 13 and 15. These numbers are alarming because the state of being drunk is a very serious thing and could have very serious and tragic consequences also. Bad habits in the future among these people are really likely.

The majority of the respondents stated that they consume alcohol when they are out, mainly in bars, pubs, restaurants, almost 60%, and they also stated they never consume alcohol alone

(97.7%). Respondents also stated they own attitude and opinion on their alcohol consuming. 76.2% of the respondents said they drink alcohol but not in dangerous amounts, they are only occasional drinkers and they do not overdo that drinking. They also do not get drunk on the regular basis. But it is important to mention that 28.2% of the respondents stated that sometime in the past they already felt the need to reduce their drinking.

The third group of the questions was interested in the economical aspect of the drinking habits. This part ended quite great, it is possible to say that young people who were asked can manage their money well. They stated that their occasional drinking do not affect their financial situation in a negative way.

		less than 4 Euro	89	37.9%
14.5%		4 - 10 Euro	52	22.1%
		11 - 17 Euro	34	14.5%
		18 - 35 Euro	26	11.1%
22.1%		36 - 53 Euro	11	4.7%
		54 - 71 Euro	14	6%
	37.9%	72 - 107 Euro	5	2.1%
		108 Euro and more	4	1.7%

Figure 4 Money spent per month ratio

Most of the responded students (37.9%) said that monthly they spend less than 4 Euro on alcohol, 22.1% stated spending between 4 and 10 Euro per month, 14.5% stated spending between 11 and 17 Euro per month and 11.1% stated spending between 18 and 35 Euro per month. The other respondents who spend more money per month are negligible. These answers can indicate that even the students do consume alcohol, maybe sometimes inadequate amount; they do not do this activity regularly, what can make this bad habit less dangerous in the context of future prospects. The last group of question contained more or less hypothetical questions. These questions were intended to find out respondents' future prospect (their own opinion) and were connected to possible drinking after finishing the school. They were asked to evaluate their health status, their financial status, personal prospects. These questions also wanted to find out whether or not are the respondents satisfied with their life, situation in general, their goals, and if this goals could be endangered by alcohol consumption.



Figure 5 Future alcohol consumption and alcohol amount ratio

The majority of the asked said that the probability of their alcohol consumption in the future is high (82.1%), but they do not see it as a threat or danger. If they will consume alcohol the amount of their consumption will probably remain the same (51.5%). They are generally satisfied with their current situation. There is an assumption based also on the results from the rest of the questions that higher education they have and also their personal and professional prospects can lead to no alcohol addiction of any form and the alcohol consumption can remain on the accepted social level.

5 Conclusion

The main goal of this article was to give a general view and summary of information about the factors that can affect drinking habits. It could be the age, the gender and general background. Many factors can affect how one will face the danger of drinking. It is up to every individual how will they deal with different situation.

After this main sup up the article also brought an inner view into the habits and attitudes of a selected target group – college students. The results are interesting and there is an assumption based on them that higher education they have and also their personal and professional prospects can lead to no alcohol addiction of any form and the alcohol consumption can remain on the accepted social level. The answers to questions about financial aspects can indicate that even the students do consume alcohol, maybe sometimes inadequate amounts, they do not do this activity regularly, what can make this bad habit less dangerous in the context of future prospects. This fact is also positive in economic aspect, in general – the alcohol consumption does not affect the financial stability of respondents.

References

ABEL, E. L and SOKOL, R. J. 1987. Incidence of fetal alcohol syndrome and economic impact of FAS-related anomalies. In: *Drug Alcohol Depend*. Vol. 19, pp. 51–70.

- BABOR, T. F. et al. 2010. Alcohol: No Ordinary Commodity: Research and Public Policy. Oxford University Press.
- BARTÁK, M., GAVUROVÁ, B. 2014. Economics and social aspects of long-term care in the context in the Czech Republic and the Slovak Republic EU membership. In: 12th International Scientific Conference "Economic Policy in the European Union Member Countries": Conference Proceedings: 16. - 18.9.2014: Karviná: Silesian University Opava, pp. 52-61. ISBN 978-80-7510-045-0.
- CASSWELL, S., YOU, R.Q. and HUCKLE, T. 2011. Alcohol's harm to others: reduced wellbeing and health status for those with heavy drinkers in their lives. In: *Addiction*. Vol. 106, pp. 1087–94.
- GAVUROVÁ, B., HYRÁNEK, E. 2013. Determinanty rozvoja jednodňovej zdravotnej starostlivosti na Slovensku (Determinants of Day Health Care Development in Slovakia). In: *Ekonomický časopis*. Vol. 61, No. 2, pp. 134-154.
- GRITTNER, U., KUNTSCHE, S., GRAHAM, K. and BLOOMFIELD, K. 2012. Social inequalities and gender differences in the experience of alcohol-related problems. In: *Alcohol Clin Exp Res.* Vol. 47, pp. 597–605.
- HILTON, M. E. 1987. Demographic characteristics and the frequency of heavy drinking as predictors of selfreported drinking problems. In: *Br J Addiction*. Vol. 82, pp. 913–25.
- HINGSON, R., EDWARDS, E.M., HEEREN, T. and ROSENBLOOM, D. 2009. Age of drinking onset and injuries, motor vehicle crashes, and physical fights after drinking and when not drinking. In: Alcohol Clin Exp Res. Vol. 33, No. 5, pp. 783–90.
- MÄKELÄ, K. and MUSTONEN, H. 2000. Relationships of drinking behavior, gender and age with reported negative and positive experiences related to drinking. In: *Addiction*. Vol. 95, pp. 727–36.
- OECD 2015. Tackling Harmful Alcohol Use: Economics and Public Health Policy, OECD Publishing.
- ŠOLTÉS, V., GAVUROVÁ, B. 2014. The Functionality Comparison of the Health Care Systems by the Analytical Hierarchy Process Method. In: *E+M Ekonomie a Management*. Vol. 17, no. 3, pp. 100-118. ISSN 1212-3609.
- ŠOLTÉS, M., GAVUROVÁ, B. 2014. Identification of the Functionality Level of Day Surgery in Slovakia. In: *Ekonomický časopis*. Vol. 62, No. 10, pp. 1031-1051. ISSN 0013-3035
- ROOM, R., JERNIGAN, D., CARLINI-MARLATT, B., GUREJE, O. and MÄKELÄ, K., MARSHALL, M. et al. 2002. *Alcohol and developing societies: a public health approach. Helsinki*: Finnish Foundation for Alcohol Studies and Geneva: World Health Organization.

WHO 2014. *Global status report on alcohol and health – 2014 edition.*

Start-up Companies – the Case of Košice Region

PETER DŽUPKA¹ – SLÁVKA KLASOVÁ² – VILIAM VAJDA³ Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

The article represents the theoretical overview on definition of start-up companies and presents results of questionnaire research conducted in Košice region. The research brought new insight into how start-up companies differ in terms of collaboration, R&D activities, financing source and what are their different support needs according to their stage of their development. The main reasons for this topic is the fact that the support policy for these companies is forming at the present in Slovakia and that there has been so far no attempt to investigate start-up companies in Kosice region. The results suggest that start-up companies collaborate mainly with firms or universities but rarely cooperation was indicated with research institutes. The findings further revealed relationship between the stage of the development of companies and their source of financing. While at the initial and growth phase of development most of stat-up companies used bank loans, at their start phase of development they opted also business angel and risk capital as their source of financing.

Key words: Start-up, Support Policy, Košice Region, Collaboration, Financing

JEL Classification: D22, C51

1 Introduction

Start-up companies have important role in supporting technological and economic growth (Grimaldi and Sobrero; 2000). Many authors suggest that government aiming at creating wealth for everybody should make an effort to increase new start-ups companies. Supporting start-up is key for enhancing competition and entrepreneurship. Generated spill-over effects contribute to higher innovation performance and productivity growth which help to boost employment. Alweendo (2004) underline that start-ups can boost employment more effectively than large firms because they tend to be more labour intensive. From this point of view government intervention is needed in order to create employment and alleviate poverty (Alweendo, 2004).

The issue of the start-up companies has become very current problem also in Slovakia. New initiatives are being implemented by Slovak government with aim to support new business ideas, especially at their starting point. On the other hand, there exist relatively few papers dealing with this issue in Slovakia. The definitions of start-up companies are often confused, although they are mentioned in strategic development documents. Another problem is that the support measures are equal for each start-up companies. However, as we found in this paper start-up companies have different needs and require different support according to their stage of development. With this perspective, this paper provides two main contributions to the start-up literature. First, it provides insight into different needs and financial sources for start-up companies in Kosice region according to their stage of development. In addition, it provides insight also into R&D and

¹ doc. Ing. Peter Džupka; PhD., Němcovej 32, 040 01 Košice, Slovak Republic, peter.dzupka@tuke.sk

² Ing. Slávka Klasová; PhD., Němcovej 32, 040 01 Košice, Slovak Republic, slavka.klasova@tuke.sk

³ Ing. Viliam Vajda; PhD., Němcovej 32, 040 01 Košice, Slovak Republic, viliam.vajda.@tuke.sk
innovation behavior of start-up companies. Thus, it highlights which aspects to pay attention and what government representatives should take into account when designing policy to support startup scene. Presented results can also serve as a useful impetus for further research. The second contribution is related to using Košice region as an observation levels. In spite of that a growing number of researchers have started to draw attention to the analyzing of start-ups, no effort was made to analyze these companies in Košice region. The need to bridge the gap has also motivated this study.

The paper is organized as follows. The following section presents some literature background on start-up companies. Section 3 presents research questions and methodological approach used in the present study, while section 4 reports the results obtained. Section 5 presents conclusion, and highlights opportunities for improving and broadening this research.

2 Start-up companies from theoretical point of view

It should be noted that various authors state different definition of start-up companies. Generally, start-up companies can be defined as newly founded companies that are in the phase of development and market research. They are in operation for a period of 0 to 3.5 years (Mazanai and Fatoki, 2012) and are formed without any support (either financial or in the form of various services). They are result of the efforts made by individual or group of individuals. Blank and Dorf (2012) describe start-up as a temporary organisation in search of a scalable, repeatable, profitable business model (Blank and Dorf, 2012). While for Ries (2011) start-ups are human institution designed to create a new product or service under conditions of extreme uncertainty.

According to Čalopa et al. (2014) these companies are mostly associated with high-tech projects mainly because their products is mostly software that can be simply produced and reproduced (Čalopa et al.; 2014). However, it must be emphasized that more and more start-ups started to belong to the traditional industries. In terms of company size, start-ups represent a segment of small and medium-sized companies (SME) (Baier, 2015). Concerning their location some research showed that technology-oriented start-ups are typically located in major urban centres as they need a market that can exceed the local level (Baptista and Mendonça, 2009). On the other hand, more and more start-up companies belong to traditional industries.

A large number of researches argue that finding investment funds to launch or expand a start-up are obstacles faced by many start-up companies (Berger et al., 2011). Start-up companies have usually access not only to internal but also to external capital. However, as was pointed out by Honjo (2010) for start-up firms, seems to be more difficult to finance R&D from external capital markets (Honjo et al., 2010). The main reasons for this are that bank or investors cannot accurately assess their potentiality (Leland and Pyle, 1977), external finance is more expensive than internal finance because of moral hazard problems and adverse selection (Carpenter and Petersen, 2002) and also many start-up companies hesitate to reveal detailed information about the project which can help to attract outsider lenders as they have a fear of disclosure to potential rivals. Paul et al. (2007) proved that start-up founders first use internal source of finance (their own funds), and after that they use external financing sources.

Cvijanović et al. (2008) pointed out that financing of the start-up companies depends on the phase of development. Authors distinguish five phases: 1. experimental or seed; 2. start-up; 3. expansion; 4. recapitalization, and 5. buyout. In the experimental phase, start-up companies commonly use their private source of financing. In the initial phase companies can use: loans, business angels, and venture capital funds. In the expansion phase, the most common sources of funds are venture capital funds and loan funds. For the buyout stage typical source of financing is private equity. Therefore, in this paper we will also focus on the financial source of start-up companies while taking into account their stage of development.

3 Research questions and methodology

Primary research was conducted through questionnaires that were sent by e-mail to selected startup companies located in Kosice region. The research questionnaire had 16 questions divided into three main areas. The first area with the title Main characteristics of start-ups contained questions about their clients and collaboration activities. The second area focused on Economic condition and competition. This area addressed the key strong advantage of start-up companies. Furthermore, this area addressed demanded and used services for start-up companies at the different stage of development. The last part dealt with the questions about their Research & Development & Investment activities. This part helps to define the source of their financing at each stage of development and thus, specify an expectation.

The main research questions dealt with in this article are:

- 1. What are the main characteristics of start-ups in terms of location of their clients and collaboration activities?
- 2. What are the key strong advantages of start-up companies?
- 3. What R&D activities start-up companies realize?
- 4. What are the main demanded services and sources of financing according to stage of development?

4 Research results and discussion

First part of questionnaire contained basic questions to identify the profile of start-up companies. Research results indicate that most of the start-up companies are mainly located in the Košice city. Out of all the respondents who completed the questionnaire, a total of 32% had four employees, 19% had only three employees, 12% had seven employees and the rest had five employees. Each of companies operates in service industry (ICT, mobile services, cloud services etc.) only one company provides creative services. The results of the research also showed that clients of start-up companies are mainly located in Slovakia, then in Košice, Košice region, Europe and rest of the world (Figure 1).



Figure 1 Location of client

Researching the collaboration activities has shown that most of the start-up companies in Košice region collaborate regularly with firms. Only 6 start-up companies out of 16 have regular collaboration with universities while, with research institute only 2 companies (Figure 2). Collaboration activities are very important, as they are source of additional or complementary knowledge and know-how that are not available within the firm (George et al., 2002). Another profit from collaboration has to do with overcoming the legitimacy problem. Especially for young start-up companies, it is difficult to prove advance proof of innovative competence and economic performance. Therefore, links with partners (university or firms) may provide the firm with a reputation by association for reliability and quality (Gübeli and Doloreux, 2005).



Second part of the questionnaire aimed at findings strong advantages of start-up companies in Košice region. Companies had to assigned points from 0 (weak) to 7 (strong) to eight areas according to their opinion, whether they have advantage or disadvantage in that areas. Figure 3 shows that most start-up companies opt Quality of products, Service and Repair as a key advantages of their business, while Intellectual property an Distribution were assigned as a weak point of their business.



Figure 3 Key strong advantages of start-up companies

The results of R&D activities showed that 69% start-up companies developed totally new product/services in the last 2-5 years. Furthermore, 23% start-up companies improved product/services existing only on foreign markets, while 8% of start-ups companies improved product/services already existing on Slovak market (see Figure 4).



Figure 4 R&D activites of start-up companies

Observing the demanded services showed that most start-ups companies seek for marketing and mentoring services at their initial phase. Regarding the mentoring services, they search mainly for mentoring in the field of funding and growth opportunities. At the start phase companies seek for services which can help them to have free or subsidised access to partner searching. On the other hand, companies at the growth phase look for access to incubators or accelerators and also would like to attend competition and events organized by private institutions (Figure 5).



Figure 5 Demanded services according to the level of development

Observing the sources of financing it seems that bank loans are important formal financial sources for many start-up companies at their initial and growth phase of development (Figure 7). It should be noted that most start-up companies try to avoid bank loans because they usually refer to complex procedures and are given based on company's credit property, credit history and collateral.



Figure 6 Financing source of start-up companies

Since start-ups are usually founded by young people who usually do not own property, it is difficult to get a bank loan (Čalopa et al., 2014). Vasilescu (2009) states that the collateral required by banks usually denotes a problem for start-up companies and this type of finance is particularly inappropriate for high-tech start-ups as their cash flow is negative or very limited at the initial phase of development. It seems that demand and supply do not meet and thus it is still difficult for start-up companies to get enough capital for their early needs. Vasilescu (2009) underlines that business angels can be important link between funding and developing companies, from their early stage to the stage to be ready for capital market. From Figure 6 we can see that some of start-up companies used business angels as their source of finance at their start and growth phase of development.

5 Conclusion

In conclusion, the study has revealed that start-up companies have different needs according to their stage of development. While in the initial phase of their development they need marketing and mentoring services, at the start phase they seek potential new partners and at the growth phase they look for access to incubators or accelerators. Results represents a basic starting point in order to plan strategies for fine-tuned policy instruments to support stat-up companies at the regional or national levels to ensure sustainable socio-economic development. By focusing the analysis on the source of financing the research revealed that that bank loans are important formal financial sources for many start-up companies at their initial and growth phase of development. However, some of start-up companies used business angels as their source of finance at their start and growth phase of development. As was mentioned previously, start-up companies face several challenges in their efforts to access the finance. Thus, it is needed that the central government will collaborate effectively with private sector institutions to ensure adequate access to finance.

For instance, in the UK business angels have a dominant role in funding start-ups in their initial phase of development. One of the reasons for that is the fact that government support business angel through tax exemption of their investments (Cosham et al., 2009). To sum up, conducted research provides an interesting key input for both public policymakers and practicing managers, who can draw implications for the design of policy

Acknowledgements

This paper was created within the project VEGA 1/0548/14 Analysis of differences in innovation performance of spin-off and start-up firms in Slovakia.

References

- ALWEENDO, T. 2004. Keynote Address at the Opening Ceremony of the 6th African Development Finance Conference and SMME Awards, Cape Town, South Africa.
- BAPTISTA, R. and MENDONÇA, J. 2009. Proximity to Knowledge Sources and the Location of Knowledge Based Start-ups. In: *The Annals of Regional Science*. Vol. 45, No. 1, pp. 5-29.
- ČALOPA et al. 2014. Analysis of financing sources for start-up companies. In: *Journal of Contemporary Management*. Vol. 19, No. 2, pp. 19-44.
- CARPENTER, R. E. and PETERSEN, B. C. 2002. Capital market imperfections, high-tech investment, and new equity financing. In: *The Economic Journal*. Vol.112, No. 477, pp. F54-F72.
- CVIJANOVIĆ, V., MAROVIĆ, M. and SRUK, B. 2008. *Financiranje malih i srednjih poduzeća*. Binoza Press.

- GEORGE, G., ZAHRA, S. A. and WOOD, D. R. 2002. The effects of business-university alliances on innovative output and financial performance: a study of publicly traded biotechnology companies. In:: *Journal of Business Venturing*. Vol.17, No. 6, pp. 577-609.
- GIURCA VASILESCU, L. 2009. Business angels: potential financial engines for startups. In: *Economic research*. Vol 22, No. 3, pp. 86-98.
- GRIMALDI, R. and SOMBRERO, M. 2000. Le strutture a supporto della creazione di nuove imprese, in Lipparini, A. and Lorenzoni, G. (Eds.). *Imprenditori e Imprese. Idee, piani, processi*, Il Mulino, Bologna.
- GÜBELI MANUEL, H. and DOLOREUX, D. 2005. An empirical study of university spin-off development. In: *European Journal of Innovation Management*. Vol. 8, No. 3, pp. 269 282.
- HONJO et al.2010. R&D financing of start-up firms: How much does founders' human capital matter?" *Working Paper Series*. Center for Economic Institutions. No. 2009-15
- LELAND, H. and PYLE, D. 1977. Informational asymmetries, financial structure, and financial intermediation. In: *Journal of Finance*. Vol 32, No. 2, pp. 371–387.
- MAZANAI, M. and FATOKI O. 2012. Perceptions of Start-up Small and Medium-Sized Enterprises(SMEs) on the Importance of Business Development Services Providers (BDS) on Improving Access to Finance in South Africa In: *Journal of social sciences*. Vol 30, No. 1, pp. 31-41.
- RIES, E. 2011. The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses. New York: Crown Publishing.

The Real Option Approach to Investment Valuation

LUCIA FABIÁNOVÁ¹ Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

The increasing market uncertainty makes it difficult to recognize and grasp emerging opportunities. Therefore, managerial flexibility is an important tool for long-term success. Traditional valuation methods fail to capture this flexibility, so real options analysis is often used to analyse such investments. This paper analysis the limitations of the traditional methods and compares traditional net present value to real option approach. It also examines the role of uncertainty in investment decision-making.

Key words: Real Options Analysis, Uncertainty, Managerial Flexibility, Investment, Valuation

JEL Classification: O16, G11

1 Introduction

Any asset has a value which can be determined, though some assets are more difficult to value than others. Valuation is a very useful tool in active portfolio management, mergers and acquisition analysis, or corporate finance management. However, with any type of valuation there are definitely associated uncertainty and risk. Uncertainty is usually linked to the asset being valued, but also the choice of the valuation method and model can add to that uncertainty.

Theory of finance offers a wide range of asset valuation models. The most used valuation approach is net present value (NPV) based on the discounted cash flow which is the foundation for many other valuation approaches. NPV determines the value of any asset as the present value of expected future cash flows generated by this asset (Damodaran, 2012).

The option valuation approach vas originally created to value options on financial assets – financial options, but it was quickly adapted to the valuation of tangible assets and investment projects. This led to the development of the real options approach that was introduced by Myers (1977). Real options analysis uses options theory to evaluate real or physical assets. Real options usually represent the opportunities to take a specific action. Option pricing models developed by Black and Scholes (1973) and Cox, Ross and Rubinstein (1979) to value financial options were quickly adapted for the valuation of options on real assets as well.

The limitations of traditional NPV approach to capture the future options in the investment decision-making is documented by several authors e.g., Trigeorgis (1993) or Copeland and Antikarov (2001). Despite the advantages of real options analysis, the companies are slow to adopt this valuation approach and the use of the real options in the real world is limited. According to Ryan and Ryan's (2002) survey of 205 Chief Executive Officers, only 11.4% used

¹ Ing. Lucia Fabiánová, Němcovej 32, 040 01 Košice, Slovak Republic, lucia.fabianova@tuke.sk

real options as the capital budgeting tool at least 50% of the time. Teach (2003) surveyed 451 senior executives from more than 30 industries regarding their use of management tools. Only 9% of these executives used real options approach. Block (2007) conducted a survey of 279 respondents and 14.3% indicated the use of real options analysis. Respondents reported few reasons for not using real options – the lack of top management support, preference of discounted cash flow method, requirement for a high degree of sophistication and tendency to take excessive risk when using the real options analysis.

It might seem that real options approach has more support among scholars than executives and CEO's.

The focus of this paper is on the main differences between traditional approach and real options approach as well as the role of volatility in the option valuation approach. The paper is organized as follows: Section 2 reviews related literature regarding the application of real options in various sectors; Section 3 presents the comparison between real options analysis and net present value; In addition, it briefly describes the significance of proper volatility estimation; Section 4 provides the conclusion.

2 Literature Review

Although surveys presented in the previous section did not speak in favour of the real options approach, a significant amount of research has been done applying the real options analysis to evaluate various types of assets and investments in different areas.

Alberti, Leon and Llobet (2003) estimated the effect of the taxi sector reform in Barcelona using the real options technique. Michailidis et al. (2009) applied the real options approach to analysis of irrigation system projects. Constantino and Pellegrino (2010) explored the advantages of switching from single sourcing strategy to flexible dual sourcing strategy in the presence of supplier default risk. Stokes (2013) examined in his research the real option value of a college degree. Kroniger and Madlener (2014) used real options approach to analyze the economic benefits of the investment in a hydrogen storage device as an expansion of a wind park. Van Reedt Dortland, Voordijk and Dewulf (2014) studied various uncertainties affecting Dutch health organizations and applied the real options method to decision-making of selected health organizations.

Recently, a large amount of research has been dedicated to the evaluation of intangible assets and the similarity between options on physical assets and options created by technology positioning investment were pointed out. A technology positioning investment represents an initial cost of a technology that gives the right, but not the obligation, to gain the benefits related with further development and deployment of this technology (Fichman, 2004). This is comparable to the principle of a real option, which creates right for its holder, but not the obligation, to gain the benefits connected to the real or physical asset.

3 NPV approach vs. option approach

Although NPV is very popular and widely used valuation technique, it has some limitations and serious shortcomings when it comes to its applicability and ability to capture management's

flexibility. Table 1 shows for which financial and real assets it is appropriate to use NPV valuation method.

	Financial assets	Corporate real assets			
Appropriate use of NPV	Valuation of bonds, preferred stocks and other securities with fixed- income	Valuation of flows from financial leases			
	Valuation of relatively safe stocks with regular dividend payments	Valuation of businesses held for the cash they generate, not for the strategic value			
Le componentiata una of NDV	Valuation of companies with significant growth opportunities	Valuation of projects with substantial growth opportunities			
inappropriate use of INP v	Valuation of call and put options	Valuation of R&D projects and intangible assets			

Source: Myers (1984, p. 135); Chevalier-Roignant and Trigeorgis (2011, p. 18)

NPV is not suitable for valuation of financial options, companies with significant opportunities to grow, projects with significant growth opportunities, R&D projects and intangible assets. These types of assets are usually characterized by high degree of uncertainty and managerial flexibility, while NPV is capable of valuing only projects and assets with little or no uncertainty and managerial flexibility. Managerial flexibility has zero effect on investment decision-making only when the investment decisions can be made without any risk. In real life that's not the case; the decision-maker deals with uncertainty and irreversibility of the investment, therefore the traditional valuation techniques are not applicable. Uncertainty exists when there is not perfect information about current state the decision-maker is in as well as the consequences of his decision (Vollert, 2003).

Traditional approaches, such as NPV, are more applicable in a shorter and rather predictable and deterministic time periods and they assume a single static decision-making. NPV approach ignores the value of waiting and deferring the investment and recommends investing as soon as the value of discounted expected future payments exceeds the value of the discounted expected costs (Brach, 2003). Static NPV approach kills the time value of the option, which leads to irrational decision of instantly investing in the project with positive NPV, or on the other hand rejecting the project with negative NPV, disregarding that the investment opportunity itself may have a positive value (Vollert, 2003).

In longer time periods with strategic opportunities new advanced analytical methods are more appropriate, including real option analysis. In contrast to NPV, real option analysis assumes multidimensional and dynamic series of future decisions and takes into account managerial flexibility. Managerial flexibility can increase the value of the project and increase the probability of its approval.

In comparison to traditional NPV, real options analysis is more complex and mathematically sophisticated. However, the evolution of computational tools has automatized the modelling process and made the real options approach more convenient.

Net Present Value	Real Options
little or no uncertainty	significant uncertainty
shorter time periods	longer time periods
no managerial flexibility	managerial flexibility
single static decision	multidimensional dynamic decisions
• passive management	active management
• underestimates the investment value	 considers the strategic opportunities of an investment
• overlooks the strategic reasons for an investment	 more complex technique with complicated mathematical computations more input parameters
relatively simple valuation technique	

Table 2 Comparison of NPV and real option approach

NPV and real options should be considered as complementary techniques. These valuation methods should be integrated when there are future decisions, which can affect the riskiness of the investment cash flow.

To value a real option it is necessary to identify the underlying assets and to estimate several parameters related to these assets. Most real options are characterized by five input parameters that are not necessarily fixed:

- *Exercise price:* is represented by the investment cost to acquire the asset.
- *Underlying asset value:* in case of real options is the asset value determined as a static net present value of future cash flows connected to the underlying asset.
- *Time to expiration:* time until the investment opportunity disappears.
- *Asset value uncertainty:* asset value uncertainty is usually expressed through the volatility of value of the underlying asset, or variance of the best and the worst case scenario for the investment.
- *Riskless interest rate:* risk-free interest rate is the only one of the basic parameters in the real options valuation, which is not related to the underlying asset and its characteristics.

3.1 Asset value uncertainty

Proper identification and estimation of the volatility is one of the most important problems that decision-makers have to face in the real options analysis, especially when the project contains more than one significant source of uncertainty. Compared to the other quantitative approaches that focus mainly on downside risk, the real options approach considers also the potential upside in risk. Real options approach argues that besides creating losses, uncertainty can also be the source of potential gains. In case of real options, firms are fully exposed to the upside potential of investment, but in case of unfavourable future events they can limit losses to the initial cost.

Volatility describes the amount of uncertainty or risk in regards to the size and degree of changes in the underlying asset value. Volatility is usually used to measure the risk related to the underlying source of uncertainty. Firms have to face uncertainty coming from external or internal sources (Vollert, 2003):

- *external uncertainty* is the result of the dynamic and the complexity of firm's environment, e.g., labor market conditions, capital market conditions, legal, technological, economic, political and sociological conditions;
- *internal uncertainty* comes from lack of organization, transfers of know-how or the knowledge and motivation of the staff.



Figure 1 Sources of uncertainty Source: Vollert (2003, p. 26)

Most used method of determining the underlying asset uncertainty for the option analysis is modelling the asset or project value itself. Vollert (2003) suggests that decomposing the overall uncertainty into its components (see e.g. Figure 1) is more appropriate than using the underlying asset value itself. Many of these sources of uncertainty are not priced by the capital market (e.g. technological risk) and affect the investment value at the same time, thus it can be problematic to model all of them at once, so the decision-maker should choose a limited number of considered uncertainties which affect the invest the most.

The underlying real assets and projects are usually not traded in the secondary market, thus their prices do not have the reliability of market prices. One possible solution is to find a substitute security that is perfectly correlated with the underlying real asset or project and has the same risk characteristics (Trigeorgis, 1996).

Another alternative approach is to use volatility of the firm's stock returns as a measure of uncertainty (Bulan, 2005). Volatility of firm's stock returns captures total relevant uncertainty in a single variable, which can be further decomposed into various risk components. Damodaran (2015) uses as an input in the real options models volatility of the corresponding industry which

is estimated as an average annualized stock price variance of traded companies that operate in the particular industry.



Figure 2 Standard deviation by industry (Western Europe) Source: Damodaran (2015)

According to computations made by Damodaran (2015), the most volatile and therefore uncertain industry are precious metals with average standard deviation of 85.62%. Prices of precious metal are very volatile and cyclical as well as the prices in metals and mining sector (71.08%). These sectors are sensitive to changes in industrial demand, political and environmental conditions. Performance of biotechnology sector is tied to the development of new drugs and is highly volatile due to lengthy and expensive drug trials with unpredictable results. Damodaran (2015) estimated the average standard deviation of this sector as 75.68%.

Coal and related energy with average standard deviation of 74.42%, and oil and gas production and exploration with 70.91% are representing the energy sector which is considered to be one of the most volatile sectors. Performance of this sector can be related to the price of commodities e.g., natural gas and crude oil. Energy sector is also affected by changes in the consumer demand, environmental and political conditions as well as the performance of the overall economy. Green and renewable energy has smaller volatility (57.10%) and is influenced by government funding or technical failures.

Many sectors from the Figure 2 are sensitive to economic cycles and consumer demand. Information technology is highly competitive and lucrative market. Industries linked to this market (e.g., software, computers, peripherals) are considered as very volatile mainly due to frequent introduction of new products and technologies that offer growth opportunities.

From Figure 2 it is apparent that the proper estimation of volatility is very important since it can significantly affect the option value of the investment, especially in highly uncertain markets.

4 Conclusion

In the absence of uncertainty and managerial flexibility, the net present value is considered to be the best among currently available valuation techniques that is consistent with the firm's main objective – to maximize its market value and the utility of firm's shareholders. However, the real world is characterized by uncertainty and risk. Despite the popularity and relative simplicity of the net present value, this method fails to capture the managerial flexibility in an uncertain and dynamic environment.

Real options are continuously gaining popularity among the academics, but this approach has also its limitations and flaws that make it less appealing for executives and managers. Although this approach is derived from the financial options, many of the assumptions that regulate financial options do not apply for the real options context. Real options can easily be miscalculated due to the complexity and sophistication of the valuation process or the use of the incorrect model or incorrect inputs. Volatility estimation in particular is considered as the biggest challenge of this technique, since the underlying investment opportunity is usually not traded and thus historical data are not available. Decision-maker has to choose not only the right valuation method, but also the right type of uncertainty that affects his investment.

The good news is that there are several valuation tools and software available that provide help with computation and mathematical aspects of real options analysis. However, decision-maker still carries a lot of responsibility on his shoulders when it comes to proper identification of the investment opportunity, correct definition of the inputs and most of all, making the optimal exercise decision. In our opinion, these practical problems should get more attention from researchers in order to increase the interest of companies in real options.

References

- ALBERTI, M., LEON, A. and LLOBET, G. 2003. Evaluation of a Taxi Sector Reform: A Real Options Approach. *CEMFI Working Paper*. No. 0312.
- ANTIKAROV, V. and COPELAND, T. E. 2001. *Real Options: A Practitioner's Guide*. New York: Texere.
- BARUCH, L. and FENG, G. 2001. Intangible Assets: Measurement, Drivers, and Usefulness. *Working paper*. Boston University/New York University.
- BLACK, F. and SCHOLES, M. 1973. The Pricing of Options and Corporate Liabilities. In: *The Journal of Political Economy*. pp. 637-654.
- BLOCK, S. 2007. Are "Real Options" Actually Used in the Real World? In: *The Engineering Economist*. Vol. 52, No. 3, pp. 255-267.
- BRACH, M. A. 2003. Real Options in Practice. USA: John Wiley & Sons, Inc..
- BULAN, L. T. 2005. Real Options, Irreversible Investment and Firm Uncertainty: New Evidence from U.S. Firms. In: *Review of Financial Economics*. Vol. 14, pp. 255-279.
- CONSTANTINO, N. and PELLEGRINO, R. 2010. Choosing Between Single and Multiple Sourcing Based on Supplier Default Risk: A Real Options Approach. In: *Journal of Purchasing & Supply Management*. Vol. 16, pp. 27-40.
- COX, J.C., ROSS and S. A., RUBINSTEIN, M. 1979. Option Pricing: A Simplified Approach. In: *Journal of Financial Economics*. Vol. 7, No. 3, pp. 229-263.

- CHEVALIER-ROIGNANT, B. and TRIGEORGIS, L. 2011. Competitive Strategy: Options and Games. USA: MIT Press.
- DAMODARAN, A. 2012. Investment Valuation: Tools and Techniques for Determining the Value of Any Asset. USA: John Wiley & Sons, Inc.
- DAMODARAN, A. 2015. Firm Value and Equity Standard Deviations (for Use in Real Option Pricing Models).
- FICHMAN, R. G. 2004. Real Options and IT Platform Adoption: Implications for Theory and Practice. In: *Information Systems Research*. Vol. 15, No. 2, pp. 132-154.
- KRONIGER, D. and MADLENER, R. 2014. Hydrogen Storage for Wind Parks: A Real Options Evaluation for an Optimal Investment in More Flexibility. In: *Applied Energy*. Vol. 136, pp. 931-946.
- MICHAILIDIS, A., et al. 2009. A Socioeconomic Valuation of an Irrigation System Project Based on Real Option Analysis Approach. In: *Water Resour Manage*. Vol. 23, pp. 1989-2001.
- MYERS, S. C. 1977. Determinants of Corporate Borrowing. In: *Journal of Financial Economics*. Vol. 5, No. 2, pp. 147-175.
- MYERS, S. C. 1984. Finance Theory and Financial Strategy. In: *Interfaces*. Vol. 14, No. 1, pp. 126-137.
- PINDYCK, R. S. 1991. Irreversibility, Uncertainty, and Investment. In: *Journal of Economic Literature*. Vol. 29, No. 3, pp. 1110-1148.
- RYAN, P. A. and RYAN, G. P. 2002. Capital Budgeting Practices of the Fortune 1000: How Have Things Changed. In: *Journal of Business and Management*. Vol. 8, No. 4, p. 355-364.
- STOKES, J. R. 2013. What is the (Real Option) Value of a College Degree? In: *Quarterly Journal of Finance*. Vol. 3, No. 3-4.
- TEACH, E. 2003. Will Real Options Take Root. In: CFO Magazine. Vol. 19, No. 9, p. 73-75.
- TRIGEORGIS, L. 1993. Real Options and Interactions with Financial Flexibility. In: *Financial Management*. pp. 202-224.
- TRIGEORGIS, L. 1996. *Real Options: Managerial Flexibility and Strategy in Resource Allocation*. USA: MIT Press.
- VAN REEDT DORTLAND, M., VOORDIJK, H. and DEWULF, G. 2014. Making Sense of Future Uncertainties Using Real Options and Scenario Planning. In: *Futures*. Vol. 55, pp. 15-31.
- VOLLERT, A. 2003. A Stochastic Control Framework for Real Options in Strategic Evaluation. Boston: Birkhäuser.

Obstacles of Development in the Arab World

MORAD FATHALLA BEN JREED¹ Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

When developing countries begin to develop and build their national economy, they were facing two forms to experience economic construction, namely the capitalist system based on free market economy and the socialist system based on the planned economy. When developing countries were trying to choose an approach to the process of socio-economic development and building the national economy must be concerned with the process of their people interact with this approach. And the mobilization of all energies in the fight against backwardness and achieve the highest rates of growth in it. Arab countries have passed tough stages in the past and some of them are still until now, beside that Arab countries will not be able to get out of this situation until they use their local natural available resources to increase the amount of goods and services produced in order to meet the needs of its citizens and this is the required economic development. The important inhibitor in the way of economic development in the Arab world is the high population growth rate, as to increase annual production rates equivalent of population growth rate than the poor countries. The reason returns back to the high population growth in the Arab countries and the lack of national cadres' rate. On the other hand, the disparity in the level of social and economic development due to the fall in the savings level of some Arab countries, add to this attempts create disability in the Arab world.

Key words: Development, Economic, Countries, Government

JEL Classification: O10, O15

1 Introduction

Most of the Arab countries facing obstacles at the beginning stages of development that starts by choosing an approach in the process of economic and social development and building of their national economy. On other hand, it is necessary to provide all the possibilities in the fight against underdevelopment, as these constraints are not unique to the state of the other countries and they are linked to the general conditions of each country. Arab countries have similar obstacles of development because of the convergence in the language, customs and special relations.

2 Obstacles of Development

The obstacles I would like to note are terrorism, high population growth rate, the lack of political instability for some of Arabic countries, Deficiency of national cadres, Unemployment, Corruption, the difference in the level of development between the Arab countries, the low level of savings and capital accumulation and the alternative.

¹ Morad Fathalla Ben Jreed, Němcovej 32, 040 01 Košice, Slovak Republic, goldenstar1122@yahoo.co.uk

2.1 Terrorism

It is a phenomenon that is present across the Arab world, after what they call to it "Arab spring", it was increased in many countries to be seemed for people as a religious phenomenon, intended to correct the world mistakes by killing people.

I found that America knows terrorism as a work characterized by violence, intended to influence the Governments by assassinations and other practices, these are dangerous to human life and affect the sanctity of the law in any country.

The danger of terrorism in the Arab countries will not only destroy the Arab identity pillars, but it also leads to crushing the Arab existence. Most of Arabic countries have suffered and are still suffering from terrorism, where nearly up to 90% of Arab countries suffer from it. (Middleeastmonitor, 2015)

2.2 High population growth rate

It's an important obstacle in the way of economic development, as an increase in annual production rates equal to or is less than the population growth rate that makes poor countries poorer, as the large increase in the number of population imposes a heavy burden on the national economy and the depletion of available resources more quickly.

Certainly, man is the main administration for economic development, but increasing in population may lead to obstruction of other disciplines for economic development. (Alwazer, 2015)

For instance, the state of Egypt having the highest density of population in the Arabic countries is facing a big problem since the Second World War it has been returned by the worst impact upon the country's interests. It's due to the lack of balance between the population and economic resources that resulted in the spread of illiteracy, interruption of electricity, water and sanitation as well as lower worker's wages and high cost of living. (Alwafd, 2015)

2.3 The lack of political instability for some of Arabic countries

The researchers identified political instability as the inability of the governments' to deal successfully with the crises faced as well as the governments' inability to work with existing conflicts within the community.

What I would like to mention to is that last five years brought many surprises for some Arabic countries. Who would have thought the fall of some Arab regimes, the economy of some states will be in critical status and the Arab spring turns to be devastation and destruction. Political instability followed by the lack of economic stability and raise the cost of living as well as increase of unemployment rate because of demonstrations came out.

2.4 Deficiency of national cadres

Building national cadres capable of contributing to economic development means, the development of education in general, although the preparation of students in universities, high and secondary schools. In Arabic countries continue to increase but it is still below the required level. From another side, brain drain of scientists and qualified people to the developed capitalist countries is an obstacle without getting the benefit of them and their experiences, also the

absence of real investment policies that create jobs may have a negative impact on development in the Arab countries. (Alwazer, 2015)

2.5 Unemployment

The Arab region has the highest areas of the developing world in the creation of new jobs. Annually it creates more than three million new jobs. This is a great achievement but it is not adequate and is unbalanced in Arab countries. On other hand, the Arab region has one of the highest unemployment rate in the world. As it exceeded the average of 25%, according to the first report from the Arab labour organization for the year 2008, under the title " Employment and unemployment in the Arab countries".

The report noted that the unemployment rate exceeded 17 million unemployed in the Arab countries. The reason for this is due to the inability of governments and the public sector to employ this number of graduates yearly. (Alukah, 2015, Carnegiemec, 2015)

2.6 Corruption

It exists in most of Arab countries and the percentage of it is different from country to country. The reason of corruption is defect in the Arab political systems.

In a multi-party political life it does not exist if it has been found to be ineffective. This defect exists because of the absence of the principle of separation of three powers "Legislative-Judicial-Executive". Sometimes, the three powers are integrated in one authority that is "The Executive Power".

The most important economic effects of corruption is "Bribery", that mean 'to give an amount of money to important government employees for specific service, such as getting permission to import certain goods or certain tender.

On other hand, five Arab countries come among the bottom ten countries for corruption "Somalia- Sudan- Libya- Iraq and Syria". (Elgomaa, 2015, Economist, 2015)

2.7 The difference in the level of development between the Arab countries

The Arab world is made up of countries with different political, economic and social conditions in evolution. On the other side, there are other factors gathering of Arab states as "language, common history and common culture". (Ahewar, 2015)

2.8 The low level of savings and capital accumulation

The high rate of accumulation in national income doesn't lead to solve the problem of financing the necessary investments. They have to focus on the amount of accumulation, especially in developing countries. Most of Arab countries are facing the problem of capital accumulation, the main reason for this is most of the Arab societies are in a state of poverty. As I would like to mention to that, whenever poverty has increased, the increase of saving and capital accumulation is needed. (Alwazer, 2015)

2.9 The alternative

Arab oil-producing countries did not try to find an alternative of oil, where the size of national economy for Arab states is varying from state to state. This seems to be clear from the share of oil in total exports in gross income or gross national product.

Oil's share ranged in net national income between 54.3% and 82.7% in seventies and eighties of the last century. (Startimes, 2015)

3 Conclusion

Most of countries suffered from constraints and problems in the early stages or in stages of the development. Everyone knows that development requires increased material production, this means increasing industrial and agricultural production. From another side, lack of interest in scientific research leads to the decline in the volume of Also lack of sufficient confidence in the ability of local research institutions and local cadres, beside that, there is no link between production and development institutions and scientific research institutions in Arab countries.

As well as I concluded in this research the following:

- They can exploit the increase in population and their integration into development plans.
- Cooperation between the ministries of culture and education to reduce the large number of child-bearing will increase awareness of the dangers of the Arab peoples frequent childbearing and associated diseases.
- There is a big benefit to establish a network for technical education schools and giving more attention to children and youth, beside of that it can be developed the rules of knowledge and follow-up of modern scientific and technical developments.
- Importance of Continuation of economic reforms to improve the standard of living of the Arab people and also the rising of growth rates.
- Creating a culture of dialogue between people confirm the peaceful coexistence between them.
- Work as soon as possible for the completion of an Arab common market to achieve the Arab countries economic integration and to develop of economic relations between them.

References

MIDDLEEASTMONITOR. 2015. Available at: http://www.middleeastmonitor.com/articles/middle-east/9778-the-extent-of-terrorism-in-the-arab-world-

ALWAFD.ORG. 2015. Available at: <www.alwafd.org>.

ALWAZER. 2015. Available at: http://vb1.alwazer.com/t85148.html>.

ALUKAH. 2015. Available at: www.alukah.net/culture/0/3409/.

- CARNEGIE-MEC. 2015. Available at: http://carnegie-mec.org/2014/02/25/arab-world-faces-unemployment-crisis>.
- ELGOMAA. 2015. Available at: <www.elgomaa.com/articale.php?id=69733>.

ECONOMIST. 2015. Available at:

<www.economist.com/blogs/pomegranate/2013/12/corruption-middle-east>.

AHEWAR. 2015. Available at: <www.ahewar.org/debat/show.art.asp?aid=23847>.

STARTIMES. 2015. Available at: <www.startimes.com/?t=31255124>.

Search Engine Optimization and its Importance in the Purchase Process

RICHARD FEDORKO¹ – LUKÁŠ KAKALEJČÍK² University of Prešov, Faculty of Management Slovak Republic Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

Searching through search engines has become the means of meeting the information needs of Internet users, and such information can be linked to a product in which users are potentially interested. The main aim of this paper was to determine the level of Internet search engines use during the purchase process in a Slovak market. Based on the results of the questionnaire survey, it was found that a major proportion of users consider a search engine to be a source of information on the already purchased product as well as on the potential product. The paper did not record a difference in search engines usage when purchasing products based on respondents' sex. The paper further states that only a small proportion of users click on the paid search results. By testing the hypothesis, however, it was shown there is a statistically significant difference in the pattern of clicking on paid search results based on the sex of respondents.

Key words: Search Engine Optimization, Google, Purchase Process

JEL Classification: M30, M31

1 Introduction

Google search engine carries out 5,9 billion searches daily world-wide (Halligan and Shah 2014). An Internet search engine can be defined as a system that returns information (Information Retrieval System) and allows browsing through digital text based on input keywords (Halavais 2008). The problem that it tries to solve can be defined as providing answers to users' questions as fast as possible (Bodnar and Kohen 2012) while users expect relevant, quick, and fresh searching experience (Enge, Spencer, Stricchiola and Fishkin 2012). Unlike users of media such as blogs or social networks, users using search engines have a clear goal, whether it's finding product information or other information (Pudło and Gavurová, 2012, 2013; Šoltés and Gavurová, 2015). When a search query is related to business of the selected company, the company wants to be found by searching (Haligan and Shah 2014). Visibility in the search results can be provided by Search Engine Optimization.

Search Engine Optimization (SEO in short) represents various techniques used to enhance the evaluation of a website in search results (Hutchinson 2012; Gavurová et al. 2014). Adams (2015) argues that Search Engine Optimization represents a set of principles, tools, and techniques for the purposes of the organic content placement in search engines. If a company wants to be successful in SEO, it has to gain trust. Scott (2013) argues that marketing using search engines is

¹ Mgr. Richard Fedorko, PhD., Konštantínová 16, 080 01 Prešov, Slovak Republic, richard.fedorko@unipo.sk

² Mgr. Lukáš Kakalejčík, Němcovej 32, 040 01 Košice, Slovak Republic, kakalejcik.lukas@gmail.com

remarkable due to the fact that unlike other media (advertising on television or radio), it does not rely on distracting the target audience. We can find many authors dealing with these issues, such as Berman and Katona (2013); Abou Nabout and Skiera (2012); Shih, Chen and Chen (2013); He, Wang and John Wei (2014); Lukito, Lukito and Arifin (2015).

Search results are divided into organic and paid. Since securing a position on the first page of organic search results is a lengthy and difficult process, many companies are trying to eliminate the time loss by ads within the search results. Høgenhaven Fishkin (2013). Marketing based on the use of paid advertising on search engines is called Search Engine Marketing (SEM). It is a method that focuses on buying ads displayed in search results (Tonkin, Whitmore and Cutroni 2010). The price for such advertising in Google AdWords platform is set via CPC, CPM or cost-per-acquisition (Marshall, Rhodes and Todd 2014). As reported by Panda (2013), the use of paid search ads is more effective when searching for products through search engines. Furthermore, it states that advertising on search engines should consume a large part of marketing budgets. We can find many authors concentrate on these issues, such as Jansen, Sobel and Zhang (2011); Kritzinger and Weideman (2013); Tomasi and Li (2015); Yanga, Shib and Wanga (2015), King, Abrahams and Ragsdale (2015).

Factors that influence the position in the search engines can be divided into on-page and off-page factors, while the company carrying out optimization can completely affect only on-page factors (Enge, Spencer, Stricchiola and Fishkin 2012). However, because the off-page factors include the quality of the content, companies can affect this factor by publishing the content to their target audience which is considered valuable and interesting to such an audience (Pulizzi 2013). Fishkin and Høgenhaven (2013) claim that this tactic aimed at helping companies to build positions in search engines involves building easily indexable web page, content creation in order to engage the target audience, establishing relationships and communities to promote content in order to build back links as well as website performance monitoring. Halligan and Shah (2014) state that the content of a web site should be made with due consideration to the users and also to search engines. This opinion is in favour of Scott, 2015) who believes that websites should be published in order to be useful for people, while allowing search algorithms and web applications to understand the content of the website much better. Combining the theories of Fishkin and Høgenhaven (2013), Halligan and Shah (2014), Scott (2015) and Adams (2015), we arrive to the conclusion that if people making up the target audience are taken into consideration when building a position in search engines, companies are able to improve search engine rankings while allowing positive customer experience and quality relevant content. Besides the above mentioned tactics, there are also tactics known as a Black Hat, the use of which may result in the total exclusion from search results (Enge, Spencer, Stricchiola and Fishkin 2012).

Jato and Oresiri (2013) research was conducted on a sample of 282 respondents studying at the Adeyemi College of Education, Ondo. The results of this survey showed that 29.43 % of respondents use search engines several times a day, 11.35 % of respondents use search engines at least once a day. Most students use either one or two search engines. The survey also showed that 62.41 % of respondents use search engines to obtain most of the information they need. In addition, 11.35 % of respondents said they use search engine to obtain all information.

In the course of the last years it was possible to follow the growing trend of spending on SEM. The trend is confirmed by the expenditure forecasts and also by the results of Forrester Research

Interactive Marketing Forecasts analysis (2014) that in June 2014 published the results dealing with online marketing tools use in the United States market. Based on this analysis the segment was estimated to reach the total expenditures of over \$ 58 billion in 2014, as compared to the same period of 2013, which represents 18.00% increase in spending. The estimated share of total marketing budget was in this respect set at 12%. When looking into the future, namely the outlook for 2016, the projected increase in spending in this segment is set at 9.50% when compared to 2014.

2 Objectives and methods

The main goal of this paper was to determine the level of Internet search engines use during the purchase process in a Slovak market. By decomposing the main goals we set ourselves partial goals. Initially the goal was on the basis of domestic and foreign literature to study and define the current state of the posed problems. Another sub-goal was aimed to ascertain the extent to which users use search engines for their intended purchase of the products. In addition, the goal was to find out what proportion of users bought their products using search engines. The last partial goal addressed the issue of clicking on paid search results. Based on the set goal we were able to state the following hypotheses:

H1: We assume that between men and women exists statistically significant difference in the purchase behaviour based on information gathered using search engines.

H2: We assume that between men and women exists statistically significant difference in clicks on paid search results.

The survey sample consists of 166 students of the Faculty of Management University of Prešov (78) and students of the Faculty of Public Administration, University of Pavol Jozef Šafárik in Košice (88). The sampling was a deliberate choice, as this is the generation Y (people born between 1980-1995), whose members are considered to be the majority of Internet users. The survey was attended by 166 students with an average age of 21.85 years (range of 19-25 years). Of that number, there were 22.29% males and 77.71% females. 63.25% of respondents were undergraduates and 36.75% were graduates. 51.20% of respondents works and 22.29% of those studying in the city resided there as well, 45.18% were city's temporary residents and the remaining 32.53% of the respondents commute from another city.

The survey was conducted in February 2015 using a questionnaire that consisted of nine items (all were closed). For the purposes of this paper three questionnaire items were processed. When selecting answers the respondents could choose from the answers ranging from 1 -strongly agree to 5 - strongly disagree. This range was chosen based on the fact that online marketing strategies are usually implemented using multiple media and a respondent may have difficulties when identifying the impact of the particular medium. The processing and evaluation of the results was conducted using software Microsoft Excel 2010 and StatSoft STATISTICA 12. As the variables are not normally distributed, in order to evaluate both hypotheses we used nonparametric tests, namely the Mann-Whitney test. In addition, we used descriptive statistics tools (pie chart) and characteristics (mean, median).

3 Results and discussion

The primary subject of interest was to determine whether the search engines were among the media used by users in case they were looking for information about the products they wanted to buy. The results are shown in Figure 1.



Source: Own elaboration

The results show that 95.18% of respondents would use a search engine to obtain product-related information with 75.30% of respondents saying strongly agree. This result demonstrates that the search engines are indeed among the primary sources of information. Only 2.41% of respondents would not use any search engine to obtain information on the intended product. Compared with the Jato and Oresiri survey (2013), which did not focus on searching for product-related information but rather on information generally, the value we found is slightly higher. Based on this knowledge we also wondered what proportion of users actually bought products based on information obtained through search engines. The results are shown in Figure 2.



Figure 2 Would you buy a product based on information obtained through search engines? Source: Own elaboration

78.91% of respondents would buy a product based on information obtained via search engines while 48.79% of respondents said they strongly agree with this statement. We assume that the change in the respondents' behaviour is caused by the following factors:

- 1. users do not decide only on the basis of information obtained through one medium. Information may be obtained from other media (eg. discussion forums, blogs) or through the conversation with their friends/relatives;
- 2. websites do not meet the sufficient level of information needs of the user and the user cannot decide only by judging the website;
- 3. search engines algorithm still does not fully meet the condition of results relevancy.

Within this sub-goal we are testing the hypothesis H1 to find out whether there is a statistically significant difference between the sexes when making purchases on the basis of information from search engines. The results of Mann-Whitney test conducted at the level $\alpha = 0.05$ showed that there is no statistically significant difference between men and women's purchases on the basis of information from the search engines. As the p-value was at 0.175076, the null hypothesis could not be rejected, thus the observed difference appears to be random.

The aim of the last sub-goal was to determine the extent to which users click on paid results. As shown in Figure 3, the paid search results is clicked by only 2.41% of users, while the response agree was not chosen by anybody. 81.32% of respondents do not click on paid search results, while the possibility strongly disagree was chosen by 33,73% of respondents.



Figure 3 Do you click on paid search results? Source: Own elaboration

We tried to eliminate the factor of unfamiliarity with the concept of paid search results by showing this type of results. We assume that it could nevertheless play a role among the respondents. Comparing to Panda's results (2013) we see a significant difference because organic search seem to be, results based on the survey, more effective in the Slovak market when acquiring visitors and customers.

After clicking on a paid search results we were again interested in gender differences. We wanted to find out the statistical significance by testing hypotheses H2 at a level $\alpha = 0.05$. Since the resulting p-value equalled to 0.028929, the null hypothesis was rejected. The difference between clicking on paid search results between men and women was large enough to appear to be random.

Summary of survey results

- 1. Search engines are in majority used by generations Y to obtain information on products they want to buy as much as with already-bought products.
- 2. There is no statistically significant difference between the use of search engines to gather information about already-bought products.
- 3. Only a small part of users consciously click on paid search results while a statistically significant difference between men and women was detected.

4 Conclusion

Search Engine Optimization is the art and science of how to crawl up to the top position in the search results related to company's line of business. The main aim of this paper was to determine the level of Internet search engines use during the purchase process in Slovak market. Through a questionnaire survey conducted among members of Generation Y we found out that such a placement can affect the profit achieved on sales, since 78.91% of users purchased products on the basis of information obtained from searching and 95.18% of respondents used the Internet search engine to find product-related information. These values are higher than the values stated by Jato and Oresiri research (2013). There is no statistically significant difference between sexes

based on information derived from search engines. It was also found that the paid search results are clicked on by only a small proportion of respondents. This is contrary to what the Panda (2013) found out about pumping a large sum of money to this type of advertising. It has been shown that there exist a statistically significant difference between men and women when clicking on paid search results. We consider these results to be useful for Slovak companies that focus on Search Engine Optimization in their online marketing strategy.

Acknowledgements

This article is one of the partial outputs of the current research grant VEGA no. 1/0145/14 entitled "Online Reputation Management (ORM) as a Tool to Increase Competitiveness of Slovak SMEs and its Utilization in Conditions of Central European Virtual Market".

References

- ABOU NABOUT, N. and SKIERA, B. 2012. Return on Quality Improvements in Search Engine Marketing. In: *Journal of Interactive Marketing*, Vol. 26, No. 3, pp.141-154.
- ADAMS, R. L. 2015. SEO 2016: Learn Search Engine Optimization. Charleston: CreateSpace.
- BERMAN, R. and KATONA, Z. 2013. The role of search engine optimization in search marketing. In: *Marketing Science*, Vol. 32, No. 4, pp. 644-651.
- BODNAR, K. and COHEN, J. 2012. The B2B Social Media Book: Become a Marketing Superstar by Generating Leads with Blogging, LinkedIn, Twitter, Facebook, E-Mail, and More. New Jersey: John Wiley & Sons.
- ENGE, E. S. SPENCER, STRICCHIOLA, J. and FISHKIN, R. 2012. *The Art of SEO (Theory in Practice)*. Sebastopol: O'Reilly Media.
- FISHKIN, R. and HØGENHAVEN, T. 2013. Inbound Marketing and SEO: Insights from the MOZ Blog. West Sussex: John Wiley & Sons.
- FORRESTER. 2014. *Interactive Marketing Forecast*. Retrieved May 13, 2015, Available online: https://www.forrester.com/US+Interactive+Marketing+Forecast+2011+To+2016/fulltext/-/E-RES59379>.
- GAVUROVÁ, B., ŠOLTÉS, V. and NOVÁČEK, M. 2014. Mobile Camera System for Ensuring Transport Security. In: SGEM 2014: 14th international multidiscilinary scientific geoconference: GeoConference on Informatics, Geoinformatics and Remote Sensing: conference proceedings: vol. 1. : 17-26, June, 2014, Albena, Bulgaria. -Sofia : STEF92 Technology Ltd., 2014, p. 249-257. ISBN 978-619-7105-10-0. ISSN 1314-2704
- HALAVAIS, A. 2008. Search Engine Society. Malden: Polity Press.
- HALLIGAN, B. and SHAH, D. 2014. Inbound Marketing: Get found using Google, Social Media and Blogs. New Jersey: John Wiley & Sons.
- HE, Y., WANG, J. and JOHN WEI, K.C. 2014. A comprehensive study of liquidity before and after SEOs and SEO underpricing. In: *Journal of Financial Markets*, Vol. 20, No. 1, pp. 61-78.

HUTCHINSON, T. 2012. Web Marketing For The Music Business. Burlington: Focal Press.

JANSEN, B.J., SOBEL, K. and ZHANG, M. 2011. The brand effect of key phrases and advertisements in sponsored search. In: *International Journal of Electronic Commerce*, Vol. 16, No. 1, pp. 77-106.

- JATO, M. and ORESIRI, J. 2013. Students' Use of Search Engines for Information Retrieval on the Web: A Case Study of Adeyemi College of Education, Ondo. In: *Greener Journal of Internet, Information and Communication Systems*. Vol. 1, No. 2, pp. 055-060.
- KING, M.A., ABRAHAMS, A.S. and RAGSDALE, C.T. 2015. Ensemble learning methods for pay-per-click campaign management. In: *Expert Systems with Applications*, Vol. 42, No. 10, pp. 4818-4829.
- KRITZINGER, W.T. and WEIDEMAN, M. 2013. Search Engine Optimization and Pay-per-Click Marketing Strategies. In: *Journal of Organizational Computing and Electronic Commerce*, Vol. 23, No. 3, pp. 273-286.
- LUKITO, R.B., LUKITO, C. and ARIFIN, D. 2015. Implementation techniques of search engine optimization in marketing strategies through the internet. In: *Journal of Computer Science*, Vol. 11, No. 1, pp. 1-6.
- MARSHALL, P., RHODES, M. and TODD, B. 2014. Ultimate Guide to Google AdWords: How to Access 1 Billion People in 10 Minutes. Irvine: Entrepreneur Press.
- PANDA, T. K. 2013. Search Engine Marketing: Does the Knowledge Discovery Process Help Online Retailers?. In: *Journal of Knowledge Management*, Vol. 11, No. 3, pp. 56-66.
- PULIZZI, J. 2013. Epic Content Marketing: How to Tell a Different Story Break Through the Clutter, and Win More Customer by Marketing Less. New York: McGraw-Hill.
- PUDŁO, P. AND GAVUROVÁ, B. 2012. Experimental learning in higher education, using simulation games as learning tool. In: SGEM 2012: 12th International Multidisciplinary Scientific GeoConference : conference proceedings : Vol. 3: 17-23 June, 2012, Albena, Bulgaria. - Sofia : STEF92 Technology Ltd., 2012, p. 1093-1100. ISSN 1314-2704
- PUDŁO, P. and GAVUROVÁ, B. 2013. Experimental teaching methods in higher education practical application. In: SGEM 2013: 13th International Multidisciplinary Scientific Geoconference: Ecology, Economics, Education and Legislation : Vol. 2: 16-22 June, 2013, Albena, Bulgaria. Albena: STEF92 Technology Ltd., 2013, p. 423-428. ISBN 978-619-7105-05-06.
- SCOTT, D. 2015. White Hat Search Engine Optimization (SEO): Structured Web Data for Libraries. In: *Partnership : The Canadian Journal of Library and Information Practice and Research*, Vol. 10, No. 1, pp. 1-21.
- SCOTT, D. M. 2013. The New Rules of Marketing & PR: How to Use Social Media, Online Video, Mobile Applications, Blogs, News Releases & Viral Marketing to Reach Buyers Directly. New Jersey: John Wiley & Sons.
- SHIH, B.Y., CHEN, C.Y. and CHEN, Z.S. 2013. An empirical study of an internet marketing strategy for search engine optimization. In: *Human Factors and Ergonomics In Manufacturing*, Vol. 23, No. 6, pp. 528-540.
- ŠOLTÉS, V. and GAVUROVÁ, B. 2015. Modification of Performance Measurement System in the intentions of Globalization Trends. [Modyfikacja systemu pomiaru wyników w intencji trendów globalizacji] In: Polish Journal of Management Studies. Vol. 11, no. 2 (2015), p. 160-170. ISSN 2081-7452 URL:

<http://pjms.zim.pcz.pl/PDF/PJMS112/Modification%20of%20Performance%20Measureme nt%20System%20in%20the%20Intentions%20of%20Globalization%20Trends.pdf>.

- TOMASI, S. and LI, X. 2015. Influences of Search engine optimization on performance of SMEs: A qualitative perceptive. In: *Journal of Electronic Commerce in Organizations*, Vol. 13, No. 1, pp. 27-49.
- TONKIN, S., WHITMORE, C. and CUTRONI, J. 2010. Performance Marketing with Google Analytics: Strategies and Techniques for Maximizing Online ROI. Indianapolis: John Willey & Sons.
- YANGA, Y., SHIB, Y. and WANGA, B. 2015. Search Engine Marketing, Financing Ability and Firm Performance in E-commerce. In: *Procedia Computer Science*, Vol. 55, pp. 1106-1112.

On-line Reputation of the Selected Slovak Start-ups

RICHARD FEDORKO¹ – ĽUDOVÍT NASTIŠIN²– FRANTIŠEK POLLÁK³ University of Prešov, Faculty of Management Slovak Republic

Abstract

The aim of this paper is to analyse phenomenon of on-line reputation in connection to the start-up ecosystem of Slovak republic. Paper presents theoretical background for the field of reputation and start-ups as well, which is the fundamental starting line for the following analysis. There are 11 Slovak start-ups analysed by selected methodology in this paper and results show their overall competitive position in the form of rank table. Based on findings one can use the information to see the company's strength in the on-line environment and it is especially useful for potential investors as the additional factor for decision making. There are also pointed out the areas for further research in this field, which can cast more light on this matter since its importance will be only greater day by day.

Key words: Reputation, Start-up, Competition

JEL Classification: M13, M31

1 Introduction

The main goal of this study is to analyze the main players in the Slovak startup ecosystem in relation to their on-line reputation. The results indicate current status of selected companies' reputation in the conditions of on-line environment. Our paper contributes to the theory and praxis as well, since the factor of on-line reputation is often overlooked despite the fact that it shows actual on-line health of a company a thus it can be applied as one of the factors taken into account, when investment to the company is under evaluation. Results presents 11 Slovak startups in descending order based on the analysis result. Companies and venture capitalists need to take this seriously since it reflects many actual and ongoing indications that can be helpful when deciding about future actions.

2 Reputation

It is defined as the often used concept of marketing and the Internet, and usually means the overall web presence. It can also be compared to leaving marks in the digital world. All activities are interrelated and complementary (Janouch, 2011).

Each company has as a standard as well as online reputation, regardless of whether or not they want it. Reputation always exists (Marsden, 2013). The reputation of the company is considered a very valuable asset. Balmer and Greyser (2003) characterize the company's reputation as a state which is formed over a longer period on the basis of what the company does and how it is maintained (Gavurová et al. 2014). Highhouse defines it as a stable global assessment of the

²Ing. Ľudovít Nastišin; Konštantínova 16, 080 01 Prešov, Slovak Republic, ludovit.nastisin@gmail.com

¹ Mgr. Richard Fedorko, PhD., Konštantínová 16, 080 01 Prešov, Slovak Republic, richard.fedorko@unipo.sk

³PhDr. František Pollák, PhD.; Konštantínova 16, 080 01 Prešov, Slovak Republic, frantisek.pollak@unipo.sk

companies that is shared by many sectors (Helm et al., 2011). It is pure reaction of customers, investors, employees and shareholders (Gavurová, 2012). It is a collective evaluation of individual impressions (Gottschalk, 2011; Šoltés and Gavurová, 2014).

2.1 From image to reputation

Companies often invest large amounts of funds to support the development and marketing activities for the purpose of creating communication campaigns that support the company's image and will thus serve as an encouragement to customers to making a purchase (Leboff, 2011; Michalski, 2014; Raisova et al., 2014; Michalski, 2015). This argument is supported Smaizien and Jucevicius (2009), who argue that companies prefer to focus primarily on the image and omit their reputation. Leboff (2011) says that the image is no guarantee of positive references and recommendations. These can only be achieved through positive reputation. In other words, the basis of modern marketing is not only to care about the image, but also to ensure the reputation, which cannot be influenced and is given a long chain of events.

Bennet and Kottasz distinguished image and reputation based on a time horizon as the main characteristic that distinguishes these two concepts. In other words, the company's image can be created in a relatively short time. Reputation is not generated in the long term and thus cannot be altered or redirected as quickly as image (Smaiziene and Jucevicius, 2009; Michalski, 2009; Bem and Michalski, 2016; Brozyna et al., 2016). This approach is also supported by Jackson (2004) and Cornelissen (2004), who also emphasize time as the main differential element. Fill (2009) perceive reputation as a broader set of image. It considers that reputation is time consuming compared to the image, which may be affected more quickly. On this basis, it can be argued that the image and reputation are not synonymous but they are interrelated and influence each other.

2.2 Creating reputation

According to Freedom (2009), reputation exists in three forms, namely primary, secondary and cyclical. Building a reputation was associated mainly with marketing and communications. Burke et al. (2011) argues that currently the company reputation is already integrated in human resources management and in corporate strategies. It is generally accepted that there is a reputation within the company and gradually penetrates out. Fombrun and Foss (2011) notes that it is good if the organization cares about its reputation and highlights the following factors:

- Resolution principle strong reputation is the result of a unique position in the customer's mind.
- The focusing principle a strong reputation is the result of a focus on communication and activities directed to one main area.
- Consistency principle a strong reputation arises as a result of the consistency of communication and activities with internal and external environment.
- The principle of identity a strong reputation arises when a company is acting in a manner that is consistent with the principles of corporate identity.
- The principle of transparency a strong reputation is the result of transparency in all spheres of society.

2.3 On-line reputation

Walter (2013) says that the reputation in life and in business is everything. This means that it is a very fragile element and it takes just one mistake for it to produce often irreversible damage. This is true even stronger in the digital environment, in which the radical transparency and customers

require the most power. By Chernatonyho et al. internet is a place where customers have the opportunity to share information about a brand, but equally it is also a place where these companies can control information about them. The negative comments on the internet can quickly and severely damage the image and reputation of the brand (Siano et al., 2011), reportedly a personal communication (electronic word of mouth) is an important aspect of on-line reputation. According to Henning-Thuraua (2004), this form of communication can be defined as a positive or negative opinion established potential, current or former customers about the product or company through the Internet.

3 Start-Ups

According to Blank and Dorf (2012) a startup is as an "organization formed to search for a repeatable and scalable business model." In this case, the verb "search" is intended to differentiate large, i.e. highly valued, startups from small businesses, such as a restaurant operating in a mature market. The latter implements a well-known existing business strategy whereas a startup explores an unknown or innovative business model in order to disrupt existing markets, as in the case of Amazon, Uber or Google. Blank and Dorf add that startups are not smaller versions of larger companies: a startup is a temporary organization designed to search for a product/market fit and a business model, while in contrast, a large company is a permanent organization that has already achieved a product/market fit and is designed to execute a well-defined, fully validated, well tested, proven, verified, stable, clear, un-ambiguous, repeatable and scalable business model. Blank and Dorf further say that a startup essentially goes from failure to failure in an effort to learn from each failure and discover what does not work in the process of searching for a repeatable, high growth business model.

Graham (2012) says that "A startup is a company designed to grow fast. Being newly founded does not in itself make a company a startup. Nor is it necessary for a startup to work on technology, or take venture funding, or have some sort of "exit". The only essential thing is growth. Everything else we associate with startups follows from growth." Graham added that an entrepreneur starting a startup is committing to solve a harder type of problem than ordinary businesses do. "You're committing to search for one of the rare ideas that generates rapid growth. Investors are generally most attracted to those new companies distinguished by their strong cofounding team, risk/reward profile and scalability. That is, they have lower bootstrapping costs, higher risk, and higher potential return on investment. Successful startups are typically more scalable than an established business, in the sense that they have the potential to grow rapidly with limited investment of capital, labor or land. Timing has often been the single most important factor for biggest startup successes, while at the same time it's identified to be one of the hardest things to master by many serial entrepreneurs and investors. Startups encounter several unique options for funding. Venture capital firms and angel investors may help startup companies begin operations, exchanging seed money for an equity stake. In practice though, many startups are initially funded by the founders themselves. Factoring is another option, though not unique to startups. Other funding opportunities include various forms of crowdfunding, for example equity crowdfunding (Gross, 2015).

The rise in start-ups across the world has been seen by many as the first stages of the commencement of the Passion based economy.

4 Methodology and analysis results

This on-line reputation study focuses on 11 Slovak startups with great enough potential to succeed in such competitive environment as a startup ecosystem definitely is. All selected entities were founded in Slovakia and they are still existing company with a great growth potential.

Sentiment analysis is one of the most widely used rating system s for online reputation in Europe. This area has already been used in the past by Rajzák et al. (2010) in the context of the evaluation of on-line reputation of banks. The assessment is recorded in the first ten results of a search engine. Analyzing each partial result and sentiment was followed by the final assessment of an entity that serves as an evaluation criterion or success or failure of the company in selected segments. In order to minimize the presence of customized search results by user it used a proxy server, which served as an anonymity tool and found only the most relevant results. The final score of the trial and was independently evaluated by three persons, namely to minimize the subjective factor representation of the results of the resulting values represent the average of all the ratings. The business name was chosen as the search phrase for all organizations. The sentiments of the individual results and the score are shown in the following table.

Sentiment / Position of the result	1	2	3	4	5	6	7	8	9	10
+	20	19	18	17	16	15	14	13	12	11
Х	10	9	8	7	6	5	4	3	2	1
±	2	2	2	2	2	2	2	2	2	2
-	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11

Table 1 Evaluation of a sentiment

The obtained final score of selected subjects and the position has been transformed into a summary table showing the result of the analysis. The total points indicate the strength of sentiment of all analyzed subjects. This score also serves as a final assessment factor of success or failure regarding this matter. The following table presents a summary of results.

Pos.	Business name	1	2	3	4	5	6	7	8	9	10	Σ
1.	Droppie	10	19	8	7	6	15	4	3	12	1	85
2.	Orderlord	10	9	18	7	6	15	2	2	12	2	83
3.	Staffino	10	9	18	7	6	15	4	3	2	2	76
4.	Croptech	10	9	8	17	16	5	4	2	2	2	75
5.	Sli.do	10	9	8	7	6	5	2	3	2	11	63
6.	GA drilling	10	2	8	7	16	5	4	3	2	2	59
7.	Appendino	20	9	8	7	2	2	2	2	2	2	56
8.	CulCharge	10	9	8	7	6	5	4	2	2	1	54
9.	BeeSafe	10	9	2	2	2	5	2	2	2	2	38
10.	Asana	10	2	2	2	2	2	4	2	2	2	30
11.	Excalibur	10	2	2	2	2	2	2	2	2	2	28

Table 2 Sentiment analysis results

5 Conclusion

In today's internet era only highly specialized power elites using new technologies come to the fore. It is a general effort in applying marketing tools to build a quality brand and publicizing the brand to wider audience. It does not matter whether it is a product, service, or organization. This paper has shown the importance of reputation in the online world that can harm a brand, or the image within milliseconds while searching for information on the Internet. Positive reputation, especially in the online environment of immediate decisions, is often a critical factor for customers when purchasing products, visiting an institution, or ordering services. In addition to a long built positive image it is therefore important to regularly verify the level of reputation and eliminate negative news, especially in such an important market area as the provision of startups. This paper seek to investigate the area of startups ecosystem in relation to online reputation of selected Slovak companies. Results showed their actual state and thus could be taken into account as the company performance indicator. Those two areas were rarely analysed as the one issue therefore it address quite new question. There is a great necessity to investigate this matter deeper as it has potential to be an important factor for investment evaluation. Further research should also address the comparison of on-line reputation with past investments into the companies to show whether any similar trends appear. This analysis plays the role of initial startup reputation status in conditions of Slovak market and act as a first step to deeper investigation.

Acknowledgements

This article is one of the partial outputs of the currently solved research grant VEGA No. 1/0145/14 entitled Online reputation management (ORM) as a tool to increase competitiveness of Slovak SMEs and its utilization in conditions of Central European virtual market.

References

- BALMER, J. and GREYSER, S. 2003. *Revealing the Corporation: Perspectives on Identity, Image, Reputation, Corporate Branding and Corporate-level Marketing*, Oxford: Routledge.
- BEM, A. and MICHALSKI, G. 2016. *Hospital profitability vs. selected healthcare system indicators*, CEFE 2015 Central European Conference in Finance and Economics, Technical University of Kosice, Kosice.
- BLANK, S. and DORF, B. 2012. The Startup Owner's Manual, K&S Ranch.
- BROZYNA, E., MICHALSKI, G. and SOROCZYNSKA, J. 2016. E-commerce as a factor supporting the competitiveness of small and medium-sized manufacturing enterprises, CEFE 2015 – Central European Conference in Finance and Economics, Technical University of Kosice, Kosice.
- BURKE, J. et al. 2011. Corporate Reputation: Managing Opportunities and Threats, UK: Gower Publishing Ltd.
- FILL, C. 2009. *Marketing Communications: Interactivity, Communities and Content*. 5th Edition, UK: Pearson Education Ltd.
- FOMBRUN, C. J. and FOSS, C. B. 2001. The Reputation Quotient, Part 1: Developing a Reputation Quotient. [on-line]. Available online: http://www.reputationinstitute.com/frames/press/01_15_14_GUAGE.pdf>.
- GAVUROVÁ, B. 2012. Source Identification of Potential Malfunction of Balanced Scorecard System and Its Influence on System Function. 2012. In: E&M Economics and Management.

Vol. 15, no. 3 (2012), p. 76-90. ISSN 1212-3609

- GAVUROVÁ, B., ŠOLTÉS, V., and NOVÁČEK, M. 2014. Mobile Camera System for Ensuring Transport Security. 2014. In: SGEM 2014: 14th international multidiscilinary scientific geoconference : GeoConference on Informatics, Geoinformatics and Remote Sensing : conference proceedings : vol. 1.: 17-26, June, 2014, Albena, Bulgaria. - Sofia: STEF92 Technology Ltd., 2014 P. 249-257. ISBN 978-619-7105-10-0 - ISSN 1314-2704
- GOTTSCHALK, P. 2011. Corporate Social Responsibility, Fovernance and Corporate Reputation. USA: World Scientific Publishing Co. Pte. Ltd.
- GRAHAM, P. 2012. *Startup Equals Growth, in Graham's Essays on entrepreneurship.* Available online: http://www.paulgraham.com/articles.html.
- GROSS, B. 2015. *The single biggest reason why startups succeed*. Available online: <<u>https://www.ted.com/talks/bill_gross_the_single_biggest_reason_why_startups_succeed?la</u> nguage=en>.
- HELM, S. et al. 2011. Reputation Management, Berlin: Springer-Verlag.
- HENNING-THUEAU, T. et al. 2004. Electronic Word-of-mouth Via Consumer-opinion Platforms: What Motivates Consumers to Articulate Themselves on the Internet? [online]. [cit. 2015-05-10]. Available online: http://www.gremler.net/personal/research/2004_Electronic_WOM_JIM.pdf.
- JACKSON, K. T. 2004. Building Reputational Capital: Strategies for Integrity and Fair Play that Improve the Bottom Line. USA: Oxford University Press.
- JANOUCH, V. 2011. 333 Advices for internet marketing. Computer Press.
- LEBOFF, G. 2011. Sticky marketing. Prague: Management Press.
- MARSDEN, H. 2013. Guard Your Reputation On-line, Birmingham: Smartebookshop.
- MICHALSKI, G. 2009. Inventory management optimization as part of operational risk management. Economic Computation and Economic Cybernetics Studies and Research, 43(4), 213-222.
- MICHALSKI, G. 2014. Value maximizing corporate current assets and cash management in relation to risk sensitivity: Polish firms case. Economic Computation and Economic Cybernetics Studies and Research, 48(1), 259-276.
- MICHALSKI, G., BROZYNA, E. and SOROCZYNSKA, J. 2015. Cash levels and its role in full operating cycle enterprises: 2005-2013 Czech, Slovak, Hungarian and Polish enterprises case. In: European Financial Systems 2015. Proceedings of the 12th International Scientific Conference, Brno: Masaryk University, pp. 382-390. ISBN 978-80-210-7962-5.
- RAISOVA, M., BULECA, J. and MICHALSKI, G. 2014. Food processing firms inventory levels in hard times. 2004-2012 Slovak, Czech and Polish enterprises case. Procedia Economics and Finance, 12, 557-564.
- RAJZÁK, P. et al. 2010. *Systém pre hodnotenie on-line reputáciebánk*. Proceedings: Faculty of Electrical Engineering and Informatics of the Technical University of Košice, pp. 652-657.
- SIANO, A. et al. 2011. Exploring the Role of On-line Consumer Empowerment in Reputation Building: Research Questions and Hypotheses. [on-line]. [cit. 2015-05-09]. Available online: http://www.academia.edu/1096337/Exploring_the_role_of_on-line_consumer_ empowerm ent_in_reputation_building_Research_questions_and_hypotheses.>.

- SMAIZIENE, I. and JUCEVICIUS, R. 2009. Corporate Reputation: Multidisciplinary Richness and Search for a Relevant Definition, In: *InzinerineEkonomika-Engineering Economics*. pp. 91-101.
- ŠOLTÉS, V. and GAVUROVÁ, B. 2014. Innovation policy as the main accelerator of increasing the competitiveness of small and medium-sized enterprises in Slovakia. 2014. In: Procedia Economics and Finance : Emerging Markets Queries in Finance and Business : 24-27 October 2013, Tîrgu Mureş, Romania. Netherland : Elsevier, pp. 1478-1485. ISSN 2212-567.

Beyond Bologna: The Sustainable University Enterprises Partnership

ALESSANDRO FIGUS¹ Link Campus University Italy

Abstract

Today very important is the debate around the relationship between the labour market and the "Academic World". It is a necessary effort to understand the effects of the globalization on the labour market. In fact, sustainable development is the biggest challenge to the university world during the globalization time involving the labour market. We would like to come back to the people, their qualitative effectiveness is the result of the "higher education product" and depends conclusively on the "performances" of the human components of the teacher, in the first place, and after of the students. (WEEVWN, 2000)

Key words: Partnership, Universities

JEL Classification: F15, P48

1 Introduction

The economic and cultural growth and the ability of renewal are the fundamental objectives of every in country and they should be also for countries in development and transition, in particular at the European Eastern countries. An important contribution to the attainment of such an objective can be brought by a suitable higher education quality that aims for the development of creativity and individual initiative, as well as to the acquisition of competences that improve the professional qualification of the teaching staff.

In contrast to the past, today in globalization time, the competitive advantage of a country is founds more and more on the wealth of human resources and less on the value of materials, capitals and technologies. Such challenges the quality of the higher education has to answer in order to satisfy the individual cultural needs, and the needs of insertion in the world of the work, with the main objective to favored the partnership between individuals, businesses, interest-based organizations, and in our case, favored the sustainable partnership enterprises – academic world, the University world.

For the students, and particularly for university students, it is not only important to attain a good cultural level form both a qualitative point of view with respect to content, but also to acquire one "higher education with a strongly practical character", as underlined by the various Resolutions of the Council of the Community European and first among all that of 5 December of 1994 (one very close to the reality in continuous evolution of the labour market.), to entry in contact with the world of the job.

¹ Prof. Dr. Alessandro Figus, Via Nomentana 335, 00162 Roma, Italy, a.figus@unilink.it
2 Discussion

To such intention, it ascertains that in the European economic world there are prefigured forms of organization - very different from those traditional and hierarchical, because today these are characterised by integration and strongly oriented to the communication, and we remark today, in globalization time, that we have not a big difference between that Europe and the Eastern Europe, considering all countries and including countries like Moldova and Ukraine (today EU associate countries), and many others, as Slovakia where the new higher education acts that incorporate the manifest aims of the Bologna process are adopted especially to show when and how the respective governments are able to control the higher education institutions (exactly in the same time Slovakia and Ukraine in 2002) and where we have introduced the Bologna process to help and to harmonise the higher education but where there is a very relevant immigration (more to the East than the West) mainly caused by the retrieval of a job, or better, a problem to find of a good job.

Today, especially in Eastern Europe, one of the most important need of the Universities is to take the lead in developing sustainable partnerships with enterprises, which requires modernizing their governance and mode of operation in order to respond to the needs of society and transfer their knowledge. By producing fully employable students (Bologna Process), promoting entrepreneurship, contributing to the lifelong learning agenda (in retraining the workforce) and transferring their research results, universities can be strong players in the Lisbon Agenda and contribute to the economic development.

It is clear that both universities and enterprises will benefit from closer cooperation; however, many universities still lack an entrepreneurial spirit, are too academically oriented and do not make relevance of their programs to the needs of the labor market a sufficiently high priority.

In the European Union the scheme of the development of the partnership between universities and enterprises has produced a number of recommendations for Higher Education Institutions and, in particular, at the European Universities with a view to further progress with the important dimension of University-Enterprise cooperation as one of the key elements to enhance Europe's competitiveness and contribute to the EU policy and activities in this area. These recommendations will be based on the findings of the online survey, the case studies and the discussions between all stakeholders at the European Conference in Bonn on 18-19 June 2007. This experience is the basis of the economical growth also in developing countries as the post soviet, diffused in all Eastern European countries. For example, it is obvious in this economic global crisis that Moldova is suffering and for the young people there is no escape, the only possibility is the education and for the Eastern and Western European Universities the possibility to increase their attractiveness through a high rate of employability of graduate students.

We have a greater sense of urgency brought by the Lisbon Agenda and following the Bologna Process. The new challenges which confront society at large: the demographics of ageing; globalization; climate change and sustainable development; the irreversible rise of information and communication technologies; for the Eastern European countries it is very useful for the elimination of its disparity with Europe and to halt the immigration. Therefore, it becomes essential to establish a quality higher education path that, exclusively overcoming the technical-operational dimension, offers interesting instruments to develop communication and the ability to work in groups, with the purpose of improving the relationships between different functions inside the student-teacher bond.

In the last years, we are witness, especially in Italy, to multiple new university courses, however there are not able to provide the necessary "complementary" preparation to satisfy the expectations expressed in the market (also because some times to employ teachers not specifically prepared.) Moreover, the market is polluted by parallel higher educational initiatives to the university institution, for example proposal by organizations of recent origin to know its substantial reliability. The excess of offers in comparison to the question produces confusion among the students and among the possible users of these courses (like enterprises, public corporate body, private) that are sometimes are disorientated and which often change directions or they prefer to abdicate.

In this context it is possible to pursue excellence objectives also in higher education is not a fashion but is an authentic necessity to be competitive on the market and to have the concrete opportunities of work. Therefore, the culture of quality has positive aspects in comparison to the development of a philosophy more directed to the users that in pure market logic he can be defined simply "customer".

Considering that for a long time the universities offered a service, they can make reference to the norm (ISO 9001) for the realization and the maintenance in the time of a proper quality control, that however should involve the whole scholastic community and not only the highest level. The key role of standards has been absolutely recognized, since a long time, in the University education programs covering a broad variety of technical sectors

However, it will be necessary to have a periodic re-examination of the analysis of the perception that the student has some service furnished with the purpose to improve:

- 1. the performances,
- 2. the productivity and the costs,
- 3. the knowledge and the management of the needs of higher educational market.

Moreover, it needs to be considered that such a norm, also usable like reference of certification, represents a complete model of the necessary requisites to build a quality system of higher education area, culturally projected toward the general principles of the "total quality". The adoption of a quality system can introduce some conceptual difficulties for the greater part of the higher education societies, often characterized by organisational structures "craft made", distant from the full awareness of the qualitative requisite of the "higher educational product". But such difficulties do not have to be for the higher-level of higher education, that is for the university.

For instance, if we consider the norm ISO the quality it has defined as "The whole of characteristics of a product or a service that confers to it the ability to satisfy the express or implicit demands". From this interpretation it derives that a control of the quality of higher education will be effective if, and only if, the performances supplied assure the satisfaction of the expectations of the students and consequently of the world of the work.

The final outcome is the result of an organizational trial that must be planed and verified since the beginning, starting from the necessary cognitive activity to obtain student needs in comparison to the "higher educational product". In this case the university structure would have "to test" the

sample "student" in order to locate, analytically, the qualitative requisites of the service, the input of the planning process.

The cognitive investigation must have effected considering that the recipients of the "higher educational products" can be divided in three large categories, correspondents to the different personal motivations:

- 1. Acquisition of a culture and professionalism suitable to the expectations of higher educational market and complementary to a working world;
- 2. Development of the competitive bases for a professional career "of success" after the attainment of the higher educational qualification;
- 3. Necessity of bringing up to date higher educational in relation work activities.

Besides, the process of planning has to be preceded by a careful comparison among question and offers that underline the possible gap in comparison to the priorities dictated by the market of work. Among suppliers of higher educational services and students there are now more direct relationships for the search of new forms of equilibrium, between ability of innovation and the question of the market. The analysis of this last one has, in fact, shown the necessity of human resources with well defined characteristics. In short there are:

- 1. good training cultural general and specific,
- 2. spirit of initiative,
- 3. quickness of decision,
- 4. availability to accept responsibilities,
- 5. communication ability,
- 6. work group ability,
- 7. professional competences that improve the higher education quality also in relation to the world of work.

There is then the planning of the process of planning, to whose inside is distinguished different phases that go from the layout and elaboration of the "higher educational product" and consequent quality control and verification of the service distributing to the appraisal of the perceptible quality by the student that in turn, in the exercise of its profession will have to integrate himself in the world of work. A different line of this tendency exists to affirm of new organizational methods for the adoption of the keys of co-planning, are that it brings students and their future world of the work intersects and compares their respective professionalisms in order to arrive at joint elaboration of competitive solutions. The activity of verification can be effected measuring the qualitative level of learning of the subjects that receive higher education through evaluations (by means of questionnaires, tests of evaluation, exercises and practical exercises) from which one can derive preventive and corrective actions to eliminate the causes and the errors of not conforming in the progress of allocation of the higher educational service.

The qualitative effectiveness of the "higher education product" depends conclusively on the human components of the teacher, in the first place, their behavior, their competence and attitudes. For behaviour we intend above all the availability to the self critical in comparison to the activity of teaching, the wish to collaborate and to listen to the students, the ability to cover the role of moderator of the classroom. Particularly competence is expounded, through a theoretical knowledge and practice of the subject, as well as for the didactic methodologies (higher educational)) to facilitate its learning.

Nevertheless, the specialized preparation of the teacher is not enough if it is not accompanied by particular abilities of communication, inside which it's possible to distinguish characteristics like: the ability to capture the attention of the "students stage", the use of language suitable to the cultural level of the student, the attitude to transmit one's own knowledge and to "to defeat" the natural resistance of the students and in general of individuals "to listen" to new subjects.

In the planning of a university higher education course, but not only, it is, therefore opportune, to define the profile of the human resources and the roles (teacher, tutor, etc.) necessary to carrying out the activities didactic/higher educational. It's not a easy task for the teachers to renovate their methodology of didactical approach in order to assure a high level of knowledge transfer.

In didactic activity, the teacher can use methodologies that facilitate the transfer of knowledge and facilitate learning. The theoretical lessons can be for instance assisting from transparent, dispensations, photos, film, graphic representations and demonstration of software products, without skipping practical exercises, in groups or individually. The teacher does not have to have on exclusive preference for a theoretical approach, to avoid the risk that the student assumes a passive role and that the communication which results is notably compromised. Learning also directed to practice, allows instead a driven discovery of the subject and a reduction of the possible differences between transmitted contents and real situations of work. In the work group, besides it is possible to overcome the student's reticence to speak from fear of appearing ridiculous in case of error.

The work group has to use techniques and tools (matrixes, brainstorming, diagram of affinity etc.) in order to the discussion and increase the objectivity of the results, allowing it to overcome the limits, to the increase the availability of psychological limits to the comparison and to win the preconceptions toward other people's ideas without penalizing creativeness.

The higher education quality, further to have as objective the exaltation of the characteristic of human resources has to neglect training in comparison to the technical aspects. Moreover, in the planning of a course it is beneficial to program the activity of training according to a run of articulated learning in forms, for each of which the subjects and the times of carrying out must be identified.

It is opportune to confirm that in the view of the quality, any higher educational course has to be projected on the base of the different needs of the student and at the same time of the work market. Nonetheless it must be structured in a flexible way, so as to be able to adapt to every possible change. The verification of the qualitative effectiveness above of a university higher educational course is immediate, in how much contemporarily to the disbursement of the service the answer of the student is evaluations. In conclusion the criticisms do not have to be considered an index of failure, but instead of improvement for future projects.

Let us say this is the construction of a plan in which intervenes and in which strategies coincide among the work market toward the world university part of the idea of a project framed to academic context for European Eastern countries following exactly the Bologna principles and recommendations (indicate in the report) of the "Bonn declaration on university-enterprise cooperation in the context of lifelong learning" and observing the partnership between world market and the academic world. I hope it will be applied quickly particularly in Eastern Europe and in our case it is interesting to find a practical application, it will be possible only trough strategic planning, through carrying out feasible projects. (Bruijn, Theo and Norberg-Bohm, 2005).

It considers new European Union experience as the European Union Forum for University-Business Dialogue launched in 2008 by the European Commission for smart, sustainable and inclusive growth. (Universities and Businesses meet, 2009)

Educational Institutions and especially the Universities are the producers of human capital. As the principal producers of human capital HEIs must plan in their production of this capital in view of the work market dynamics and in consideration of the challenges of their various backgrounds to overcome these challenges in order to assure a sustainable development.

The University-enterprise collaboration requires shared interest to explain a particular problem, whether it is student assignment, move of research or spin-off, and it growth only if the partners cannot obtain the same results on their own. The project's approach is to guarantee that university-enterprise relationship provides an "added supplementary value" from shared effort in:

- 1. setting the qualifications frameworks as the reference points for labour market needs analyses, skills shortage analyses, career guidance, continuing professional development (European Commission, 2009);
- 2. outlining the pedagogical component of university-enterprise partnership and the real contribution which it makes to competency based training;
- 3. entrepreneurship education, as an important element of curricular reform within the LLL frame;
- 4. development of training materials and courses towards industry needs.

The educational target is to graduate better professionals with knowledge and skills needed to succeed in the highly competitive world of today and tomorrow. UNESCO proposed that the vision of education for sustainable development is a world where everyone has the opportunity to benefit from quality education and learn the values, behaviour and lifestyles required for a sustainable future and for positive societal transformation.

Even though several projects aim at the university management reform, pedagogical components are also addressed: i.e., practice-based curriculum; balance of theoretical knowledge with market realities and professional skills; practice of communication and teamwork needed for industry success. This will result in: improvement of the capacity of HEIs to adapt to changing needs; switch to student-centred learning, in terms of pedagogy, curriculum, quality assurance, funding and infrastructure; better return on investment in R&D; the realisation of cost savings in training. Finally, we remark that in Europe, there are about 300 to 400 Regional Labour Market Observatories6 that generate data periodically to ensure transparency in the regional labour markets. In addition to information about branches, employees and unemployment; data on key industries and future qualifications are also taken into account. Regional Labour Market Observatories often work very isolated from each other (Larsen, Mathejczyk, and Schmid, 2007). Thus, resources cannot be shared and it is not possible to find synergies through jointly developing concepts and implementation. Furthermore, differences in data concepts and structures between observatories and regions show up, creating more difficulties in trans- regional comparisons. Instead of this the conceptual idea is also to promote the partnership between the University and

the Labour Market, because of the set of indicators which can be applied in youth monitoring. Youth monitoring is now important in many European regions and will be very important in Eastern Europe. As it shows, the European experience, the creation of Employability Monitoring Centres, Start-up Centres can be a guide for the students both during the first impact with University World and during the first impact with the "Labour world". The Centres that we are willing to create in Eastern Europe and especially in Eastern Europe have particular relevance after the financial crisis as youth unemployment has increased significantly and employment for young people (students today, workers tomorrow) has become a difficult issue. We need to go beyond Bologna, not forgetting that the Bologna Process has been an extremely important catalyst for change, with employability one of the key issues. The situation is clear: less labour market entrants, high replacement demand, increasing skill requirements, skill gaps and shortages are today's challenges. There is a growing need for highly skilled personnel to meet the requirements of global competition of knowledge and innovation, the challenge that awaits us.

In order to provide a High quality involvement of stakeholder it is better to include in the partnership the ministry of education, the ministry of economy, the representative enterprise from the Eastern Europe in the work market. In order to assure a university – enterprise really cooperation the stakeholders will have an important voice in formulating the mission and strategy. How Bologna process help to obtain this target? It is not evident that the modernisation of universities and the adaptation of curricula and programs called for in the Bologna Process will necessarily make the European economy more competitive internationally, but it is not clear how making many courses shorter will contribute to increased competence of graduates in function of the needs of the labour market (skills and competences).

The involvement of the representatives from those identified creating the target groups is described by USAID where will be possible to see several activities. Not surprisingly there is a differentiation between Western Europe and Eastern Europe, the Bologna process has a different meaning in Central and Eastern Europe than in the rest of the Continent and where the Bologna process became an element of the economic, social and political change sometimes throughout the European Union but with different perspectives which go beyond the Bologna process. In the traditional Bologna process when we compare systems or policies (in education as well as in other areas of social and political life) we have some application problem but the first of all, that often forget the complexity of European union, where today still 28 States are discussing University issues and in the same time forgetting that the society has moved on and that the only problem is the "job". That's why there is a need to look beyond the Bologna process.

Bologna process for several years has been focused on credit system also in Eastern Europe, today we are also in these countries to harmonize the process, but academia has moved on, the world has changed, but for example the credit system of the Central and Eastern European institutions does not promote foreign studies, rather it makes them difficult. Credits acquired outside the national systems are difficult to get accepted, and Academia has become highly critical of the Bologna process, in fact the Bologna process is a top-down bureaucratic process everywhere, without relation with only target students: find a job!

3 Conclusion

The Bologna process forgot the Labour Market, the students cannot afford it. They need to have motivation and commitment, in this case will be very important for the University "beyond Bologna" to locate the indicators, the University Employment Outcomes. The questions must be: How many students successfully graduate from university? Do university graduates find jobs? How many students pay back their student loans? Indicators (Key Performance Indicator) will qualify the universities, classifying them, students will choose their future already at enrollment. Beyond Bologna the world will be more and more in competition, it is a matter of world in recession/after the recession.

In conclusion the terms of the partnership University-Enterprise cooperation, beyond Bologna process (change and renewal of the European education system) is the only real need is the direct contact between academia and business, it is needed, as well as a guidance system and counseling tools developed in cooperation with business that helps students make more adequate choices and as a result preventing employees matching the needs of enterprises, virtually anywhere.

References

- ARMENIA. "Strategic Planning in Higher Education: Modern Experience and Perspectives", Tempus project "Environment Driven Strategic Planning at SEUA" (Tempus-Tacis JEP 25058-2004).
- AYLETT, R. and GREGORY, K. (Eds). 1996. Evaluating Teacher Quality in Higher Education, London, Falmer.
- BRUIJN, T. and NORBERG-BOHM, V. 2005. "Introduction: Toward a New Paradigm for the Transition to a Sustainable Industrial Society?." Chap. 1 in Industrial Transformation: Environmental Policy Innovation in the United States and Europe. Cambridge, Mass.: The MIT Press Bonn declaration on university-enterprise cooperation in the context of lifelong learning", 2006.
- CHISINAU (MD) EU TEMPUS TACIS WORKSHOP. 2007. Standardele si calitatea in invatamintul continuu, Chisinau, Moldova.
- CONFERENCE ON EDUCATION QUALITY. 2003 World Bank for Reconstruction, Novosibirsk, Russian Federation.
- COORDINATION OF WORKSHOP"LA METODOLOGIA DELLA VALUTAZIONE DELLA QUALITÀ DELLA FORMAZIONE DEI GIOVANI IN EUROPA. 2004. Giovani e mondo delle imprese in Europa tra est ed ovest", VII National Congress of Italian Society of Evaluation, Milano.
- CORTESE, A.D. 2003. "The Critical Role of Higher Education on Creating a Sustainable Future", Planning for Higher Education.
- EU TEMPUS MEDA WORKSHOP. 2006. Training and the maritime work market : Mediterranean perspectives, Alexandria Egypt.
- EUROPEAN COMISSION. 2008. about the European Qualifications Framework (EQF) European institutions in 2008, the EQF is being put in practice across Europe.
- FIGUS, A. 2003. Higher Education Quality and the world of work, in TOM 3, World Bank Quality Conference in Novosibirsk (RF), NSTU, Novosibirsk, 2003.

- FIGUS, A. 2004. La metodologia della valutazione della qualità della formazione dei giovani in Europa. Giovani e mondo delle imprese in Europa tra est ed ovest, paper presented in the workshop by the Italian Society of Evaluation (AIV) "La rete e l'arcipelago: viaggio tra le pratiche della valutazione italiana", published on the website: http://www.valutazioneitaliana.it/iniziative.php.
- FIGUS, A. 2005. Quality between higher education and the world market, in Standardele si calitatea in invatamintul continuu, IIC Moldova ISBN 9975-70-542-1, Chişinău, pp.53-61.
- INTERNATIONAL CONFERENCE «ITALIA-RUSSIA NELLE REGIONE DI KUBAN». 2004. Krasnodar, Kuban State University.
- INTERNATIONAL CONFERENCE OF RUSSIAN ECONOMISTS. 2004. Soci (Russian Federation).
- INTERNATIONAL CONFERENCE OF RUSSIAN ECONOMISTS. 2006. Soci (Russian Federation).
- KAPTEYN, A., KOOREMAN, P. and WILLEMSE, R. 1988.Some Methodological Issues in the Implementation of Subjective Poverty Definitions. In: The Journal of Human Resources. Vol. 23, No. 2, pp. 222 – 242.
- LARSEN, C., MATHEJCZYK, W., KIPPER, J. and SCHMID, A. 2008. Target Group Monitoring in European Regions. Empirical Findings and Conceptual Approaches, Rainer Hampp Verlag, Munich.
- LARSEN, C., MATHEJCZYK, W. and SCHMID, A. 2007. Monitoring of Regional Labour Markets in European States. Concepts, Experiences, and Perspectives, Rainer Hampp Verlag, Munich.
- LECLERCQ, D. 1998. Pour une pédagogie universitaire de qualité, Sprimont, Mardaga. MOON, B. (edited by). 1999. Judging Standards and Effectiveness in Education, London, Hodder, 1999.
- RAPPORTO FINALE SULLE ATTIVITÀ DI VALUTAZIONE CAMPUS. Roma, Conferenza dei Rettori delle Università italiane, 2000-2008.
- SIMS, S.J. and SIMS, R.R. (Eds.). 1995. Total Quality Management in higher education: Is it working? Why or why not?, Westport Connecticut: Praeger Publishers.
- TEMPUS TACIS INTERNATIONAL CONFERENCE ON «THE QUALITY OF HIGHER EDUCATION» 2006. Chişinău.
- UNIVERSITIES AND BUSINESSES MEET AT EUROPEAN FORUM TO DISCUSS COOPERATION. 2009. Brussels, 5-6 February 2009.
- VAN WEENEN H. 2000. Towards a vision of a sustainable university, International Journal of Sustainability in Higher Education, Vol. 1, Amsterdam.RAVALLION, M. 1992. Poverty comparisons: A guide to concepts and methods. Washington, D. C.: The World Bank.
- ZABRISKIE N.B. and ALAN B.H. 1991. Developing Strategic Thinking in Senior Management. Long Range Planning Volume 24, Issue 6.

Public Investments from EU Cohesion Policy in Slovakia: A Regional Perspective

KAROL FRANK¹ – TOMÁŠ JECK² Institute of Economic Research, Slovak Academy of Sciences Slovak Republic

Abstract

In the last eight years the Cohesion policy has been the main source of public investments in Slovakia. The aim of the paper is to show the regional and thematic distribution of Cohesion policy interventions in Slovakia at the end of 2014 and examine the role of these interventions on nature of regional policy. The paper is based on microdata on final beneficiaries of EU funds from the Information and Monitoring System (ITMS) system which are broken down to NUTS 3 level. The expenditure is further broken down by the methodology used by the European Commission which provides a more detailed picture of the thematic distribution of interventions in the Slovak regions. We show relationship between Cohesion policy interventions and regional GDP. Especially in the first years of implementation the majority of expenditure was spend in least developed regions. However, in 2013 and 2014 the EU spending was focused mainly on large infrastructure projects, which distorted the character of conducted regional policy, while the majority of EU funds were spent in regions which are not among the least developed. The need to use these financial resources crowded out the focus on least developed regions.

Key words: Cohesion Policy; EU Funds; Regional Development; NUTS 3, Regional Policy

JEL Classification: H50, R10, R11

1 Introduction

The Cohesion policy is one of the main instruments for addressing existing regional disparities among European regions. Its main objective is to mitigate the existing regional disparities and support a more even economic and social development of European regions. 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. In Slovak conditions all regions with the exception of the Bratislava region have been eligible for the Convergence objective. The support has been carried out through European Regional Development Fund (ERDF), European Social Fund (ESF) and Cohesion Fund (CF). The Cohesion policy has played a dominant role in the Slovak public investment funding in the previous year. Slovakia had the highest share of EU funding on total public investment (more than 80 %) among EU member states during 2011 – 2013. The aim of our contribution is to provide comprehensive view on regional and thematic distribution of Cohesion policy interventions in Slovakia during 2007 – 2014.

The Cohesion policy is one of the main instruments for addressing existing regional disparities among European regions. Its main objective is to mitigate the existing regional disparities and

¹ Ing. Karol Frank, PhD., Šancova 56, 811 01 Bratislava, Slovak Republic, karol.frank@savba.sk

² Ing. Tomáš Jeck, PhD., Šancova 56, 811 01 Bratislava, Slovak Republic, tomas.jeck@savba.sk

support a more even economic and social development of European regions. 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. In Slovak conditions all regions with the exception of Bratislava region have been eligible for the Convergence objective. The support has been carried out through European Regional Development Fund (ERDF), European Social Fund (ESF) and Cohesion Fund (CF). The Cohesion policy has played a dominant role in the Slovak public investment funding in the previous year. Slovakia had the highest share of EU funding on total public investment (more than 80 %) among EU member states during 2011 - 2013 (EC, 2014). The aim of our contribution is to provide comprehensive view on regional and thematic distribution of Cohesion policy interventions in Slovakia during 2007 - 2014.

2 Literature

Assessment of the socio-economic impact of Cohesion policy interventions in various sectors is the objective of studies and research papers in EU member states. Although mostly dominated by econometric approaches, we find works applying various combinations of methodologies. A comparative qualitative analysis of EU funds impacts on forestry in Slovakia and the Czech Republic was conducted by Jarský et al. (2014). The applied methods were (i) evaluation and qualitative analysis of financial aid applications, beneficiaries and indicators; and (ii) telephone interviews.

The Structural funds allocations 2007 - 2013 were evaluated in the context of regional digital strategies by Reggi and Scicchitano (2014). The impact of SF and CF related policies for development of sustainable energy in Poland, Lithuania and the Czech Republic were assessed using descriptions by Streimikiene et al. (2007). The Structural funds and the concept of lifelong learning in Romania were investigated by Nicolaua (2010), using the research approach of good practice mapping. Qualitative research (based on semi-structured interview) of the Greek education system in the context of the Europe 2020 Strategy was conducted by Panitsides (2014). 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). The Cohesion policy in the Czech Republic and its statistical analysis from 2007 to 2013 based on data on the final beneficiaries in combination with socio-demographic and financial data was conducted by Mirošník et al. (2014). The empirical analysis of the impact on improvement in accessibility and territorial cohesion from a policy perspective in Poland was focus of work done by Rosik et al. (2015). The effect of EU Structural Funds on regional performance was empirically investigated by Becker et al. (2010). Experiences with evaluation in the context of Slovakia were published by Radvanský (2014) and Frank (2013). Procedural aspect, political and administrative barriers of 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) of the Central Governing Body (CGB) at the Government Office of Slovakia (GOS). The CGB is collecting all relevant data related to projects and final beneficiaries in the ITMS. In order to be able to use the data had to be sorted, aggregated and disaggregated according to partial objectives of our research. The final dataset has been analysed

with respect to social and economic context (regional GDP) based on the data published by the Statistical Office of Slovakia. For the purpose of regional analysis, the data had been disaggregated to regional level (NUTS 3 level), which in Slovak conditions, is a unique approach. In the case that the ITMS system did not provide relevant information on precise regional allocation of the project, the regional spending has been determined by the respective ITMS project code in the Central Register of Contracts (CRC). In the case of so called national projects, which have been implemented in all regions or only in the seven convergence regions (i.e. all regions except the Bratislava region) the financial implementation was distributed by population weight of these region on total national population. This approach is also used in analyses made by the European Commission. Furthermore, the expenditure has been broken down by applying the EC methodology according to the Commission Regulation No 1828/2006 to 6 policy areas and 86 priority themes on NUTS 3 level. This classification allows us to abandon the traditional research of interventions based on the existing structure of operational programmes (OP) and their priority axes and measures. The classification based on policy areas and priority themes provides a different view of the financial implementation with better application in economic analysis and useful reflections on economic policy. In Slovak conditions this methodology was used by Frank (2013a) and Frank (2014). The regional analysis is based on the financial implementation of ERDF and CF, without ESF spending. Furthermore, the projects which are included in the dataset have been already completed or still being implemented. Projects which have been contracted but did not receive any financial contribution are omitted in the analysis. With respect to the n+2(3) rule³, our analysis is using the latest available data, which in our case is the end of 2014.

4 EU funds spending in regional and thematic view

The implementation of Cohesion policy programmes can be understood and analysed from various perspectives. With regard to its prime objective (to address the existing regional disparities among EU countries), the EU funds represent the main instrument of regional policy in Slovakia. However, each region has different socio-economic foundations and different ability to absorb cohesion policy support. This resulted in different level of absorption of EU spending among Slovak regions. Figure 1 shows absolute (in EUR mil.) and relative distribution (in % of national level) of EU spending in Slovak regions. The relative distribution varies between minimal value of 7% (the Nitra region) and maximal value of 17% (the Trenčín region).

The implementation of Cohesion policy programmes can be understood and analysed from various perspectives. With regard to its prime objective (to address the existing regional disparities among EU countries), the EU funds represent the main instrument of regional policy in Slovakia. However, each region has different socio-economic foundations and different ability to absorb cohesion policy support. This resulted in different level of absorption of EU spending among Slovak regions. Figure 1 shows absolute (in EUR mil.) and relative distribution (in % of national level) of EU spending in Slovak regions. The relative distribution varies between minimal value of 7% (Nitra region) and maximal value of 17% (Trenčín region).

³ Member States Cohesion Policy allocations are divided into annual allocations which must be spent within two or three years. This is known as the "n+2 or n+3" rule, with n being the start year when the money is allocated. Any of that annual amount which is not spent by the Member State in that period, is automatically deducted from their total allocation is returned to the general EU budget.



Figure 1 Absolute and relative EU spending in Slovak regions in 2008 – 2014 Source: ITMS, own calculations

Note: BA – Bratislava region, TT – Trnava region, TN – Trenčín region, NR – Nitra region, ZA – Žilina region, BB – Banská Bystrica region, PO – Prešov region, KE – Košice region

EU spending relative to regional GDP gives slightly different picture. Since 2008 to 2014 the highest share of EU spending has been recorded in the Trenčín region (4.7 % of its regional GDP) and the Prešov region (4.6 % of GDP). These relatively high shares are the result of rail and motorway construction in these regions. The share of EU spending in Bratislava region is rather low but is caused mainly by the highest regional GDP in the whole EU. In 2013 the Bratislava regions was the 7th wealthiest region in the EU by GDP per capita in PPS. In absolute terms the EU spending in the Bratislava region was the third highest in comparison with other Slovak regions.



Figure 2 Share of annual EU spending on regional GDP in 2008 – 2014 (in % GDP) Source: ITMS, SO SR, own calculations. Note GDP data for 2014 are estimates based on Radvanský et al.(2015)

The high volume of EU spending in Bratislava region is caused by the OP Technical Assistance, whose final beneficiaries were mainly managing authorities with seats in the region. At the end of 2014 a total of EUR 219 million has been spend in the region from this OP. This volume is comparable with the amount spent on transport or R&D support (two dominant themes in the

Slovak EU spending). Therefore the effects of EU spending in Bratislava region manifested itself in the relative improvement of administrative capacities and qualification of public servants.

Relatively highest share of spending to information society (31%) and research and technological development, innovation and entrepreneurship (30%) is caused by localisation of public administration bodies (i.e. ministries, managing authorities) which implemented the OPIS (Operational Programme Informatisation of Society) projects and public research capacities (Institutes of the Slovak Academy of Sciences and universities). Distribution of EU interventions to the Trnava region is rather even, however, this region has the lowest total share on EU funds (Figure 1). Absolute as well as relative EU interventions are highest in the Trenčín region. This region absorbed one third of national EU expenditures on transport. On the other side, regional absorption capacity in research and technological development, innovation and entrepreneurship is the lowest in Slovakia. The Nitra region had the second lowest (relative and absolute) financial implementation among Slovak regions with significant low interventions to transport and quite relative high interventions to energy and urban and rural regeneration. The Žilina region had the second highest spending; EU funds were invested mainly in transport and social infrastructure. EU interventions in the Banská Bystrica region are significantly high in tourism (33 % of total national spending) and energy (23 % of total national spending). Surprisingly high are EU interventions in research and technological development, innovation and entrepreneurship (in term of regional research and innovation capacity). The Prešov region shows rather even distribution of EU funds to themes, however we can see significant share of investment to tourism, social infrastructure and environment. The Košice region spent almost two third of national EU expenditures on culture (project Košice – European Capital of Culture). The second highest spending went to research and technological development, innovation and entrepreneurship.

	BA	TT	TN	NR	ZA	BB	РО	KE	Total
Tourism	0.3	2.7	7.9	7.9	15.9	33.2	24.0	8.2	100
Transport	10.0	2.4	35.8	1.2	20.9	10.3	12.6	6.9	100
Energy	0.0	7.5	10.5	18.8	5.9	22.8	17.0	17.5	100
Information society	30.6	7.7	7.2	9.2	11.5	11.1	10.8	11.9	100
Investment in social infrastructure	1.5	9.5	8.1	12.8	18.7	14.6	18.4	16.3	100
Culture	0.0	4.8	9.5	3.9	3.4	8.8	7.5	62.0	100
Urban and rural regeneration	7.9	8.1	8.8	16.3	13.0	13.3	17.3	15.3	100
Environmental protection and risk	-	10.0					• • •		100
prevention	5.0	10.9	10.5	9.9	15.1	15.4	20.2	13.1	100
Technical assistance	96.9	0.3	0.4	0.4	0.4	0.7	0.4	0.4	100
Research and technological development, innovation and									
entrepreneurship	30.1	8.5	4.9	8.7	10.8	15.3	7.2	14.4	100

Table 1 Relative distribution of EU funds spending by themes in Slovak regions (%)

Source: ITMS, own calculations

A simple correlation between regional GDP and regional share on EU funds give us a basic image on nature of regional policy in Slovakia. In case of strong negative correlation (region with lower GDP gets more EU interventions) we can assess the regional policy as being relevant in terms of spending distribution. In other words, the regions which are most lagging behind receive the majority of EU funding.



Figure 3 Pearson correlation between regional GDP and regional EU spending (2008 – 2014) Source: ITMS, SO SR, own calculation. Note: Data for 2014 are estimation based by Radvanský et al (2015)

Figure 3 shows the values of Pearson correlation coefficient of regional GDP and region EU spending in 2008 to 2014. Omitting the year 2008 due to the low volume of spending, we can observe that between 2009 and 2012 the EU spending fulfilled the role of regional policy instrument (relatively poorer regions received increased share of EU funding). However, already in 2013 and 2014 we can define the conducted regional policy as ambivalent due to the need to spend the outstanding financial allocation and minimise the loss of financial resources from the 2007 – 2013 programming period. In these two years the EU spending was focused mainly on large infrastructure projects, which distorted the character of conducted regional policy, while the majority of EU funds were spent in regions which are not among the least developed. The need to use these financial resources crowded out the focus on least developed regions.

5 Conclusions

In the ending programming period 2007 - 2013, the Cohesion policy provided for the least developed countries (all EU 13 Countries) with GDP less than 75 % of EU average substantial amounts of financial resources for necessary public investments, with the objective to narrow the existing regional disparities and support a more even economic development in the EU. In most of these countries and due to the consequences of the financial and economic crisis, which hit in 2009, Cohesion policy programmes and investment represented the majority of the public investments in this time period. This being said, the role of cohesion policy shifted from being an additional source of investment to the most important source of financial resources for regional policy and public investments. In the 2007 – 2013 programming period, the priorities of Cohesion policy shifted towards objectives supporting economic growth, employment and aggregate demand especially in times of insufficient private investments. Similarly, public capital expenditure has been lower or stagnant due to the need to consolidate public finances in most of the EU countries. Therefore, the Cohesion policy provided at least in Slovak conditions the majority of funding for public investments, with exceptionally high share on total public expenditure of the central government budget and in fact substituted the capital expenditure from national sources. The aim of our paper was to provide and comprehensive view on the distribution of Cohesion policy interventions in regional and thematic perspective. In the recent period, the research of Cohesion policy has been focused mainly on process oriented aspects of implementation and sectoral view by individual operational programmes. The end of the programming period and rising volume of financially implemented projects provides the opportunity to a more thorough research of Cohesion policy interventions on regional level and its impacts on economic growth, employment, competitiveness, innovation and other aspects of regional development. Our paper shows the regional distribution of cohesion policy interventions by individual policy areas and priority themes. Using the correlation analysis, we examined the hypothesis that the cohesion policy interventions in 2008 - 2014 reflected the regional economic strength and performance. We can state that between 2009 and 2012 the EU spending fulfilled the role of regional policy (relatively poorer regions received increased share of EU funding). However, already in 2013 and 2014 we can label the conducted regional policy as ambivalent due to the need to spend the outstanding financial allocation and minimise the loss of financial resources from the 2007 - 2013 programming period. A challenge which remains ahead of us is the research of structural changes in the economy influenced by the Cohesion policy interventions in the area of innovation performance, competitiveness, environment, tourism and social development on regional level (even in international comparison). Further research is expected to use a more detailed classification of Cohesion policy expenditure from the ITMS system and other relevant data.

Acknowledgement

This article is published as a part of research project APVV-0750-11. We would like to thank Ing. Martin Bernát and Mgr. Anna Hrončáková from the Central Coordination Office of the Government of Office of Slovakia for providing assistance and microdata data from the ITMS system.

References

- BECKER, S., EGGER, P. H. and EHRICH, M. 2010. Going NUTS: The effect of EU Structural Funds on regional performance. In: *Journal of Public Economics*. Vol. 94, pp. 578–590.
- EC. 2014. Investment for jobs and growth. Promoting development and good governance in EU regions and cities. Sixth report on economic, social and territorial cohesion. Brussels: European Commission.
- FRANK, K. 2013a. Implementácia politiky súdržnosti v SR nástroj štruktúrnych zmien? In: *Pohľady na štruktúrne problémy slovenskej ekonomiky*. Bratislava: VEDA, vydavateľstvo SAV
- FRANK, K. 2013b. Country report on achievements of cohesion policy. Slovakia: version final. In: Expert evaluation network delivering policy analysis on the performance of cohesion policy 2007-2013. Year 3 - 2013 : task 2. Brussels: European commission - Directorate-General regional policy, pp. 1-32.
- FRANK, K. 2014. Vybrané aspekty regionálneho rozvoja ako faktora štruktúrnych zmien. In: *Pohľady na štruktúrne problémy slovenskej ekonomiky II*. Bratislava: VEDA, vydavateľstvo SAV
- JARSKÝ, V., SARVAŠOVÁ, Z., DOBŠINSKÁ, Z., VENTRUBOVÁ, K. and SARVAŠ, M. 2014. Public support for forestry from EU funds – Cases of Czech Republic and Slovak Republic. In: *Journal of Forest Economics*. Vol. 20, pp. 380 – 395.
- MIROŠNÍK, K., PETKOVÁ, L. and ČADIL, J. 2014. Statistical Analysis of Cohesion Funding in the Czech Republic. Enterprise and the Competitive Environment 2014 conference, ECE 2014, 6–7 March 2014, Brno, Czech Republic. In: *Procedia Economics and Finance*. Vol. 12, pp. 437 444.

- NICOLAU, A. 2010. Structural funds and the concept of lifelong learning in Romania. In: *Procedia Social and Behavioral Sciences*. Vol. 2, pp. 5625–5629.
- PANITSIDES, E. A. 2014. "Europe 2020" Practical implications for the Greek Education and Training system: A qualitative study. In: *Procedia – Social and Behavioral Sciences*. Vol. 140, pp. 307 – 311.
- PASCA, E. M. 2014 Integration of the Roma population in and through Education. European Educational Experiences. In: *Procedia - Social and Behavioral Sciences*. Vol. 140, pp. 512 – 517.
- RADVANSKÝ et al. 2015. Assessment of Cohesion Policy Impacts on the Development of Slovakia Using a Suitable Econometric Model - Evaluation Report 2015. Bratislava: Government Office of Slovak Republic.
- RADVANSKÝ, M. 2014. *Možnosti analyzovania vplyvu kohéznej politiky na regióny a trh práce SR: ekonometrický prístup.* Bratislava : Ekonomický ústav SAV.
- REGGI, L. and SCICCHITANO, S. 2014. Are EU regional digital strategies evidence-based? An analysis of the allocation of 2007-13 Structural Funds. In: *Telecommunications Policy*. Vol. 38, pp. 530–538.
- ROSIK, P., STEPANIAK, M. and KOMORNICKI, T. 2015. The decade of the bigpush to roads in Poland: Impact on improvement in accessibility and territorial cohesion from a policy perspective. In: *Transport Policy*. Vol. 37, pp. 134–146.
- ŠIPIKAL, M. 2015. Political and Administrative Barriers of Cohesion Policy Implementation in Slovakia. In: IISES The International Institute of Social and Economic. Vol. 4, No. 2, pp. 39-48.
- SO SR. 2015. Database DATAcube. Statistical Office of the Slovak Republic.
- STREIMIKIENE, D, KLEVAS, V. and BUBELIENE, J. 2007. Use of EU structural funds for sustainable energy development in new EU member states. In: *Renewable and Sustainable Energy Reviews*. Vol. 11, pp. 1167–1187.

The Importance of Health Policy for the Development of Day Surgery in Slovakia

BEÁTA GAVUROVÁ¹ – VINCENT ŠOLTÉS² Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

In recent years, some settings of the Slovak health system, which shifted the equilibrium of relationships in the system have been negatively changed and also significantly changed the motivation of actors. It also deepened inefficiencies by using healthcare resources, expressed with continuing growth of Slovak hospitals' indebtedness. One form of increasing the efficiency of the health system is the development of day surgery, which has been stagnating in Slovakia for 15 years of its existence and this development represents 7 % of total numbers. The aim of the study was to investigate the system of day surgery in Slovakia, assess the reasons for its stagnation and propose optimal solutions for its elimination. The structure of day surgery performance was analyzed on patients under the age of 18 from database of the National Health Information Center, which we have gained through our contractual cooperation. In 2012, we analyzed a mutual dependency among duplicate characteristics of day surgery data. In testing, we compared real absolute calculations with the so-called expected absolute calculations that would be visible in case of questioning independence. We used the statistical software SPSS, version 19 for data processing. The analysis confirmed the uneven development of day surgery performances and revealed the causes of its low level of development. The given status is influenced by the fact that conditions for day surgery provision in junior group are stricter as in the adult group. We specified some critical areas in the system of day surgery as well as evaluated their impacts on the development of day surgery on the basis of our present analyses and systematic study of the conditions of day surgery development in Slovakia. In conclusion, there have been proposed options for setting optimal strategy that supports the development of day surgery in Slovakia regarding the identified regional discrepancies. We combine the issue of day surgery of a national aspect with international aspects, especially with the conceptual and methodological problems in the area of day surgery reporting, which have been already announced by international institutions, such as Eurostat, OECD and WHO.

Key words: Day Surgery, Healthcare System, Efficiency of the Healthcare System, Health Policy, Barriers in Day Surgery

JEL Classification: I15, I18

1 Background

Health policy of the Slovak Republic is based on the premise that population health is in the interests of the individual and society as a whole. Unfortunately, this healthcare regulation meets the definition of a mixed public good, and as a result of a conflict within the health care system. The health system in Slovakia includes a clear significant information asymmetry, which does not necessarily mean a market failure. The reason is a specificity of health care, where the diagnosis and the treatment are in some sense the products (Janíčko and Koubek, 2012). Health information and health services are provided by the same person – doctor (Vostatek, 2013; Minařík and Kraftová, 2012, Brozyna et al., 2016, Michalski et al., 2015). Therefore, there may

¹ doc. Ing. Beáta Gavurová, PhD., MBA, Němcovej 32, 040 01 Košice, Slovak Republic, beata.gavurova@tuke.sk

² prof. RNDr. Vincent Šoltés, CSc., Němcovej 32, 040 01 Košice, Slovak Republic, vincent.soltes@tuke.sk

be a conflict of interest, and the doctors may be inclined to identify the diagnoses with the determination of more expensive treatment (Dlouhý and Barták, 2013; Kunstova and Potancok, 2013; Meacock and Kristensen, 2014; Michalski, 2009). State uses alternative methods to limit the amount of provided health care, such as limits on services or consumed goods, categorization lists, waiting lists, marginal fees or arbitrary decisions of doctors. It is an evident fact that increasing of life expectancy, as well as the increase in the number of older people is a significant determinant of the continuous increase in healthcare costs (Esser, 2013; Michalski, 2014; Fiala and Langhamrová, 2013; Davies, Rixon and Newman, 2013; Manafo and Wong, 2012; Tsiachristas, Dikkers, Boland and Rutten-van Mölken, 2013). This increased life expectancy results in a growing demand for health care and an increased impact on the Slovakian health insurance system. Health insurance system allows the isolation of the health care costs from the patient supports the definition of large-scale healthcare covered by insurance and thus disproportionately increases the consumption of health care by patients (the moral hazard). This creates an environment allowing the systems patrons a certain "ignorance" in regards to the costeffectiveness of health care provided by the provider, as well as for the provision of very often unnecessary and overpriced health care (induced demand). Since 2002, the Slovak health system is characteristic of soaring indebtedness, which was the cause of inefficient use of public resources in the system and soft budget criteria of state contributory organizations. During this period, there emerged a question of introducing and use of day surgery, defined as one of the effective ways of providing health care that is suitable for patients as well as health insurance companies (Buzink, Šoltés, Radoňak, Fingerhut, Hanna and Jakimowicz, 2012; Michalski, 2015). The process of reducing inpatient facilities, which was a part of the criticized restructuring process of government, is due to the acceptance of foreign models associated with the development of day surgery since 2007. As evidenced by the results of the research study (Šoltés and Gavurová, 2014a; Šoltés and Gavurová, 2014b, Šoltés and Gavurová, 2014c), present day surgery system in Slovakia is indeed functional, but its components are not correctly set. In Slovakia to 2013, there was a distinctive lack of research studies dealing with the issue of day surgery; this led to an inefficient processing of beds and a stagnation that led to liquidation of many hospitals in Slovakia. The primary objective of this study is to highlight the importance of the advance in optimal strategies for the process of day surgery development, as well as the creation of a state health policy geared towards increasing the efficiency of the Slovak healthcare.

2 Economic interaction of HIC with HCP

Slovak hospitals represent the weakest segment of health care. Public hospitals are favored longterm by the expense of non-state hospitals and outpatient departments. As such there was formed the minimum end network composed of exclusively public hospitals. This network allowed them to claim the contracts, irrespective to the quality and efficiency of health care provision. For constitutional and ambulatory healthcare facilities (HCFs), there was an adopted decree on minimum material-technical and personal normative, in the regulation of the structural assumptions of healthcare providers' quality. The ambition of the government was to ensure the preservation of accessibility and quality of healthcare provision for all citizens and prevent to uncontrolled and inefficient extension of the network of HCFs. Simultaneously, there has to be supported a restructuring of the HCP network in which, there is a preference to the transfer from medical activities to ambulatory care, including day surgery procedures. This would lead to desirable purposeful specialization and consequently to increase of the quality and productivity of healthcare services. The given specialization has not been fulfilled and at present within the

Slovak healthcare system. There is a lack of a definition regarding population health needs, which would allow to set the minimum network of healthcare providers and in turn the availability of health services. Also currently, there continues an expansion of ambulatory capacity which stagnates the transfer of healthcare from inpatient to outpatient care and to the provider of day surgery. While it is still a privileged position of state medical facilities in the minimum network of healthcare providers, the given issues are not depleted yet. They only represent a calculation of the most visible problems. With this in mind, we consider for a significant critical point the absence of conditions ensuring transparent competition between health care providers, deformed by indicated government interventions. At the turn of 2009 and 2010, as well as the 2011, there were paid off debts of public health facilities, which caused considerable dissatisfaction of healthcare providers. At the same time, the downturn was enhanced by the significant differences in average prices of procedures between the University Hospital and general hospitals, these prices were higher of 30 - 100 %. This favouritism did not correspond to complexity of provided health care (intensity expressed as a case-mix index was higher in the university hospitals on average only about 28 %) and clearly, it has to be reflected in the intersectoral breakdown of resources. Soft budget constraints of state contributory organizations allow continuing in the formation of state hospital debt. For these reasons, The Slovak health care sector urgently needed to seek opportunities for increasing efficiency and optimizing processes of health care management and the adoption of quality measures with positive synergy (Šoltés and Gavurová, 2014c).

3 Day surgery in healthcare system

The implementation of day surgery was the first step in identifying process gaps in the increasing efficiency of the health care system. During the Slovak Association of Day Surgery (SADS) these first steps were established by observing activities practiced in the field of ophthalmology 15 years prior. Institutional support for this process was subsequently ensured by a government programme under the MoH SR within the system reduction of beds in hospitals. Day surgery was then declared as a highly effective therapy which excelled at healing patients in the shortest amount of time and also without unnecessary pain or stress (Dedivitis, Pfuetzenreiter, Castro, and Denardin, 2009; Smith, McWhinnie and Jackson, 2012). This process was also revered for being of the highest quality and with the lowest costs (Gurusamy, Junnarkar, Farouk and Davidson, 2008; Hofer, Kai, Decker and Warner, 2008). Present studies in Slovakia reveal underdevelopment and support from the perspective of health system enactors and draw attention to the urgent need of a full solution regarding this issue (Šoltés and Gavurová, 2014b, Šoltés and Gavurová, 2014c). The situation abroad is vastly different in the development of day surgery process. The numbers of day surgery procedures are varied considerably, due to the changes within the health care systems in different countries. The USA and Canada refer to 65-70 % of day surgeries from total operations (e.g. CHung, Yuan, Yin, Vairavanathan and Wong, 2009; Cullen, Hall and Golosinskiy, 2009), 43% of all surgical procedures in Sweden (Segerdahl, Warren-Stomberg, Rawal, Brattwall and Jakobsson, 2008), 51 % of planned operations in the UK and 61 % of the planned operations in Norway. This is based on vastly different development of day surgery processes, which have been effectively developed and linked together with supporting social programmes (McNutt, Johnson, Kane, Ackerman, Odwazny and Bardha, 2012; Stensland, Akamigbo, Glass and Zabinsky, 2013). The IAAS has been collecting data on the global scope of day surgery in order to implement benchmarking since 1994, which has allowed the specification of appropriate day surgery procedures (Jarrett and Roberts, 2006). In the

interpretation of benchmarking data it is essential to take account the differences between healthcare systems in different countries, differences in the use of terminology, and the register of medical documentation in different countries, etc. (Toftgaard and Parmentier, 2006; Franck, Maesani and Birenbaum, 2013). Day surgery in Slovakia is performed under the professional guidance of MoH SR of day surgery healthcare procedures. Development of day surgeries could save financial resources in particular by reducing the cost and need for hospital beds. Hospital beds in previous years in Slovakia were more than the patients really needed which is distinctly pointed by the analysis of the MoH SR. The most functional and cost effective medical systems related to day surgery are based on the Ophthalmology, Gynecology and Otorinolaryngology departments (Gavurová and Hyránek, 2013). General surgeons, orthopedics and plastic surgeons also use this form of day surgery during operations. Since 2009, new conditions based on the later have started to be implemented within Slovakian medical system. In the Bulletin of the MoH SR, there was a list of operations, after which the patient may be released home within 24 hours. This Bulletin included 450 procedures of surgical medical disciplines, of which about 130 procedures also affected pediatric patients. Many pediatric specialists and surgeons supported the decision of the MoH SR. These conditions were also accepted in regards to day surgery for children and are stricter than the conditions applied to adult care. Prohibitions and restrictions on the child day surgery treatment mentioned in the Bulletin of MoH SR arise in surgeons and reveals an even greater personal responsibility, because a surgeon diagnoses an illness, indicates operating treatment, operates the patient and he/she is responsible for the outcome and possible consequences of their decision. Given the existence of these specifics, we need to focus on the analysis of the procedure structure of child day surgery in Slovakia in order to ascertain the necessary facts to set up the financial system for day surgery procedures.

4 Data-base and methodology

The analysis basis for day surgery structure regarding child patients was based on data provided by National Health Information Center (NHIC) – annual report J (MoH SR) 1-01 of day healthcare during 2012. Together with given number of patients, this report shows a code-list of day surgery procedures that form the basis of 'procedure list' published in the Bulletin of MoH SR on 1.3.2006, sum 9-16, part 23 – MoH SR Professional Guidance of Day Healthcare Procedures. The primary structure of the report is illustrated in Table 1.

Type of day surgery procedures		Number of Patients					
	Coue day	Operated From that hospitalized after s					
	procedures	Age category of Juniors [*] (0 – 18)	Age category of Adults (19+)	Age category of Juniors* (0 - 18)	Age category of Adults (19 +)		
Procedures	а	1	2	3	4		

 Table 1 Annual report J (MoH SR) 1-01 and the Bulletin of MoH– MoH SR Professional Guidance of Day Healthcare Procedures

Source: NHIC

The data of day surgery in 2012 we analyzed a mutual dependency between duplicate characteristics. In testing, we compared real absolute calculations with the so-called expected absolute calculations that would be visible in case of questioning independence. We had also determined a hypothetical zero factor for the test with the following basis: Primary Hypothesis: That the two given signs do not correspond with each other. Alternative Hypothesis: That the two given signs correspond with each other. We observe from statistically formal point of view that p-value is lower than 0.05. If p-value is higher than 0.05, we may accept a zero hypothesis which states the following: two given signs do not correspond with each other, on the basis of our data. If p-value is lower than 0.05, then we refuse a zero hypothesis and subsequently, two given signs correspond with each other. The aforementioned represents a standard process in a small number of tests as well as small absolute calculations in the fields of cross tables. On the other hand, in case of larger number of test as well as larger absolute calculations, which is also our case, it is necessary to tighten the critical p-value (we have chosen p=0.001 as critical p-value).

To determine the cause of the significance of relationship between two categorical characters we use, so called "Adjusted Residual", which is defined by the formula:

$$AR_{ij} = \frac{f_{ij} - E_{ij}}{\sqrt{E_{ij} \left(1 - \frac{r_i}{N}\right) \left(1 - \frac{c_j}{N}\right)}},\tag{1}$$

where:

 f_{ii} is real frequency in the i-th row and the j-th column of table,

$$c_j = \sum_{i=1}^{R} f_{ij}$$
 is sum of the j-th column, $r_i = \sum_{j=1}^{C} f_{ij}$ is sum of the i-th row, (2)

$$N = \sum_{i=1}^{R} r_i = \sum_{j=1}^{C} c_j \text{ is total sum of table, } E_{ij} = \frac{r_i c_j}{N} \text{ is expected frequency.}$$
(3)

The Adjusted Residual (AR) value had been used in the analysis of cross tables. It indicates a size of deviation between real and expected frequency, as well as its direction. If AR value is negative, then the real frequency is lower than expected (there is lower number in a given field than it is expected in the case of tested characteristic independence). If the value is positive, then the real frequency is higher than expected (there is larger number in a given field than it is expected). The sign indicates deviation direction. Absolute AR value refers to the fact, whether determined difference between real and expected frequency is significant. If |AR| is higher than 2, then the difference between real and expected frequency is significant on the level of p < 0.05. If |AR| is higher than 2.6, then the difference between real and expected frequency is significant on the level of p < 0.01. In case of |AR| value that is higher than 3.3, the difference between real and expected frequency is significant on the level of p < 0.01. In case of |AR| value that is higher than 3.3, the difference between real and expected frequency is a significant on the level of p < 0.01. In case of an expected frequency in a given field regarding larger number of tests as well as larger number of operated patients.

5 Results

In Table 2, there are proposed the results of 2012 that include real calculations of day surgery procedures and AR to determine a cause of test significance. The table columns represent regions, while in case of dependency testing of hospitalization ratio on region, there is a fixed year and discipline. The primary aim of testing was to determine, whether a ratio of hospitalized juniors depends on a region.

Field			Region					Total				
				BC	BL	KI	NI	PV	TA	TC	ZI	
Surg	Juniors	Non-	Count	467	453	269	104	253	171	192	550	2459
		hosp	AR	10,0	-3,1	-8,3	-7,1	3,4	0,3	5,1	-0,4	
		Hosp	Count	31	180	175	85	48	51	20	177	767
			AR	-10,0	3,1	8,3	7,1	-3,4	-0,3	-5,1	0,4	
	Total	1	Count	498	633	444	189	301	222	212	727	3226
Gyn	Juniors	Non-	Count	71	-	93	8	30	6	15	17	240
		hosp	AR	7,2		-6,6	-4,3	4,4	-2,4	3,0	1,8	
		Hosp	Count	0	-	104	22	0	11	0	4	141
			AR	-7,2		6,6	4,3	-4,4	2,4	-3,0	-1,8	
	Total	1	Count	71	-	197	30	30	17	15	21	381
Oftal	Juniors	Non-	Count	8	3	49	8	42	-	4	54	168
	Hos	hosp	AR	1,0	0,6	2,9	-11,5	2,7		0,7	3,1	
		Hosp	Count	0	0	0	22	0	-	0	0	22
			AR	-1,0	-0,6	-2,9	11,5	-2,7		-0,7	-3,1	
	Total		Count	8	3	49	30	42	-	4	54	190
ORL	Juniors	Non-	Count	148	615	1532	726	1883	359	536	1491	7290
		hosp	AR	-33,7	9,8	16,5	3,8	3,7	-12,4	8,9	-8,2	
		Hosp	Count	280	0	0	67	218	156	2	335	1058
			AR	33,7	-9,8	-16,5	-3,8	-3,7	12,4	-8,9	8,2	
	Total	•	Count	428	615	1532	793	2101	515	538	1826	8348
Urol	Juniors	Non-	Count	6	19	786	170	38	149	41	136	1345
		hosp	AR	-5,3	1,1	1,7	2,0	1,0	-5,8	-1,8	3,2	
		Hosp	Count	5	0	45	5	1	29	6	0	91
			AR	5,3	-1,1	-1,7	-2,0	-1,0	5,8	1,8	-3,2	
	Total		Count	11	19	831	175	39	178	47	136	1436

Table 2 Operated juniors in the Slovak regions for specialized fields of day surgery in 2012

Abbreviations to the table:

Specialized Field:

SURG: Surgery, Orthopedics, Department of Trauma and Plastic Surgery, GYN: Gynaecology and Obstetrics, OPHT: Ophthalmology, ORL: Otorhinolaryngology, UROL: Urology.

Region: BC: Banská Bystrica, BL: Bratislava, KI: Košice, NI: Nitra, PV: Prešov, TA: Trnava, TC: Trenčín, ZI: Žilina.

Source: own elaboration (SPSS version19)

5.1 Interpretation of test results

Surgery Department

The main causes of significance are Košice and Nitra Regions with excessively high ratio of hospitalized people 175/444 or 85/189. The second causes of significance are Banská Bystrica, Prešov and Trenčín Regions with a low ratio of hospitalized people.

Gynaecology and Obstetrics Department

The main causes of significance are Košice and Nitra Regions with excessively high ratio of hospitalized juniors 104/197 or 22/30. The second causes of significance are Banská Bystrica and Prešov Regions that include no hospitalization (0/71 or 0/30).

Ophthalmology Department

On the contrary to 2009 and 2010, test is significant in 2012 again. High ratio of hospitalized people was in the Nitra Region (22/30).

Otorhinolaryngology Department

The main cause of significance is a higher ratio of hospitalized juniors in the Banská Bystrica Region (280/428), Trnava Region (156/515) and Žilina Region (335/1826). On the other hand, lower amount of hospitalized people is in the Bratislava, Košice, Nitra, Prešov and Trenčín Regions.

Urology Department

Higher ratio of hospitalized people in a contrary to an expected ratio was recorded in the Banská Bystrica Region (5/11) and Trnava Region (29/178).

The given analysis results confirm significant regional differences in a number of operated patients, as well as hospitalized juniors. These results are possible to use in setting the optimal strategy of a development day surgery system. In Table 2, data was obtained and analyzed for patients up to the age of 18. If we look at the development of a number of all the realized day surgery procedures (Figure 1), we may observe an increasing trend and it is especially visible in adult patients' group.

The given status is influenced by the fact that conditions for day surgery provision in junior group are stricter as in the adults' group. Prohibitions and limitations in day surgery procedure in the juniors' group that are published in the Bulletin of MoH SR evoke even bigger responsibility in surgeons, because a surgeon diagnoses an illness, indicates an operational procedure, operates a patient and takes responsibility for the result, or possible consequence of his/her decision-making. We specified some critical areas in the system of day surgery as well as evaluated their impacts on the development of day surgery (Table 3) on the basis of our present analyses (Šoltés and Gavurová, 2014a; Šoltés and Gavurová, 2014b, Šoltés and Gavurová, 2014c), and systematic study of the conditions of day surgery development in Slovakia. It is important to know them in order to set the system measurements to their elimination that would be a part of strategic intention of health system in Slovakia.



Figure 1 Development of number of day surgery procedures in Slovakia during 2009 – 2012 Source: Own elaboration on the basis of NHIC data

Critical area of day surgery development	Impacts and interaction relations
Medical di	mension
 Clear information asymmetry that results from healthcare specifications, Unevenly distributed technological and material equipment of healthcare providers in realizing of day surgeries procedures, clear regional disparity – tendency to induced inquiry (Gavurová et al. 2013). Insufficient process of doctors' education in the field of day surgery – low number of professionals, irregularity of their effect in the regions, cost increases of their work. Lack of educational programmes for students of 2nd and 3rd university degree that are related to day surgery, Absenting or insufficient information of causal connections between day surgery procedures and complications, patients' satisfaction, necessity of consequent healthcare, etc. Dictate of healthcare availability by day surgery procedures through concluding (non-concluding) of the contract with HIC and determining the terms of payment. High resistance of health facilities in Slovakia towards changes that are caused by use as well as expansion of day surgery. Non-compatibility of available health facilities that prevents day surgery development. 	 Availability of healthcare – fundamental barriers: Geographical (inconvenient) transport connection from remote places that prevent taking the health examination after day surgery procedure, price (various prices of day surgery procedure in the insurance companies - unclear conditions, their non- compatibility as a consequence of an absence of standardized procedures), long waiting periods in some types of procedure in state hospitals that move inquiries to a private sphere, administrative – heterogeneity in defining the health processes, and relating issues of showing the realized procedures for HIC, an absence of research studies that declare the availability of day surgery from technical as well as geographical point of view. Healthcare quality absenting information discipline for HCP in relation to national register (NHIC), inappropriate and insufficient structure of presenting data published in annual reports of MoH SR of day surgery (aggregated items in the group of adult patients), an absence of research studies analyzing the procedure risks depending on unit type, where it is realized (private clinics, specialized workplaces of big hospitals, etc.).

Economic d	Economic dimension					
 absenting motivation system in the hospitals in order to provide better quality and more cost-efficient healthcare via day surgery form, economically difficult implementation of day surgery (in case of new clinics) – absenting inevitable financial state support, Warranty absence of return on investment into day surgery clinics' development – short-term contracts with HIC. Absence of calculation patterns of day surgery procedures in HCP's economics, price strategies of HIC and HCP are formed on the basis of lobbing, and influenced by hospitals' ownerships and their legal form. Formation of health plans in accordance with health policy of SR is not realized on the basis of inevitable analyses of healthcare availability. Number of procedures that offer a legislative support to perform day surgery procedures and healthcare availability for day surgery procedures into groups suitable for day surgery. 	 Tendency of induced inquiry from day surgery providers' side and manipulation with prices of HIC procedures. Tendency to realize a defensive diagnostics and testing (it does not have any influence on health improvement of a patient) as a consequence of total absence of performance risk information for individual groups of patients, Lack of interest to create calculations for individual day surgery procedure as a consequence of given HIC prices that are selected by hospitals. (Hospitals are forced to prefer that price for finished hospitalization, which is much higher than a price for day surgery procedures). Price differentiation of day surgery procedures depending on HIC ownerships (private vs. state). HIC force to realize the chosen types of procedures by day surgery form, in case of risk performance price payment only in a rate of day surgery more dure – motivation degradation of a day surgery development support for clinics. Tendency to move an inquiry to private clinics in proclaimed and more advantageous waiting periods, where in case of a risk case, a teaching hospital has 					
	to realize the next treatment.					
Social di Concentration risk that is related only to an aspect of a distinct HIC means economy without any complementary analyses of day surgery availability and	 Underestimation of social issues that influence on the length of stay in the hospital after day surgery precedure on well on a precedure choice of day. 					
 complementary analyses of day surgery availability and suitability for chosen patients' types, as well as making provision for social aspects that accompany day surgery development and efficiency. Insufficient home, regional and public support – in case of an absence of adequate social services that prevent patients to undergo day surgery. 	 procedure, as well as on a procedure choice of day surgery form. Absence of special after-treatment departments for older lonely people after realization of a day surgery procedure. 					

Source: Own elaboration

Day surgery in Slovakia has been insufficiently regulated for a long period of time. It was implemented into a process of increasing health system efficiency in Slovakia, however, there is absent some of its important existential interconnections. Despite the multi-year legislative support of day surgery by MoH SR, its ratio as opposed to other countries is very low and has been without any positive progress. The reasons may be formulated into three fundamental dimensions: medical, social and economic. Each of them has intensive interactions with healthcare availability parameters in Slovakia, quality of healthcare, economic expenses, efficiency and equation. Setting of an active health policy in a state requires searching for compromises between given parameters, which is very problematic.

5.2 Discussion

We discovered by the analyses an uneven development in a number of realized day surgery procedures in the individual regions of the junior's group and we also specified the revealed

differences. It is very complicated to reconstruct precise reasons for this condition. One of these reasons is an intentional use of local allocation methodologies in given health facilities that are activated by present price strategies of the HICs. As a consequence of the aforementioned, many hospitals intentionally transform the procedures of day surgery procedure groups into the group of specially reimbursed procedures (SRP – it is a three-day procedure, where a patient is released from a hospital till 72 hours). Hospitals prefer SRP in order to obtain more advantageous financial reimbursement per procedure. This is done in comparison to payment for a day surgery procedure, as well as procedure realization by traditional forms of hospitalization. Traditionally, if a hospital has implemented day surgery for a given type of procedure and it is conducting it without any adequate reason, it will obtain payment only through the value of the performance by utilizing the day surgery form provided by the HIC. This relays deeper systematic problems connected with the price making policy of local HICs, short-term contractual relations between primary healthcare and healthcare, as well as with other causes (legislative, procedural, etc.). The given problems will not be solved by any planned classification system implementation (herein called Diagnoses Related Groups or DRG), which is not implemented in our country as the only EU country. The German planned system DRG that our country is preparing to implement in 2015 does not include any day surgery procedures, thus it will be necessary to solve these issues separately. Bed capacities in the hospitals should regulate in parallel with day surgery development, some hospitals have already re-profiled the bed facilities into day surgery facilities. It will also be inevitable that we will need to determine a precise framework and rules for all subjects of a day surgery system. It will have to represent a precise definition of patients who are suitable for treatment in day surgery regime. Beyond this is a need for high consideration of day surgery workplaces outside the hospital facilities. Consequently, analyses realizations that focus on 'risk patient' groups are inevitable to correctly localize a given procedure type. Determination of defined requirements on personal and technical equipment of given workplaces is related to the aforementioned as it is possible to realize high % of common operational procedures typical of child age in day surgery regime not only in adult surgery, but also child surgery. It is also expected that there will be a need to regulate a competition in day surgery system within proposed system measurements, though a competition does not form among day surgery facilities, but between day surgery facilities and standard bed departments of hospitals. At present, it is possible to realize almost half of all surgeries procedures in day surgery regimes. We do not consider it as a threat to a hospitals' existence, as there still exists a wide spectrum of high operations that will always belong to a standard bed facility. It is connected with a risk level of patients who have to be admitted to bed facilities after realization of a simple operation procedure that is influenced by comorbidities in order to provide them surgical care on the intensive care units. Similarly, the complications that occur after day surgery procedure may only be solved in the standard bed facility with complementary background. Therefore, it is inevitable to simultaneously provide the departments' activity – day surgery, as well as standard bed facility. As a consequence of the recognized regional difference in a number and structures of realized day surgery procedures, it would be appropriate to specialize the day surgery clinics and hospitals to chosen types of procedures. Some small hospitals should re-transform into day surgery units in order to decrease their costs. It would be possible to operate at almost the same spectrum of procedure with the exception of complicated or rarely realized procedures. A patient who suffers from a serious illness would be treated within one of the educational hospitals or in other specialized workplaces. This patient would be provided with a high level of healthcare as the specific workplace will be specialized for a given type of procedure. This would provide that patient with a rich experience and the technical background required for subsequent treatments.

We have not provided a high-grade system for future healthcare in day surgery realization. Therefore, day surgery is not appropriate for patients who live alone (it is related to older patients) in Slovakia. Consequently, there is a necessity for the government support of institutions, such as home nursing agencies or after-treatment geriatrics centers. Current geographical conditions and social situations in Slovakia prevent the present expansion of day surgery. In Slovakia, HICs dictate day surgery availability to a great extent through concluding (non-concluding) a contractual relation with HCP as well as setting the financial limits. Unless the HIC concludes a contract with HCP, many surgeons recommend hospitalization, because it seems unrespectable for a patient to pay for services that are supposed to be freely available for him/her. Price strategies are significantly influenced by HIC ownership. The HIC determine different prices for day surgeries procedures that are also differentiated from HCP, while their preferential criteria's are not clear. The private HIC give private HCP an advantage over others. In Slovakia, there is also insufficient reporting on the standardization of day surgeries procedures that prevents comparing their prices.

We would like to pay attention to the issue of reporting that is connected with NHIC data for the individual analyzed years, which were available within our cooperation for analyses procedures in relation to the presented outputs. The NHIC plans the reports' edit in 2015. Therefore, the output of our analyses will be a proposal to their changes in order to implement the standard parameters of individual types of healthcare according to developed countries. Also this output will help acquire the subsequent relevant outputs with a possibility of benchmarking (efficiency and strategic). Slovakia as one of a few countries does not report the data of day surgery procedures that are required by international organizations, such as OECD, Eurostat and WHO (Lafortune, Balestat and Durand, 2012). The main reasons include significant methodological issues that are noted by many countries (Böhm, Schmid, Götze, Landwehr and Rothgang, 2013, Bem and Michalski, 2016, Raisova et al., 2014). One problem appears in a differently declared definition that is used in the process of data collection. This data variation causes the problems of inconsistent and incomparable data notifications. The definition according to Eurostat has more general and wider character than those given by OECD and WHO-Europe. This is especially due to the implementation of surgical and other procedures as the definition states. This fact was significantly consequential to report an even larger number of procedures were to be submitted with the data for Eurostat and then compared to reported data for OECD or WHO-Europe (with regard to exceptions). These international organizations had agreed to stop the data collection of a total number of surgical procedures, until they can agree upon and implement an international classification of procedures that will guarantee a higher consistency of reported data among individual countries (Lafortune, Balestat and Durand, 2012). The given problematic aspects of day surgery development have a highly systematic character on both the national and the international scale and it is necessary to include them into the strategic plans of health system. Certainly, this process will support the day surgery development in Slovakia that will ultimately be comparable with foreign countries.

6 Conclusion

In the previous two decades, there was a reduction of beds as well as an average length of stay in the hospital in many health systems of most European countries. Intensity of this process was not the same in that it was also defined by significant differences among individual countries from the perspective of the total number of bed sources and activities, the average length of patient's

stay in the hospitals and the rates of realized procedures by day surgery form on the overall procedures, etc. The solution to day surgery efficiency in the health system is very difficult, which relates to conceptual and methodological issues of its measurement. These problems had been previously noted by international institutions, such as Eurostat, OECD a WHO, which have been gathering data of surgical procedures as a part of a total data collection of healthcare activities for many years. The outputs of these statistics show a different development in number and structure of surgical procedures that were realized within varied health facilities. These aspects are especially influenced by an aging population, a constant increase of surgical procedures', procedure reductions, as well as many other factors (social, edification, trends of healthier lifestyle, etc.). There is currently absent a solid international classification of procedures, which would enable a comparison of countries in day surgery use, and also which would support the provisions of comparable platforms. It is a complex issue that results from methodical divergence to correctly report the realized day surgeries procedures. Reporting issues regarding day surgery realization data is related to varied evidence, day surgery procedure specificity, place of realization, and registered output of day surgery process both planned and real. As the findings prove, in Slovakia, there is a very low rate of day surgery use, in spite of its existence for almost 15 years. The main reasons may be insufficient system measurements necessary for the development of low level of clinic specialization, unclear price strategies due to preferential criteria of HICs, and insufficient social support related to subsequent healthcare. There also is absent the analyses of the influence of comorbidities on the risk level of day surgery procedure, backward evaluation of previously performed types of day surgeries, etc. Its positive progress will not be possible without new effective measures, analyses implementations of outputs into a day surgery system, and its subsequent transformation into a strategic plan for the Slovak health system. Scientific development will certainly affect the development of day surgery processes, patients' choice, pre-operation and after-operation procedures. The possibility of pain relief, as well as a development of other mini-invasive clinical and anesthesiological methods will provide operation time reduction and increase of number and type procedures suitable for day surgery. An aggressive reduction of some procedures will provoke an acceleration of this process of patients' recovery, and it will help to eliminate the after-operation pain. Day surgery is a great challenge for our country and its concerned subjects. This provides us with an extremely strong reason to systematically progress in the organization of medical treatment and to alter the current system of day surgery within Slovakia.

Acknowledgements

This research paper is made possible through the support from VEGA Project No. 1/0929/14 Multidimensional economic and financial evaluation of the implementation process and the use of one day health care and quantification of the financial impact on the health system in the Slovak Republic.

References

- BEM, A. and MICHALSKI, G. 2016. *Hospital profitability vs. selected healthcare system indicators*, CEFE 2015 Central European Conference in Finance and Economics, Technical University of Kosice, Kosice.
- BÖHM, K., SCHMID, A., GÖTZE, R., LANDWEHR, C. and ROTHGANG, H. 2013. Five types of OECD healthcare systems: Empirical results of a deductive classification. In: *Health Policy*. Vol. 113, No. 3, pp. 258–269.

- BROZYNA, E., MICHALSKI, G. and SOROCZYNSKA, J. 2016. E-commerce as a factor supporting the competitiveness of small and medium-sized manufacturing enterprises, CEFE 2015 – Central European Conference in Finance and Economics, Technical University of Kosice, Kosice.
- BUZINK, S., ŠOLTÉS, M., RADOŇAK, J., FINGERHUT, A., HANNA, G. and JAKIMOWICZ, J. Laparoscopic Surgical Skills Programme: Preliminary Evaluation of Grade I Level 1 Courses by Trainees. In: *Videosurgery and other Miniinvasive Techniques*. Vol. 7, No.3, pp. 188 – 192.
- CHUNG, F., YUAN, H., YIN, L., VAIRAVANATHAN, S. and WONG, D. T. 2009. Elimination of preoperative testing in ambulatory surgery. In: *Anesthesia & Analgesia*. Vol. 108. No. 2: pp. 467-475.
- CULLEN, K. A., HALL, M. J. and GOLOSINSKIY, A. 2009. Ambulatory Surgery in the United States, 2006. National Center for Health Statistics.
- DAVIES, A., RIXON, L. and NEWMAN, S. 2013. Systematic review of the effects of telecare provided for a person with social care needs on outcomes (f)or their informal carers. In: *Health & Social Care in the Community*. Vol. 21, No. 6, pp. 582-597.
- DEDIVITIS, R. A., PFUETZENREITER, E. G., CASTRO, M. A. F. and DENARDIN, O. V. P. 2009. Analysis of safety of short-stay thyroid surgery. In: *Acta Otorhinolaryngol Ital.* Vol. 29, No. 6, pp. 326–330.
- DLOHÝ, M. and BARTÁK, M. 2013. Mental Health Financing in Six Eastern European Countries. In: *E+M Ekonomie a management*. Vol. 16, No. 4, pp. 4-13.
- ESSER, D. E. and WARD, P. S. 2013. Ageing as a global public health challenge: From complexity reduction to aid effectiveness. In: *Global Public Health*. Vol. 8, No. 7, pp. 745-768.
- FIALA, T. and LANGHAMROVÁ, J. 2013. Development of economic and social dependency and population ageing. In: *Politicka Ekonomie*. Vol. 61, No. 3, pp. 338-355.
- FRANCK, L., MAESANI, M. and BIRENBAUM, A. et al. 2013. Feasibility study for ambulatory surgery in emergency. In: *Annales Françaises d'Anesthésie et de Réanimation*. Vol. 32, No. 6, pp. 392–396.
- GAVUROVÁ, B. and HYRÁNEK, E. 2013. Determinants of day health care development in Slovakia. In: *Ekonomicky casopis*. Vol. 61, No. 2, pp. 134-154.
- GURUSAMY, K., JUNNARKAR, S., FAROUK, M. and DAVIDSON, B. R. 2008. Metaanalysis of randomized controlled trials on the safety and effectiveness of day-case laparoscopic cholecystectomy. In: *British Journal of Surgery*. Vol. 95, No. 2, pp. 161-168.
- HOFER, R. E., KAI, T., DECKER, P. A. and WARNER, D. O. 2008. Obesity as a risk factor for unanticipated admissions after ambulatory surgery. In: *Mayo Clinic Proceedings*. Vol. 83, No. 8, pp. 908-916.
- JANÍČKO, M. and KOUBEK, I. 2012. Informační asymetrie a systém dvojího standardu ve vztahu zdravotník pacient. In: *Politická ekonomie*. Vol. 60, No. 3, pp. 262-379.
- JARRETT, P. E. M. and ROBERTS, L. M. 2006. Planning and designing a Day Surgery Unit. In: Lemos P, Jarrett P, Philip B, editors. In: *Day Surgery Development and Practice*. London: International Association for Ambulatory Surgery (IAAS), pp. 61-87.
- KUNSTOVA, R. and POTANCOK, M. 2013. How to Measure Benefits on Non-standard Healthcare Systems. In: *Engineering Economics*. Vol. 24, No. 2, pp. 119–125.

- LAORTUNE, G., BALESTAT, G. and DURAND, A. 2012. Comparing activities and performance of the hospital sector in Europe: how many surgical procedures performed as inpatient and day cases? Directorate for Employment, Labour and Social Affairs OECD Health Division.
- MANAFO, E. and WONG, S. 2012. Health literacy programs for older adults: a systematic literature review. In: *Health Education Research*. Vol. 27, No. 6, pp. 947-960.
- MCNUTT, R., JOHNSON, T., KANE, J., ACKERMAN, M., ODWAZNY, R. and BARDHAN, J. 2012. Cost and Quality Implications of Discrepancies Between Admitting and Discharge Diagnoses. In: *Quality Management in Health Care*. Vol. 21, No. 4, pp. 220-227.
- MEACOCK, R., KRISTENSEN, S. R. and SUTTON, M. 2014. The cost-effectiveness of using financial incentives to improve profider quality: a framework and application. In: *Health Economics*. Vol. 113, No. 3, pp. 221–227.
- MICHALSKI, G. 2009. Inventory management optimization as part of operational risk management. Economic Computation and Economic Cybernetics Studies and Research, 43(4), 213-222.
- MICHALSKI, G. 2014. Value maximizing corporate current assets and cash management in relation to risk sensitivity: Polish firms case. Economic Computation and Economic Cybernetics Studies and Research, 48(1), 259-276.
- MICHALSKI, G. 2015. Cash levels and its role in full operating cycle enterprises: 2005-2013 Czech, Slovak, Hungarian and Polish enterprises case. In: Proceedings of the 18th International Scientific Conference Enterprise and the Competitive Environment, Brno: Mendel University, pp. 559-568.
- MICHALSKI, G., BROZYNA, E. and SOROCZYNSKA, J. 2015. Cash levels and its role in full operating cycle enterprises: 2005-2013 Czech, Slovak, Hungarian and Polish enterprises case. In: European Financial Systems 2015. Proceedings of the 12th International Scientific Conference, Brno: Masaryk University, pp. 382-390.
- MINAŘÍK, J. and KRAFTOVÁ, I. 2012. Lékařská praxe jako objekt oceňování. In: *E+M Ekonomie a management*. Vol. 15, No. 2, pp. 54–67.
- RAISOVA, M., BULECA, J. and MICHALSKI, G. 2014. Food processing firms inventory levels in hard times. 2004-2012 Slovak, Czech and Polish enterprises case. Procedia Economics and Finance, 12, 557-564.
- SEGERDAHL, M., WARREN-STOMBERG, M., RAWAL, N., BRATWALL, M. and JAKOBSSON, J. 2008. Clinical practice and routines for day surgery in Sweden: results from a nation-wide survey. In: *Acta Anaesthesiol Scand*. Vol. 52, No.1, pp. 117-24.
- SMITH, I., MCWHINNIE, D. and JACKSON, I. 2012. Day Case Surgery. British Association of Day Surgery. Oxford Specialist Handbooks. USA: Oxford University Press.
- ŠOLTÉS, M and GAVUROVÁ, B. 2014c. Identification of the Functionality Level of Day Surgery in Slovakia. In: *Ekonomický časopis*. Vol. 62, No. 10, pp. 1031-1051.
- ŠOLTÉS, V. and GAVUROVÁ, B. 2014a. The Functionality Comparison of the Health Care Systems by the Analytical Hierarchy Process Method, In: *E+M Ekonomie a Management*. Vol. 17, No. 3, pp. 100 -118.
- ŠOLTÉS, V. and GAVUROVÁ, B. 2014b. The possibilities of day surgery system development within the health policy in Slovakia. In: *Health Economics Review*. Vol. 4, pp. 1-12.

- STENSLAND, J., AKAMIGBO, A., GLASS, D. and ZABINSKY, D. 2013. Rural And Urban Medicare Beneficiaries Use Remarkably Similar Amounts Of Health Care Services. In: *Health Affairs*. Vol. 32, No. 11, pp. 2040 2046.
- TOFGAARD, C. and PARMENTIER, G. 2006. International terminology in ambulatory surgery and its worldwide practice. In: Lemos P, Jarrett P, Philip B, editors. In: *Day Surgery Development and Practice*. London: International Association for Ambulatory Surgery (IAAS). pp. 35-59.
- TSIACHRISTAS, A., DIKKERS, C., BOLAND, M. R. and RUTTEN-VAN MÖLKEN M. P. 2013. Exploring payment schemes used to promote integrated chronic care in Europe. In: *Health Policy*. Vol. 113, No.3, pp. 296–304.
- VOSTATEK, J. 2013. Political Economy of Health Care Financing. In: Politická ekonomie.

Portfolio Selection Based on Long-Term Equilibrium Model

JOZEF GLOVA¹ Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

Cointegration is a prevalent statistical tool in applied economic in the last decade. In our proceeding we describe a very specific selection method for picking an investment set based on cointegration as a powerful technique for investigating long-term dependence in multivariate time series. We follow two stages process: at first we associate long-term, and in the second stage we use a dynamic model of correlation, called an error correction model based on linear regression analysis of returns. We considered an allocation into portfolio consisting of Dow Jones In dustrial Average components and thereafter we compare long term return and risk profile of portfolio focus on cointegration selection process and index DJIA. The cointegration technique enabled us to use long calibration period and provided that portfolio weights do not change too much over time and outperform the index DJIA in post-sample performance measurement.

Keywords: Portfolio Selection, Cointegration, Portfolio Risk and Return, Index Tracking, Linear Regression

JEL Classification: C51, C52, G12, G32

1 Introduction

The traditional construction of a financial portfolio is based on an analysis of the correlation structure among the particular financial assets involved in the portfolio. It was Harry Max Markowitz (1952) in early 1950's who published a revolutionary paper on how does one select an efficient set of risky investment or so called efficient frontier. This theory provides the first quantitative view of portfolios variance, where co-movements in securities returns are considered. So, the variance of portfolios is not a simple product of the particular investment proportion and their variances. Instead of it one has to consider covariance structure implicitly involved in multivariate distribution of securities returns. Almost three decades ago the general approach RiskMetrics was developed by J.P. Morgan during the late 1980's and has been commonly applied by financial market participants for more than two decades. Unfortunately the concept lacks of accuracy if the correlation structure varying in time. From this perspective the traditional portfolio needs rebalance repeatedly, what could increase the cost structure of the portfolio dramatically. In general the use of the traditional concept is delimited and depends on the level of change within the portfolio volatility.

While the traditional approach considers historical time series returns of the selected set of financial assets and their replication against the return of a particular index the cointegration analysis uses assets' time series appearing and behaving as random processes or processes of the so-called random walk. In our study we use the second mentioned concept, cointegration. The classical papers on cointegration are by Granger (1986) and Engle and Granger (1987).

¹ doc. Ing. Jozef Glova, PhD., Němcovej 32, 042 00 Košice, Slovak Republic, jozef.glova@tuke.sk

The cointegration is based on the long-term relationship between time series. One can consider the cointegration, if there is such linear combination of the non-stationary time series that is stationary. The passive index tracking strategy tries to achieve equal return as well as the underlying index, and concurrently tries to diminish the volatility of the tracking error, thus a difference between the portfolio return and underlying index.

The paper is divided as follows: at the beginning we briefly start with an overview of time series stationarity, a specific assumption that is expected to be fulfilled for applying the cointegration approach. A difference between correlation and cointegration is being explained in a brief form. Further we describe cointegration analysis and the possible fields and forms of its applicability. All this effort is summarized in an overview the theory and the state of the art. Engle-Granger method has been applied as a technical part of our research methodology. We considered an allocation into portfolios consisting of Dow Jones Industrial Average (DJIA) components. At first we describe methodology with a description of data and later the further attributes for asset allocation are specified. Beyond the current research in this field we consider particular modifications of key parameters and them sensibility change in a form of different number of stocks, reselection interval, calibration period and strategy used as well as level of transaction expenses. At the end the final discussion of results is provided.

2 Passive and active management of equity portfolio

Passive and active equity portfolio management style is usually discussed and described in economics literature. The crucial phase in the investment process is allocation what for equity style portfolios means stock picking or stock selection. It was Harry M. Markowitz (1952, 1959) who made the first quantitative and empirical contribution to portfolio selection. According to Reilly and Brown (2012) no middle ground exists between active and passive equity management strategies. They also argue that "hybrid" active/passive equity portfolio management style exists, in a form of enhanced indexing, but such styles are variations of active management philosophies. Focusing on passive equity portfolio management means a long-term buy-and-hold strategy. Very often some authors like Nofsinger (2013) referee about indexing strategy, because of the goal of tracking an index. In this context only occasional rebalancing is needed, specifically because dividends and their reinvesting, stocks merge or change in the index construction. In traditional literature one can find three basic techniques for constructing a passive index portfolio – full replication, sampling, and quadratic optimization or programming. Full replication technique helps ensure close tracking, but it may be suboptimal because of transaction cost connecting with purchase of many securities and dividend reinvestments. With sampling technique we need to buy a representative sample of stacks that comprise the benchmark index. The last passive technique is quadratic optimization or quadratic programming based on historical information on price changes and correlations between securities as inputs to a computer program that determines the composition of a portfolio that minimize tracking error with the benchmark. This technique lack of accuracy because it relies on historical price changes and correlation. According to Alexander (2008) correlation reflects co-movements in returns, which are liable to great instabilities over time. Returns have 'no memory' of a trend so correlation is intrinsically a short term measure. As she further explains that is why portfolios that have allocations based on a correlation matrix commonly require frequent rebalancing and long-short strategies that are based only on correlations cannot guarantee long term performance because there is no mechanism to ensure the reversion of long and short portfolios. That's the reason why Alexander (1999), Alexander and Dimitriu (2005) and Dunis and Ho (2005) proposed to use cointegration analysis as a sound statistical methodology for modelling the long term equilibrium.

In general we can say cointegration and correlation are related but different concepts. High correlation does not automatically imply high correlation nor vice versa. If there is cointegration or not, high correlation can occur. But to distinguish both terms we need to note that correlation tells us nothing about the long term relationship or behaviour between two assets. So correlation is not adequate measure over long periods of time. Correlation only reflects co-movements in returns, which have no 'memory' of a trend, so is intrinsically a short term measure.

As we already mentioned in our papers in Glova (2013a, 2013b), the co-movements between stocks can be due to a single or multiple indices. So the correlation or covariance structure of security returns might be obtained by relating the return on a stock to the return on a stock market index or other non-market indices. Unfortunately as mentioned by Alexander (2008) so created portfolios require frequent rebalancing because there is nothing to prevent the tracking error from behaving in the unpredictable manner of random walk. That also affects single or multi-factor models including many risk factors and their estimated factor sensitivity considered and mentioned in Gavurová and Šoltés (2015), Mura et al. (2015) or Raisová et al. (2014). Specific aspect of taxation and its effects is also discuss in Anrejovská (2013), and Andrejovská and Mihóková (2015). To conclude, since correlation tells us nothing about long term performance there is a need to augment standard risk-return modelling methodologies to consider long term trends in prices. Therefore as mentioned by Alexander and Dimitriu (2005) portfolio management strategies based on cointegrated financial assets should be more effective in the long term.

3 Research Methodology

We use the financial data on the DJIA to construct our own portfolio based on cointegration. We preselected 15 different stocks with the highest Pearson correlation coefficient with the DJIA. Time period spreads from December 29, 2000 till December 31, 2013 and it is based on daily close prices of the selected stocks. Data have been downloaded from Yahoo Finance financial portal. The preselected stocks are listed and highlighted with bold and underlined in Table 1. We used ticker symbols to identify the particular stock within DJIA.

Stock – Ticker	Correlation coefficient	Stock – Ticker	Correlation coefficient	Stock – Ticker	Correlation coefficient
MMM	0.934253	Œ	-0.00933	<u>NKE</u>	0.955621
AXP	0.867675	GS	0.645468	PFE	0.183908
Т	0.888639	HD	0.75425	PG	0.940315
<u>BA</u>	0.909297	INTC	0.408917	TRV	0.960777
CAT	0.907977	IBM	0.883226	UNH	0.794894
<u>CVX</u>	0.96574	JNJ	0.929247	UTX	0.982367
CSCO	0.406203	JPM	0.879797	VZ	0.892479
<u>KO</u>	0.922822	MCD	0.917502	WMT	0.777172
DD	0.90675	MRK	0.497268	DIS	0.960382
XOM	0.918978	MSFT	0.863137	HPQ	0.31728

Table 1 Pre-selection process based on correlation coefficient

Source: Own calculation based on the data from Yahoo Finance

The existence of long term equilibrium relationship between log prices that are part of our portfolio and log values of stock index is a pre-condition for index tracking methodology. It is also necessary that all variables in regression are integrated processes with same order of integration. We tested this assumption based on Augmented Dickey Fuller test. In Table 2 are summarized test statistics and some selected data from descriptive statistics.

The cointegration-based index, that employs the Engle-Granger methodology, was introduced and developed by Alexander and Dimitriu (2005) and by Dunis and Ho (2005). According to the methodology the log of the current weighted index price I_t is the dependent variable and the log of the stock prices P_{kt} are the independent variables

$$\ln(I_t) = \alpha + \sum_{k=1}^{n} \beta_k \ln(P_{kt}) + \varepsilon_t$$
⁽¹⁾

If the number of stocks in the portfolio is sufficient large, the cointegration optimal portfolio has weights.

$$\beta^* = \left(\sum_{k=1}^n \hat{\beta}_k\right)^{-1} \left(\hat{\beta}_1, \cdots, \hat{\beta}_n\right)' \tag{2}$$

Table 2 Test statistics and selected data from descriptive statistics

	adf stat	p-value	diff adf stat	diff p- value	mean	median	sd
DJIA	-2.5656	0.3389	-15.4058	< 0.01	7.116151	7.10273	0.286637
MMM	-2.0358	0.5632	-14.9765	< 0.01	4.171923	4.168472	0.269858
BA	-1.7952	0.6651	-15.6069	< 0.01	4.030695	3.949168	0.40381
CAT	-2.4029	0.4078	-14.6204	< 0.01	3.95182	3.800438	0.57174
CVX	-2.7732	0.251	-16.5604	< 0.01	4.053696	3.978853	0.50123
KO	-2.8145	0.2335	-15.8045	< 0.01	2.9877	3.091706	0.293619
DD	-2.3179	0.4437	-15.0284	< 0.01	3.460723	3.522741	0.252424
XOM	-2.1475	0.5159	-16.0362	< 0.01	4.084463	3.964202	0.39877
JNJ	-2.4047	0.407	-15.4202	< 0.01	3.923952	3.92214	0.217917
MCD	-3.4879	0.04343	-15.0976	< 0.01	3.701549	3.625511	0.625699
NKE	-3.4485	0.04723	-15.6388	< 0.01	3.154444	3.14433	0.574842
PG	-2.9542	0.1743	-15.2178	< 0.01	3.912623	3.848129	0.294671
TRV	-2.9786	0.164	-15.9509	< 0.01	3.626738	3.691693	0.326625
UTX	-2.9357	0.1822	-15.6732	< 0.01	3.968592	3.893412	0.417218
VZ	-2.3703	0.4216	-15.4705	< 0.01	3.162517	3.236234	0.278395
DIS	-2.3524	0.4291	-15.5949	< 0.01	3.282789	3.313332	0.378482

Source: Own calculation

4 Model fitting and diagnostic

We apply OLS regression and estimate the coefficients in such a way as to minimize the variance of the residuals. The tracking error has a minimum variance property and is mean reverting process. Using 15 pre-selected stocks and perform an Engle-Granger regression of the form (1) we achieved the regression results summarized in Table 3.

Table 3 Regression results

Regression statistics							
Multiple R			0.996912				
R Square			0.993834				
Adjusted R Squa	are		0.993806				
Standard Error	:		0.022563				
Observations	Observations			3269			
	A	ANOVA					
	df	SS	MS	F			
Regression	15	266.9267	17.79511	34955.53			
Residual	3253	1.656033	0.000509				
Total	3268	268.5827					

Source: Own calculation

After fitting regression function we tested the residuals for stationarity. and seeing that are stationary we normalize the coefficient estimates as in (2) so that they sum to one. The optimal weights on the cointegration tracking portfolio are listed in Table 5.

Table 4 ADF and KPPS tests on residuals from Engle-Granger regression

	ADF stat	p-value	KPPS	p-value			
Residuals	-5.2174	< 0.01	0.33	>0.1			
0 0 1 1							

Source: Own calculation

An augmented Dickey-Fuller (ADF) test and Kwiatkowski-Phillips-Schmidt-Shin (KPPS) test on residuals from Engle-Granger regression of log DJIA on log stock prices had been used to proof the stationarity. The regression residuals are indeed stationary. see Table 4. Hence. the portfolio is cointegrated with the index the optimal portfolio weights had been obtained using (2) and the results are shown in Table 5.

Table 5 Portfolio optimal weights using Engle-Granger regression

	Coefficient	Portfolio weight		
Intercept	4.021658462			
MMM	0.018103843	0.021120614	2.11 %	
BA	0.111003924	0.129501286	12.95 %	
CAT	0.050339613	0.058728055	5.87 %	
CVX	-0.129850495	-0.151488393	-15.15 %	
KO	0.050956778	0.059448063	5.94 %	
DD	0.087693655	0.102306663	10.23 %	
XOM	0.16400877	0.191338701	19.13 %	
JNJ	-0.035757506	-0.04171603	-4.17 %	
MCD	0.022153456	0.025845042	2.58 %	
NKE	0.039216491	0.045751409	4.58 %	
PG	0.020871154	0.024349061	2.43 %	
TRV	0.187831383	0.219131043	21.91 %	
UIX	0.108292106	0.126337579	12.63 %	
VZ	0.092465071	0.107873173	10.79 %	
DIS	0.069836405	0.081473734	8.15 %	
Total	0.857164648	1	100%	

Source: Own calculation
5 Comparison of return and risk characteristics of constructed portfolio and DJIA

In the following Table 6 we can see DJIA and portfolio characteristics for time period spreads from December 29. 2000 till December 31. 2013. We wanted to compare values of constructed portfolio and DJIA using daily values of portfolio and index. We employed following equation to calculate data and so enable the comparison:

$$\pi_{T+x} = \pi_T \sum_{k=1}^{n} \frac{w_{k,T}}{P_{k,T}} \cdot P_{k,T+x}$$
(3)

where πT = value of portfolio at timeT.wk.T = weights of particulars stocks at time T. Pk.T = closing prices of particulars stocks at time T. x = shift in time.

		DJIA	Portfolio		
Return	E(R _x)	0.000262	0.000302		
Variance	σ^2_x	0.000161	0.000185		
St. Deviation	σχ	0.012682	0.013619		
Correlation	ρ _{x.y}	0.935946			
0 0 1 1 /					

Table 6 DJIA and portfolio characteristics

Source: Own calculation

Our cointegration-based index tracking model uses a sufficiently long calibration period and so is capable of producing optimal portfolios that outperform the index DJIA in post-sample performance measurement. In Figure 1 we see the DJIA downturn in October 9. 2002., where the market had declined 38% since January 14. 2000. The values of DJIA had faced the financial downturn in 2007 and following Great Recession lasting from 2007 till the beginning of 2010. From these perspectives it is clearly visible that cointegration-based tracker outperforms the index quite spectacularly even if the index declines sharply after a period of stability.



Figure 1 Comparison of index and portfolio values (base period value of 100) Source: Own calculation

6 Conclusion

In last two decades cointegration has become the prevalent statistical tool in applied economics. It is a powerful technique for investigating long term dependence in multivariate time series because it provides a methodology for modelling the long term equilibrium and the short term dynamics in one concept. Because of limitation of correlation. we pointed out the difference between cointegration and correlation. We have also explained why correlation fails specifically in long term perspective. We demonstrate the applicability of the concept within cointegration-based index tracking model using real data of the index DJIA and its components. The cointegration technique enabled us to use long calibration period and provided that portfolio weights do not change too much over time and outperform the index DJIA in post-sample performance measurement. So we could construct a sufficiently large and well diversified stock portfolios outperforming better than the index itself. Compared to traditional correlation-based index tracking portfolio strategy we do not need rebalance our portfolios so frequently, what also help us diminish our transaction cost significantly.

Acknowledgements

The work was supported by the Ministry of Education of the Slovak Republic under grant VEGA No. 1/0607/16.

References

- ALEXANDER, C. 2008. Market Risk Analysis Volume II Practical Financial Econometrics. John Wiley & Sons. Inc. West Sussex.
- ALEXANDER, C. and DIMITRIU, A. 2005. Hedge fund index tracking. In: GREGORIOU, G.N., HUBNER, G., PAPAGEORGIOU, N. and ROUAH, F. (eds). *Hedge Funds: Insights in Performance Measurement. Risk Analysis. and Portfolio Allocation.* John Wiley & Sons. Inc. Hoboken: NJ. pp. 165-179.
- ALEXANDER, C. and DIMITRIU, A. 2005. Indexing. cointegration and equity market regimes. In: *International Journal of Finance and Economics*. Vol. 10, pp. 213-231.
- ANDREJOVSKÁ, A. 2013. Meta-analysis combining cluster analysis and multidimensional scaling-categorisation of sings of the European Union countries' insolvency. In: *Journal of Applied Economic Sciences*. Vol. 8, No. 4, pp. 416-425.
- ANDREJOVSKÁ, A. and MIHÓKOVÁ, L. 2015. Developments of VAT rates in EU countries in the context of harmonization and fiscal consolidation. In: *Acta universitatis agriculturae et silviculturae Mendelianae brunensis*. Vol. 63, No. 2, pp. 487-498.
- DUNIS, C. and HO, R. 2005. Cointegration portfolios of European equities for index tracing and market neutral strategies. In: *Journal of Asset Management*. Vol. 6, pp. 33-52.
- ENGLE, R. F. and GRANGER, C.W. J. 1987. Co-integration and error correction: Representation. estimation and testing. In: *Econometrica*. Vol. 55, No. 2. pp. 251-276.
- GAVUROVÁ, B. and ŠOLTÉS, V. 2015. Modification of Performance Measurement System in the intentions of Globalization Trends. In: *Polish Journal of Management Studies*. Vol. 11, No. 2, pp. 160-170.
- GLOVA. J. 2013a. Determinacia systematickeho rizika kmenovej akcie v modeli casovopremenliveho fundamentalneho beta. In: *E&M Economics and Management*. Vol. 16, No. 2, pp. 138 - 150.

- GLOVA. J. 2013b. Exponential Smoothing Technique in Correlation Structure Forecasting of Visegrad Country Indices. In: *Journal of Applied Economic Sciences*. Vol. 8, No. 2, pp. 184-190.
- MARKOWITZ, H. M. 1952. Portfolio Selection. In: Journal of Finance. pp. 77-91.
- MARKOWITZ, H. M. 1959. Portfolio Selection. Efficient Diversification of Investments. John Wiley & Sons. Inc., New York.
- MURA, L., BULECA, J., HAJDUOVÁ. Z. and ANDREJKOVIČ, M. 2015. Quantitative financial analysis of small and medium food enterprise in a developing country. In: *Transformations in Business and Economics*. Vol. 14, No. 1, pp. 212-224.
- NOFSINGER, J. 2013. Psychology of Investing. Pearson Series in Finance. Prentice Hall.
- REILLEY, F. K. and BROWN, K. C. 2012. *Investment Analysis & Portfolio Management*. South-Western Cengage Learning.
- RAISOVÁ, M., BULECA, J. and MICHALSKI, G. 2014. Food processing firms inventory levels in hard times. 2004-1012 Slovak. Czech and Polish enterprises case. In: *Procedia Economics* and Finance. Vol. 12, pp. 557-564.

Quantification of the Impact of Accounting Reform in the Czech Republic on Municipalities in the Moravian-Silesian Region and Their Evaluation

JANA HAKALOVÁ¹ – ŠÁRKA KRYŠKOVÁ²– YVETTA PŠENKOVÁ³ VŠB-Technical University of Ostrava, Faculty of Economics Czech Republic

Abstract

As a part of the project No. SGS SP2015/80 conducted at Faculty of Economics VŠB-TU Ostrava, this paper analyses, quantifies and evaluates the impact of accounting reform in the Czech Republic on municipalities in the Moravian-Silesian Region. The main aim of the ongoing reform, which begun in 2010, is the improvement of financial management and control in the public administration while allowing preparation of consolidated financial statements of the whole Czech Republic. The reform brought the municipalities a number of changes (in legislation, implementation of new accounting, valuation and depreciation methods and ways of reporting), including problems with their application.

Key words: Reform Process, State Accounting, Municipality Accounting, Accounting and Financial Statements, Consolidation

JEL Classification: M41, M42, M48

1 Introduction

This paper deals with the analysis of the ongoing process of creation of the state accounting in the Czech Republic with a focus on the quantification of the impact of accounting reform in the public administration of municipalities in the Moravian-Silesian Region, as a part of the project No. SGS SP 2015/80 at Faculty of Economics VSB-Technical University Ostrava. The impact of the state accounting reform on selected municipalities (some selected accounting entities) was analysed using questionnaire survey not only in terms of legislative changes, but also in terms of implementation of new accounting principles, methods and changes in reporting and transfer of accounting records to the central state accounting information system.

The main purpose of the state accounting reform that has been running since 1st January 2010 is to improve the management and financial control in the public administration and at the same time to enable preparation of consolidated financial statement for the whole state. The state will so become (according to the updated schedule of the accounting reform for the first time in the accounting period of 2015)⁴ a consolidating accounting entity, to which all consolidated (subordinate) accounting entities will be obliged to collect and transfer accounting records in newly

¹Ing. Jana Hakalová, Ph.D., Sokolská třída 33, 701 21 Ostrava, Czech Republic, jana.hakalova@vsb.cz

²Ing. Šárka Kryšková, Ph.D., Sokolská třída 33, 701 21 Ostrava, Czech Republic, sarka.kryskova@vsb.cz

³Ing. Yvetta Pšenková, Ph.D., Sokolská třída 33, 701 21 Ostrava, Czech Republic, yvetta.psenkova@vsb.cz

specified structure and deadlines as well as in newly specified way for the purpose of their aggregation and consolidation.

As a part of the ongoing accounting reform in the public sector, it was necessary to create such legislative conditions so that the state would be able to prepare the consolidated financial statements of the Czech Republic. The creation of accrual-based state accounting was also a necessary condition for increasing the credibility of financial statements of the Czech Republic, both in relation to the European Union and international entities, including foreign investors. New accounting principles and methods have been established to ensure the truest representation of the actual state of assets and liabilities and business activity of some selected accounting entities (municipalities).

The process of state accounting reform was focused on 3 main areas related to:

- legislative process (for some selected accounting entities),
- implementation of newly introduced accounting principles and methods,
- financial statements and transfer of accounting records to the central state accounting information system.

2 Changes during the State Accounting Reform Related to the Legislative Process

Changes related to the legislative process can be generally divided into several areas:

- amendment of the Accounting Act,
- implementation of new regulations and amendment of the existing ones,
- release of new Czech Accounting Standards,
- implementation of central state accounting information system.

The basic foundation for the accounting reform in public administration was the amendment of the Accounting Act No. 563/1991 Sb., which with effect from January 1st 2010 defined in Section 1 (3) a new concept of "selected accounting entity". The selected accounting units include "some selected accounting entities" and health insurance companies. "Some selected accounting entities" are understood as state organisational components, territorial self-governing units (municipalities, regions and the capital city of Prague), voluntary associations of municipalities, the regional councils of the cohesion regions and state-funded organisations.

The approval of requisite regulations, to which the amended act referred, was a necessary precondition for the proper functioning of the state accounting system from 1st January 2010. This concerns following regulations:

- regulation on stocktaking of assets and liabilities (stocktaking regulation),
- regulation on conditions of preparation and presentation of the financial statements of the Czech Republic (consolidation regulation),
- regulation on accounting records in a technical form for selected accounting entities and their transfer to the central state accounting information system and on requirements for technical and mixed forms of accounting records (technical regulation).

Another significant change related to the accounting reform for the selected accounting entities resulted from the text in Section 36 (1) of the Accounting Act where it is stated that in order to achieve consistency in the use of accounting methods by accounting entities and to ensure a higher level of comparability of financial statements, the Czech Accounting Standards (hereafter "standards") shall be followed by accounting entities in all cases. Before the initiation of the reform the total of 22 standards were in force. At the present time, i.e. as of 1st January 2015, only 10 accounting standards for some selected accounting entities are in force. This concerns the following standards:

- 701 Accounts and accounting principles in accounts,
- 702 Opening and closing books of accounts,
- 703 Transfers,
- 704 Funds of accounting entity,
- 705 Reserves,
- 706 Adjustments and disposal of claims,
- 707 Inventories,
- 708 Depreciation of fixed assets,
- 709 Own resources,
- 710 Intangible and tangible fixed assets.

From the limited number of standards follows a certain degree of uncertainty in bookkeeping of some selected accounting entities during the ongoing reform. The question is, how to proceed when dealing with specific accounting cases that are not regulated by accounting standards. In this case, the accounting entity should choose a procedure that will, according to its view, bring as true and fair view of the facts in the accounts as possible, as states Schneiderová and Nejezchleb (2012). When searching for an optimum procedure, the information published on the web pages of Ministry of Finance of the Czech Republic (hereafter "MF CR") or methodological recommendations of regions⁵ may help.

According to the authors, based on the comparison of provided work schedule published on web pages of MF CR and the actual status of work done at the time of beginning of the state accounting reform, following facts are emerging:

- on the date of reform launch, not all of the legal regulations that should became effective according the schedule from 1st January 2010 were in force,
- both regulations (No. 410/2009 Sb. and 383/2009 Sb.) had been issued shortly before their practical implementation, so the selected accounting entities could not have had enough time to prepare for the new changes and their timely implementation into their accounting,
- as of the beginning of the reform, not all Czech accounting standards that should establish more detailed description of accounting methods and procedures for some selected accounting entities had been prepared, which introduced a certain uncertainty in recording of accounting operations.

Another important provision of the Accounting Act for the selected accounting entities was the completion of Section 1 with two new paragraphs, from the text of which follows the obligation of MF CR to collect accounting records for the needs of the state, including preparation of financial

⁵http://www.kr-jihomoravsky.cz/Default.aspx?ID=156690&TypeID=2

statements of the Czech Republic through the establishment of central state accounting information system. The act therefore defines two essential goals of the existence of central system of accounting data as:

- a tool for the preparation of consolidated financial statements of the Czech Republic and the sub-consolidating units of the state,
- a place where the individual entities will obtain accounting information about selected accounting entities.

The process of data transfer to the central state accounting information system is provided by regulation No. 383/2009 Sb., on accounting records in a technical form for selected accounting entities and their transfer to the central state accounting information system, and on requirements for technical and mixed forms of accounting records (technical regulation).

3 Changes during State Accounting Reform Related to the Implementation of New Accounting Principles and Methods

Changes associated with the implementation of new accounting principles and methods in the accounting of municipalities can be generally divided into several areas:

- implementation of fixed asset depreciation method in the main activity of municipalities,
- implementation of accrued/deferred costs and revenues, the possibility of establishing reserves and adjustments,
- the obligation to revalue fixed assets for sale to its fair value,
- the change in defining and accounting for transfers etc.

According to Section 4 (8) of the Accounting Act, when keeping the books, accounting entities are required to comply with accounting methods defined by the implementing regulation for individual groups of accounting entities. New methods and accounting principles are regulated by Decree No. 410/2009 Sb., the decree from 1st January 2010 replaced the former regulation No. 505/2002 Sb. Other some selected accounting entities had gradually implemented new accounting methods according to the schedule set by MF CR and began to fulfil provisions of the Accounting entity in practise. The gradual implementation of new obligations and their distribution in time by the state was motivated with feasibility of these obligations. The accounting of some selected accounting entities is now accrual-based.

With the implementation of new accounting principles (such as accrual or prudence principle). and methods (such as fixed asset depreciation, accrued/deferred costs and revenues, the creation of reserves and adjustments), the accounting of some selected accounting entities came closer to the accounting of business entities and significantly increased the explanatory power of financial statements. The balance sheet provides users with information on the interim and permanent reduction in the value of assets (assets are shown in gross, correction and net values), the profit and loss statement gives them an overview of costs and revenues broken down by main and economic activities, etc.

4 Changes during the State Accounting Reform related to Financial Statements and Transfer of Accounting Records

Changes associated with financial statements and the transfer of accounting records can be generally divided into several areas:

- the change in the conditions for the obligation to prepare a statement of cash flows and a statement of changes in equity,
- implementation of binding model example of individual parts of financial statements,
- introduction of a new report "Auxiliary Analytical Overview"- for the purpose of monitoring and controlling public finances and preparing financial statements of the Czech Republic and of particular sub-consolidating units of the state.

The Section 18 (1) of the Accounting Act implies that financial statements as a whole consist of the balance sheet, the profit and loss account and explanatory notes. It is apparent from the text of this section that the financial statements of business or non-governmental organizations may include the statement of cash flows or statement of changes in equity. However, when certain criteria are met, the preparation of these two statements is mandatory for some selected accounting entities "With effect from 1st January 2011, conditions for preparing the statement of cash flow and statement of changes in equity were alleviated. Some selected accounting entities are under the obligation to prepare these statements if they meet both of the following conditions simultaneously." as states Hakalová and Urbancová (2012, p. 34).

The selected accounting entities always prepare the statement of cash flows and the statement of changes in equity if both of the following criteria are met as of the balance sheet date and for the immediately preceding accounting period:

- total assets of more than 40 million CZK,
- total annual net turnover of more than 80 million CZK.

Regulation No. 410/2009 Sb., as amended, contains a binding model example of individual parts of financial statements for some selected accounting entities. One of the objectives of the accounting reform in the public administration was the preparation of financial statements of the Czech Republic. According to Section 1 (3) and (4) of the Accounting Act, the MF CR is responsible for the preparation of statements of the Czech Republic and the administration of the central state accounting information system. As a result of these changes, the Czech Republic was not declared a new accounting records from the selected accounting entities and to prepare financial statements of the Czech Republic. The accounting records created in connection with the preparation of accounting records for the Czech Republic (using the method of consolidation) will be created at the level of MF CR (Kryšková and Urbancová, 2011). The MF CR will so prepare the financial statement for the accounting entity of MF CR and financial statements of the Czech Republic, i.e. the ministry will in this case have a superior position towards the selected accounting entities (including other ministries).

Basic obligations, possibilities and the methods of preparation of financial statements of the Czech Republic are stipulated by the regulation No. 312/2014 Sb., on conditions for preparation of financial statements of the Czech Republic (consolidation regulation of the state) with effect from 1st January 2015. It was initially assumed that the first consolidation will occur in 2012 for the

accounting period of 2011. The deadline for the first preparation of consolidated financial statements had been postponed several times, as well as passing of the consolidation regulation. The consolidated financial statements will therefore be prepared for the first time during 2016 for the accounting period of 2015.

Amendment to the technical regulation No. 383/2009 Sb., which is effective from 1st January 2012, brought another obligation to some selected accounting entities, and that is according the Section 3a, the transmission of a newly established statement - Auxiliary Analytical Overview - to the central state accounting information system. The statement should be used to obtain detailed information for the purpose of monitoring and controlling public finances. Municipalities the population of which according to the Czech Statistical Office at the beginning of the immediately preceding accounting period equals to or is greater than 3,000 are under the obligation to submit the overview quarterly. The requirements arising from the membership of the Czech Republic in the European Union are the reason for the introduction of the auxiliary analytical overview. This concerns especially requirements of the European System of National and Regional Accounts in the Community (ESA 95), the European statistics and the application of the Protocol on Excessive Budgetary Deficit Procedure annexed to the Treaty Establishing the European Community. Approximately 10% of the total number of selected accounting entities are currently under the obligation to prepare the auxiliary analytical overview, which covers 90% of all their assets⁶.

5 Results of Questionnaire Survey on the project of "Quantification of the Impact of State Accounting Reform in the Czech Republic on Municipalities in the Moravian-Silesian Region and Their Evaluation"

The aim of the questionnaire survey was to quantify and evaluate impacts of the state accounting reform on municipalities the Moravian-Silesian Region as a part of the project No. SGS SP 2015/80 "Quantification of the Impact of State Accounting Reform in the Czech Republic on Municipalities in the Moravian-Silesian Region and Their Evaluation".

As part of the questionnaire survey, which took place from January to April 2015, 300 municipalities in Moravian-Silesian Region were approached⁷. 222 questionnaires came back, which represented 74% return from the total of 300 municipalities. The questionnaire contained the total of 26 questions, including 1 open question used to express own opinion and any possible comments of the respondents to the reform process.

Questions used in the questionnaire were focused on three main problem areas:

- questions related to the legislative support of the state accounting reform and its methodological support,
- questions concerning the newly introduced accounting methods,
- questions aimed at the reporting of the territorial self-governing units (municipalities).

⁶http://www.mfcr.cz/cs/verejny-sektor/regulace/ucetni-reforma-verejnych-financi-ucetnic/ucetni-vykaznictvistatu/pokyny-a-sdeleni/2014/materialy-ze-seminare--pomocny-analytick-19423

⁷http://verejna-sprava.kr-moravskoslezsky.cz/obce.html

Changes under the state accounting reform represented for some selected accounting entities, including municipalities, entirely new procedures and processes, which in practice gradually began to apply from the 1st January 2010. The reform has not finished yet, and the consolidated financial statements of the Czech Republic will be for the first time prepared for the accounting period of 2015.

If followed from the analysis and evaluation of questionnaire survey that respondents (municipalities) obtained information on the reform processes, new legislation, accounting and valuation methods especially through training and courses, which they financed themselves or were hold by the Regional Authority of the Moravian-Silesian Region. Respondents rated the methodological support from the MF CR quite negatively, as information was incomplete and provided late.

When the new regulation No. 410/2009 Sb. came to force, and Czech Accounting Standards for some selected accounting entities were implemented, the implementation of new bookkeeping system for municipalities was inevitable. That brought the respondents additional financial requirements associated mainly with expanses on training and workshops, purchase of new accounting software, etc. The increased demands associated with the introduction of a new methodology to the accounting and reporting system of municipalities, which had to be handled by accountants of all municipalities, unfortunately did not reflected in their higher salary. Only 15% of respondents said that in connection with the state accounting reform, accountants were better financially evaluated or new workforce was hired.

Following conclusions followed from the evaluation of individual answers from the questionnaire:

- In terms of evaluating reform's benefits for the municipalities, 48% of respondents see the implementation of the accrual principle into the accounting of municipalities as the most beneficial, and 26% of the respondents rate the new method of transfer accounting positively.
- In terms of legislation, respondents saw the frequent change of methodology during each accounting period as the biggest problem, as well as the delayed publication of new relevant legislation.
- In terms of new accounting methods of municipalities, respondents see as problematic especially the determination of fair value of the asset for sale (118 respondents), posting of transfers (102 respondents) and the creation of reserves and adjustments (70 respondents),
- And as the least problematic they see the off-balance-sheet accounting.
- Most respondents answered the question on the difficulty of implementing the method of fixed asset depreciation that the implementation of the method was demanding, especially in terms of time (74% of the respondents).
- The accounting of transfers was rated quite negatively; the research confirmed that accounting procedures are not clear to 71% of respondents and keep on changing.
- In terms of reporting, almost 75% of respondents stated that the state accounting reform contributed to the increase of explanatory power of the municipality's financial statements. However, the mayors of municipalities tend to make decisions based rather on the report on budget implementation than on financial statements. It is obvious that they are more interested in incomes and expenses than in the accounting perspective, that is costs, revenues and economic result.

- The creation of a new statement "Auxiliary Analytical Overview" was the biggest issue of municipalities. They reacted negatively to the obligation of compiling the statement (the obligation applies to 19% of the respondents, all of whom evaluate it as complicated and time-consuming). Requirements for analytical breakdown for the needs of financial statements and accounting entity management do not correspond with requirements for analytical breakdown using the auxiliary analytical overview; this brought major intervention in the creation of analytical accounts and as well as in the information recorded during the accounting entry.
- Only 8% of respondents answered positively to the question if the municipalities are prepared for the consolidation of financial statements. The overwhelming majority of respondents (87%) is aware of the upcoming consolidation but does not deal with the issue in more detail. Since the first preparation of consolidated financial statement of the Czech Republic is to happen in 2015, these findings are quite negative and may have an impact on the explanatory power of these financial statements.

In conclusion, it can be stated, and it is also evident from respondents' responses in the questionnaire survey, that mayors and accountants perceive the process of the state accounting reform rather negatively. It is arguable that the poor level of legislative support of the entire reform process is the main reason for the attitude of municipalities. Most of the legal norms had been published and approved at the last moment, so it was impossible to prepare for the upcoming changes, which caused accountants of the municipalities a certain level of uncertainty in decision-making about capturing accounting transactions and implementing new accounting methods.

6 Conclusion

The status and complexity of the legislative process were one of the main issues of the ongoing accounting reform in the public administration. Considering its large extent and importance of the reform's content, crucial regulations were approved and published shortly before their practical implementation. Similarly, the Czech accounting standards had been gradually published during the reform and have not yet been completed. This is causing problems with accounting processing of transactions that are not unequivocally regulated by any of the standards, which in practice results in a great variability during the application of the new accounting methods with a different effect on the economic result. Before the initiation of the state accounting reform 22 Czech accounting standards were in force, but at the moment only 10 standards regulate the accounting of municipalities.

Since the launch of the reform, the usual procedures and methods of accounting have changed, and the accounting of municipalities came closer to the accounting of business entities.

Accounting, which was until the end of 2009 cash-based and reflected mainly budget activities, has fundamentally changed. Along with new accounting methods and procedures, the new principle of accrual basis was introduced in the accounting of municipalities. Because of the accrual principle, accounting transactions are recorded in the accounting period, to which they relate in terms of materiality and time. Benefits of the accrual-based accounting for the state and for the accounting entities themselves are obvious and can be summarised in the following requirements:

• to know exactly the value of one's assets, i.e. what the state owns (its receivables), or more precisely, what the state owes (its payables),

- to improve assets management, i.e. fixed assets, interests in institutions and companies, medium-term payables and risk management,
- to provide the state with complete financial information for its decision-making 8 .

One of the reform's objectives also was to increase the explanatory power of financial statements at the level of the accounting entities and the follow-up preparation of the consolidated financial statements of the Czech Republic. At the same time, as part of this process, it was intended to reduce the reporting requirements for the selected accounting entities by introducing central state accounting information system, from which the state and transnational authorities should have the opportunity and ability to obtain the data necessary for its further work. For this reason, the requirement for submitting another statement was introduced (Auxiliary Analytical Overview -AAO) whose preparation most municipalities perceive very negatively. However, MF CR states that by introducing the AAO statement a whole series of statistical surveys had been cancelled. In 2013 more than 7 000 accounting entities were freed from their obligation to submit VI 1-01 statement (annual statement of territorial self-governing units, state organisational components, state-funded organisations and similar government institutions), which involved mainly municipalities and state-funded organisations. The annual statement Granty 1-01 (Grants 1-01), a mandatory statement for more than 7,000 accounting entities, was cancelled in 2014⁹.

The result of the analysis performed is the assessment of past course and current situation of the ongoing accounting reform and an outline of future development in the accounting of public administration entities. Frequent changes of the legislation meant and still mean intensive work for the selected accounting entities when monitoring the nature and impact of the changes to the established accounting system, which was confirmed by the questionnaire survey during the project.

Based on the analyses, it can, however, be noted that the accounting reform in the public administration was necessary. It includes a rational core, many necessary ideas, procedures and methods. The current system of accounting in the public administration is devised on the accrual basis. In comparison with the accounting before the reform, it is easier and more comprehensible. The accounting of municipalities came closer to the accounting of business entities. High quality financial information may help better monitoring of the financial health of all public administration entities, even in relation to reporting to the EU.

Acknowledgements

This article was made with the financial support of Student Grant Competition held at the Faculty of Economics - Technical University in Ostrava as a part of the project No. SP 2015/80 "Quantification of the Impact of State Accounting Reform in the Czech Republic on Municipalities in the Moravian-Silesian Region and Their Evaluation".

 $^{^{8}\} http://www.ucetnikavarna.cz/archiv/dokument/doc-d14594v17508-ne\,kolik-dalsich-poznamek-k-reforme-ucetnictvi-verejnych-financi/$

⁹http://www.mfcr.cz/cs/verejny-sektor/regulace/ucetni-reforma-verejnych-financi-ucetnic/ucetni-vykaznictvistatu/pokyny-a-sdeleni/2014/materialy-ze-seminare--pomocny-analytick-19423

References

ACTNo. 563/1991 Sb. on accounting, as amended.

- CZECH ACCOUNTING STANDARDS for some selected accounting entities, which keep the books according to the regulation No. 410/2009 Sb., No. 701 710.
- HAKALOVÁ, J. and KRYŠKOVÁ, Š. 2014. Analýza změn v účetnictví subjektů veřejné správy v průběhu reformy účetnictví veřejných financí v České republice. In: 14. International scientific conference "Globalizacija a jej sociálno-ekonomické dósledky 2014". ISBN 978-80-554-0927-6. pp. 140 – 151.
- HAKALOVÁ, J. and URBANCOVÁ, A. 2012. Účetní reforma veřejných financí v České republice a její vliv na účetnictví, účetní závěrku, přezkoumání hospodaření a audit účetní závěrky některých vybraných účetních jednotek. In: *Acta academica karviniensia*. Vol. 7, No. 2, pp. 29 42.
- KRYŠKOVÁ, Š. and URBANCOVÁ, A. 2011. Účetní reforma veřejných financí v České republice a právní úprava některých vybraných účetních jednotek. In: *Právo, ekonomika, management*. Vol. 2, No. 2, pp. 13 25.
- MINISTRY OF FINANCE OF THE CZECH REPUBLIC. ÚČETNÍ REFORMA VEŘEJNÝCH FINANCÍ - ÚČETNICTVÍ STÁTU. [online]. Available online: <http://www.mfcr.cz/cs/verejny-sektor/regulace/ucetni-reforma-verejnych-financi-ucetnic>.
- MINISTRY OF FINANCE OF THE CZECH REPUBLIC. ÚČETNÍ REFORMA VEŘEJNÝCH FINANCÍ - ÚČETNICTVÍ STÁTU. [online]. Available online: <http://www.mfcr.cz/cs/verejny-sektor/regulace/ucetni-reforma-verejnych-financiucetnic/ucetni-vykaznictvi-statu/pokyny-a-sdeleni/2014/materialy-ze-seminare--pomocnyanalytick-19423>.
- PROKŮPKOVÁ, D. 2010. Několik (dalších) poznámek k reformě účetnictví veřejných finance. UNES (Účetnictví neziskového sektoru) 2010/7. [online]. Available online: http://www.ucetnikavarna.cz/archiv/dokument/doc-d14594v17508-nekolik-dalsich-poznamek-k-reforme-ucetnictvi-verejnych-financi/ >.
- REGULATION No. 410/2009 Sb. implementing some provisions of the act No. 563/1991 Sb. on accounting, as amended, for some of the selected accounting entities, as amended.
- REGULATION No. 383/2009 Sb. on accounting records in technical form for selected accounting entities and their transfer to the central state accounting information system, and on requirements for the technical and mixed forms of accounting records (technical regulation on accounting records), as amended.
- REGULATION No. 5/2014 Sb. on means, deadlines and information submitted for evaluation of the state budget, budgets of state funds, budgets of territorial self-governing units, budgets of voluntary associations of municipalities and budgets of regional councils of cohesion regions.
- REGULATION No. 312/2014 Sb. on the conditions of preparation and presentation of the financial statements of the Czech Republic (consolidation regulation of the state).
- REGULATION No. 270/2010 Sb. on stocktaking of assets and liabilities, as amended.
- SCHNEIDEROVÁ, I. and NEJEZCHLEB Z. 2012. Účetní reforma 2012 pro ÚSC a jimi zřizované příspěvkové organizace. Praha: Acha obec účtuje. 710 p. ISBN 978-80-260-2780-5.
- ÚČETNÍ REFORMA V OBLASTI VEŘEJNÝCH FINANCÍ METODIKY, ÚČETNÍ POSTUPY, OSTATNÍ. Jihomoravský kraj: Odbor ekonomický. Dokumenty odboru krajského

úřadu. [online]. Available online: ">http://www.kr-jihomoravsky.cz/Default.aspx?ID=156690&TypeID=2>"">http://www.kr-jihomoravsky.cz/Default.aspx?ID=156690&TypeID=156690&TypeID=156690&

VEREJNA SPRAVA. MORAVSKOSLEZSKY KRAJ. [online]. Available online: http://verejna-sprava.kr-moravskoslezsky.cz/obce.html>.

New Reverse Bonus Certificate Design and Pricing

MONIKA HARČARIKOVÁ¹ – MARTINA BOBRIKOVÁ² Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

This paper focuses on design of the new capped reverse bonus certificate with the aim to present the nature of this certificate's creation as relatively new financial product and to discuss its advantages and disadvantages at different underlying price development. We conclude with the findings that this product is created through the process of financial engineering as the underlying asset together with options, namely put option, down and knock -in call option and call option. There is provided the profit function in analytical form and developed the formula for pricing of this certificate. Finally, we analyze and compare the new capped reverse bonus certificates with various parameters for Euro Stoxx 50 index by investigation of their profitability with recommendation for potential investors. The best new capped reverse bonus certificate for every estimated development of the underlying price is identified.

Key words: Investment Certificate, Vanilla Option, Barrier Option

JEL Classification: G11, G13

1 Introduction

Investment certificates are structured financial products which can offer opportunity for every market scenario. Investment certificates consist basically of two essential elements, i.e. an original instrument and a derivative one, often classic vanilla or exotic option. Less known, but much more sophisticated type of exotic option is a barrier option. A barrier option has a second strike price called barrier. A barrier influences the activation (knock-in) or deactivation (knock-out) of barrier option and the barrier may be over (up) or below (down) the current price of the underlying asset at the time of closing option contracts. Barrier option is therefore associated with a condition which has to be fulfilled, otherwise it will expire as worthless. More detailed descriptions of classic vanilla and barrier options exist in the literature Zhang (1998), Haug, (2007) or Hull (2008).

Barrier options are used in the construction of a bonus certificate and a reverse bonus certificate. Papers Hernandez, Brusa and Liu (2008), Younis and Rusnáková (2014) deal with the analysis of the classical bonus certificates. The reverse bonus certificates are analyzed in papers Harčariková and Rusnáková (2014). For example papers Šoltés (2011), Šoltés (2012), Šoltés and Harčariková (2015) deal with other types of investment certificates.

For significant declining markets the new reverse bonus certificates are suitable financial instruments. The proposal of the new type of uncapped and capped reverse bonus certificate, their profit functions and nature of the formation using vanilla and barrier options are mentioned in the

¹ Ing. Monika Harčariková, PhD., Němcovej 32, 040 01 Košice, Slovak Republic, monika.harcarikova@tuke.sk

² Ing. Martina Bobriková, PhD., Němcovej 32, 040 01 Košice, Slovak Republic, martina.bobrikova@tuke.sk

paper Rusnáková and Harčariková (2014). This paper provides the application to the underlying variable Euro Stoxx 50 index.

The aim of this paper is to perform an analysis of the proposed new capped reverse bonus certificate on Euro Stoxx 50 index. Based on the data set, we design and price the new capped reverse bonus certificate with various parameters using portfolio replication method. We analyze and compare the new capped reverse bonus certificates with various parameters by investigation of their profitability with recommendation for potential investors. The best new capped reverse bonus certificate for every estimated development of the underlying price is identified.

2 The new type of capped reverse bonus certificates

The new types of capped reverse bonus certificates can be available for investors who wish to benefit from significant volatility in the market. If the underlying asset value falls below the barrier, then the investor is guaranteed a bonus (down and knock-in barrier option is activated). On the other hand, if the barrier level is not reached, the maximum loss is a limited by the purchasing price in the underlying price growth. The barrier level is set below the cap level and the initial price of the underlying asset is set above the bonus level.

If the underlying price has at least once breached the barrier level, then the investor receives at the minimum – bonus amount and at the maximum – cap amount. If the underlying price has never breached the barrier level but it is below the cap level, then the investor receives an amount equal to the cap level. If the underlying price has never breached the barrier level and it is above the cap level, then the investor receives a cash payment equal to the actual price of the underlying at maturity.

Let us denote the underlying asset price at the issue time S_0 , the price at the maturity date S_T , the cap level C, the bonus level B_L , the barrier B, the multiplier p, the fair value of the certificate k_0 , then the profit function of the new capped reverse bonus certificate at the maturity date T is:

$$P(S) = \begin{cases} p[S_0 + (S_0 - C)] - k_0 & \text{if } S_T < C, \\ p[S_0 + (S_0 - S_T)] - k_0 & \text{if } C \le S_T < B_L, \\ p[S_0 + (S_0 - B_L)] - k_0 & \text{if } \min_{0 \le t \le T} (S_t) < B \land S_T \ge B_L, \\ p[S_0 + (S_0 - S_T)] - k_0 & \text{if } \min_{0 \le t \le T} (S_t) \ge B \land S_T < 2S_0, \\ -k_0 & \text{if } S_T \ge 2S_0. \end{cases}$$
(1)

The new capped reverse bonus certificate is formed by selling of the underlying asset at the spot price S_0 , at the same time by selling of the put option with the strike price referred to as the cap level *C*, the premium p_S for option, by buying of the down and knock-in call option with the strike price referred to as the bonus level B_L , the barrier *B*, the premium c_{BDI} per option and by buying of the call option with the strike price referred to as 2 the starting price $2S_0$, the premium c_B per option. There is used a European-style of options for the same underlying asset and with the same expiration time.

At the maturity date the buying of the underlying asset will be depend on the actual market situation and the reaching/not reaching of the barrier by underlying asset development during time to maturity. The fair value of the new capped reverse bonus certificate for the multiplier p is:

$$k_0 = p(S_0 - p_S + c_{BDI} + c_B).$$
⁽²⁾

3 Application to the Euro Stoxx **50** index

In this section, we propose new capped reverse bonus certificates on Euro Stoxx 50 index with different levels of its parameters and perform the analysis of their profitability for to the investor at the time of maturity.

3.1 Research methodology

Investment certificates are created as a combination of the underlying asset and the financial derivatives, mainly options (classic vanilla or barrier) on this underlying asset. Options are the significant part of every investment certificates, therefore methodology of the paper must be based on these instruments. Through the analytical expression of the profit functions of the classic vanilla/barrier options the paper Rusnáková and Harčariková (2014) proves the nature of the new capped reverse bonus certificates creation. According to the presented approach we can simultaneously apply our research to the Euro Stoxx 50 index.

The profit function of the new capped reverse bonus certificate at the maturity date is expressed by the equation (1). The fair value of the investment certificates can be calculated based on the value of its individual components, i.e. value of an alternative portfolio as a combination of an underlying asset position and the positions in options. The fair value of the new capped reverse bonus certificates based on the value of the alternative portfolio is expressed by the equation (2). Consequently, we need to obtain values of the vanilla and the barrier option positions. For our approach, there are used real European vanilla call/put option prices gained from Bloomberg. Due to the lack of market barrier option data, the values of the position in European style of down and knock-in call barrier options are calculated according to Haug (2007). All calculations of call barrier options are implemented in Bloomberg database.

3.2 Data

Euro Stoxx 50 is Europe's leading Blue-chip index for the Eurozone, which covers 50 stocks from 12 Eurozone countries. The price of the index is very volatile, what it is seen in its historical prices and the historical volatility at the level of 15.89%. Therefore there are expected changes of the index development. The actual price of Euro Stoxx 50 index is 3232.91 EUR on 1st December 2014. The common stylized data about the certificates is in the Table 1.

Underlying asset	EURO STOXX 50
Underlying price (S ₀)	3232.91 EUR
Issue date	01/12/2014
Maturity date (T)	18/09/2015
Multiplier (p)	1:100

 Table 1 Basic characteristics of EURO STOXX 50 index at the issue date

Let's assume, investors expect decline of Euro Stoxx 50 index in the future (up to September 2015) and believe the underlying value 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 assume Euro Stoxx 50 option prices quotes on 1st December 2014. There is traded European style of vanilla options on Euro Stoxx 50. All real European vanilla option prices and the implied volatilities are gained from Bloomberg, which we can find in the Table 2.

σ _{impl}	Call option	STRIKE	Put option	σ _{impl}
21.83 %	505.61	2,700	72.06	21.83 %
21.41 %	466.83	2,750	81.64	21.41 %
22.20 %	437.10	2,800	89.15	20.54 %
21.22 %	362.70	2,900	114.65	19.72 %
20.75 %	327.70	2,950	129.60	19.32 %
20.31 %	294.35	3,000	146.20	18.32 %
17.96 %	157.50	3,232.91	256.10	17.96 %
19.23 %	0.00	6,465.82	3,326.85	19.23 %

Table 2 Implied volatilities and European vanilla call/put option premiums on EURO STOXX 50 index

Source: Bloomberg

Calculated down and knock-in call barrier option prices (results in the Table 3) depend on the input parameters such as the strike prices, the barrier levels, the cap levels, the bonus levels, the maturity date, the risk-free interest rate (0.18%) and the implied volatilities. The barrier levels (2,500; 2,550 and 2,600 EUR), the cap levels (2,800; 2,750 and 2,700 EUR) and the bonus levels (3,000; 2,950 and 2,900 EUR) are selected by the authors and specified at the time of issue. These parameters impact on the issue price of the certificates and on the investor's profit too.

Table 3 Implied volatilities and European down and knock-in call option premiums on EURO STOXX 50 index for the given barrier

Barrier / Strike price	2500	2550	2600	σ _{impl}
2,700	11.55	19.57	31.47	21.83 %
2,750	8.70	15.07	24.74	21.41 %
2,800	6.52	11.54	19.34	22.20 %
2,850	4.86	8.79	15.04	21.70 %
2,900	3.61	6.66	11.64	21.22 %
2,950	2.66	5.03	8.97	20.75 %
3,000	1.96	3.77	6.87	20.31 %
3,232.91	0.45	0.94	1.89	17.96 %

Source: Own calculation in Bloomberg

3.3 Results

Let us propose new capped reverse bonus certificate (NCRB) as the replicating portfolio, i.e. a combination of a short position in Euro Stoxx 50 with the actual price 3,232.91 EUR, a short position in put option in Euro Stoxx 50 with the strike level 2700 EUR, option premium 72.06 EUR per option, maturity date 18th September 2015, a long position in down and knock-in call option with the strike level 2,950 EUR, barrier level 2,600 EUR, option premium 2.66 EUR per option, maturity date 18th September 2015 and a long position in call option in Euro Stoxx 50 with strike level 6,465.82 EUR, option premium 0 EUR per option, maturity date 18th

September. The profit function at the maturity of the designed new capped reverse bonus certificate is represented by the following equation:

$$P(S_T) = \begin{cases} 6.02 & \text{if } S_T < 2700, \\ 33.02 - 0.01 \cdot S_T & \text{if } 2700 \le S_T < 2950, \\ 3.52 & \text{if } \max_{0 \le t \le T} (S_t) < 2600 \land S_T \ge 2950, \\ 33.02 - 0.01 \cdot S_T & \text{if } \max_{0 \le t \le T} (S_t) \ge 2600 \land S_T < 6465.82, \\ -31.64 & \text{if } S_T \ge 6465.82. \end{cases}$$
(3)

The purchase certificate's price k_0 based on (2) equals 31.64 EUR. Results of designed certificate show, the maximum profit in height of 6.02 EUR for underlying asset price lower than 2700 EUR. Otherwise, the profit profile depends on the reaching/not reaching the barrier level. If the barrier level is reached and the underlying asset is above 2950 EUR, the investor receives the bonus in height of 3.52 EUR. If the barrier level is not reached, the profit profile depends on the actual underlying asset price at the maturity date. The maximum loss is 31.64 EUR.

The same method is used for next designed new capped reverse bonus certificates with different parameters, where all information are summarized in the Table 4.

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 price and the change of the given parameters (barrier level *B*, cap level *C* and bonus level B_L) detected using the selected certificates. Our results from the Table 4 indicate positive influence of the barrier level (variants NCRB1, NCRB10, NCRB19), negative influence of the bonus level (variant NCRB1, NCRB4, NCRB7) and the cap level (variants NCRB1-NCRB3) on the certificates price, i.e. growth of the barrier (closer to the actual price S₀) causes growth of the issue price and vice versa and in case of the growth of the bonus level and the cap level causes drop of the issue price and vice versa. Summarized parameters of the influence are shown in the Table 5.

Denotation of investment certificate	В	So	c(2S ₀)	$\mathbf{B}_{\mathbf{L}}$	c _{DI} (B _L)	С	p(C)	k ₀
NCRB1	2,600	3,232.91	0.00	3,000	1.96	2,800	89.15	31.46
NCRB2	2,600	3,232.91	0.00	3,000	1.96	2,750	81.64	31.53
NCRB3	2,600	3,232.91	0.00	3,000	1.96	2,700	72.06	31.63
NCRB4	2,600	3,232.91	0.00	2,950	2.66	2,800	89.15	31.46
NCRB5	2,600	3,232.91	0.00	2,950	2.66	2,750	81.64	31.54
NCRB6	2,600	3,232.91	0.00	2,950	2.66	2,700	72.06	31.64
NCRB7	2,600	3,232.91	0.00	2,900	3.61	2,800	89.15	31.47
NCRB8	2,600	3,232.91	0.00	2,900	3.61	2,750	81.64	31.55
NCRB9	2,600	3,232.91	0.00	2,900	3.61	2,700	72.06	31.64
NCRB10	2,550	3,232.91	0.00	3,000	0.96	2,800	89.15	31.45
NCRB11	2,550	3,232.91	0.00	3,000	0.96	2,750	81.64	31.52
NCRB12	2,550	3,232.91	0.00	3,000	0.96	2,700	72.06	31.62
NCRB13	2,550	3,232.91	0.00	2,950	1.33	2,800	89.15	31.45
NCRB14	2,550	3,232.91	0.00	2,950	1.33	2,750	81.64	31.53
NCRB15	2,550	3,232.91	0.00	2,950	1.33	2,700	72.06	31.62

 Table 4 Designed new capped reverse bonus certificates

٢

NCRB16	2,550	3,232.91	0.00	2,900	1.84	2,800	89.15	31.46
NCRB17	2,550	3,232.91	0.00	2,900	1.84	2,750	81.64	31.53
NCRB18	2,550	3,232.91	0.00	2,900	1.84	2,700	72.06	31.63
NCRB19	2,500	3,232.91	0.00	3,000	0.44	2,800	89.15	31.44
NCRB20	2,500	3,232.91	0.00	3,000	0.44	2,750	81.64	31.52
NCRB21	2,500	3,232.91	0.00	3,000	0.44	2,700	72.06	31.61
NCRB22	2,500	3,232.91	0.00	2,950	0.62	2,800	89.15	31.44
NCRB23	2,500	3,232.91	0.00	2,950	0.62	2,750	81.64	31.52
NCRB24	2,500	3,232.91	0.00	2,950	0.62	2,700	72.06	31.61
NCRB25	2,500	3,232.91	0.00	2,900	0.88	2,800	89.15	31.45
NCRB26	2,500	3,232.91	0.00	2,900	0.88	2,750	81.64	31.52
NCRB27	2,500	3,232.91	0.00	2,900	0.88	2,700	72.06	31.62

Table	5 Factors	influencing	the pr	ice and	the	profit	of the	new capped	reverse bonus	certificates
			P-			P- 0	~~~~~	ne o cappea		

Factors	The effect or	n the certificate price	The effect on the profit/ loss of the certificate			
	Drop	Increase	Drop	Increase		
Bonus level (B_L)	↑	\downarrow	↑	\downarrow		
Barrier (B)	\downarrow	↑	<u>↑</u> /↓	\downarrow /\uparrow		
Cap level (C)	↑	\downarrow	↑	\downarrow		

Profitability analysis of the selected investment certificates (NCRB1-NCRB9) with the same barrier level 2,600 EUR and different levels of the bonus and the cap, there are given the following results. If the barrier level was not reached during time to maturity and the underlying asset price is below 2740 EUR at the maturity date, the variant NCRB9 is the best with the profit 6.01 EUR. If the underlying asset price is in the interval $\langle 2740; 2793 \rangle$, NCRB8 is profitable. But if the underlying asset price is above 2,793 EUR, the variant NCRB7 is the best up to level 3318 EUR, where the certificate receives zero profit. The loss of the given certificate will increase with the growth of the underlying asset price, but the maximum loss is limited the purchase price 31.47 EUR. Otherwise, if the barrier level was reached during time to maturity and at the maturity date is below 2,740 EUR, then NCRB9 is profitable with the minimum bonus 4.01 EUR. If the underlying asset price is interval $\langle 2740; 2793 \rangle$, NCRB8 receives the minimum bonus 4.11 EUR, but NCRB7 is the best above 2,793 EUR with minimum bonus 4.18 EUR.

4 Conclusion

Investment certificates are new innovations of investment instruments, which attract investors. These products are created by combining the underlying asset and options products on this underlying asset. Their structure is complicated and increases demands on intellectualization of the investor.

In this paper we focused on the new capped reverse bonus certificate. On the basis of the existing studies, we priced and proposed the various new capped reverse bonus certificates. We demonstrated that the profit of the new capped reverse bonus certificate can be replicated by the combination of a short position in some underlying asset, a short position in put options with the cap level, a long position in down-and-in call options with the bonus level and a long position in call options with the strike level equals double of the spot price. Our approach is applied on the Euro Stoxx 50 index. We proposed the new capped reverse bonus certificates with the various barrier, cap and bonus levels. We performed profitability analysis of the proposed certificates to

the investor, showing which parameters the investor should focus and are significant for the profit profile. Performed analysis should help to understand the pricing and design of the new reverse bonus certificates, as well as the influence of the individual factors.

Acknowledgements

This contribution 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.

References

- HARČARIKOVÁ, M. and RUSNÁKOVÁ, M. 2014. Economic Analysis of Reverse Bonus Certificates (Part 1). In: *Hradec Economic Days 2014: The International Conference: Economic Development and Management of Regions*. 4-5 February 2014, Hradec Králové: Gaudeamus, pp. 263–269.
- HAUG, E. 2007. The Complete Guide to Option Pricing Formulas. 2nd edition. Hardcover: McGraw-Hill.
- HERNANDEZ, R., BRUSA, J. and LIU, P. 2008. An economic analysis of bonus certificates Second-generation of structured products. In: *Review of Futures Markets*. Vol. 16, No. 4, pp. 419–451.
- HULL, J.C. 2008. *Options, Futures and Other Derivatives*. 7th edition. New Jersey: Pearson Prentice Hall.
- RUSNÁKOVÁ, M. and HARČARIKOVÁ, M. 2014. Economic Analysis of Reverse Bonus Certificates (Part 2). In: *Hradec Economic Days 2014: The International Conference: Economic Development and Management of Regions*. 4-5 February 2014, Hradec Králové: Gaudeamus, pp. 270–276.
- ŠOLTÉS, M. 2012. New Option Strategy and Its Using for Investment Certificate Issuing. In: Procedia Economics and Finance: Emerging Markets Queries in Finance and Business. Vol. 3, No. 1, pp.199–203.
- ŠOLTÉS, V. 2011. The Application of the Long and Short Combo Option Strategies in the Building of Structured Products. In: *Liberec Economic Forum 2011: proceedings of the 10th international conference*. 19-20 September 2011, Liberec: Technical University of Liberec, pp.481–487.
- ŠOLTÉS, V. and HARČARIKOVÁ, M. 2015. Analysis of using barrier options to the formation of new structured products. In: *Mediterranean Journal of Social Sciences*. Vol. 6, No. 2, pp. 303–311.
- ZHANG, P.G. 1998. *Exotic options*. 2nd edition. Singapore: World Scientific Publishing Co.Pte.Ltd.
- YOUNIS, A.M.A. and RUSNÁKOVÁ, M. 2014. Formation of the new types of bonus certificates. In: *Actual Problems of Economics*. Vol. 152, No. 2, pp. 367–375.

Trend of Savings in Slovakia from 2009

JOZEF HETEŠ¹ - IVANA ŠPIRENGOVÁ² National Bank of Slovakia, Economic and Monetary Analyses Department Slovak Republic Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

The main source of financing of banks is saving of households. It is very important to know the factors that influence deposits from households. In the article we analyses the trend of savings as the first step of analysis the factors influencing savings. The article includes analysis of the stability of deposits through a variation coefficient. Then we analyse a trend of total deposits, total deposit of nonfinancial subjects and individual types of deposits of nonfinancial subjects.

Key words: Trend of Savings, Deposit, Nonfinancial Subject

JEL Classification: D140, G21

1 Introduction

Bank deposits, or savings, are base element of bank financing. Banks are focused on making a profit. They make this profit from interest spread among the interest from loans and deposits. The aim of banks is to change deposits into loans to gain the profit.

For banks as a financial middleman of free deposits in economy, is very important to follow up a trend of deposits. That is, because of changes in economy can influence bank business and also its profit. So it is important to know factors that influence a supply and a demand for deposits. Knowing that factors, banks can better react for course of deposits.

2 Analysis of deposits

From 2009 is Slovakia part of Eurozone and National Bank of Slovakia (NBS) belong to Eurosystem. So the legal money became euro. To be a part of Eurozone also means the change in showing a statistical data of NBS. So NBS shows data in euro.

In the article we analyse data after entering Slovakia in Eurozone. Development of deposit market will be described through new provided deposits – new trades.

As it is written above, deposits are very important source of financing in banks. They are considered to be more stable than other types of banks liabilities. Concerning the stability of deposits, there is difference between some of them. Europe central bank (ECB) paper³ shows that

¹ Ing. Jozef Heteš, PhD., Imricha Karvaša 1, 813 25 Bratislava, Slovak Republic, jozef.hetes@nbs.sk

² Ing. Ivana Špirengová, Němcovej 32, 040 01 Košice, Slovak Republic, ivana.spirengova@tuke.sk

³ Ahlswede (2012)

the deposits of household are more stable than deposits of nonfinancial corporation⁴. In this paper the ECB analysis the stability of deposits through a variation coefficient. We use this method to analyse if the deposits of banks are a stable source of bank financing in Slovakia and compare the result to those from ECB's paper. Stability of deposits measured by variation coefficient shows Figure 1^5 .



Figure 1 Variation coefficient according to types of deposits Source: Own data processing based on data from NBS

On the basis of calculation of variation coefficient we can sum up that the deposits of household are more stable than deposits of nonfinancial corporation. Mean value of variation coefficient for deposits of households is 25.28% and for nonfinancial corporation is 42.72%⁶. Looking up at individual types of deposits, we will see that the lower rate of variation coefficient has deposits of households with maturity (21.74%) and deposits on demand (11.99%) than deposits of nonfinancial corporation. Deposits with maturity are stabile at nonfinancial corporation with variation coefficient 38.44%, whereas variation coefficient for household is 42.10%.

In compare with average values of variation coefficient in Eurozone⁷, deposits with cancellation and deposits on maturity are higher than average for households and for nonfinancial corporation. Deposits on demand shows lower values than average, where rate of variation coefficient for households is 11.99%, for nonfinancial corporation is 12.35%, whereas the average value in Eurozone is 19%.

2.1 Trend of deposits in Slovakia from 2009

We start from aggregate data for all banks on analysis of trend of deposits in Slovakia. These data are from NBS. NBS aggregate individual types of deposits into three groups:

- 1. Deposits on demand.
- 2. Deposits with maturity.
- 3. Deposits with cancellation.

⁴ For example: in Spain, Netherland or Slovenia (Ahlswede, 2012)

 $^{^{5}}$ VVL – deposits with cancellation; VDS – deposits with maturity; VSP – deposits on demand; D is for households; N is for nonfinancial corporation

⁶ The period of calculation is from 01.01.2009 to 31.12.2014

⁷ The average values of variation coefficient in Eurozone: deposits with cancellation 11%, deposits with maturity 18%, deposits on demand 19% (Ahlswede, 2012)

On the Figure 2 there is shown a year on year growth of total deposits in Slovakia from 2010⁸. We will see on the Figure 2 that total deposits are raising up during reference date. Whereas at the beginning of the first quarter of the year 2010 the value of total deposits is 65 billion euro, at the end of four quarter of the year 2014 the value of total deposits is 80 billion euro. During the first half-year there is a decrease in total deposits compared to the same period in 2009. It is a continuation of decreasing in deposit position, mainly households that started at the beginning of the year 2009. Reason of this decrease was financial crisis that comes through the real economy at that time in Slovakia. The other reason was also the adoption of new currency, euro, in Slovakia. This year on year decrease was lowering gradually and in the second part of the year there was a decrease in volume of total deposits toward the last year.



Source: Own data processing based on data from NBS

Year on year increase in the deposits reached a peak in first quarter of 2011 at the 7.11%. From this time the deposit growth rate has begun to decline gradually and in the four quarter of 2011 total deposits experienced decrease against the same time in the previous year. This decrease was continuing to the third quarter of 2012. During this time we can see marked decrease in economic activity, gradual decreasing in growth of GDP in Slovakia. We can see that the development of deposits reflects the development of real economy in a certain measure. This fact acknowledges the value of correlation coefficient between total deposits and GDP, which is 60%. This shows positive relationships between these variables.

At the end of the year 2012 we can see a certain economic recovery, which has come through rising in GDP growth. The reaction of deposits was in boom of year on year rise with the peak in the third quarter of 2014. The value of rise was 10.68%.

On the Figure 3 can be seen a share of individual types of deposits on total deposits in Slovakia.

 $^{^{8}}$ There are quarterly data. Total deposits mean deposits within all sectors without sector S.2 (The rest of the world) accepted by Eurozone



Figure 3 Part of individual types of deposits on total deposits Source: Own data processing based on data from NBS

During the reference period there is a domination of deposits on demand. These deposits creates 78.06% of total deposits in Slovakia on average. The value of these deposits was raising gradually. Where as in January 2009 they created 67% of total deposits, at the end of the year 2014 they was 85.72% of total deposits. The second deposit product was deposits with maturity. There were 15.45% of total deposits on average. Their proportion was decreasing gradually, what means, that economic subjects prefer short-term deposits. The proportion of deposits with maturity on total deposits declined from 27.97% in January 2009 to 5.81% in December 2014. On the other side the proportion of deposits with cancelling increased from 4.29% in January 2009 to 8.46% in December 2014.

Development of total real deposits according to individual types in Slovakia shows Figure 4. We can draw a conclusion from analysis of trend of deposits that during the reference period there is a marked increase of deposits on demand and deposits with cancelling in Slovakia. It suggests that economic subjects have begun to prefer deposits without liability.

The main reason of this deposit reswitching was the fact that during the whole reference period there was a reduction among short-term interest rate and long-term interest rate on deposits. Where in 2009 the spread between average interest rate on deposits on demand and deposits with maturity was 1.2 of percentage point, at the beginning of the year 2014 was only 0.4 of percentage point. So the long-term deposits was becoming less attractive for clients.

Second partly explanation of deposit reswitching can be the preference of collective investment that can be consider as investment alternative of deposits with long-term liability. The third partly explanation can be a decrease in competition and lesser effort to gain new client or sustain existing clients. (ASFS, 2013)



Source: Own data processing based on data from NBS

2.2 Trend of deposits of nonfinancial subjects

In this part we analyse a trend of deposits in nonfinancial sector, S.11. It is a sector according to ESA 2010⁹. A part of deposits of nonfinancial subjects on whole deposits in Slovakia was 34.05% on average. The biggest part of whole deposits was hold by households, which represents 52.43% of whole deposits on average. The part of the other sectors deposits on whole deposits was 13.52% on average. So the deposits of nonfinancial subjects are the second important source of primary financing of banks.

Even though the households have the biggest part on total deposits, we can not to apply this fact for all types of deposits. In more detailed analysis we can see that households have the main part in deposits on demand and in deposits with cancelling. It is over 96% of total volume of this type of deposit in Slovakia.

In Table 1 there is shown an average part of deposits of nonfinancial sector and household sector (a part of other sectors on total deposits according to types is shown in third column in Table 1). On the other side the nonfinancial subjects dominate in the deposits with maturity which presents 79.34% of total deposits of nonfinancial subjects on average in Slovakia. Deposits with maturity represents 20.07% of total deposits of nonfinancial subjects and deposits with cancelling represents only 0.59% of total deposits of nonfinancial subject. The results are shown in Figure 5.

	The part of sectors on total deposits according to type							
	Nonfinancial subjects	Households	The other sectors					
Deposits on demand	34,61%	55,94%	9,45%					
Deposits with maturity	43,5%	16,21%	40,29%					
Deposits with cancelling	2,81%	96,71%	0,48%					

Table 1 Average part of deposits of nonfinancial sector and household sector

Source: Own data processing based on data from NBS

⁹ ESA 2010 is a European system of national accounts that represents internationally compatible accounting framework for systematic and detailed definition of whole economy, its parts and relationships between economies. Sectors of ESA 2010 are: S.11 Nonfinancial corporations; S.12 Financial corporations; S.13 Central government; S.14 Households; S.15 Non-profit institutions serving for households; S.2 Rest of the world

We can see that in the sector of nonfinancial subjects dominate deposits with shorter maturity. During the tracking period the amount of this type of deposits has increased. At the beginning of the year 2009 the deposits on demand of nonfinancial subjects made 67.85% of total deposits of nonfinancial subjects, at the end of the year 2014 it was 90.39%. Nonfinancial subjects substituted deposits with longer maturity to deposits with shorter maturity. For example, part of deposits with maturity of nonfinancial subjects presented in January 2009 32.12% and in December 2014 8.62% on total deposits.



Figure 5 Average part of individual types of deposits of nonfinancial corporations on total deposits of nonfinancial corporations

Source: Own data processing based on data from NBS

The analysis shows us that deposits of nonfinancial subject are the second important source of primary financing of banks in Slovakia. There is the biggest demand after the deposits on demand and deposits with maturity.

3 Conclusion

In this paper we have attended to enquiries of analysis of trends of savings in Slovakia. We showed the importance of deposits for banks as a stable source of financing. There is also a detailed analysis of total deposits in Slovakia, especially deposits of nonfinancial subjects. We showed a trend of reswitching from term deposits to non-term deposits. It means that economic subjects preferred deposits with shorter maturity than deposits with longer maturity. It points to importance of liquidity for nonfinancial subjects in that time.

Acknowledgements

This paper was supported by the Slovak Scientific Grant Agency as part of the research project VEGA 1/0446/15

In 2004 SR with 9 countries became a member of EU. The proposed project fills the gap in current empirical literature on development of these banking sectors (BS). Research will be carried out in several areas. Firstly, will be examined structure of BS where banks of new EU member states operate. Will be used recent theoretical models and gained new knowledge on competition, stability, performance and banks efficiency and determinants that influenced development of credit and deposit market for last 10 years. Secondly, new theoretical framework for measuring bank efficiency in incorporation of credit risk in form of non-performing loans

based on the use of parametric and non-parametric methods will be created. Realized research fills gap in current scientific research area, which describes relationship between development of BS and economic growth in surveyed countries.

References

AHLSWEDE, S. 2012. Poised for a comeback: Bank Deposits. Global Financial Markets. Deutsche bank DB Research, Germany. Available online: <http://www.dbresearch.com/PROD/DBR_INTERNET_EN-

PROD/PROD00000000287475/Poised+for+a+comeback%3A+Bank+deposits.PDF>.

- European system of accounts ESA 2010. Luxembourg: Publications Office of the European Union, 2013.
- Európsky systém účtov ESA 1995. December 1995, Available online: http://www.rozpocet.sk/app/docFile?docFileName=/docs/ESA_1.doc.
- Manual on Sources and Methods for the Compilation of ESA 95 Financial Accounts. 2011. 2nd Edition. Available online: http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-RA-11-004/EN/KS-RA-11-004-EN.PDF>.
- National Bank of Slovakia. Vklady prijaté v aktuálnom mesiaci a ich úrokové miery nové obchody. Available online: ">http://www.nbs.sk/sk/statisticke-udaje/menova-a-bankova-statistika/statisticke-udaje-penaznych-financnych-institucii/vklady>">http://www.nbs.sk/sk/statisticke-udaje/menova-a-bankova-statistika/statisticke-udaje-penaznych-financnych-institucii/vklady>">http://www.nbs.sk/sk/statisticke-udaje/menova-a-bankova-statistika/statisticke-udaje-penaznych-financnych-institucii/vklady>">http://www.nbs.sk/sk/statisticke-udaje/menova-a-bankova-statistika/statisticke-udaje-penaznych-financnych-institucii/vklady>">http://www.nbs.sk/sk/statisticke-udaje/menova-a-bankova-statistika/statisticke-udaje-penaznych-financnych-institucii/vklady>">http://www.nbs.sk/sk/statisticke-udaje-penaznych-financnych-institucii/vklady>">http://www.nbs.sk/sk/statisticke-udaje-penaznych-financnych-institucii/vklady>">http://www.nbs.sk/sk/statisticke-udaje-penaznych-financnych-institucii/vklady>">http://www.nbs.sk/sk/statisticke-udaje-penaznych-financnych-institucii/vklady>">http://www.nbs.sk/sk/statisticke-udaje-penaznych-financnych-institucii/vklady>">http://www.nbs.sk/sk/statisticke-udaje-penaznych-financnych-institucii/vklady>">http://www.nbs.sk/sk/statisticke-udaje-penaznych-financnych-institucii/vklady>">http://www.nbs.sk/sk/statisticke-udaje-penaznych-financnych-institucii/vklady>">http://www.nbs.sk/sk/statisticke-udaje-penaznych-financnych-institucii/vklady>">http://www.nbs.sk/sk/statisticke-udaje-penaznych-financnych-institucii/vklady>">http://www.nbs.sk/sk/statisticke-udaje-penaznych-financnych-institucii/vklady>">http://www.nbs.sk/sk/statisticke-udaje-penaznych-financnych-institucii/vklady>">http://www.nbs.sk/sk/statisticke-udaje-penaznych-financnych-institucii/vklady>">http://www.nbs.sk/sk/statisticke-udaje-penaznych-financnych-financnychinacnychinacnychinacnychinacnychinacnychinacnychinacnyc
- National Bank of Slovakia. 2013. Analýza slovenského finančného sektora za rok 2013. Bratislava: NationalBank of Slovakia. Available online: <http://www.nbs.sk/_img/Documents/_Dohlad/ORM/Analyzy/protected/AnalyzaSFS2013.p df>.

Dynamic Auctions

CHRISTIAN MARTIN HOFFMEISTER¹ – MARTIN UŽÍK²

Technical University of Košice, Faculty of Economics Slovak Republic Berlin School of Economics and Law Institution Germany

Abstract

In the field of marketing strategies, the auction is a popular instrument to sell a certain number of goods efficiently. The flower market in the Netherlands for instance is using auctions for a long time. Mainly private Internet auction platforms like eBay Inc. became more famous in the 1990s. Airline companies were one of the first, which used dynamic auctions to sell their flight tickets. Over the years more sectors wanted to profit by using this instrument like the hotel and touristic industry. In this paper we mainly focus on dynamic auctions as used by Airlines. With the first-price auction and the second-price auction we review two different models of auctions. Both models can evolve optimal allocations of the goods depending on the situation, the framing and the purpose. In general the ambition of the described models is to maximize the profit of a seller of one or more similar goods by finding the optimal allocation to the buyers over multiple periods. By varying the form (framing) of the auction the optimal results can be controlled. In dependence of the framework the seller or auctioneer can influence or at least approximate the behavior of the buyers. However, different cases require different kinds of optimal auctions. In the described model the first-price auction as well as the second-price auction result in optimal allocations, if all side conditions can be fulfilled. In general the implementation of the second-price auction is easier, because the strategies of the bidders can calculated simpler. For the first-price auction the credibility of the seller is necessary. Particularly, in relation to the practice the optimal auction seems to be a suitable alternative to traditional price-setting mechanisms.

Key words: Auction, First-Price, Second-Price, Bid, Revenue

JEL Classification: D440

1 Introduction

In the field of revenue management, dynamic auctions represent a sales strategy of goods. After the clarification of the term revenue management, different forms of auctions will be discussed, particularly the form of dynamic auctions. The following chapter will present a mathematical model of a dynamic auction as published in the working paper "Optimal Dynamic Auction for Revenue Management" (Vulcano, Ryzin and Maglaras, 2002). In the third chapter an analysis of this model will be conducted, enabling to identify potentials for expansion and improvement as well as comparisons. Due to opposing perceptions and focuses of different authors, one can find inconsistent definitions of revenue management in the literature (Talluri and van Ryzin, 2004, Popescu and Bertisma, 2000). The following definition is generally accepted and even refers to the field of airlines, where the conception of revenue management originates: "Revenue Management is the art and science of predicting real-time customer demand at the micromarket level and optimizing the price and availability of products" (Cross, 2011). The objective is to maximize the profits gained by selling a number of the same or similar products in a specific time frame, for instance flight tickets. Tourists book safely and in advance (vacation / in combination with a hotel). Businessmen, on

¹ Dipl. Econ. Christian Martin Hoffmeister, Memeler Straße 5, 50735 Cologne, Germany, christian.hoffmeister@student.tuke.sk

² Prof. Dr. Martin Uzik, Badensche Straße 50-51; 10825 Berlin, Germany, martin.uzik@hwr-berlin.de

the other hand, usually book several reservations for a single flight. In order to take measures for counteractions, airlines were forced to introduce mechanisms as overbooking or dynamic auctions (Brumelle and McGill, 1993). From that time on, the term revenue management includes the fields of dynamic pricing, supply, advertisement as well as distribution and was adapted by diverse other industries, such as the hotel or rental car sector (McGill, 1999). Auctions as a sales instrument are divided into static and dynamic auctions. In the former case, auctions are being done once and disguised, meaning without information about other biddings. The latter type of auction functions with a minimum-bidding price, which can be surpassed until the end of the auction. Depending on the rules, the highest bidder usually wins. Further, one distinguishes between first-price auction and second-price auction (Vickrey-auction), where the static form is common. The first-price auction leads to the winner paying his bid, whereas the second-price auction leads to a payment of the second highest bid (Matthews, 1990). Referring to the revenue management, dynamic auctions are indeed a static form of auctions, which are called "dynamic" only because a series of bids is being made consecutively over a period of time.

2 Model

2.1 Fundaments and structure of the model

The objective of the following model (Vulcano, Ryzin and Maglaras, 2002) is to maximize profits by selling several homogenous goods over a period of time. The listed mathematical assumptions are the basis of the model: All vectors are valid in the range \mathbb{R}^n_+ . v_j designates the j-th component of vector v and v_j all components except j. The value of the vector components decreases with larger indices. This means, for a vector v that $v_{(1)} \ge v_{(2)} \ge \cdots \ge v_{(n)}$. A function is called rising (falling) when it is not falling (rising). In the initial situation a certain quantity of a good is to be sold in a limited period of time. For this purpose a sequence of auctions is carried out in succession, in each of which a part of the total amount is auctioned. These auctions are denoted by t = T, T-1, ...1, where T describes the first and 1 the last auction.

The time after the last period is denoted by t = 0. The buyers or bidders will be divided over the entire period of time. In period t N_t risk-neutral bidders are added, without any influence or knowledge of the point of time. N_t is a non-negative discrete random variable, that is distributed over a known probability function $g(\cdot)$ with $\{0, ..., M\}$ for all M > 0 and starts strictly positive.

Each bidder participates in exactly one auction period in order to prevent bidders adjusting their behavior in response to the conduct of their competitors, or - in case of failure - to participate in a later auction period again.

The aim of each bidder is to obtain one unit of a good at most while not paying more than his individual reservation value v_i^t , where $1 \le i \le N$. Reservation values are private information of each bidder, which represent independent and identically distributed samples of a distribution $F(\cdot)$.

The course of $F(\cdot)$ is strictly rising and the distribution has a density function $f(\cdot)$ over the range $\{\underline{v}, \overline{v}\}$, with $F(\underline{v}) = 0$ and $F(\overline{v}) = 1$. Without losing generality, it is always assumed that $\underline{v} = 0$. v is used as a random vector of the value estimates (from the seller's perspective) as well as for its realization. Other assumptions are used to simplify. Thus, the functions F and g should be independent of time t. It is assumed that g and F are common knowledge for

all buyers and the seller, i.e. publicly accessible knowledge. In addition, each buyer knows his own (private) value v_i . The uniform residual value for the seller at time t = 0, let $v_0 = 0$. The seller wants to maximize its expected incomes over a suitable auction mechanism. According to the goods for which the auction is to be conducted, the auctioneer determines the mechanism. This consists of a set of rules, which depend both on the time t and on the remaining amount x of the material at the beginning of each period. With the aim to maximize his expected utility, each bidder selects his bid or his strategy. The decision is based on the knowledge of the bidder, on the distribution functions F and g, on his private appreciation and on the established rules. After the submission of bids, it is determined according to the rules what number of units will be auctioned during this period and which payments have to be settled for it.

2.2 Results from the theoretical consideration of optimal auctions

The following analysis is based on fundamental knowledge of optimal auctions (Maskin and Riley, 2000; Myerson, 1981; Riley and Samuelson, 1981; Vulcano, van Ryzin and Maglaras, 2002). The starting point is an auction for one or more similar goods with n buyers. It is considered that any buyer wants to buy at maximum one good, that he values with v_i , and this appreciation is his private information. The fact that the values v_i are distributed independently identical to the function F, however, is known to all buyers. The allocation for buyer i is $q(v_i, v_{-i})$ and has the value 1 if buyer i gets a good, and 0 if not. The allocation of all purchasers are combined to form a vector: $q(v) = (q_1(v_1, v_{-1}), \dots, q_n(v_n, v_{-n}))$. One considers only symmetrical equilibriums, in which all have the common distribution function F and the same bidding strategy.

The expected income of the seller can only be expressed by terms of allocations without payments:

$$E_{v_i,v_{-i}}[\sum_{i=1}^n J(v_i)q_i(v_i,v_{-i})]$$
(1)

Where $J(v) = v - 1/\rho(v)$ and $\rho(v) = f(V)/[1 - F(v)]$ of the risk rate associated with the distribution function F (Maskin and Riley, 2000).

The result is that all mechanisms, as a result, for each realization of v lead to the same allocation q(v), also provide the same expected profit. This is called revenue equivalence theorem (Myerson, 1981; Vulcano, van Ryzin and Maglaras, 2002). Expression (1) can be further used in the search for the optimal mechanism. To this end, one chooses the allocation rule $q^*(v)$, that maximizes the $\sum_{i=1}^{n} J(v_i)q_i(v_i, v_{-i})$, taking into account all constraints (e.g. $q_i \leq k$, with k given units). The following general assumption on the distribution function F should apply here as well. "Assumption 1: J(v) is strictly increasing in v." (Vulcano, van Ryzin and Maglaras, 2002). If $v^* = \max_{v} \{V: J(v) = 0\}$ defined as (2) and $v^* = \infty$ applies to the case that J(v) < 0 for all v, then it follows from (1) that it can never be optimal to a buyer whose value is $v_i < v^*$ to allocate one unit. This simple observation provides the basis to use (2) as the optimal reservation price in an auction with k units.

3 Analysis of the model

The application of the mentioned method of auction design requires an implementable mechanism, which produces the optimal allocation $q^*(v)$.

There follows a two-step analysis, where first the optimal allocation $q^*(v)$ is to be found and

in the second step an applicable mechanism is constructed. The latter then yields for each realization of v precisely this optimal allocation.

3.1 Optimal Allocations

It is important to find the optimal allocation for each period. For this purpose, we define the value function $V_t(x)$ as the maximum attainable expected profit from periods t, t - 1, ..., 1 under the condition that x units at time t are desired. To express the Bellmann equation for $V_t(x)$ in terms of the allocation q(v) use (1) as the expected profit in each period (Vulcano, van Ryzin and Maglaras, 2002)

$$V_t(x) = E_{N_t, \nu} \left[\max_{q} \left\{ \sum_{i=1}^{N_t} J(\nu_i) q_i + V_{t-1}(x-k) : q_i \in \{0,1\}, k = \sum_{i=1}^{N_t} q_i, k \le x \right\} \right]$$
(3)

where k in period t equals the awarded number of corresponding units (Vulcano, van Ryzin and Maglaras, 2002).

Further transformed:

$$V_t(x) = \mathbb{E}_{N_t, \nu} \left[\max_{0 \le k \le x} \{ \sum_{i=1}^k [\Delta R(i) + \Delta V_{t-1}(x-i+1)] \} \right] + V_{t-1}$$
(4)

where the sum is 0, in the case that k = 0. n_t now describes any realization of the random variable N_t and v be a realization of types of buyers.

The following *theorem* (1) then describes the optimal allocation: "For every realization (n_t, v) is the optimal number of assigned units in the state (x, t) given by

$$k_t^*(x) = \begin{cases} \max_k \left\{ 1 \le k \le \min_x \{x, n_t\} : \Delta R(k) > \Delta V_{t-1}(x-k+1) \right\} & if \ R(1) > \Delta V_{t-1}(x), \\ 0 & otherwise. \end{cases}$$

It is optimal to give the $k_t^*(x)$ units buyers with the $k_t^*(x)$ -highest values v_i ."(Vulcano, van Ryzin and Maglaras, 2002)

If the seller can derive the values v_i of the buyers, it can distribute the units optimally by theorem (1). Since $\Delta R(i) = J(v_i)$ for $i = 1, ..., \min_x [x, N_t]$, the optimal number of accepted bids determined by the values v_i ordered and the units gradually the most judgmental bidders are allocated until the value of $J(v_{(i)})$ under the boundary opportunity costs $V_{t-1}(x - k + 1)$ falls. The allocation chance of a buyer increases his appreciation as required by the "Revenue Equivalence Theorem". Finally, a simple optimal allocation exists when the values v of the buyers and their value function $V_{t-1}(x)$ are given. If $k_t^* \ge 1$, results from this fact that V(x) is increasing in x and $\Delta V_{t-1}(x) \ge 0$, that $\Delta R(k_t^*(x)) = J(v_{(k_t^*(x))}) > 0$, and that $v_{(k_t^*(x))} > v^*$, where v^* defines the optimal reservation price for a one-period auction because of (2). For this reason, no vendor shall ever give a unit a buyer with values below v^* .

3.2 Mechanism

The second part of the analysis is concerned with finding an applicable mechanism that leads to the optimal allocation, called the optimal mechanism. Modifications of the first-price and second-price auctions are investigated.

3.2.1 Second-price auction

In second-price auctions with k units to be auctioned to pay the winner the (k + 1)-highest bid (i.e. the first bid, which gets no unit). Therefore, it is to provide their own values for the buyers a dominant strategy. An informal reasoning may show you why that strategy would not be optimal in a simple example case for this situation, since it can lead to non-truthful bids.

The following modification of the second-price mechanism avoids this problem: In each period t, the seller first calculated based on the current amount x the limit v_i . Then he will, if the vector of bids b is given, distribute k units, where:

$$k = \max_{i} \{ i \ge 1 : b_{(i)} > \tilde{v}_i \}$$

$$\tag{5}$$

and k = 0 if $b_{(i)} \leq \tilde{v}_i$.

The winners must then pay the amount

$$b_{(k+1)}^{2nd} = \max_{k} \{ b_{(k+1)}, \hat{v}_k \}$$
(6)

where $b_{(k+1)}$ is the (k + 1)-highest bid and \tilde{v}_k is the limit to obtain the k-th unit. Connections among the bids are prevented by a random arrangement. To simplify equation (5) and (6) are called a modified second-price mechanism. Hence the outcome of this is **Theorem (2)**: "**The** dominant strategy of a buyer in the modified second-price auction for the allocation and payments by equation (5) and (6) are given, to provide their own values. In addition, under this optimal strategy equilibrium is the mechanism [also] optimal" (Vulcano, van Ryzin and Maglaras, 2002).

The modified second-price mechanism above can be seen as a variety of the Vickrey-Clarke-Groves-mechanism, in which the minimum bid that obtains one unit, is equivalent to the price paid by a successful bidder (Milgrom, 2004). The minimum bid corresponds to equation (6), because it must exceed both the (k + 1)-highest bid and the limit of the seller \tilde{v} to still get the k^{th} unit. Due to the fact that bidding one's own value is a dominant strategy, the assumption can be relaxed with respect to the information that hold the purchaser of the distributions of g and F as well as the total amount. Thus, both the assumptions as a whole and the information of the buyer specifically become more realistic. Considering a case in which T = 1, the problem becomes a one periodical auction model with multiple similar units. And since all the remaining values of the unsold units at t = 0 are zero, all margin values are $\tilde{v}_i = v^*$ of the equation (2). Therefore, a standard second-price auction with an optimal reservation price v^* is created due to the mechanism.

3.2.2 First-price auction

In a first-price auction the units to the bidders with the highest bids are distributed, they have to pay their bid. In order to prove that the first-price auction achieved optimal yields, the units must be distributed according to the optimal allocation rule from *Theorem* (1). To show this, it is sufficient that a symmetric equilibrium bidding function of bidders exists, which is strictly increasing in the values of the bidders. Then the bidder could find out by inverting the bidding function of these values based on the bids and thus calculate the optimal number of units. The sequence of a first-price auction will be described. Bidders are informed about the time t, the remaining amount x and about the allocation rule of the seller:

If the vector of bids b is given, the seller will distribute k units, besides $k = \max_{i} \{i \ge 1 : B^{-1}(b_{(i)}) > \hat{v}_i\}$ and k = 0 if $B^{-1}(b_1) \le v_1$. B(·) here represents the equilibrium bidding function, which can be calculated by the seller. The highest bidders will get units and pay their bids. As a result there is **Theorem** (3): "In a first-price auction exists a symmetric equilibrium, strictly increasing bidding strategy $B(v_i)$. Strategy B depends on the current values of x and t from:

$$\widehat{B}_{(v_i)} = v_i - \frac{\int_{\widehat{v}_1}^{v_i} P(v) dv}{P(v_i)} \text{ and } B(v_i) \equiv \lim_{\varepsilon \to 0^+} \widehat{B}(v_i - \varepsilon)$$
(7)

[...] Under this symmetric equilibrium, the first-price auction is optimal" (Vulcano, van Ryzin and Maglaras, 2002).

Bidders cover their bids in the first-price auction, since it is apparent from (7) that B(v) < v, in order to obtain a positive profit. This is to be expected, since the own bids must be paid. The strict increase of $B(\cdot)$ shows that the mechanism is implemented. This means that by inserting of the observed bids b_1, \dots, b_n in the reverse bidding function $B^{-1}(b_i) = v_i$ the seller can calculate the values v_1, \ldots, v_n of the bidders. It should be noted that the first-price auction does not maximize the sum of all current bids and any additional revenue expected gain. Since the seller prefers to compare virtual values $J(v_i)$ with the limit value $\Delta V_t(\cdot)$ and is not regarding the commandments themselves, two phenomena can be observed: On the one hand it may be that the seller accepts bids that are below the threshold when $J(v_{(k)}) >$ $\Delta V_{t-1}(x-k+1) \geq B(v_{(k)})$. On the other hand, it may happen that the seller rejects bids that are higher than the limit, if $B(v_{(k)}) > \Delta V_{t-1}(x-k+1) \ge J(v_{(k)})$. In most auctions, the seller can open up the values of the buyer, by observing the commandments. Then he would have an incentive not to adhere to the established rules, but to submit to the highest bidder an offer that is only minimally less than their bids. For the buyer, it is then worthwhile to accept this offer. If the buyers expect that the seller will behave accordingly in advance, they will not offer as assumed, whereby the equilibrium analysis is invalid (Vulcano, van Ryzin and Maglaras, 2002). If the seller breaks the rules in one of several consecutive auctions, he is no longer perceived as credible by bidders and risking loosing future income. Related to the airlines, these could only use those auctions as a suitable pricing mechanism, if they perform dynamic auctions for many future departures. Faced with the imminent loss of future profits, it is risky for the airlines not to comply with the rules in one period. Finally, the implementation of the allocation rule for the first-price auction is much more complex than for the second-price auction because the seller has to calculate and to invert the equilibrium bidding strategy. In addition, the bidding problem faced by the bidders is rather difficult to handle, because they must take into account the same balance as well as the temporal actions of the seller. It is questionable whether the parties will behave as predicted in this mechanism. Basic properties - that bidders reduce their values and that the seller should not accept any bids that are higher than the marginal cost of the lot to bring buyers to a higher bidding equilibrium – are probably more robust (Vulcano, van Ryzin and Maglaras, 2002).

4 Extensions of the model and further reading

The model has many applications (Ausubel and Crampton 2004, 2006) and modification options. For example, the number of periods can be changed to a minimum of a period. Here, the seller gets the best information about the values of the buyer, so he can now distribute the units optimally. Accordingly, an auction with only one period is more desirable for the seller, assuming a constant number of bidders. If the number of bidders varies, this is an incentive to

keep a series of auctions over several periods to increase the number of bidders. Neither one extreme nor the other one is optimal for the seller, he has to find the right "trade-off" between a rising number of bidders and the simultaneously rising uncertainty about the future number of bidders and their values. A combination of auctions and common mechanisms with list price and quantity control in different variants is conceivable. For example, it can be started with an auction and then switched to list prices with quantity control. Another variant could use both mechanisms alternately in each period. Such is common among airlines: Often auctions are used for ticket sales via Internet, whereas on the counter tickets are sold to the list price. It is a prerequisite for the combination that both mechanisms for the quantity x in the next period have x-catching limits $V_{t-1}(x)$, which is the case here (Vulcano, van Ryzin and Maglaras, 2002). In addition, other effects, such as the concentration of the bidders, the values of demand and volume, the different variability of the estimation of the bidders and the difference in the number of bidders were analyzed and compared with suboptimal mechanisms. One of these suboptimal mechanisms consists of a sequence of standard auctions with reservation price over several periods to which the seller has the amounts previously distributed evenly. Another suboptimal mechanism is the DLPCC (Vulcano, van Ryzin and Maglaras, 2002) mechanism (dynamic list-price, capacity-control), not only the quantity but also the prices will be adjusted in each period, unlike the traditional LPCC model. The results of an example for the calculated concentration of the buyers can be found in Figure 1.

i	Revenue for Differe	ent Concentration	on of Buyers						
Buyers per period	Number	Optir	mal auction rev.	DLPC	C rev.	Precommitting auction rev.			
	of periods	Mean	95% CI	Mean	Gap	Mean	95% CI	Gap	
1	64	11.410	(11.390, 11.430)	11.412	0.16%	_			
2	32	11.434	(11.420, 11.448)	11.401	0.41%	_	_	_	
4	16	11.480	(11.466, 11.495)	11.382	0.98%	10.162	(10.146, 10.177)	11.49%	
8	8	11.534	(11.511, 11.556)	11.348	1.79%	10.822	(10.803, 10.841)	6.17%	
16	4	11.621	(11.602, 11.639)	11.292	2.99%	11.311	(11.296, 11.327)	2.66%	
32	2	11.722	(11.704, 11.740)	11.201	4.59%	11.639	(11.624, 11.654)	0.71%	
64	1	11.796	(11.780, 11.812)	11.060	6.36%	11.796	(11.780, 11.812)	0.00%	

Figure 1 G	Gains for	different	concentrations	of bidders	(Vulcano,	van	Ryzin and	Maglaras,	2002)
------------	-----------	-----------	----------------	------------	-----------	-----	-----------	-----------	-------

From the Figure 1 results on the one hand, that the optimal auction profit increases with the concentration of bidders, and on the other hand, that the gain by the DLPCC mechanism decreases when the bidders are spread over a few periods. This is because the mechanism DLPCC over several periods cannot be worse than one, because you can set the same fixed price for the additional periods.

It is also conceivable to extend the original model to the effect that strategic actions of the bidder are allowed, concerning the period in which they bid. With this option of the bidders, the seller can use this mechanism to receive perfect information about the values of the bidders. Afterwards he can distribute just as perfectly as in a single-period auction the units with all N bidders at once. Similarly also Bulow and Klemperer modeled a mechanism that allocates units exactly to the C-highest bidders by decreasing and increasing dynamic list prices (Bulow and Klemperer, 1994). They argued that higher evaluative bidders bid first and therefore first get assigned units. Thus, the optimal allocation is generated. For example, by a sequence of second-price auctions, in which in each period a reservation price above v^* is selected and in the last period exactly v^* , the bidder be tempted to bid in earlier periods. The probability of winning and not the payments are directly affected by the bid, the higher the

reviewer; provide first and also get first units, as it is optimal (Bulow and Klemperer, 1994). The strategic actions of the bidder will be very similar formulated as in other papers concerning this model, with the difference that bidders can determine the time of purchase as well as their exit date of their entry time point. Result is that representing the solution as a generalization of the solution for the static case (Pai and Vohra, 2008).

5 Summary and Conclusion

The optimal dynamic auction provides an important theoretical evaluation measure for traditional "Revenue Management" - mechanisms and simple auction schemes. The results reveal important insights into how the optimal auction is carried out. It is important that the number of to be distributed units per period depends on the quality of the commandments and of the opportunity cost of the crowd, and that the seller also takes into account to refuse bids that initially seem to be profitable in order increase the equilibrium bid. In relation to the practice the optimal auction seems to be a suitable alternative to traditional price-setting mechanisms. For example, it is relatively easy for the second-price case to calculate the optimal strategies efficiently. Possibly DLCPP mechanisms can (almost) be optimal (Vulcano, van Ryzin and Maglaras, 2002), e.g. if only one bidder offers, the amount is not limited or the sales volume is very large. A very different approach is an extension of the analysis to a production problem, in which the contractor wants to control how many units he produces, stores for the next period or currently sold through an auction (Vulcano, van Ryzin and Maglaras, 2002). Overall, the dynamic auction in revenue management is an interesting, extendible approach for the optimization of sales strategies, even though not all realistic aspects and their interactions are considered simultaneously.

References

- AUSUBEL, L. and CRAMTON, P. 2004. Auctioning many divisible goods. In: *The Journal* of the European Economic Association. Vol. 2, No. 2-3, pp. 480-493.
- AUSUBEL. L. and CRAMTON, P. 2006. *Dynamic Auctions in Procurement*. The Handbook of Procurement. Cambridge, England: Cambridge University Press.
- BRUMELLE, S. L. and MCGILL, J. 1993. Airline seat allocation with multiple nested fare classes. In: *Operations Research*. Vol. 41, No. 1, pp. 127–137.
- BULOW, J. and KLEMPERER, P. 1994. Rational frenzies and crashes. In: *The Journal of Political Economy*. Vol. 102, No. 1, pp. 1-23.
- CROSS, R. 2011. Revenue Management. Crown Business.
- MASKIN, E., RILEY, J. and HAHN, F. 1989. Optimal multi-unit auctions. The Economics of Missing Markets, Information, and Games. Theory of Auctions. Oxford University Press, pp. 312-335.
- MATTHEWS, S. A. 1990. A Technical Primer on Auction Theory. Mimeo. Northwestern University.
- MILGROM, P 2004. Putting Auction Theory to Work. Cambridge University Press.
- MYERSON, R. 1981. Optimal auction design. In: *Mathematics of Operations Research*. Vol. 6, No. 1, pp. 58-73.
- MCGILL, J. I. and VAN RYZIN, G. 1999. Revenue Management: Research Overview and Prospects. In: *Transportation Science*. Vol. 33, No. 2, pp. 233-256.
- PAI, M. and VOHRA, R. 2008. Optimal Dynamic Auctions. *Discussion Paper, Center for Mathematical Studies in Economics and Management Science*. No. 1461.
- POPESCU, I. and BERTISMA, D. 2000. Moment problems via semidefinite programming:
Applications in Probability and Finance. Working Paper. INSEAD, 2000/27/TM.

- RILEY, J. and SAMUELSON, W. 1981. Optimal auctions. In: *The American Economic Review*. Vol. 71, No. 3, pp. 381-392.
- TALLURI, K. and VAN RYZIN, G. 2004. Revenue Management under a General Discrete Choice Model of Consumer Behavior. In: *Management Science*. Vol. 50, No. 1, pp. 15-33.
- VULCANO, G., VAN RYZIN, G. and MAGLARAS, C. 2002. Optimal Auction for Revenue Management. In: *Management Science*. Vol. 48, No. 11, pp. 1388-1407.

Policy Solutions for the Debt Crisis and their Reflections in the Real Economy

BORIS HOŠOFF¹

Slovak Academy of Sciences, Institute of Economic Research Slovak Republic

Abstract

In this short paper we provide explanation for different policy outcomes in advanced economies even though responsible authorieities adopt similar or the same measures and strategies to fight deflation and the debt crisis. Analysis of main factors leading to the onset of financial crisis has shown that there was greater influence from the side of moral hazard, financialization and the efforts to maximize bank profits than from the side of governments and their expenditures or deficits. Broadening of budgetary unbalances came in line with the bail-out programmes and the slowdown of economic growth. In global economy are financial subjects and their activities bundled with each other and with the help of existing monetary arrangements they have transmitted problems on to the non-financial subjects, especially governments and souvereign states. Sectoral analysis and comparison of selected advanced economies has helped us to identify possible incorrect assumptions as reasons for different consequences of policy actions accomplished by responsible authorities.

Key words: Debt, Deflation, Macroeconomic Policy, Demand

JEL Classification: E21, E31, E41, H31

1 Introduction

Debt crisis in the Europe has provided ample room for discussions about its causes and perhaps more importantly also about the adequacy of chosen policies and their consequences. Debt and deflation problems are part of a broader financial and macroeconomic crisis affecting besides the EMU also other advanced economies, particularly Japan and the USA. Comparative analysis of preffered policy mix and real economy developments underpinned with empirical evidence could expand our knowledge about the new phenomenas and their implications for economic theory.

2 Development of the debt crisis

The debt crisis in Eurozone was preceded by global financial crisis during the years 2008-2009. After the US housing market bubble bursted in 2007, many bank balances in countries around the world remained negatively affected by the bad loans. One of the main causes of the problems were sub-prime mortgages serving as the basis for expansion of US housing market. After the FED raised official interest rates to 5,26% in the summer of 2006 (from 1% in 2004), many borrowers found themselves positioned as nonpayers, leading to widespread insolvency, both of the mortgage lenders and creditors, as well as those subjects which bought these assets in the secondary market. In globalized world economy, sub-prime loans landed up in the portfolios of other banks and financial corporations, which were binding these mortgages together with other loans and hence creating new financial products – mortgage backed securietes (MBS). Fiancnial instability was

¹ Ing. Boris Hošoff, PhD., Šancová 56, 81 105 Bratislava, Slovak Republic, boris.hosoff@savba.sk

magnified with the existence of other financial derivatives and practices such as securitization, even thought derivatives are used to hedge risk and we would expect them to softer the crash (Akerlof, 2013). Expanded trading with these financial instruments amplified the insolvency around the global financial system.

Financial institutions and banks remained burdened with excessive debts after the outbreak of the crisis, what threatened their very existence. Therefore, they had to limit provisions of new loans, thus the threat of bankruptcy was extended also to non-financial economic subjects. Shortages of new loans and mortgages negatively affected real estate markets. Imbalance between the demand and supply begun further to intesify and the consequence was a massive slump in home prices.



Note: Data for Ireland on the right axis

Althought the average home price index for the entire EU rebounded in 2014, the decline since 2007 had such a big magnitude, that housing markets were not able to fully recover yet. It is important from household financial wealth and confidence point of view, because houses are very often largest assets owned by the households. Decline in the value of such collateral resulted in significant decrease of households wealth, while limiting the possibilities for drawing already scarcely obtainable loans from banks. The mortgage crisis gradually took the form of banking crisis, which revealed several interesting findings.

In particular, there were such interventions by public authorities and the state to the functioning of market forces and the economy, that were only hardly imaginable before the 2007 and in the light of mainstream liberal economics. Selected financial institutions were declared as "too big to fail" and were given direct financial help from the state and central banks, while many of them were partly or fully nationalized.

Another lesson learned is the fact that at the beginning of the financial crisis (2007-2008) Eurozone countries on average did not exhibit high budget deficits or high budget expenditures and there

even absented current burden in the form of high public debts. From the basic and immediate causes of the financial crisis point of view there was greater influence of moral hazard and efforts to maximize the profits on the side of financial institutions and rating agencies than on the side of states and governments. It is best illustrated by the fact, that financial crisis as such originated in the USA - in a country where there is not at all such a involvement of the state in the economy as in the continental Europe, which is paradoxically² most affected by the debt crisis. This reflects both the vulnerability resulting from heterogeneous structure and imperfect form of the European monetary union in comparison to the USA, but also poorly designed economic policy strategy in Europe based on incorrect assumptions and expectations of responsible authorities.

Financial crisis had essentially provoked the debt crisis as it brought about the increase in budget deficits and public debts as results of (i) strategy when the states have decided to rescue the financial system by the public money and (ii) recession accompanied with large shortfalls in the tax revenues³. From this perspective we can point out that public deficits and debts incurred after the year 2007 have not structural nature, imbalance of which should be tackled whith the help of massive fiscal restriction and changes in public transfers.



Source: Eurostat (2015)

The European Union as alliance of 28 countries had in the year 2014 average public debt on the level of 86,8% of GDP, while in the case of the EMU the debt numbers were little bit higher, at around 92% of GDP (Eurostat, 2015). The average numbers of public debt increased from around 60% of GDP in 2007, however, not as much as a result of irresponsible budgetary policies, but rather as a result of necessary fiscal interventions and negative imlications of recession on budget revenues in particular countries.

² From the point of view state involvement in the economy

³ Accompanied with higher budget expenditures as a consequence of rising unemployment

On the other hand we have to underline the development of the Greek economy as symptomatic for the debt crisis in Europe. Economy of Greece could not cope with the deficits well before the European debt crisis. After the Euro was introduced in 1999, foreign investors started in large to finance domestic demand in the peripheral countries, including Greece, while these countries experienced significant reduction of interest rates. Households and businesses were suddenly able to borrow at historically low prices, allowing residents of Spain, Portugal, Ireland or Greece to achieve higher standards of living, incomparable with the lives of previous generations. But given the relatively poor economic performance of these peripheral countries, they started borrowing too much from abroad, hence supporting a creation of unsustainable external imbalances. After the outbreak of the financial crisis, banks have begun to demant higher interest rates, making the repayment of debts very difficult, especially for these currently most indebted countries of the European periphery. Not surprisingly, countries most affected by the debt crisis were those that have created the greatest imbalances. In a monetary union such as the EMU, member countries do not have the opportunity to simply respond on the creation of imbalances by exploiting its own monetary policy or currency devaluation and swiftly achieve competitive advantage to compensate the pressure of growing external imabalances.

Skepticism about the sustainability of public finances pushed European governments into significant expenditure cuts and deficits reduction, despite the need of fiscal assistance during the crisis. In this context have deficiencies of EMU manifested. European monetary union lacks equivalent to the federal budget, existing for example in the USA, which would offset the fiscal consolidation programmes imposed (by the financial markets and non-national institutions) on the member states. Fiscal authorities in Europe have had to consolidate public finances despite the fact, that interest rates were gradually reduced to historical lows, making the refinancing of higher deficits and debts easier and cheaper then ever before. In this context it is important to underline the fact, that EMU had chosen a different policy path than other two advanced economies, specifically USA and Japan.

3 Sectoral analysis of GDP and chosen macroeconomic policy mix

Sectoral analysis of final demand components points to some important differences that may provide an answer to the question of why the economies of Japan and USA have on average grown faster than the EMU during the Great Recession. Economies of EMU, Japan and USA have been behaving differently despite the common process of deleveraging, higher deflationary pressures and growing public debts. Economies of UK, Japan, or USA were able to reach positive contributions to GDP growth from households and government consumption, as well as capital formation, as can be seen on the next Figure 3.



Figure 3 Final demand components contribution to GDP growth (%), 2012 Source: OECD, National Accounts

During the crisis times could EMU positively contribute to final demand of advanced economies only through the net export. Some Eurozone member states were thus able to support GDP growth through export (eg. Germany, the Netherlands, Austria), but on the other hand⁴, there were countries such as Spain or France, where the economic growth was negatively influenced by external imbalances.

Fixed exchange rates and the impossibility of currency adjustment are creating permanent imbalances within the EMU, with the only solution being an internal devaluation and wage level adjustments. These are rather painful solutions with regard to the households, which are further weakening aggregate demand. Trade relations between countries such as Germany, the Netherlands or Austria on the one hand and Spain, Portugal or Greece on the other have implications manifesting through longterm external imabalances. Countries recording trade surpluses do not spend more⁵ and do not increase their real exchange rates. On the other hand, countries with trade deficits are not able to cut them down without having to get into a recession, which could sometimes last awfully long time. As a result of the unwillingness or inability to change these monetary conditions, it was up to the financial crisis to stop such an accumulation of deficits and debts.

An alternative, at the level of individual EMU member states, to changes in the exchange rates and fiscal expansion are measures leading to reduction of profits, labour costs and budget deficits, which have negative consequences for budgetary balances. This strategy is weakening aggregate

⁴ All member states are not table to achieve positive trade balance simultaneously

⁵ Domestic demand is not strong enough to bring down the trade surplus

demand and is quite difficult to politically accept, especially when it leads to limited access to social and public services. In the short and medium term are these developments inevitably manifested through an increase in deflationary pressure.

This strategy is relentless by the fact, that it can lead to deeper recession⁶ and thus to great extent complicate the achievement of economic policy objectives, such as promotion of GDP growth and employment. European monetary union is in this respect particularly vulnerable and for example in comparison to USA imposes on its members greater challenges in terms of internal restructuring, large-scale innovations and bolstering of real competitiveness (not the one supported by currency depreciation). These measures and targets are realistically possible to reach only in the long-term horizon, leaving economies trapped in stagnation and deflationary pressures during short and mid-term horizons.

When comparing economic policies conducted by respective authorities in advanced economies, we can find common features as well as important differences explaining divergent outcomes of adopted macroeconomic strategies. In the case of monetary policy and the strategy of quantitative easing we can observe similar procedures adopted in the USA, as well as in Japan and EMU. But at the fiscal policy level there are substantial differences among these three advanced economies, perhaps explaining differences in developments of business cycles between respective economies. Empirical evidence suggests that monetary policy alone (even in its extreme form of quantitative easing) can not reliably boost private consumption and sustainable economic growth. These goals could not be reached without active fiscal policy. Japan and the USA, on the contrary to the EMU, have always been able to respond on the development of business cycle and in the case of recession or higher deflationary pressures (where necessary) adopted measures to increase the thresholds for bublic debts - so that they could effectively support aggregate demand. The US Congress, for example, was always able to act unless it was necessary to permanently rise, temporarily extend, or revise the deficition of the upper limit for public debt (ie. Fiscal cliff)⁷. Not to mention Japan, which has been prolonging fiscal expansion to stimulate aggregate demand for years, if not decades. But Europe has applied different strategy, not allowing budgetary deficits and expansion under the rules of Fiscal Compact and The Treaty on Stability, Coordination and Governance in the Economic and Monetary Union. Automatic mechanisms to reduce deficits and public debts are applied right at the time when aggregate demand and economic growth are dampened due to the weakened private demand. Moreover, whilst there is common monetary policy and budgets of member states are bound by strict rules, EMU does not have federal budget that could compensate for the fall in aggregate demand caused by the recession and imposed financial rules at the national level. Implications of this economic policy mix on the economies of EMU countries are well known and documented (Arestis and Pelagidis, 2010).

Based on the empirical evidence and theoretical argumentation mentioned above we can conclude, that chosen economic policy strategy aimed to address the negative impact of the financial crisis and the Great Recession in the EMU has missed its intended targets. The effort to consolidate public finances has led to precisely opposite results in terms of economic growth stagnation and deepening of public debts. Economic policy concentrated in one direction and purely on monetary stimulus could not solely boost consumption or investments in the real economy.

⁶ As in the case with more expansionary mode of fiscal policy

⁷ Since 1960 it was revisited 78 times



CEFE 2015 - Central European Conference in Finance and Economics

Note: M3 (Broad Money), Seasonally adjusted

As documented in the Figure 4, despite the extreme increase of monetary base, the supply of money stayed virtually unchanged and its growth lagged significantly behind. On the contrary, before 2009 it was determited that these two variables have moved together and the increase of monetary base by the ECB was equally reflected in the real economy money supply. However the inception of the Great Recession in Europe (2008) supported divergent tendencies in the development of above mentioned monetary indicators. In this regard we can argue that if the private sector is a subject to significant financial difficulties and to the imbalance between assets and liabilities caused by the bursting of the bubble financed through debt, it may be that private subjects are not willing to borrow even at zero interest rates. As it turns out, decrease in the proportion of debt to disposable income of households in advanced economies took place regardless of the decrease in interest rates. The share of debt on net disposable income of households decreased between the years 2008-2013 in almost all advanced economies, not leaving out Japan and USA, as well as several European countries including United Kingdom, Germany, Spain, Portugal, Ireland, Denmark, Austria and also Hungary (OECD, 2015). Other European countries like Slovak Republic, Czech Republic, Poland, or France and Italy recorded growth of the debt on disposable incomes during this respective time period, suggesting perhaps better financial health of the households and not so big need for deleveraging as in the former group of countries. It does not mean that the latter group of countries will not experience difficulties with repayment of debts if they take on too much debt in years to come 8 .

Despite the large monetary expansion, monetary policy has failed to increase the supply of money and convince private economic subjects to start borrowing and spending again. The causes of weak demand for credit may be hidden in addition to deleveraging also in the lack of investment opportunities associated with weakened aggregate demand brought about high unemployment and fiscal contraction. We can argue that indebted private economic subjects behaved rationally and it

⁸ The shock in the form of deleveraging can bring rising interest rates

is legitimate to stabilise their financial balances, or even get them to surplus. But this behavior has undiserable aggregate impact on the entire economy, because saved money are not getting back into circulation (through bank intermediation) as is usual and the economy gets by this means into a deflationary spiral. On the one hand there are private subjects that increase their own savings and repay their debts, on the other hand, however, economy lacks someone who would borrow these funds, spend them and thereby activate the multiplier to get economy on the path of expansion. We assume that this task should be accomplished by the state authorities.

As long as households do not increase their demand for loans and companies see no investment opportunities, easy money and monetary expansion may not be sufficient to expand the business cycle. In this case it is necessary to conduct large-scale reforms aimed at increasing productivity and innovations (which could create new investment opportunities). These are essentially structural and supply side reforms, that are time consuming and very hard to implement. However in the absence of these reforms could monetary expansion miss the real economy⁹ and contribute to speculations and bubbles in the asset markets. Despite the extreme growth of the monetary base in several rounds of quantitative easing policy, loans to private sector dropped significantly.





Note: Net amount of liabilities in which the sectors Non-Financial corporations and Households and Non-Profit institutions have incurred along the year. Millions of national currency.

This means that the central bank may indeed pour into banking system any amount of money, as long as the private sector records aggregate financial surplus (ie. generates savings) there is no demand for loans and supply (reserves) generated by the central bank remains inside the banking

⁹ And adequate support for employment and household income which remain suppressed and affected by bad experiences brought by the crisis

system. Financial intermediation does not work properly and money do not flow to the real economy. Deflationary pressures resulting from private sector deleveraging can not be handled by central bank itself. It is necessary to build up aggregate demand and the only subject who can do this is a state authority. Just like central bank acts as lender of last resort so should state act as borrower of last resort (Koo, 2011). In doing so, government could create additional demand for savings and subsequently spent them, hence making possible for money to flow into the real economy. Restored money multiplier could create new revenues, thereby facilitating debt repayments for the private sector and thus faciliate conditions for the recovery and expansion of the business cycle.

4 Conclusion

Analysis of empirical evidence from the financial crisis and the Great Recession episodes has supported arguments for the active role of the state authorities and fiscal policy particularly when dealing with the negative consequences of debt and deflation. Our findings are in line with the arguments of Koo, C.R., that the state should act as a borrower of last resort during the times of balance sheet crisis and constrained household demand. We have broaden the theoretical framework of systemic interconnections between economic variables like debt, money supply and aggregate demand, which helped us to explain different outcomes of policy actions taken by respective authorities in developed countries.

Acknowledgements

This paper was supported by the project VEGA No.: 2/0104/12: *Makroekonomické aspekty dlhovej krízy - pripravenosť krajín čeliť novým výzvam*.

References

- AKERLOF, G.A. 2013. The Cat in the Tree and Further Observations: Rethinking Macroeconomic Policy II. Washington, D.C.: International Monetary Fund.
- ARESTIS, P. and PELAGIDIS, T. 2010. The Case Against Deficit Hawks, Absurd Austerity Policies in Europe. In: *Challenge*. Vol. 53, No. 6, pp.54-61.
- EUROSTAT, 2015. [Online Database]. Available online: http://ec.europa.eu/eurostat/data/database online:
- KOO, C.R. 2011. The world in balance sheet recession: causes, cure and politics. In: *Real-world Economics Review*, No. 58, pp.19-37.

OECD, 2015. [Online Database]. Available online: http://stats.oecd.org/

Silver Economy – Emerging Business Opportunities

VERONIKA HVOZDÍKOVÁ¹ – GABRIELA DOVÁĽOVÁ² – KRISTÍNA PETRÍKOVÁ³ ^{1,2}Slovak Academy of Sciences, Institute of Economic Research Slovak Republic ³Faculty of National Economy of University of Economics in Bratislava Slovak Republic

Abstract

Is ageing population a burden to public finance and society or can it represent an opportunity to expand business activities or even to facilitate the growth of economy? The aim of the paper is to call attention to the other comprehension of ageing phenomenon. Mainstream studies on ageing rarely see this inevitable population change as a potential source of economic opportunity. Adaptation is a key word in this context. Adaptation to the needs of elderly population means that orientation on production and services designed for the growing number of older consumers will ensure stable market share in the environment of changing consumer preferences (in aggregate macroeconomic perspective the significant changes in the number of seniors will shape new consumption patterns that will be reflected in demand side). Moreover, it is not just a matter of a business or economic theory, adaptation to the needs of silver population clearly has a strong social aspect – implementation of innovative IS solutions can improve active and independent lives of older people and enhance their living conditions. For both, economic growth content as well as social aspect we strongly recommend promoting development of silver sectors, supporting providers of silver services and searching for new solutions in an ageing society. The new technologies, information systems and innovative communication concepts will no doubt play a significant role in implementation of this new paradigm.

Key words: Silver Economy, Population Ageing, Silver Market, Technologies

JEL Classification: D11, J11, J14

1 Introduction

Currently, the socio-economic balance in Europe is threaten by instabilities rising from (among others) persisting low economic growth, ongoing debt crisis, problematic budget deficits, wage stagnation, high unemployment, and emerging new external occurrences that recently hit the European territory. In this context, the search for new factors of growth gains importance. Ageing population and its effects are also frequently discussed topics globally, not only in the EU, for several years now. Low fertility rates as well as increasing life expectancy are main contributors to demographic change in Europe, accompanied by progress in economic, social and health sectors. The review of literature on ageing population theme discovers two opposite attitudes: first sees ageing population as a burden to society or as a threat to public finances due to the increasing number of pensioners and growing economic dependency ratio, with corresponding growth of public debts (e.g. Bloom, Canning, 2008, Sharpe, 2011). Second sees ageing as a new potential for economic growth, which inclusive character could create new employment opportunities also for excluded groups, as well as brings better access to essential goods and services relevant for older people. In relation to the second direction the term "silver economy" is more and more coming to

¹ Ing. Veronika Hvozdíková, PhD., Šancová 56, 81105 Bratislava, Slovak Republic, veronika.hvozdikova@savba.sk

² Ing. Gabriela Dováľová, PhD., Šancová 56, 81105 Bratislava, Slovak Republic, gabriela.dovalova@savba.sk

³ Mgr. Kristína Petríková, Dolnozemská cesta 1/b, 852 35 Bratislava, Slovak Republic, kristina.petrikova@savba.sk

the fore. Silver economy is understood as adaptation of the economy to the (future) needs of growing number of elderly people. This is also connected with emerging of the new market opportunities for business sector. These are created not only by private, but also by public expenditures associated with population ageing and specific needs of elderly people (European Commission, 2015). Silver economy is formed by consumers in late productive and post-productive age, i.e. above 50 or 55 years – in some studies even limit of 45 years of age is considered (Štefánik et al., 2013; Páleník et al., 2014; Gassman, 2009).

However, we still lack comprehensive studies systematically dealing with silver economy. Earlier studies capture only partial economic dimensions of ageing population, where the authors discuss its particular aspects such as: purchasing power (e.g. Pauhofová and Páleník, 2013), savings (e.g. Bloom et al., 2006), household consumption (e.g. Twigg and Majima, 2014), new opportunities for innovative companies responding to the needs or export potential for goods and services designed to meet seniors needs (e.g. Vistesen, 2009; Radvanský and Páleník, 2011).

2 Population Ageing – Challenge or Opportunity

From the perspective of public policy making, actions towards alleviating the pressure on public resources resulting from the accelerated ageing process can be considered in the scope of the silver economy. While the promotion of active participation of older people both on labour market and in the society is clearly pronounced, the major challenge for the policy making remain to be the issue of securing economic growth and fostering further job creation. Over the time, two opposing views on the silver economy have been articulated – while some conclude that this new trend, if an active approach is taken, can lead to significant economic benefits, other sources suggest that there are crucial challenges to current development which might prove to be difficult to mitigate.

2.1 Demographic background

There are two aspects that are behind a major societal transformation: increasing life expectancy and non-increasing birth rate. This is underpinned in The 2015 Ageing Report (European Commission's paper Growing the Silver Economy in Europe) which states that 'In the EU as a whole, life expectancy at age 65 is projected to increase by 4.8 years for males and by 4.6 years for females over the period 2013 - 2060. Fertility rate has steadily declined during the second half of the 20th and 21st century (with the one exception being the first decade of 21st century). According to EUROPOP2013, fertility rate is set to increase on the European level from 1.56 to 1.72 by 2060, which is still considerably below the natural replacement rate. As a result, the demographic oldage dependency ratio is expected to double up to 2060 – from current 27.8 % to 50.1 %, implying decrease in the number of working people to those retired to almost one half (The 2015 Ageing Report; European Commission, 2015). The European population is becoming older; however, the age structure of population and timing and pace of ageing process varies across the member states. Generally, the populations that are currently the oldest ones in Europe will continue to age at a high speed during the next two or three decades, then they stabilize. The youngest populations, namely in the Central and Eastern Europe, will increase the speed of their ageing at the end of the projected period and will belong to the oldest ones by then. The fact, that the lower income countries will copy the ageing trends from the more developed ones within shortened period and with more profound result, should be of a special concern.

2.2 Aggregate macroeconomic perspective

Public finance is frequently considered to be an area primarily threatened by the progressing ageing process. Provision of the age-related spending and disbursement related to healthcare is going to be challenged. The pension schemes with the first pillar in particular will come under pressure. Public pension expenditure is set to increase by 0.4 p.p. of GDP within the period 2013 - 2040 in the EU as a whole, with significant differences among member states. As regards healthcare related provisions, it is not only estimated that there will be shortage of around 2 million workers in the sector up to 2020, but it is estimated that 'For the EU, public expenditure on LTC is projected to increase by 1.2 pp. of GDP. This is equivalent to an increase of expenditure by 71 %' (European Commission, 2015).

From a macroeconomic perspective, population decline in Europe is connected basically with the decreasing of the number of potential consumers what can consequently has an impact on the size of aggregate demand and profit in individual sectors (however, simultaneously it leads to the growth of the part of population that has lower but relatively stable incomes). The absolute value of the net number of potential consumers is, clearly, not the only indicator of business opportunities. An important role in possible compensation of lower number of consumers is played by the size of their purchasing power (for example, the size of accumulated wealth, size of net household incomes derived from the labour productivity etc. have an impact on the purchasing power), as well as the propensity to consume. In the European context, for example, Italian economists Christelis, Jappelli, Paccagnella, and Weber (2009) focus on elder people with regard to incomes, wealth and other financial indicators. Christelis, Jappelli and Padula (2008) are among those scholars who deal with the problem of income inequality, which can consequently influence also inequality of wealth within the EU countries.

Projected decline of working age population is one concern, the burden posed by increasing dependency ratio is the other; alternatively, attention is paid to changing consumption patterns and the challenges for producers. Old people consume more than they produce but they also spend more on age-specific goods and services. The logic behind the first part of hypothesis is simple and can be explained by the life cycle theory. At the macroeconomic level, variations in demand for goods and services determine investment opportunities, change production, investment patterns and thus capital and labour allocation. The results of the research suggest that age related consumption is not limited to individuals' lifetime budget constraint as it may be understood from the standard life cycle hypothesis, in point of fact, rather than that consumption is constrained by total production. People adjust their life cycle behaviour to the likelihood that they will live longer and healthier lives. However, numerous empirical evidence suggest that there may be a significant drop in consumption after retiring from work, this have given rise to a term retirement-consumption puzzle (see UN, 2007 for a literature overview; for example a substantial drop in consumption was found in Great Britain, but in US the consumption level for older persons was even higher than for working age persons, thanks to voluminous after-retirement consumption of public goods, especially healthcare services, also older Japanese consume substantially more than Japanese adults do in their 30s and early 40s; see Lee and Mason, 2007).

Many authors (e.g. Lührmann, 2008; Desvaux et al., 2010) assume that ageing population could be accompanied with changing consumer preferences or purchasing power within particular age groups, it can also affect aggregate demand and the structure of consumer basket consequently leading to changes in the sectors of production and also in employment. This can rise spending

especially in the field of education. Whether the elders will finance their consumption by public and private transfer or by accumulated assets, in the aggregate view consumption by elderly population can be expected to rise, not only thanks to the second dividend theory (with implications for savings and capital accumulation broadly described in the economic literature) but simply because the number of retirees will increase rapidly over time (contingent drop in their purchasing power in the future may be easily offset by unprecedented rise in their number). Latest results suggest that elderly population tend to spend a higher proportion of their sources on housing and social services than younger cohorts (Lührmann, 2005) or that their spending on healthcare services may even boost their share in overall shape of country's consumption profile (like in the case of US, see Lee and Mason, 2007). Comparison based on household income and expenditure survey data (UN, 2007) reveals that spending on housing, energy and healthcare steadily increase with age in both, US and the EU, while the expenditures on entertainment and transport decline and share of basic food and clothing goods in total consumption seems to be relatively constant. Today's elders lead more active, independent life with a quality of their lives still improving; some retirees even start their own businesses. They actively seek for innovative products that could meet their needs efficiently. The baby boom generation is considered as one to redefine the term "old age", they are used to consume, their attitudes towards changes in mobility and flexibility, changes in their tastes and needs will have to be reflected in the new marketing, communication and production paradigm.

2.3 Emerging market opportunities

Difficult financial situation and problematic health condition of elderly people in some ageing countries discourage the corporate sector to invest in the development of silver innovations and calls for changes to be made to social and welfare systems. Countries where governments face resource constraints will not give the development of silver markets the same priority as wealthier nations, and may not be able to offer such extensive grant schemes. Therefore initiatives at the EU level could facilitate the implementation of the silver economy especially in the new EU member states. Although new EU countries took major steps towards economic integration in recent decades, due to the diversity in the economic level, the differences in wage and pension levels in old and new EU member states can be still observed. Based on previous research using multifactor analysis and based on average income approach (Pauhofová and Páleník, 2013), from the territorial point of view, regions with the highest potential demand for the silver production are those of Mediterranean Sea (mainly Italy), Germany and Austria but also regions of France. Northern countries and countries of Benelux have also relatively good potential for realization of silver economy concept. Lower level of income and wage stagnation, problematic pension system reforms can be still seen as a barrier for developing the silver economy mainly in the new EU countries.

On the other hand, in some literature there is also stated that the societal transformation presents a number of opportunities as regards increasing economic prosperity, job growth and European competitiveness (European Commission, 2015; Páleník et al., 2012; Bonn Declaration, 2005). Their expectations are based on the premise that ageing post-war baby boom generation in Europe signalizes an arrival of a new generation of healthier, more educated and financially more independent people. People of this generation have more varied interests and they spend more money on communication technologies, electronics as well as leisure activities and goods (Coughlin and Lau, 2006b). Some authors, such as Coughlin and Lau (2006a) point out, that

opportunities for innovations connected with population ageing, which could help improve life quality of elder people, may be found in all the areas of Maslow's hierarchy of needs.

Evidence suggests that the share of older people on total wealth is rising and they will represent an attractive target group for companies in the future (Eitner, 2010; Furlong, 2007). This is also supported by the research conducted in Germany stating that 55 % of companies consider the silver economy to be a great business opportunity while 38 % consider it to be an important business segment (Kohlbacher, Gudorf and Herstatt, 2010). The age-related expenditure at the European level is expected to rise by around 2 p.p. up to around 27 % of GDP in 2060 (The 2015 Ageing Report) which represents a compelling market opportunity in particular for the businesses focusing on satisfying older people. Development of goods and services for active and healthy ageing can also impact the functioning of healthcare system along with social services, potentially leading to cost savings.

3 Technologies as Substantial Part of the Silver Market

The aim of supporting silver economy was underpinned also by OECD in the series of expert group meetings. One of the main conclusions was that 'policy reforms are necessary to address 21st century demographic change' as well as that creation of new markets for ageing population should be empowered via technology solutions. Further research and exploration of appropriate measures to exploit the potential of ICTs for the social and economic benefit of people with special needs are deficient. At EU level there are still only partial studies dealing with this issue, resulting in lack of comprehensive assessment which areas are the most promising. However, as Europe is ageing rapidly, its population is going to need more technological support in terms of dealing with arising limitations and disabilities. Starting at the average rate of 32 % of disabled among the younger silver population and rising up to 70 % within the elderly (Eurostat), there is a strong mandate to tackle these obstacles in order for older population to have an opportunity to live healthy, active and foremost independent lives. Taking on from this, there is a strong appeal for developing new technologies alongside improving accessibility together with home as well as community-based provision of services and as such these can present one of the pillars for successful growth of silver economy at the European level.

3.1 IS/ICT solutions to enhance living conditions of elderly

Several projects which have been conducted are focusing on independent living technologies (e.g. Carretero and Kucsera, 2015) or on mapping overall situation of home care across Europe (e.g. Genet, Boerma, Kroneman, Hutchinson and Saltman, 2013). Promising field of research is development of intelligent living which encompasses securing connection between different household devices and appliances – the servicing of these should become more user-friendly for seniors (Gassman, 2009). According to SEN@ER newsletter there are also ongoing initiatives in Germany which aim at promoting independent living (e.g. Vital 50 plus) that interlink social activities, healthcare consultation and educational facilities for ageing population. The European Commission is aware of a sharp progress which is to take place in this area and cites in its report (Growing the European Silver Economy, 2015) that 'the market for telehome technologies (...) is predicted to grow (...) to 24 billion dollars by 2019' while 'smart home systems in the EU will grow at a rate above 50 % in the next five years'.

According to another authors (e.g. Obi, Ishmatova and Iwasaki, 2013) ICT innovations for ageing society should cover and transform also areas as new traffic solutions and transport systems (smart cities, e-mobility, e-Government/e-Municipality), lifelong education, social participation (ICT-utilised social networks etc.), pension system (designing a new ICT-based pension service system) or safety and security components (emergency assistance systems, security features, fall prevention, etc).

In the field of ICT for health, the most promising area of research is telemedicine and telecare which should result in providing a more efficient healthcare (Gassman, 2009). According to Beolchi (2002), telemedicine consists of two major areas - homecare provided to seniors by various devices and house appliances and cooperative work in terms of setting up a network of healthcare apparatus that are interconnected. Within this there are activities regarding e-health that are set to meet demand for electronic and online provided services for older people. However, these still have to be developed so that booking medical appointments or receiving the healthcare screenings and reminders in electronic form would become a routine for seniors. It was stated by European Commission that on the global scale the telecare and telehealth market is set to grow up to 17.6 billion Euros by 2017 and therefore with effort put in these technologies significant benefits can be gained at the European level. This is corroborated in the European Commission paper stating that telecare is already a considerably widespread concept in major member states, with the number of patients set to grow significantly over following years. Specifically targeted health service linked to ICT technologies is the mobile health (mHealth) which can be understood as practicing medical and public healthcare in support of mobile devices (Green Paper on Mobile Health "mHealth"). Since the burden posed on the European healthcare systems is increasing (as a consequence of growing number of chronically ill and disabled predominantly among older people), this concept should relieve the systems and help to maintain their sustainability. Potential of mHealth is underpinned also in the European Commission's paper (Growing the European Silver Economy, 2015, p. 16) which cites that the mobile health market value (at the European level only) will reach 5.2 billion EUR by 2017 presenting a biggest share worldwide. WHO (2011) report also showed that 83 % of the 112 participating member states reported the presence of at least one mHealth initiative in the country, which means a huge potential not only in EU but across the world.

Lehmann, Giacini and Davis (2012) emphasize opportunities for creating simple diagnostic technologies (e.g. blood pressure cuffs, electronic stethoscopes and hand held ultrasounds with 3D data sets with conventional 2D scanners). Today, treatments of older people are costly also because medicine is reactive, which means it responds to the diagnosis of diseases late in their progress when they become symptomatic or at worse advanced stage. The concept of personalized medicine is not new, however it resonates increasingly as more countries worldwide are facing population ageing. According to the European Alliance for Personalized Medicine (2013), personalized medicine "looks at health information from single patients, using the new and detailed information now becoming available through advances in science and technology. It could provide better prevention and treatment and a more efficient and cost-effective healthcare system". A big challenge in this area in relation to ICT is lifelong monitoring and delivering meaningful information on risk prediction, molecular and physiological phenotyping, treatment outcomes and monitoring in a form that supports clinical decision-making.

3.2 Promotion of online activities

The rate of internet usage is an important indicator of ICT implementation. According to the Eurostat data (2014) nearly two-thirds of individuals aged 16 to 74 in EU28 use internet on daily base, compared with less than a third in 2006, what represents emerging opportunities and challenges in the digital economy. Older people still use internet as well as other ICT solutions less than younger population who has grown up with ICT as a part of their daily lives. According to OECD data (2015) over 95 % of 24 year-olds used Internet in 2014 against less than 49 % among 65-74 years-olds. This means, it is expected that future generations in old age will use technology solutions far more than today's senior citizens. The iAge study (Willemse, van der Velden and Pot, 2014), in which authors besides other focused on the barriers and needs in ICT solutions for older people, shows that older adults are more willing to accept new technologies if someone they know and trust introduces the technology. Its findings also indicate that technology needs to have an appropriate design and should, among other things, be ergonomic, reliable and user-friendly to improve usability and accessibility. New ICT solutions should be also tailored to specific needs, expectations, lifestyle and preferences of older people.

Activities, which could be done online (e.g. e-banking, e-shopping, etc.), help older people to preserve their independence and stay more flexible. Innovations in the field of telework could improve the (labour force) participation rate of older people. The frequency of working from home has been rising rapidly in the United States and Europe, but there is still uncertainty and skepticism over the effectiveness of this practice (Bloom, Liang, Roberts and Ying, 2015).

4 Conclusion - Supporting Silver Activities

The purchasing power and overall economic potential of growing number of (more active) consumers-pensioners can no doubt facilitate the economic growth not only in Europe as a whole, but the growth of regional economies in particular, especially when it comes to the regions with the natural resources comparative advantage – particularly if they are able to provide adequate services to elder people. Regions adapted to the new challenge – as well as the business opportunity – created by the population ageing can materialize their expertise and advantages in services, healthcare provision (pharmacy, biotechnologies and medical care), leisure activities, culture and education, tourism, financial services and care of households. Mainly coastal areas of Southern and Western Europe, the Alps, the Pyrenees, the Massif Central and Corsica are the most significant localities with a strong potential for the silver economy and silver services development and at the same time they are characterized by a high volume of elder population (and they deal with demographic change in their regional policies).

The concept of silver economy development and related certain activities can be supported by direct financing from the European Union funds, the region of Andalusia can serve as a good example. In this region, private projects proposed by the companies which develop a variety of goods to satisfy demand of older people (they are primarily focused on medical sector), have been financed by the European fund of regional development through the scheme of public procurement. Recent experience from several member states suggests that in addition to actions at the European level, national initiatives also play an important role in supporting and fostering the silver economy activities (especially when it comes to private businesses). These initiatives might take different form and can be targeted on either promoting the new dimensions of the emerging markets linked to population ageing, providing the consultancy or can consist of stimulating the actions which

motivate the society to react to new challenges related to many aspects of population ageing. Another form of support can be reflected in regulations (policy measures) that would guide the society towards certain standards, e.g. introducing universal design, supporting of smart homes etc. According to Dujin, Lehuédé, Mathé and Siounandan (2010), in Germany the society awareness is geared towards better understanding of the silver economy potential via government initiatives. Besides that several projects supporting cooperation in the development of innovative products and services for seniors were launched. These projects were targeted at building and enhancing international cooperation which would enable export of such products to foreign markets. In 2009 the Federal Ministry of Family Affairs, Citizens, Women and Youth launched a programme that supported three activities: active ageing helping older people to stay in the labour market, intergenerational volunteering in support of the spare time of pensioners and the activity aimed at development of innovative products for all generations highlighting the universal design.

Since 2008 Great Britain has applied new building standards which require universal design to be implemented in construction. Furthermore, the national action plan was introduced by the British government evaluating the scope of the future economic potential generated by ageing population. Here the sectors that would benefit the most from the public support in terms of development of the silver economy were identified.

In 2013, a national strategy focused on creation and consequent support of "silver sector" was put in place. Within this strategy the first initiative has been already implemented – creation of co-called "Silver Valley". There are currently over 150 participants grouped in the valley, consisting of 80 companies generating approx. 1000 jobs. The number of involved subjects is expected to grow up to the creation of 5000 jobs. The goal of the strategy is to create an environment for innovation solutions within the framework of the silver economy.

Above mentioned "best-practices" examples indicate wider areas and methods how to promote silver market; the support by society and politics at the national as well as at the Community's level will be at least forward-looking since the ageing process will hit the economies and societies in even more profound way then in the past years. ICT solutions will no doubt be a large part of the silver economy development in many of the mentioned areas.

Acknowledgements

This paper was supported by VEGA - Scientific Grant Agency of the Ministry of Education of the Slovak Republic (ME SR) and of Slovak Academy of Sciences (SAS) under the project contracts [No. 2/0026/15] and [No. 1/0810/15] and by APVV - Slovak Research and Development Agency under the project contract [No. APVV-0750-11].

References

- BEOLCHI, L. 2002. European Glossary of Concepts, Standards, Technologies and Users. 4th Edition. Information Society of the European Commission, Working Document.
- BLOOM, D. E. et al. 2006. *Demographic Change, Social Security Systems and Savings*. NBER Working Paper 12621, National Bureau of Economic Research, Cambridge, MA.
- BLOOM, D. E. and CANNING, D. 2008. Global Demographic Change: Dimension and Economic Significance. In: *Population and Development Review*. Vol. 34, pp. 17 51.

- BLOOM, N., LIANG, J., ROBERTS, J. and YING, Z. J. 2015. Does working from home work? Evidence from a Chinese experiment. In: *The Quarterly Journal of Economics*. Vol. 130, No. 1, pp. 165 218.
- Bonn Declaration. 2005. [online]. Available online: http://www.silvereconomy-europe.org/events/2005/documents/Bonn_Declaration.pdf>.
- CARRETERO, S. and KUCSERA, C. 2015. *Report on case studies of technology-based services for independent living for older people*. Luxembourg: Publications Office of the European Union.
- COUGHLIN, J., F. and LAU, J. 2006a. Cathedral Builders wanted: Constructing a new vision of technology for old age. In: *Public Policy & Aging Report*. Vol. 16, No. 1, pp. 4-8.
- COUGHLIN, J., F. and LAU, J. 2006b. *Global aging & technology policy: Extending the vision of innovation in aging societies*. Presented at the 9th International Conference on Technology Policy and Innovation, Santorini, Greece, June 21, 2006.
- DESVAUX, G. et al. 2010. Meeting the 2030 French consumer. *How European-wide trends will shape the consumer landscape*. McKinsey&Company.
- DUJIN, A., LEUHUÉDÉ, F., MATHÉ, T. and SIOUNANDAN, N. 2010. Étude de l'impact du vieillissement de la population sur l'offreet la demande de biens et de services de consummation. [online]. Available online: http://www.entreprises.gouv.fr/files/files/directions_services/secteurs-professionnels/etudes/seniors-rapport-juin2010.pdf>.
- EITNER, C. 2010. Discovery and Development of the Silver Market in Germany. In: Kohlbacher, F. and Herstatt, C. 2010. *The Silver Market Phenomenon, Marketing and Innovation in the Aging Society*. Germany: Springer. pp. 309 324.
- European Commission. 2015. *Growing the European Silver Economy*. [online]. Available online: http://ec.europa.eu/research/innovation-union/pdf/active-healthy-ageing/silvereco.pdf>.
- European Commission. 2014. *Green Paper on mobile Health ("mHealth")*. [online]. Available online: http://ec.europa.eu/digital-agenda/en/news/green-paper-mobile-health-mhealth>.
- CHRISTELIS, D., JAPPELLI, T. and PADULA, M. 2008. Real and Financial Assets in SHARE Wawe2. In: *Socio-Economic Status. Health, Ageing and Retirement in Europe* (2004 2007). Starting the Longitudial Dimension.
- CHRISTELIS, D., JAPPELLI, T., PACCAGNELLA, O. and WEBER, G. 2009. Income, wealth and financial fragility in Europe. In: *Journal of European Social Policy*. Vol. 19, No. 4, pp. 359 376.
- European Alliance for Personalised Medicine. 2013. *Innovation and Patient access to personalized medicine*. [online]. Available online: http://euapm.eu/wp-content/uploads/2012/07/EAPM-REPORT-on-Innovation-and-Patient-Access-to-Personalised-Medicine.pdf>.
- FURLONG, M. 2007. *Turning Silver into Gold, How to Profit in the new Boomer Marketplace*. FT Press, New Jersey.
- GASSMANN, O. 2009. Silver Market in Europe: Myth or Reality? In: Cabrera, M. and Malanowski, N. 2009. Information and Communication Technologies for Active Ageing,

Opportunities and Challenges for the European Union. In: Assistive Technology Research Series, Vol. 23, pp. 77 – 90, IOS Press, Netherlands.

- GENET, N., BOERMA, W., KRONEMAN, M., HUTCHINSON, A. and SALTMAN, R. 2013. *Home care across Europe*. Case studies. [online]. Available online: < http://www.nivel.nl/sites/default/files/bestanden/Home-care-across-Europe-case-studies.pdf>.
- KOHLBACHER, F., GUDORF, P. and HERSTATT, C. 2010. Silver Business in Japan, Implications of Demographic Change for Human Resource Management and Marketing, German Chamber of Commerce and Industry in Japan, Tokyo. [online]. Available online: http://www.dijtokyo.org/publications/silver_business_in_japane.pdf>.
- LEHMANN, C., GIACINI, J., M. and DAVIS, D. 2012. *Innovative Technologies for the Ageing*. [online]. Available online: <http://www.un.org/esa/socdev/egms/docs/2013/ict/CraigLehmann.pdf>.
- LEE, R. and MASON, A. 2007. *Population Aging, Wealth, and Economic Growth: Demographic Dividends and Public Policy*. WESS Background Paper (background paper prepared for UN World Economic and Social Survey 2007). [online]. Available online: http://www.un.org/esa/policy/wess/wess2007files/backgroundpapers/popaging_lee_mason. pdf>.
- LÜHRMANN, M. 2005. *Population Aging and the Demand for Goods & Service*. Mannheim Research Institute for the Economics of Ageing. Discussion Paper, No. 95-05. Mannheim: Department of Economics, Universität Mannheim. [online]. Available online: http://mea.mpisoc.mpg.de/uploads/user_mea_discussionpapers/gtyzs5eximf4u8v9_95-2005.pdf.
- LÜHRMANN, M. 2008. *Effects of Population Aging on Aggregated UK Consumer Demand*. IFS and CEMMAP, London.
- OBI, T., ISHMATOVA, D. and IWASAKI, N. 2013. Promoting ICT innovations for the ageing population in Japan. In: *International Journal of Medical Informatics*. Vol. 82, No. 4, pp. e47 e62.
- OECD. 2015. OECD Digital Economy Outlook 2015. OECD Publishing, Paris. ISBN: 978-92-64-2344-0.
- PÁLENÍK, V. et al. 2012. Strieborná ekonomika v slovenskom, európskom a svetovom kontexte (*Silver economy in Slovak, European and world context*). Bratislava: Ekonomický ústav SAV. ISBN: 978-807144-205-9.
- PÁLENÍK, V. et al. 2014. Strieborná ekonomika potenciál na Slovensku (Silver economy potential in Slovakia). Bratislava: Ekonomický ústav SAV. ISBN: 978-80-7144-234-9.
- PAUHOFOVÁ, I. and PÁLENÍK, M. 2013. Súvislosti realizácie koncepcie striebornej ekonomiky v krajinách Európskej únie. In: *Ekonomický časopis (Journal of Economics)*, Vol. 61, No. 8, pp. 861 – 876.
- RADVANSKÝ, M. and PÁLENÍK, V. 2011. Silver economy as possible export direction at ageing Europe – case of Slovakia. In: *EcoMod 2011: international conference on economic modelling*. Azores, June 29 – July 1, 2011 [online]. Ponta Delgada: University of Azores, pp. 1-11.

- SHARPE, A. 2011. Is Ageing a Drag on Productivity Growth? A Review Article on Ageing, Health and Productivity: The Economics of Increased Life Expectancy. In: *International Productivity Monitor*. Vol. 21, pp. 82 94.
- ŠTEFÁNIK, M. et al, 2013. *Modelling the economic potential of the Silver economy*. Neujobs working paper no. D12.3. [online]. Available online: <http://www.neujobs.eu/sites/default/files/NEUJOBS%20Working%20Paper_Modelling%2 OSilver%20Economy_12.3.pdf>.
- TWIGG, J. and MAJIMA, S. 2014. Consumption and the constitution of age: Expenditure patterns on clothing, hair and cosmetics among post-war "baby boomers". In: *Journal of Aging Studies*. Vol. 30, pp. 23 32.
- UN. 2007. World Economic and Social Survey 2007: Development in an Ageing World. New York: United Nations, Department of Economic and Social Affairs. E/2007/50/Rev.1, ISBN 978-92-1-109154-0. [online]. Available online: <https://www.un.org/esa/analysis/wess/wess2007files/wess2007.pdf>.
- VISTESEN, C. 2009. Ageing and Export Dependency. Working Paper 02-09. Copenhagen Business School.
- WILLEMSE, B., VAN DER VELDEN, C. and POT, A., M. 2014. Barriers and needs in ICT use of older people. A translational iAge study. [online]. Available online: ">http://www.trimbos.org/~/media/Nieuws%20en%20Persberichten/PO14101602-iAge%20Barriers%20and%20needs%20in%20ICT%20compleet-LR.ashx>">http://www.trimbos.org/~/media/Nieuws%20en%20Persberichten/PO14101602-iAge%20Barriers%20and%20needs%20in%20ICT%20compleet-LR.ashx>">http://www.trimbos.org/~/media/Nieuws%20en%20Persberichten/PO14101602-iAge%20Barriers%20and%20needs%20in%20ICT%20compleet-LR.ashx>">http://www.trimbos.org/~/media/Nieuws%20en%20Persberichten/PO14101602-iAge%20Barriers%20and%20needs%20in%20ICT%20compleet-LR.ashx>">http://www.trimbos.org/~/media/Nieuws%20en%20ICT%20compleet-LR.ashx>">http://www.trimbos.org/~/media/Nieuws%20en%20ICT%20compleet-LR.ashx>">http://www.trimbos.org/~/media/Nieuws%20en%20ICT%20compleet-LR.ashx>">http://www.trimbos.org/~/media/Nieuws%20en%20ICT%20compleet-LR.ashx>">http://www.trimbos.org/~/media/Nieuws%20en%20ICT%20compleet-LR.ashx>">http://www.trimbos.org/~/media/Nieuws%20en%20ICT%20compleet-LR.ashx>">http://www.trimbos.org/~/media/Nieuws%20en%20ICT%20compleet-LR.ashx>">http://www.trimbos.org/~/media/Nieuws%20en%20ICT%20compleet-LR.ashx>">http://www.trimbos.org/~/media/Nieuws%20en%20ICT%20compleet-LR.ashx>">http://www.trimbos.org/~/media/Nieuws%20en%20ICT%20compleet-LR.ashx>">http://www.trimbos.org/~/media/Nieuws%20en%20ICT%20compleet-LR.ashx>">http://www.trimbos.org/~/media/Nieuws%20en%20ICT%20compleet-LR.ashx>">http://www.trimbos.org/~/media/Nieuws%20en%20ICT%20ICT%20compleet-LR.ashx">http://www.trimbos.org/~/media/Nieuws%20en%20ICT%20compleet-LR.ashx">http://www.trimbos.org/~/media/Nieuws%20en%20ICT%20compleet-LR.ashx">http://www.trimbos.org/~/media/Nieuws%20en%20ICT%20compleet-LR.ashx">http://www.trimbos.complet/~/www.trimbos.compleat//www.trimbos.compleet/~/www.trimbos.compleet
- WHO. 2011. mHealth. New horizons for health through mobile technologies. [online]. Available online:: http://www.who.int/goe/publications/goe_mhealth_web.pdf>.

Selected Aspects of Price Estimations within Public Procurement: Evidence from Slovakia

FRANTIŠEK JANKE¹ – MARTIN DUJČÁK² Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

During last decade, electronic reverse auctions have become one of the most popular ICT innovations within private and public procurement sector. The existence of this trend, which is expected to continue, is based on their effect leading to lower costs, as they effectively support competition among suppliers. In this paper we focus our analysis on measuring the effect of price changes within electronic reverse auction using the latest data from Slovak centralized e-procurement marketplace used for public tenders. The analysis is also performed on subsamples divided according to type of the product – products or services.

Key words: Procurement, Efficiency, Competition, Electronic Reverse Auction

JEL Classification: C33, D44

1 Introduction

Information and Communication Technologies (ICT) have provided answers to many local and global challenges of business as well as public organizations. In this context a lot of organizations are aware of the possibility to improve on the organization of internal processes (Šoltés, Gavurová and Balloni, 2014; Gavurová, 2012; Stefanescu et al., 2009). In the wide range of innovative solutions they are provided for optimizing business processes, increasing effectiveness of public services or new services for citizens (Doucek, et al., 2010; Sudzina, et al., 2011; Zgodavova and Bober, 2012). During last decade, a new trend of application of ICT technologies in processes has become very popular in private as well as in public sector. And the processes within procurement were not the exception. Electronisation has brought many changes. Communication between suppliers and procurers was put into virtual reality and today, according to findings based on real data, we can declare that e-sourcing, as the form of negotiation within global supply chain is considered as one of the most important factors for efficient collaboration between companies (Amelinckx, Muylle and Lievens, 2008) which can lead to higher efficiency of procurement, today considered as a key element of effective management, in the private and also public sector. Today, after the rise of the Internet and various forms of web applications which has affected almost all aspects of the business (Swaminathan and Tayur, 2008), ICT technologies are perceived as crucial in the process of raising effectiveness from the view of lower costs (Prídavok and Delina, 2013) and higher transparency (Mabert and Skeels, 2002).

¹ Ing. František Janke, PhD.,Němcovej 32, 040 01 Kosice, Slovak Republic, frantisek.janke@tuke.sk

² Ing. Martin Dujčák, Němcovej 32, 040 01 Kosice, Slovak Republic, martin.dujcak@tuke.sk

2 Electronic reverse auctions

A few forms of e-sourcing have been developed and one of the most recognized and popular is electronic reverse auction (eRA). This mechanism provides not just huge potential savings or Total Cost of Ownership (TCO) reduction, but also improvements in quality and cycle time are expected. (Prídavok and Delina, 2012) eRA represents an electronic sourcing method that builds a competitive and dynamic environment in which a number of suppliers compete against each other in real-time to win the business (Amelinckx, Muylle and Lievens, 2008). Suppliers compete by bidding against each other through online software. Theory assumes that eRA represents pure market environment with information perfectly distributed between both buyers and suppliers (Amelinckx, Muylle and Lievens, 2008). Expansion of Information and Communication Technologies (ICT) in the meaning of popularisation of electronic auctions has raised during last decade and this trend is expected to continue (Jap, 2002; Beall et al., 2003; Schoenherr and Mabert, 2007) It was significant especially in the Slovak republic. It lead to increased usage of eRA, but despite the great amount of procurement data, very little research has been done yet (Prídavok and Delina, 2012) and not all aspects of their process are fully known.

3 Public Procurement in Slovakia

Implementation of ICT technologies, time of its deployment and concrete form is dependent on many factors. One of them is regulation affecting activities of particular authority. In the case of private companies, the main borders are usually made by financial capacities. On the other hand, when we consider public company or other type of public authority, such as local or national government, ministry etc. a change in the processes must be approved by responsible subject and of course in accordance with actual legislative. Within public procurement in Slovakia, we can observe two main approaches – centralized and decentralized. According to Li (2007) centralized procurement is a consolidated purchasing of needs for entire organization. In the context of public procurement is means that public body higher in public sector hierarchy structure in the given field is procuring the needs for the bodies lower. On the contrary, when decentralization approaches are applied, the local bodies (authorities lower in the hierarchy structure) have higher power to choose suppliers and effectively use local resources. As mentioned, in Slovakia both approaches are applied, e.g. Self-Governing Region or the City is procuring the needs for the schools in its responsibility, but on the contrary universities are independent from the view of purchases.

In Slovakia, the main framework for public procurement is described in Law 25/2006 C.o.L. about public procurement. In last year there have been applied significant changes in the law. One of them was approved 19th March 2013 and their main purpose was to declare the the development of Electronic Contracting System (ECS). The ECS is the state-controlled centralized marketplace used by different public bodies to procure products meeting the specific criteria and price levels according to Slovak National Act on Public Procurement using electronic reverse auction mechanism for price negotiation. What is needed to highlight is the fact that on ECS, the "common products" (goods or services) are being procured. By "common products", the National Act understands the products, which:

- 1. are not produced or provided on specific "tailor-made" needs,
- 2. are sold in the form without major modifications of features,
- 3. are used for satisfaction of operational needs,
- 4. and have consumable nature.

The process of procurement on ECS is based on eRA. It means that the best bid is that of the lowest price. But there is one aspect not very common and often discussed from the view of its application. Before the auction starts, the procurer describes not only needed object of purchase but also Maximum price they are willing to pay. Naturally, the winner on ECS must offer not only the lowest price in comparison with their competitors, but there is also requirement that the winning price must be lower than set Maximum price. On the one hand, this aspect helps to avoid getting inappropriate bids for a particular procurer. On the other hand, when Maximum price is not correctly estimated it can lead to purchase with higher costs than are average on the market. Procurer should not inform suppliers about disposable budget as it affects the behavior of suppliers which set their bids in relation to this data. And so, the Initial price, so the first price in auction, can be higher than in case when disposable budget is unknown, as well as it can lead to lower savings in general. (Constant, 1993; Che and Gale, 1998; Maskin, 2000; Pai and Vohra, 2008)

4 Methodology

4.1 Research goals

Due to the previously described facts this study will be devoted to analyzing Maximum price, what is the maximum price that is procurer willing to pay and Initial price, so the first price offered in electronic auction, as well as Maximum price and Contract price, so the final price. The aim of this study is to evaluate the behavior of suppliers in terms of determining the Initial offer with respect to the budget and gap between Contract price and the set budget – Maximum price, what is known as savings. This allows us to identify the accuracy of predicted price by procurers and if there are the savings at least on the average level.

Based on previous research goals, we formulate our working hypothesis as:

Working hypothesis: Knowing the disposable budget of procurer, the Initial price is very close to the level of Maximum price.

4.2 Data used

Research is based on data from Electronic Contracting System (ECS) in Slovakia. As was mentioned before it is the state-controlled centralised marketplace using electronic reverse auction mechanism for price negotiation. We choose this database as it provides very specific kind of data. Thanks to them we can analyze behaviour of both sides – procurers and suppliers, when setting the prices, not just the first price in auction – Initial price and final price – Contract price, as it is usual for auction databases, but we know also the Maximum price, which is set before the auction and which represents the sum which cannot be exceeded.

Name of variable	Description
Object of contract	Categorization of purchased object – products or
	services
Maximum price	The price which procurer wants to pay for the object of
	procurement
Initial price	The first bid in eRA in EUR
Contract price	The final price in eRA, so the price which was paid to
	supplier by procurer in EUR

Table 1 Description of variables

Source: Authors

4.3 Model specification

To fulfil defined research goal, following linear regression models based on panel data will be used:

$$IP_i = \beta_1 MP_i$$

where:

 $\ensuremath{\text{IP}}_i$ is the Initial price, so the first offer, within the eRA auction in EUR

MP_i is the Maximum price, which is the procurer willing to pay

 $CP_i = \beta_1 M P_i \tag{2}$

where:

 CP_i is contract price which is the result of eRA performed in EUR MP_i is the Maximum price, which is the procurer willing to pay

Both models are composed only by one dependent variable, Initial or Contract price, and one independent variable, Maximum price. Variables were chosen according to research goals and we decided not to include the Intercept (Constant) as we are focusing on the specific relation of two factors.

4.4 Expectations

Before the regression analysis we estimate the effect of each independent variable in both specified panel regression models. We expect that within process on ECS the Maximum price acts as the base value for setting the Initial price as well as Contract price. According to the previous findings between Maximum and Initial price should be very significant relation as when the disposable budget is known, suppliers are expected to set the first bid very equal to the value of Maximum price. When thinking about the relation between Maximum and Contract price we expect also very close link, at the level lower than is the market standard. According to previous research savings in public and private sector differ. In private sector, where more methods supporting competition can be applied, we can observe savings at level 5-30% (Losch and Lambert, 2007). On the other hand, the standard in public sector is significant lower. Findings of authors are various – e.g. 4% according to Singet et.al (2009) or 12.1% according to Shalev and Asbjornsen (2010).

5 Data description

Our analysis was based on 8,751 records of procurement cases performed on Electronic Contracting System (ECS) in Slovakia, during time period June, July and August in 2015. The number of purchases indicates that Electronic Contracting System is already established in Slovakia, recognized not only by procurers, but also by suppliers. This specific database was selected as the Electronic Contracting System was launched in March 2015 and first months of usage might include many irregularities caused by the adoption of new processes.

Database is composed by procurement cases for products and services, what describes the following graph (Figure 1).

(1)



Figure 1 Objects of procurement cases in database Source: Authors

Basic description statistics is provided in the table below. As we can see in the sample are small as well as big purchase cases speaking about the contract price, while the mean price is 7,193.68. The mean of maximum price and initial price are naturally little higher - 8,608.21 and 8,338.08. Already these numbers indicates that there is generally gap between Maximum price set by procurer and Contract price (1,414.53) and between Maximum and Initial price (270.14).

	N	Range	Minimum	Maximum	Sum	М	ean	Std.	Variance
]		Deviation	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
Object_of_co	8,751	1	1	2	16,454	1.88	.003	.325	.105
ntract									
Max_price	8,751	361,371.0	6.0000	361,377.0	75,330,4	8,608.2	285.5525	26,712.5	7.136E8
		000		000	84.0700	14383	531	217886	
Initial_price	8,751	361,375.0	2.0000	361,377.0	72,966,5	8,338.0	280.3411	26,225.0	6.878E8
		000		000	11.3800	76949	107	081340	
Contract_pric	8,751	356,377.0	.0000	356,377.0	62,951,8	7,193.6	251.3871	23,516.4	5.530E8
e		000		000	77.5900	78161	501	583593	
Valid N	8,751								
(listwise)									

Table 2 Descriptive Statistics

Source: Authors

Table 3 Tests of Normality

		Kolmogorov-Smirnov ^a								
	Statistic	df	Sig.							
Object_of_contract	.524	8751	.000							
Max_price	.374	8751	.000							
Initial_price	.375	8751	.000							
Contract_price	.380	8751	.000							

Source: Authors

Before the performance of regression analysis there was need to know if values of variables are normally distributed, as it could affect choice of concrete form of statistical method. For this purpose we applied Kolmogorov-Smirnov test of normality. As we can see, on table below, our data is not normally distributed.

6 Results

6.1 Scatter Plots

As first we analyzed the mentioned relations among specific types of prices via graphic interpretation using scatter plots. On the Figure 2 we can see the lines representing the relations of 3 types:

- 1. Reference line with ratio 1:1.
- 2. Line representing relation of Maximum price and Initial price and
- 3. Line representing relation of Maximum price and Contract price.

On the axis X are values of Maximum price and values on the axis Y represents Initial and Contract price. As it is obvious the relation between Maximum and Initial price is very strong. In case of second pair of variables. Maximum and Contract price the relation is still very strong but at a little lower level as for Initial price.



Figure 2 Maximum, Initial and Contract price (services & products)

The following figures (Figure 3) provide description of mentioned variables but separately for products and services. As we can see the graph for products is very similar to the Figure two what is obvious as the majority of records were procurement cases of that kind. For both sectors – products and services we can distinguish very strong relation between Maximum and Initial price and little weaker but still very significant link between Maximum and Contract price.



Figure 3 Maximum, Initial and Contract price (services-left & products-right)

6.2 Regression

In our research the main method to reach given goals was linear regression using the panel data. As first we analyzed relation of Maximum and Initial price. The dependent variable was Initial price and independent variable represented Initial price. The beta coefficient and significance of particular factors are stated in the table below. We can assume that our expectation was right and we can see that Initial price set by supplier as the first price within the auction is very significantly dependent on Maximum price set by procurer. We can see that for the whole sample. Initial price is lower by 2.5% in comparison with Maximum price. Interesting is the difference when we analyzed separately products and services. For products relation is little higher (1.6% decrease) on the other hand for services relation is little weaker (4.8% decrease). It means that the weaker is relation the bigger is gap between prices.

Object of contract	R of model	Model						Sig. of beta coefficient
Products and services	0.995	Initial_price	=	Max_price	*	0.975		0.000
Products	0.997	Initial_price	=	Max_price	*	0.984		0.000
Services	0.99	Initial_price	=	Max_price	*	0.952		0.000

Table 4 Results of linear regression model for Initial pr

Source: Authors

In the next step. We applied regression analysis to variables of Contract price. Which represents dependent variable and Maximum price which represents independent variable in the model. In this case we can see that link is little weaker as in the previous case. The average decrease of price - saving is at the level of 15.2%. When looking separately on products it is 12.3% and for services. it is 23.3%. As we can see again Relation is stronger of purchase cases where the object of procurement was products.

Table 5 Results of linear regression model for Contract price

Object of contract	R of model	Model				Sig. of beta coefficient	
Products and services	0.968	Contract_price	Ш	Max_price	*	0.848	0.000

Products	0.976	Contract_price	=	Max_price	*	0.877	0.000
Services	0.946	Contract_price	Ш	Max_price	*	0.767	0.000

Source: Authors

7 Conclusion

The paper focused on analyzing the behavior of procurers and suppliers in the virtual marketplace (Electronic Contracting System) using the electronic reverse auction mechanism. The analysis shows that electronic reverse auctions enable procurers to save organizational resources - the average saving for purchases cases in our sample was 15.2%. When we compare it with findings of other authors - 4% according to Singet et.al (2009) or 12.1% according to Shalev and Asbjornsen (2010). We can say that on ECS are savings upon the average value despite the fact that suppliers know the budget what could lead to negative effect on savings.

Our study also proves that findings of previous authors (Constant. 1993; Che and Gale. 1998; Maskin. 2000; Pai and Vohra. 2008) and natural prediction which says that when the disposable budget is known first price in auction – Initial price is at the level very close to the budget - Maximum price so we do not reject our working hypothesis: *Knowing the disposable budget of procurer the Initial price is very close to the level of Maximum price*. From this finding we can form recommendation for procurers - they should devote enough time when preparing not only description of needed objects but also when predicting Maximum price they are willing to pay. Moreover as we can see suppliers tend to keep their starting position (Initial Price) as high as possible and therefore the savings calculated using the change from Initial to Final price seem to be overrated.

References

- AMELINCKX I. MUYLLE S and LIEVENS. 2008. A. Extending electronic sourcing theory: An exploratory study of electronic reverse auction outcomes. In: *Journal of Electronic Commerce Research and Applications*. Vol. 7, No. 1, pp. 119-133.
- CHE. Y.-K. and GALE. I. 1998. Standard auctions with financially constrained bidders. In: *Review* of *Economic Studies*. Vol. 65, No. 1, pp. 1-21.
- DELINA. R. and PRÍDAVOK. M. 2013. Effective Spend Management Through Electronic Reverse Auction Configurations KVALITA INOVÁCIA PROSPERITA / QUALITY INNOVATION PROSPERITY XVII/1 – 2013, pp. 1-8.
- DOUCEK. P. 2010. Human Resources in ICT ICT Effect on GDP. In: *IDIMT-2010: Information Technology Human Values. Innovation and Economy.* 18th Interdisciplinary Information Management Talks. Linz: Trauner Verlag universität. Book Series: Schriftenreihe Informatik Vol. 32, pp. 97-106.
- GAVUROVÁ. B. 2012.Source Identification of Potential Malfunction of Balanced Scorecard System and Its Influence on System Function. 2012. In: *E+M Ekonomie a management*. Vol. 15, No. 3, pp. 76-90.
- GENE. C. 1993. Budget repair guide: cost cutting tips every manager should use. New York: Vantage Press.
- LI. L. 2007. Supply chain management: concepts. techniques and practices enhancing the value through collaboration. Hackensack. NJ: World Scientific.

- LOSCH. A. and LAMBERT. S. 2007. Information behaviour in e-reverse auctions. In: *Journal of Enterprise Information Management*. Vol. 20, No. 4, pp. 447-64.
- MABERT. V. A. and SKEELS. J. A. 2002. Internet reverse auctions: Valuable tool in experienced hands. Business Horizons. Vol. 45, No. 4, pp. 70-76.
- MASKIN. E. S. 2000. Auctions development and privatization: Efficient auctions with liquidityconstrained buyers. In *European Economic Review*. Vol. 44, pp. 667-681.
- PAI. M. M. and VOHRA. R. 2008 August. *Optimal auctions with financially constrained bidders*. Unpublished.
- SINGER et al. 2009. Does eProcurement Save the State Money? In: Journal of Public Procurement. Vol. 9, No. 1, pp. 58-78.
- SHALEV. M.E. and ASBJORNSEN. S. 2010. Electronic reverse auctions and the public sector Factors of success. In: *Journal of Public Procurement*. Vol. 10, No. 3, pp. 428-452.
- STEFANESCU A., STEFANESCU L. and CIORA I. L. 2009. Intelligent tools and techniques for modern management. In: *Chinese Business Review*. Vol. 8, No. 2, February 2009, pp.46-55.
- SUDZINA. F., PUCIHAR. A. and LENART. G. 2011. A Comparative Study of the Impact of ERP Systems Implementation on Large Companies in Slovakia and Slovenia. In: *Enterprise Information Systems. PT 1. Book Series: Communications in Computer and Information Science.* Vol. 219, pp. 322-330.
- SWAMINATHAN M. and TAYUR S. 2008. Models for Supply Chains in E-Business. In: *Management Science*. Vol. 49, No. 10, pp. 1387-1406.
- ŠOLTÉS. M., GAVUROVÁ. B. and BALLONI. A.J. 2014. Ekonomický význam využívania informačno-komunikačných technológií v systéme zdravotníctva. In: *Ekonomický časopis*. Vol. 62, No. 1, pp. 83-104.
- ZGODAVOVA. K. and BOBER. P. 2012. An Innovative Approach to the Integrated Management System Development: SIMPRO-IMS Web Based Environment. In: *Quality Innovation Prosperity*. Vol. 16, No. 2, pp. 59-70.

Coevolution in the Samaritan's Dilemma

MARTIN KAMENÍK¹ Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

In the article the model of populations of agents playing Iterated Samaritan's dilemma against each other is presented. The agents, who make decisions about next steps according to the history of previous games are evolved through a genetic algorithm, which includes operators such as selection, crossover and mutation. This algorithm makes the agent relatively better. Evolved population pairs (population of Samaritans and Parasites) can be divided into three groups. For the most common group of presented simulations was typical permanent exploitation of Samaritan by Parasite. Also, there is a case when evolved population of Samaritans was able to force the opposite population to work.

Key words: Iterated Samaritan's Dilemma, Genetic Algorithm

JEL Classification: C63, C73

1 Introduction

Genetic algorithm represents searching algorithm that simulates basic features of natural evolution. In this paper we are using this genetic algorithm to learn the agents to play Samaritan's dilemma, a game with non-zero sum, which was firstly introduced by Buchanan and he used a matrix game to illustrate negative consequences of altruistic behavior.

The inspiration for conducting of the following simulation was the article The Evolution of Strategies in the Iterated Prisoner's Dilemma, in which the author, beside other things, uses this non-deterministic method of problem solving to create strategies and simulate evolution of agents in the environment of static strategies. Subsequently Miller uses genetic algorithm to simulate coevolution of agents in the environment of Iterated Prisoner's dilemma. Our aim is the application of this co-evolutionary approach to the Iterated Samaritan's dilemma. Unlike Iterated Prisoner's dilemma, Iterated Samaritan's dilemma presumes the existence of two populations of agents who choose steps according to the results of three previous game rounds. After the game, the natural selection is used to choose the best agents that underlie genetic operators.

2 Samaritan's Dilemma

Buchanan introduced Samaritan's Dilemma in economics in order to show that altruism can induce adverse behavior of potential recipients based on the failure of the donor to act strategically. Buchanan gives wide range of examples of the dilemma. For instance misbehaving child and spanking mother or university administration. Buchanan also identified that Samaritan's Dilemma reflects some features of modern welfare state, because the advantages in the form of allowances are the reason for weakened motivation to work. He depicted the dilemma as a bi-

¹ Ing. Martin Kameník, Němcovej 32, 040 01 Kosice, Slovak Republic, martin.kamenik@tuke.sk

matrix game in active and passive form. As he said the real world examples of passive form are more familiar than examples of active form, both in international relations and in domestic affairs. Therefore we decided to concentrate only on the passive Samaritan's dilemma in our paper. In both cases, the Samaritan's dilemma is his exploitation due to his inability to commit not to help and so Parasite with his strategic behavior in form of choosing Refuse work strategy forces Samaritan to use Charity strategy (see Figure 1).



Figure 1 Passive Samaritan's dilemma

Samaritan is represented by strategies Charity and Non-charity and Parasite's strategy space is described by strategies Work and Refuse work. Samaritan in the passive form prefers the situation in cell I, which represents socially optimal situation, whereas Parasite prefers situation in cell IV, otherwise also socially unacceptable situation that society tries to avoid. These cells represent Nash equilibrium of the game.

2.1 Simulation of Iterated Samaritan's Dilemma using Genetic Algorithm

Let's start with a description of the simulation. Suppose we have defined population of Samaritans and Parasites in form of *r*-tuples $S = (s_1, s_2, ..., s_r)$ and $P = (p_1, p_2, ..., p_r)$ consisting of *r* agents, each agent has defined its strategy in form of binary *l*-tuple $s_i = (s_{i,0}, s_{i,1}, ..., s_{i,l-1})$ and $p_j = (p_{j,0}, p_{j,1}, ..., p_{j,l-1})$. For these binary *l*-tuples is valid $s_{i,a}, p_{j,b} \in \{0,1\}, a \ b \in \{0,1,...,n-1\}$. We can identify each binary *l*-tuple with integer number $s_{i,0} \cdot 2^{l-1} + s_{i,1} \cdot 2^{l-2} + ... + s_{i,l-1} \cdot 2^0$ what leads to the search space $\Omega = \{0,1,...,n-1\}$ with cardinality $|\Omega| = n = 2^l$.

We are going to analyze the simulation model from Samaritan's point of view, but we can apply given approaches analogically to Parasite. We presume that agents choose their strategies in the following round based on the history of three previous rounds, thus the history of their own turns and their opponent's turns. Agents are allowed to use only pure strategies. The *w*-length history consists of a series of previous actions starting with the opponent's last action h_1 , the player's own last action h_2 , the opponent's next to last action h_3 etc. If we denote strategies Charity, Work – Non-charity, Refuse work as 1 - 0, we can label an *w*-length history by binary number

 $h^a = (h^a_w, ..., h^a_2, h^a_1)$. Samaritan chooses strategy $s_{i,a}$ when the history h^a occurs. Because the game in one round can have 4 various results, there are $4^3 = 64$ possible histories with the memory 3. For example, the history of repeated choices of strategies Charity – Work during three previous rounds is $h^{63} = (1,1,1,1,1)$. In this way, every history that can turn up is attributed with some component in *l*-tuple. But in the first three rounds of the game there was no history with required size, so the coding is as follows. Component $s_{i,70}$ represents initial turn in first round, $s_{i,68}$ and $s_{i,69}$ represent which turn will be used in second turn depending on previous turn of opponent and components $s_{i,64}$, $s_{i,65}$, $s_{i,66}$, $s_{i,67}$ represent, which turn will be used in third round depending on turns of opponent done in previous two rounds.

During the existence of agents in generation t every Samaritan s_i will play q rounds with every Parasite p_j from the Parasite population. Fitness value is attributed to every individual from the population after playing all rounds, which determines the effectiveness of individual in problem solving:

$$f_t(s_i) = \frac{\sum_{k=1}^{q} \sum_{j=1}^{r} \varphi_k(s_i, p_j)}{qr}$$
(1)

 $\varphi_k(s_i, p_j)$ represents the payoff of *i*- th Samaritan against *j*- th Parasite in *k*- th round of game. It follows that the aim of the agents is to maximize the average payoff.

Once the fitness is attributed to each agent in both populations we can continue with the selection of individuals. Their genetic material -l-tuples are used for creating new individuals in the next generation t+1. The selection operator is used for improving the average quality of the population. To agents with higher fitness assigns higher probability of copying in the next population.

We use the method called tournament selection with replacement, which was mathematically analyzed by the authors Blickle and Thiele, for appropriate choice of individuals. This selection mechanism randomly chooses two *l*-tuples s_{i_1} and s_{i_2} , $i_{1,2} \in \{1,2,...,r\}$ from *S* and under condition $f_t(s_{i_1}) > f_t(s_{i_2})$ moves into so-called pool mate agent s_{i_1} , in the other case moves s_{i_2} . If $f_t(s_{i_1}) = f_t(s_{i_2})$, the individual s_{i_1} moves. We repeat the given approach *r*-times.

Expected number of occurrence or expected fitness distribution $p(s_i)$ of individuals s_i in the pool mate is then given as:

$$p(s_i) = r \left[\left(\frac{i}{r}\right)^2 - \left(\frac{i-1}{r}\right)^2 \right]$$
⁽²⁾

under condition $f_t(s_1) < f_t(s_2) < ... < f_t(s_r)$ (if every agent in population reaches unique fitness value). In that case we can interpret *i* as a number of agents with fitness value $f_t(s_i)$ or lower.

Let us now define some bitwise operations with *l*-tuples. Firstly it is bitwise modulo-2 addition $s_{i_1} \oplus s_{i_2}$, secondly it is bitwise modulo-2 multiplication $s_{i_1} \otimes s_{i_2}$ and bitwise binary complement $\overline{s_{i_1}}^2$.

² For example $011 \oplus 101 = 110$, $011 \otimes 101 = 001$, $\overline{011} = 100$



Figure 2 Flowchart of the simulation

Because an offspring of individual (placed in the pool mate after selection) occurs in generation t+1 we need to create them. Based on defined logical operations we define first genetic operator - crossover operator $\chi_{\Omega} = s_{i_1} \otimes m \oplus m \otimes s_{i_2}$ or $\chi_{\Omega} = s_{i_1} \otimes \overline{m} \oplus m \otimes s_{i_2}$ (each with probability 0.5), where $m \in \Omega$ represents random crossover mask. Literature recommends applying crossover operator with high probability. In our case it is probability $\chi = 0.85$. For one-point crossover applies the crossover mask m is randomly chosen from Ω according to the probability distribution

$$\chi_{m} = \begin{cases} 1 - \chi , & m = 0 \\ \chi / (l - 1), & m = 2^{\lambda} - 1, & 1 \le \lambda \le l - 1 \\ 0 & , & otherwise \end{cases}$$

Beside this, to keep diversity in population another genetic operator is necessary. Mutation operator is defined as $\mu_{\Omega} = s_i \oplus m$, where *m* is random mutation mask $m \in \Omega$. Random mutation mask is randomly chosen according to the probability distribution

$$\mu_{\Omega} = \mu^{\mathbf{1}^{T}} \cdot (1 - \mu)^{l - \mathbf{1}^{T} m} \tag{4}$$

This process leads to creation of new agents and also new populations of Samaritans and Parasites, whereby the individuals are similar to their relatively more successful parents from the previous generation. Consequently, the whole approach is repeated. In such co-evolutionary process, the environment for first population consists of second population and vice versa. Simulation starts with random populations with low average payoffs. First population tries to adapt to the environment of the second population and simultaneously, second population tries to adapt to the environment consisting of first population. Remaining settings are l = 71, r = 60 and q = 60.

2.2 Results

The whole simulation was created in program language R. We need to emphasize that genetic algorithm belongs to the area of heuristic algorithms. Therefore it may give various results. This is the reason why we repeated every simulation of Samaritan's dilemma 30-times with same settings, but with randomly generated initial populations of Samaritans and Parasites. Figure 3 illustrates the evolution of average fitness for population of Samaritans during 100 generations. We illustrate all 30 simulations at once. At the same time, we increased the number of generations for three simulations, during which their evolution progresses (which was not clearly finished in the course of 100 generations).

Totally in 24 simulations the games of initial random agents converged relatively fast to the state, in which Samaritan is exploited in every round by Parasite, so Nash equilibrium from cell I in Figure 1 has the highest number of occurrence.


Figure 4 Average payoffs for populations of Parasites

The more intuitive description of repeated game of two agents is illustrated by transition diagram. The nodes represent the history of three games that preceded the given state together with the reaction of agent to the given history (in the case of first node the history was not created yet, whereas other two nodes illustrate only the history of opponent's turns). Oriented edges and loops represents opponent's turn that also reacts to the history of previous games.

Diagram on Figure 5 indicates how the Iterated Samaritan's dilemma of two randomly generated strategies can look like.



Figure 5 Iterated Samaritan's dilemma of 2 randomly generated agents

Diagram on Figure 6 depicts the game of average Samaritan³ against average Parasite from chosen simulation, which converged to the state of exploitation.



Figure 6 Representative game of final populations in 24 simulations

In the first three rounds, the agents choose strategies Non-charity – Work and came to cell I. After three rounds Samaritan must react to repeated exploitation of by Parasite. The consequent reaction Charity – Refuse work takes them to a state in which the history is the same as in the previous round. As a result, the players always repeat the same turns that are depicted by a loop in both diagrams.

³ If actual component in l-tuple is 0 for more than 50% of individuals in population, it is average component – bit; consequently by similar calculation of all bits we get average individual of the population



The most of the mentioned 24 simulations evolved as depicted in Figure 7. Now we assume, that in simulations, which resulted in the permanent exploitation, mutation occurs. More precisely, it will be mutation of component $s_{i,42}$, from the strategy Charity to Non-charity. We can interpret this as a situation, when Samaritan after three rounds of exploitation decides not to help, whereas l-tuples of Parasites stay unchanged. The game from the point of view of Samaritan is depicted in the following diagram.



Figure 8 Game with mutation of 42th element of Samaritan's 1-tuple

Initial development is preserved to the moment when agents must show a reaction coded in components $s_{i,42}$, $p_{j,21}$. Parasite reacts with strategy Refuse work and Samaritan with mutated strategy Non-charity. Considerable consequence is a following development, when agents after other three rounds will get to native state. Samaritan is again required to react to history representing his exploitation during three previous rounds. Similar case is also noted in all 24 simulations. But Samaritan with such mutation will not survive in population of Samaritans (due to lower average payoff) and will be excluded from population during following generations using selection mechanism.

The game in those simulations that did not converge to the state of Iterated exploitation (simulations 12, 21, 26) developed similarly as depicted in the figure below.



Figure 9 Representative game from the point of view of Samaritan of final populations in 3 simulations

The differences in these simulations occurred only during first rounds, whereas their common feature was the same behavior as depicted in the last two nodes of diagram. Parasite could not totally force Samaritan to permanent help and consequently, from the certain round an alternate exchange of reactions including payoffs of agents occurs. Players alternately move between cells I and IV, which represent Nash equilibrium of passive Samaritan's Dilemma. Similar evolution as on Figure 10 was in simulations number 12 and 21.



Figure 10 Evolution of average payoffs in simulation number 26

Only in simulation number 19 an average Parasite was not able to permanently or alternately exploit average Samaritan. Samaritan evolved into a form in which he could force average Parasite to work regularly, what represents socially optimal state.



Figure 11 Game from the point of view of Samaritan of evolved populations in simulation 19

This evolution, as also Figure 12 indicates, was not so clear as in the previous two cases.



Figure 12 Evolution of average payoffs in simulation number 19

3 Conclusion

With combination of appropriate representation of strategies and genetic algorithm it was possible to simulate the evolution of behavior of agents based on the evolution in the environment of Iterated Samaritan's dilemma. Using selection mechanism, crossover and mutation it was possible to create new and better strategies, which were appropriately adapted to the environment of opposite population. As a result of repetition of this process, the evolution converges to a certain result. We must say that strategies created by coevolution can be effective against population representing an environment to which they adapt, but their performance can be lower, if they play Iterated Samaritan's dilemma against other population.

Even if strategies of agents and the games converge into a certain state, it does not mean, that the change in subsequent evolution is not possible. It implies that none of the populations will finish their evolution, but constantly try to adapt to the environment creating other population. But we can notice, that from the random populations consisting from not very rational agents, the often result of coevolution is Iterated exploitation of Samaritan by Parasite, what represents socially

unacceptable situation. In the smaller number of cases the populations were created, whose agents were alternately situated in cell I and IV on Figure 1 and only in one case the population of Samaritans was able to force the population of Parasites to repeated work.

References

- AXELROD, R., 1987. The Evolution of Strategies in the Iterated Prisoner's Dilemma. In: L. Davis, ed. 1975. *Genetic Algorithms and Simulated Annealing*. London: Pitman, pp. 32-41.
- BLICKLE, T. and THIELE, L.1995. A mathematical analysis of tournament selection. In: L. Eshelman, ed., *Proceedings of the 6th International Conference on Genetic Algorithms*. San Francisco: Morgan Kaufmann Publishers, pp. 9-16.
- BUCHANAN, J.M., 1972. The Samaritan's Dilemma. In: E. Phelps, ed. 1975. *Altruism, Morality and Economic Theory*. New York: Russell Sage, pp. 71-85.
- ENGELBRECHT, A. P. 2007. Computional Intelligence: An Introduction, Second Edition. John Wiley & Sons, Ltd.
- FOGEL, D.B., 1993. Evolving Behaviors in the Iterated Prisoner's Dilemma. In: *Evolutionary Computation*. Vol. 1, No. 1, pp. 77-97.
- KOZA, J. R., 1992. Genetic programming: on the programming of computers by means of natural selection. Cambridge, MA: MIT Press.
- MILLER, J. H. 1996. The coevolution of automata in the repeated prisoner's dilemma. In: *Journal of Economic Behaviour and Organization*. Vol. 29, pp. 87-112.
- SCHMITT, L.M., 2001. Theory of genetic algorithms. In: *Theoretical Computer Science*, Vol. 259, No. 1, pp. 1-61.
- WEISE, T. 2009. Global Optimization Algorithms Theory and Application, Second edition. Thomas Weise.

A Practical Method for Valuing Accounts and Notes Receivable

JOZEF KAŠÍK¹ Technical University of Ostrava, Faculty of Economics Czech Republic

Abstract

The paper reacts to the growing need of estimating the market value of accounts and notes receivable. Recently, there has been a significant amount of the bank rupted companies in the Czech Republic and liquidators who sell the assets of these companies demand appraisers to estimate their value. The accounts and notes receivable very often form an important part of the liquidation value of the bank rupted businesses but at the same time their valuation is challenging. Therefore a multi-criteria method as a very practical tool for valuing accounts receivable is proposed and presented in detail in this paper.

Key words: Accounts Receivable, Valuation, Market Value, Multi-Criteria Method

JEL Classification: G21, G32, G33

1 Introduction

Accounts and notes receivable represent the right of one party (the creditor) to require certain fulfilment in relation to the other participant (debtor). They emerge after an agreement is signed or after entering into a contract. To be more precise, accounts receivable are amounts due from customers for services or goods that have already been delivered (Piper, 2010). Therefore accounts receivable is usually a short-term receivable because the firm expects to receive the money within one year (Nickels, McHugh, J. and McHugh, S., 2010). Notes receivable are short-term or long-term promissory notes legally binding the debtor to pay certain amount of money to the business (lender) in future. They are usually raised through lending activities of the business. From the point of view of the Czech accounting rules, receivables are included in current assets, regardless of whether it is a short-term or a long-term receivable. On the company's balance sheet, receivables can represent a substantial part of the assets. At the same time, most companies deduct some allowance for potentially uncollectible accounts. The typical policy of the businesses is to increase the allowance for doubtful receivables at the end of each month by a percentage of that month's credit sales, which shows up as a deduction from accounts receivable on the balance sheet (Pratt and Niculita, 2008).

The valuation of the receivables in general is very important in case of, e.g., mergers and acquisitions or liquidation of businesses. Because we have different standards of value (e.g., book value, liquidation value or market value), it is important to point out at the beginning that the focus of the paper is on the market value of receivables. The definition of market value is taken from the International Valuation Standards as the estimated amount for which the property should be exchanged on the date of valuation between buyer and seller in a transaction between independent partners after proper marketing, the parties had each acted informed, reasonably and

¹ Ing. Josef Kašík, Ph.D., Sokolská třída 33, 701 21 Ostrava, Czech Republic, josef.kasik@vsb.cz

without pressure (IVSC, 2007, p. 27). An important fact is that, unlike the price, which is a fact, the value is an estimate of the amount of money for which the asset could be sold. The goal of the paper is to briefly describe available methods for valuing receivables and to present a new practical method for valuing receivables.

2 Brief Description of Available Methods

The available methods for valuing receivables will be described in this chapter. There are many methods we can use to determine the value of receivables, of which the most important ones are (Kislingerová, 2001; Mařík et al., 2007; Šantrůček, 2005):

- 1. nominal value method,
- 2. discounted value method with risk assessment,
- 3. rating method,
- 4. liquidation method,
- 5. method comprising also other than economic effects,
- 6. combination of methods.

2.1 Nominal value method

Nominal value of the receivable is usually the stated value of the receivable adjusted for all the received payments, the interests and possible penalties. It is the starting point for calculation the market value of the receivable.

2.2 Discounted value method with risk assessment

In its simplest form, this method is based on the on the following formula:

$$MV = \frac{NV}{(1+d)^t} \tag{1}$$

where MV is market value of receivable, NV is nominal value, d is discount rate taking into account risk and T is expected time of receiving money (usually in years). In this case, the nominal value of receivables is decreased because of opportunity cost. If there is more payments during the longer period (long-term receivables), we can use the formula:

$$MV = \sum \frac{P_t}{(1+d)^t} \tag{2}$$

where Pt are payments in time t.

The formula can be extended by the determination of probabilities of payments to the following form:

$$MV = \sum \frac{p_t * P_t}{(1+d)^t} \tag{3}$$

where pt is probability of receiving the payment Pt in time t.

Nevertheless, it can be very difficult to determine the probabilities in practice.

2.3 Rating method

This method is used for classification of receivables into several groups according to the risk

level. By this way the receivables are usually categorized into five groups:

- 1. standard receivables receivables that are paid on time or less than 31 days after the due date, there is no reason to doubt about payment of the receivable,
- 2. monitored receivables receivables that are more than 30 days and less than 91 days after the due date,
- 3. nonstandard receivables payment of the total amount of money is very uncertain, there are receivables that are more than 90 days and less than 181 days after the due date in this category,
- 4. doubtful receivables payment of the total amount of receivable is very unlikely, receivables that are more than 180 days and less than 361 days after the due date,
- 5. uncollectible (loss-making) receivables receivables that are more than 360 days after the due date.

The idea of this approach is very often used in banks (Mařík, 2007). The only criterion for valuing receivables using this method is a number of days after the due date. The appraiser uses the following formula:

$$MV = K * NV$$

where K is the coefficient from 0 to 1 reflecting the risk of non-payment. The values of the coefficient K very often used in practice are shown in Table 1.

lade 1

Time after the due date	Coefficient K
before the due date	0.97
after the due date but less than 31 days	0.91
more than 30 days but less than 91 days	0.80
more than 90 days but less than 181 days	0.61
more than 180 days but less than 361 days	0.32
more than 360 days after the due date	0

Source: Author's own elaboration based on Mařík (2007)

It is important to emphasize that the values of coefficient K in Table 1 are not compulsory and they can be modified to better reflect the real situation, e.g. the guarantee for the receivables.

2.4 Liquidation value method

Liquidation value method is used when the debtor is in liquidation or in bankruptcy. We determine the value of the receivables based on an estimate of the yield of the debtor's assets. If the receivable is secured by the property of the debtor, then we will carry out an estimate of the liquidation value of the collateral. The yield of the debtor's property may be calculated either by estimation of the value of the whole business or if the company is unable to continue in its operation, we can sell-off the individual assets of the debtor.

(4)

2.5 Method comprising also other than economic effects

Using this method, we also take into account other than economic aspects of the deal. For example, we know cases in the Czech Republic, in which the government bought some receivables at prices higher than their market values to avoid the negative social impacts in the event of company's bankruptcy.

2.6 Combination of methods

We can also use combination of methods for valuing receivables. This is usually done by calculating the weighted average of the values obtained by using different methods of valuation. This method is quite suitable if the difference between the values calculated by the different methods is not too big. If not, we should attach to one or another method after reasoning because it seems that one of the methods is more suitable in this case.

3 Multi-criteria method for valuing receivables

The main goal of this paper to present a practical method for valuing receivables that overcomes some of the shortcomings of the methods described above. For example, the rating method takes into account only one factor, which is the time after the due date, although we know that there are more factors influencing the payment of receivables in reality. On the other hand, we do not need a too complex formula or a model with many inputs that are very difficult to obtain. Although we always can use rough estimation the saying "garbage in – garbage out" describes the reliability of the obtained results.

The proposed multi-criteria method seems like a sensible golden mean.

The original version of this method was expressed by the formula (Kašík, 2003):

$$MV = NV * [(1 - C_1) * (1 - C_2) * (1 - C_3) - DRCF]$$
(5)

where MV is market value of the receivable, NV is nominal value of the receivable, C1, C2 and C3 are the coefficients reflecting the individual debtor's creditworthiness criteria and DRCF is the debt recovery cost factor.

This method of multi-criteria assessment of the receivable is based on the idea that its market value is affected by many risk factors with varying intensity. The relevant risk factors can be categorized into several groups according to their common features and create a set of criteria for quantifying the effects of the risks. The evaluation of the effects of the risk factors is expressed by the coefficients C1 - C3, which can take values from 0 to 1. It indicates minimal risk when the value is close to 0 and maximum risk when the value of the coefficient is close to 1. The selection of the criteria used in the formula was based on own appraisal experience of authors (Novotný and Kašík, 2003). First criterion C1 represents the legal aspects of the receivable, i.e., its legal existence and the level of its formal requirements, which enables the potential applicability of claims in lawsuits. The time after the due date or negative prescription (expiration or loss of rights) can be reflected in this criterion.

Second criterion C2 represents the willingness of the debtor to pay the debt. It includes the acknowledgment of debt, payment history, cooperation and communication with the debtor and also acceptance of collateral.

Third criterion C3 represents the economic condition of the debtor. It can be evaluated using either various paid databases or it can be based on generally available information, e.g., available financial reports of the companies.

When determining the market value of receivables, it is also necessary to take into account the costs that are associated with their recovery. Hence, we have to take into account the debt recovery cost factor (DRCF). This factor is defined as the ratio of the estimated costs of debt recovery to the nominal value of the receivable. The estimated size of these costs can also be expressed as a percentage of the nominal value of the receivable.

The usage of multiplication in the formula ensures that the high risk in even one area, e.g., economic condition of the debtor, causes the minimum market value of the receivable. Hence, if the coefficient C3 is equal to one then the market value of the receivable is mathematically equal to zero independently of the values of other factors. In this specific situations, the formula gives us very good results. In practice, we usually determine the market value of receivables 1 CZK, if the result is mathematically zero or negative value (due to DRCF).

However, when the situation in none of the assessed factors is so extreme, the multiplication of the values causes that the market value of the appraised receivables goes also very quickly to zero, which usually underestimates the market value of the receivables. Another disadvantage of this model is that the existence and quality of the collateral, which can be very important factor influencing the market value of receivables, is not explicitly expressed in the formula. Hence, a new modified version of the formula using the combination of multiplication and summation of the factors is proposed:

$$MV = NV * \left[(1 - C_1) * (1 - C_2) * \frac{(1 - C_1) + (1 - C_1)}{2} - DRCF \right]$$
(6)

where C1 represents the legal aspects of the receivable (legal existence of the receivable, expiration etc.), C2 represents the economic condition of the debtor (sales, profit, assets, financial condition of the debtor etc.), C3 represents the existence and market value of collateral securing the receivable, C4 is the willingness of the debtor to pay the debt and DRCF is the debt recovery cost factor defined in the previous formula. The most important change is the fact that we can distinguish two types of factors:

- 1. hard factors C1 and C2, i.e., the legal aspects of the receivable and the economic condition of the debtor these factors highly influence the market value of receivables, the very poor condition of one or another factor causes that the market value of the appraised receivable is at minimum,
- 2. soft factors C3 and C4, i.e. the existence of the collateral and the willingness to pay the debt the impact of these two factors on the market value of receivables is dependent on the condition of other factors. That is even true for the relationship between the factors C3 and C4. For example, the high level of unwillingness to pay the debt does not automatically mean that the market value of the receivable is close to zero because it is dependent on the condition of other factors (e.g., the legal aspects and the collateral quality).

The presented model could be theoretically modified by adding the weights to each of the factors. This modification would better reflect the reality but it would also lead to the rising complexity and the increasing number of the model inputs.

4 Conclusion

The paper is focused on the valuation of receivables and especially on the presentation of a particular multi-criteria method for valuing receivables. The author tries to find the balance between the theoretical and practical approach to this issue. There is a brief description of the available methods for valuing receivables at the beginning of the paper. It continues with the description of the old version of the multi-criteria method. The modified version of this method, reacting on some disadvantages of the previous model, is proposed and presented. Future CEFE 2015 – Central European Conference in Finance and Economics research will be focused on testing the presented model in practice. It can also indicate that some further modifications of the model are needed.

Acknowledgements

This paper was supported by the European Commission within Operational Programme Education for Competitiveness under Project No. CZ.1.07/2.3.00/20.0296.

References

- IVSC. 2007. International valuation standards 2007. London: International Valuation Standards Committee.
- KAŠÍK, J. 2003. Vícekriteriální model oceňování pohledávek. In: Výsledky vědecké práce studentů doktorského studia Ostrava 2003. Sborník příspěvků z mezinárodní konference studentů doktorského studia. Ostrava: VŠB-TU Ostrava, pp. 97-99.

KISLINGEROVÁ, E. 2001. Oceňování podniku. Praha: C. H. Beck.

- MAŘÍK, M. et al. 2007. Metody oceňování podniku: proces ocenění základní metody a postupy. Praha: Ekopress.
- NICKELS, W., McHUGH, J. and McHUGH, S. 2010. Understanding business. New York: McGraw-Hill/Irwin.
- NOVOTNÝ, J. and KAŠÍK, J. 2003. Určování hodnoty pohledávek. In: Finanční řízení podniků a finančních institucí. Ostrava: VŠB-TU Ostrava, pp. 297-301.
- PIPER, M. 2010. Accounting made simple: Accounting explained in 100 pages or less. Chicago: Simple Subjects.

PRATT, S. and NICULITA, A. 2008. Valuing a business. New York: McGraw-Hill.

ŠANTRŮČEK, J. 2005. Pohledávky, jejich cese a hodnota. Praha: VŠE.

Concentration and Performance: Cointegration Analysis

KRISTÍNA KOČIŠOVÁ¹ Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

The aim of the paper is to estimate the long-term relationship between concentration and performance in the US banking industry during the period 1966-2013. The first part brings the theoretical definition and literature review focused on examining the relationship between concentration and performance. There were used several methods to estimate the performance and concentration in the relevant market. Performance was measured through ratios (return on assets and return on equity); and concentration was measured through concentration indices. Using a Johansen cointegration analysis we tested the relationship between selected variables. The negative long-term relationship between concentration and performance was estimated in the US banking market. Our findings are is in line with the Quiet Life Hypothesis indicating that the decrease of concentration (increase of competition) contributed to higher performance of the analysed banking market.

Key words: Banking Sector, Concentration, Performance, Johansen Cointegration Analysis

JEL Classification: G21, C12, D40

1 Introduction

In the economic system of the country that works in accordance with the principles of the market mechanism there are carried out economic activities of individual economic entities. One of conditions for effective functioning of the economic system is functioning financial system. Significant changes that have affected the financial sector in recent years have included changes in deregulation, globalization of markets, innovation and technological progress. Changes mentioned above are the main factors that will gradually reduce cost of capital and significantly affect the performance and competitiveness of the banking sector in the international context. Just a gradual process of globalization significantly affects the structure of the financial and banking system, their performance and stability. It is therefore very important to focus on examination of bank and banking systems performance, under purpose of investigation of their structure (the level of concentration), and it is important to follow these issues not only as isolated phenomena, but also focus on investigation of their relationships.

The aim of this paper is to examine relationship between these variables. The given issue in the Slovak and the Czech banking market is not sufficiently examined, which creates space for expansion of scientific knowledge in that area. The analysis of the performance, concentration and relations between them has not been made on a sample of the Slovak and the Czech banking market, since this is a market relatively young and small, which allows working only with a relatively small sample of data. Therefore, our initial ambitions were focused on the analysis of the banking sectors of EU countries, but we found out that the data basis is quite limited. Retrospectively we could process the data only since 2008 and the data structure did not allow us

¹ doc. Ing. Kristína Kočišová, PhD., Němcovej 32, 040 01 Košice, Slovak Republic, kristina.kocisova@tuke.sk

to select variables necessary for calculation of selected indicators. Therefore, the practical analysis was conducted on the data of the US banking market (which consists of the banking sector in 50 US states) within the period 1966-2013. Secondary data from the US banking sector was characterized by the desired properties. Their heterogeneity, completeness and availability during a longer period provide reliable data platform. Using only this type of data is not limitation of our work, because this presented paper can represent a form of methodology and analytical processes, and in case of data availability this can be also applied in the banking sectors of other countries and continents.

The structure of this paper is following. The second section reviews the empirical literature regarding the relationship between concentration and performance in the banking sector. Next section describes data and methodology applied in this paper. Results of empirical analysis are presented in the fourth section. The last section concludes results and findings.

2 Literature review

The concentration of the banking market is widely examined and analyzed primarily because of close relation of competition and business performance in market economies. The basic principle of business activities by Polouček (2006) assumes that conducting of enterprises is dependent on market structure and market structure in turn will influence their conduction.

In the literature, there are two main theoretical approaches describing relationship between structure and performance in the banking market. Structural approach used two basic hypotheses to define this relationship: Structure-Conduct-Performance (SCP) and Efficient structure (ES) hypothesis.

In case of SCP hypothesis concentration is measured by indicators of absolute concentration (e.g. concentration indices of the relevant market). SCP hypothesis was for the first time introduced in the work of Mason (1939) and now forms one of the basic approaches for testing of competing hypotheses. This hypothesis is based on the idea that economic performance depends on the conduct of the manufacturers and buyers, while their conduct depends on the structure of the market. Market structure and conduction of the manufacturers and buyers are also influenced by the basic conditions (e.g. economic environment) within they operate. Mason (1939) identified not only flows from the basic conditions to the structure, conduct and performance, but found that there are feedbacks between the parts of the model.

The shift in the SCP theory brought Bain (1959), which allowed empirical test the hypothesis through regression analysis. Since the conduct of producers is difficult to measure, Bain (1959) focused directly on the relationship between performance (of producers) and structure (market concentration). It concludes that fewer firms in the market (more concentrated structure of market supply) leads to less competitive behaviour (in terms of higher prices and restricted output), and less competitive outcome (higher ratio of prices to costs and higher profits at the expense of lower consumer welfare). According to Bain (1959) effective companies in most sectors are consistent with their low or medium market share, while as an indicator of effective behaviour is considered profit.

Second, efficient structure (ES) hypothesis argues that performance of enterprises increases with their size. This means that an increasing market share of enterprises and growing ability to achieve higher profits are linked to the growth of concentration in the relevant market. According to the ES hypothesis, the higher concentration is the logical result of market forces. Therefore in case of this hypothesis concentration is measured by indicators of relative concentration (e.g. market share of individual banks).

Concentration and hence competition in the banking market is an important factor affecting the effectiveness of provided services, quality of offered products and degree of innovation in the banking sector. Claessens and Leaven (2004) reported that the level of competition in the banking sector also affects the access of businesses and households to financial products and services, what ultimately affects overall economic growth. As well as in other sectors of the economy, increase in competition should also cause increase of efficiency and maximize the welfare of the whole economy.

The relatively high concentration of assets in the banking market, in the hands of a small number of banks in most countries, raises the question of whether the banking market is effective, and whether its performance is not just result of revenues achieved at the expense of clients due to monopoly prices. Due to high concentration in the banking market, banks have undoubtedly favourable conditions, which enable them to establish and maintain a higher interest margin; there can occur the allocation of credit, as banks have a strong negotiating position. The higher concentration gives an additional incentive for the banks to act in a concerted fashion which can lead to higher margins and higher profits.

The importance of measuring concentration and performance are separately described in works of several authors. Individual authors in their papers used to measure the performance of the banking market by using of traditional methods (ratios), modern methods of measuring performance based on the use of mathematical models, or information technology (e.g. methods of multi-criteria decision (in Akkoc and Vatansever, 2013) or the Balanced Scorecard method (e.g. Gavurová, 2011). On the other hand, market concentration is most frequently measured by the Concentration ratio or Herfindahl-Hirschman index, while the majority of authors use these two indexes simultaneously. Only a small number of authors use other concentration indices (e.g. Hall-Tideman index, Rosenbluth index, or Entropy index).

Author(s)	thor(s) Sample characteristics		Concentration	Results of testing	
Smirlock (1985)	US banking sector; 1973- 1978	ROA, ROE	CR _{3V} , MS _V	ES Hypothesis	
Goldberg and Rai (1996)	EU banking sector; 1989- 1991	ROE, NIM, CE	HHI _A , MS _A	ES Hyp. (ROE, NIM) SCP Hypothesis (CE)	
Grigorian and Manole (2002)	EU banking sector; 1995- 1998	BCC	MSA	ES Hypothesis	
Kosmidou et al. (2005)	Banking sector in United Kingdom; 1995-2002	ROA, NIM	CR _{5A}	SCP Hypothesis	
Tregenna (2009)	US banking sector; 1994- 2005	ROA, ROE	CR _{10A} , MS _A	SCP Hypothesis	
Rumler and Waschiczek (2012)	Banking sector in Austria; 1995-2009	ROA, ROE, NIM	HHI _A , MS _A	SCP Hypothesis	

 Table 1 Literature review

Ahamed (2013)	Indian banking sector; 2004-	ROA, ROE	HHI _A , MS _A	SCP Hypothesis	
	2011				
Řepková	Czech banking sector; 2001-	BCC, CCR	Lerner index	Quiet Life	
and Stavárek (2013)	2010			Hypothesis	

Notes: BCC/CCR-pure/overall technical efficiency measured by DEA model, CE-cost efficiency measured by SFA model, $CR_{3/5/10/V/A}$ -concentration ratio for 3/5/10 biggest banks on the deposit/asset market, HHI_A-Herfindahl-Hirschman index on the asset market, NIM-net interest margin/assets, ROA-return on assets, ROE-return on equity Source: Prepared by author

Only a small amount of works analyzes relationship between these two variables. Analysis of the relationship between concentration and performance in the banking market is driven by an examination of one of the main aims, namely creation of an efficient banking market, which minimizes probability of bankruptcy. Table 1 provides overview of the works of selected authors who have focused on examining the relationship between concentration and performance on a local or global banking market. As can be seen, results of these authors led to different conclusions. While in the case Smirlock (1985), Goldberg and Rai (1996), Grigorian and Manole (2002), the ES hypothesis was confirmed, in the paper by Goldberg and Rai (1996), Kosmidou et al. (2005), Tregenna (2009), Rumler and Waschiczek (2012), Ahamed (2013) the SCP hypothesis was confirmed. In case of Řepková and Stavárek (2013) results are in line with the Quiet Life Hypothesis and the suggestions that the increase of the competition will contribute to efficiency (performance). Therefore aim of this paper is to analyze long-term relationship between concentration and performance in conditions of the US banking market using the Johansen cointegration analysis.

3 Methodology

Next section describes the approaches applying for estimation performance and concentration in the banking sector. The performance will be measured by the classical ratios like Return on Assets (*ROA*) and Return on Equity (*ROE*). As this indicators are commonly used in literature it will be not detail described in this paper.

We will focus on the description of methods used for measurement of concentration. The classification of concentration measures in the literature is not systematic. The concentration can be measured by concentration indices (*CI*), which could be expressed in the following form:

$$CI = \sum_{i=1}^{n} r_i \cdot w_i \tag{1}$$

Where r_i is the market share of bank *i*, w_i is weight attached to the market share and *n* is the number of banks in the relevant market.

The value of attached weight can be different according selected weighted scheme. Marfels (1971) examined the weighting structure of various concentration indices whereby he had found that the weighting scheme of an index determines its sensitivity towards changes at the tail-end of the banks size distribution. Based on the analysis Marfels (1971) classified the concentration indices into four basic groups according to the weighting scheme:

• Weights of unity are attached to the shares of an arbitrarily determined number of banks ranked in descending order ($w_i = 1$; $\forall i \leq m$); and zero weights are attached to the remaining

banks in the industry ($w_i = 0$; $\forall i > m$). An example is the *m* bank concentration ratio (CR_m), probably the most frequently used concentration index. Concentration ratio (CR_m) can be calculated as the sum of the market shares (r_i) of the *m* largest banks ($m \in \{1; n >\}$), which are arranged from highest to lowest value of market share ($r_1 \ge r_2 \ge ... \ge r_m \ge ... \ge r_n$). The calculation of the Concentration ratio of the *m* strongest players on the market can be written as follows:

$$CR_m = \sum_{i=1}^m r_i \tag{2}$$

This indicator can takes values $0 \le CR_m \le 1$; respectively in percentages $0\% \le CR_m \le 100\%$. Number of subjects included in the calculation of CR_m is free, there are no rules for determining m, but in the banking sector, the CR_m is most frequently quantified for three (m=3), respectively five (m=5) largest banks in the market.

• Banks' market shares are used as their own weights ($w_i = r_i$; $\forall i$). The greater weights are attached to larger banks. These indices take account of all banks in the industry. An example is the Herfindahl-Hirschman index (*HHI*) which is a standard accepted methodology for evaluating the absolute concentration. This index is often called the full-information index because it captures features of the entire distribution of banks sizes. It takes the following form:

$$HHI = \sum_{i=1}^{n} (r_i)^2 \tag{3}$$

As the values of index are in sectors with a large number of subjects relatively low, value of the index is multiplied by the appropriate multiplier, most frequently 10000. As defined by US Department of Justice adjusted index values can be interpreted as follows (NBS, 2013): the value of *HHI* below 1000 shows a very low concentration, in the range 1000–1800 shows a moderate concentration, value of *HHI* above 1800 shows a very high concentration of the banking system, whereas the index value equal to 10000 shows a full concentration.

• The rankings of the individual banks are used as weights $(w_i = i; \forall i)$, where banks can be ranked in increasing or decreasing order. All banks are included in computing this index. Examples are the Hall-Tideman index (*HTI*) and Rosenbluth index (*RI*). The concentration indices developed by Hall and Tideman (1967) and Rosenbluth (1955)

resemble one another both in form an in character. Hall and Tideman bring forward a number of properties which concentration indices should satisfy. They emphasize the need to include the number of banks in the calculation of a concentration index, because it reflects to some extent the conditions of entry into a particular industry. In their work was suggested the so-called Hall-Tideman index (*HTI*), which can be calculated by the following formula:

$$HTI = \frac{1}{\left[2\sum_{i=1}^{n} (i \cdot r_i)\right] - 1}$$
(4)

Where the market share of each bank is weighted by its ranking in order to ensure that the emphasis is on the absolute number of banks, and that the largest bank receives weight w_i =

1. Banks with smaller market shares will have higher values of weights and smallest bank will be weighted $w_i = n$. The *HTI* ranges between zero and unity, being close to zero far an infinite number of equal-sized banks, and reaching unity in the case of monopoly (Bikker and Haaf, 2002). The lower value of the *HTI* thus indicates a lower market concentration which creates more competitive environment in the market. On the other hand, growth in the *HTI* value indicates a higher concentration which reduces the competitive environment in the market.

Rosenbluth index uses for its calculation the rankings of the banks as weights, starting with the smallest banks. This will ensure that the smallest bank will be weighted $w_i = 1$, subjects with higher market share will have higher values of weights and largest entity will have the weight $w_i = n$. Rosenbluth index can be calculated by the following formula:

$$RI = \frac{1}{\left[2\sum_{i=1}^{n} (i \cdot r_i)\right] - 1}$$
(5)

Also, this indicator can take values $0 \le RI \le 1$; whereas if the number of entrants to the market grows, the value of the *RI* increases, suggesting declining levels of market concentration and therefore increasing the level of competition.

Both indices (HTI and RI) thus use the same weight scheme. The difference between HTI and RI is in the arrangement of banks in ranking in accordance with market share and in allocation of weights where HTI assigns greatest weight to the smallest banks and RI assigned the maximum weight of the largest banks.

• Each market share is weighted by the negative of its logarithm ($w_i = -\log(r_i)$; $\forall i$). A smaller absolute weight is thus attached to larger market shares. An example of this type of index is the Entropy index (*EM*). *EM* can be calculated by the following formula:

$$EM = -\sum_{i=1}^{n} r_{i} \cdot \log_{2} r_{i} = -\left(\frac{1}{\ln 2}\right) \cdot \sum_{i=1}^{n} r_{i} \cdot \ln r_{i}$$
(6)

This indicator can take values in the interval between 0 and $\log 2n$. This indicator develops inversely with the level of concentration (as well as *RI*). The *EM* decline indicates an increasing level of concentration (therefore decreasing the level of competition), while growing *EM* indicates decreasing concentration level (therefore increasing the level of competition).

The data set used in this paper was obtained from the Federal Deposit Insurance Corporation (FDIC), which publishes data on the development of the US banking market since 1966. From the set of all published data have been chosen adequately variables, development of which was followed by one in 50 US states, as well as summaries for the entire US banking market from 1966 to 2013.

4 Results and discussion

Following section estimates level of performance and concentration in the US banking sector within the period 1966-2013. Further, relationship between concentration and performance is determined, using Johansen cointegration test.

4.1 Estimation of performance and concentration

The performance of banking sector can be measured by different methods. In our paper we decided to measure the performance by the classical ratios, profitability indicators (ROA and *ROE*). The graphic development (Figure 1) shows that trends of both indicators are the same, but a higher degree of variability shows return on equity. Profitability of the US banking market was positive throughout the analyzed period (1966-2013). The exception is 2009, when the average return on assets (-0.1479%) and equity (-1.6673%) were negative. As we know achieving losses in the US banking market in 2009 is a consequence of the crisis, which gradually began to affect banking market since 2004. Since that year (2004) the indicators of profitability were also affected by this trend as proved by a sharp decline in the average ROA and ROE values. Declining profitability and ultimately unprofitability of banking market was probably influenced by the need to create adjustments to previously issued loans, which are due to rising interest rates became more expensive and led to a growing inability their repayment. Provisioning, but also a shortfall in interest income was reflected in a decline of profit making in the US banking market in the analyzed period. In recent year there can be seen a significant increase in profitability for both indicators. Portfolios of banking markets were sufficiently cleaned from the riskiest loans and significantly reduced the need to create provisions.

As the aim of the paper is to estimate the relationship between concentration and performance in the US banking industry, the other analyzed variables were indicators of absolute concentration. For concentration analysis were chosen two most commonly used methods (Concentration ratio for five largest banks in the market (CR5) and Herfindahl-Hirschman index (HHI)), but also three less frequently used method (Hall-Tideman index (HTI), Rosenbluth index (RI) and Entropy index (EM)). The above indicators were calculated and analyzed on three sub-markets: the market of total assets (TA), total loans (TL) and total deposits (TD). The development of these indicators can be seen on Figure 1.

The value of *CR5* index demonstrates that through the whole analyzed period the top five banking markets owned an absolute majority of the assets, loans and deposits of the American banking market. At the beginning of analyzed period the development can be regarded as relatively stable until 1978 when there was a significant growth of values. Between the years 1980-1995 can be seen improvement in the competitive environment and consequently increasing concentration from 1995 until the end of the analyzed period. *CR5 reached its* minimum values in 1995, when the first five banking markets owned less than a half of total assets, loans, and deposits. Index reached the lowest value in the lending market, suggesting the best competitive environment in this market. *CR5 reached the* maximum values at the end of the analyzed period, what indicates decline in quality of the competitive environment.

On the basis of Figure 1 we can see that *HHI* and *HTI* showed the same tendency of development as the CR5 index. Based on the classification of *HHI* can be market of assets, loans and deposits considered during the analyzed period as low concentrated market. Only at the end of the analysed period (and also on the loan market between the years 1980-1982) the *HHI* exceeded the 1000 points, indicating that the banking market can be considered as the moderate concentrated. Increasing values of *HHI* and *HTI* at the end of analyzed period indicates decline in the quality of the competitive environment which is in line with development of *CR5*. The last two indicators, *EM* and *RI* belong to the concentration indices, whose value evolves inversely with the level of concentration. Thus, increase of values indicated that the level of concentration decreased

(thereby competition increased) and on the other hand, decreased of values indicated growth of concentration (and therefore decreased competition).



Figure 1 Performance and concentration in the US banking sector, 1966-2013 Source: Prepared by author based on FDIC, 2014

Based on the Figure 1 in the case of RI and EM can be confirmed the same tendency of concentration development as was evaluated through the previous indicators. The maximum values on the asset market were reached in 1992, on the credit market in 1994 and on the deposit market in 1977. In those years the level of concentration in the relevant markets was the lowest, indicating the highest level of competition in the relevant markets. The minimum values reached EM and RI in the last year, which indicates the highest level of concentration and thus the lowest competition in all three markets, which is also in line with development of CR5 and HHI. The comparison of the concentration indices shown, that each method leads to the same conclusion. This may be due to the fact, that the basis for calculation of all indices is the value of market share of individual banking sectors.

4.2 Relation between concentration and performance

In this section we focused on testing of long-term relationship between performance and concentration in the US banking market. For this testing the Johansen cointegration test was used, while we used the average annual data on performance and concentration of the global banking market in the US.

The first prerequisite for using the Johansen cointegration test is testing the stacionarity of time series. Stacionarity was tested by augmented Dickey-Fuller (ADF) test (include trend and intercept in the test equation). Unit root test has found that time series were stationary at the first difference I(1), and therefore testing of the cointegration relationship between variables could be performed.

The finding of long-term relationship between performance and concentration in the Johansen cointegration test could be identified by Trace test and Maximum Eigenvalue test. In our analysis Maximum Eigenvalue test was used. The results of estimating the cointegration relationship between selected variables in the US banking market are presented in Table 2.

The results of Johansen cointegration test in left side of Table 2 indicated one cointegration relationship between variables *ROA* and *HHI_TA*, *EM_TA*, *CR5_TD*, *HHI_TD*, *HTI_TD*, *RI_TD*, *EM_TD*; and between *ROE* and *HHI_TA*, *CR5_TL*, *HHI_TL*, *CR5_TD*, *HHI_TD*, *RI_TD* at the 0.1 significance level. One cointegration relationship was indicated between variables *ROA* and *CR5_TA*, *HTI_TA*, *RI_TA*, *CR5_TL*, *HHI_TL*, *HTI_TL*, *RI_TL*, *EM_TL*; and between *ROE* and *CR5_TA*, *HTI_TA*, *RI_TA*, *EM_TA*, *HTI_TL*, *RI_TL*, *EM_TL*, *HTI_TD*, *EM_TD* at the 0.05 significance level. The test results indicated that among these variables there existed long-term relationships, which means that the variables in the long term moved together.

Relationships between indicators of performance and indicators of concentration for which there was confirmed cointegration, can be described through the cointegration equation. Direction of cointegration relationships estimated through the cointegration equations between analyzed variables is displayed in the right part of Table 2.

The results of cointegration equations have shown that in the case of *ROA* and *ROE* there were significant negative long term relationship between performance and concentration. It indicates that growing concentration (and therefore decreasing of competition level) in the US banking market was associated with a decrease in *ROA* and *ROE*. These results are in line with so called Quiet Life Hypothesis presented in the work of Hicks (1935). According to this hypothesis, higher level of market concentration reduces the bank's efforts to improve performance. Hicks (1935) argued that monopoly allows managers quiet life without competition. This quiet life leads to decrease in performance. On the other hand, a stronger competitive environment prevents managers to "live quietly", forcing them to constantly look for opportunities to strengthen its position in the market, which will be reflected in the growth of performance.

		ROA	ROE		DOA	DOE	
Variables		Max-Eigen Stat.	Max-Eigen Stat.		KUA	KUE	
CR5_TA	r≤1	0.27	0.14			***	
	r=0	15.25**	15.40**		-	- • • •	
HHI_TA	r≤l	0.69	0.33				**
	r=0	13.07*	13.82*		-	_ * *	
HTI_TA	r≤1	1.38	1.82			***	
	r=0	15.73**	15.95**		-		
RI_TA	r≤1	0.04	0.00			. ***	
	r=0	15.68**	15.58**		+	+ ***	
EM_TA	r≤l	0.01	0.07		1	· ***	
	r=0	14.38*	15.25**		+	+ · · ·	
CR5_TL	r≤1	1.75	1.41		*	***	
	r=0	16.72**	14.37*			- • • •	
HHI_TL	r≤1	2.54	2.08		**	**	
	r=0	17.05**	13.30*				
HTI_TL	r≤l	0.00	0.02			***	
	r=0	16.29**	17.18**		-	- • • •	
RI_TL	r≤1	0.80	0.56			-1-	. ***
	r=0	16.14**	16.33**		+	+ · · ·	
EM_TL	r≤1	0.90	0.62		. *	. *	. ***
	r=0	16.29**	15.96**		+ *	+ ***	
CR5_TD	r≤l	0.13	0.05			***	
	r=0	14.32*	14.39*		-		
HHI_TD	r≤1	0.52	0.25			***	
	r=0	13.02*	14.13*		-	- • • •	
HTI_TD	r≤l	2.14	2.59			***	
	r=0	14.48*	15.01**		-		
RI_TD	r≤1	0.00	0.01			. ***	
	r=0	14.78*	14.85*		+	+ · · ·	
EM_TD	r≤1	0.04	0.12			. ***	
	r=0	13.67*	14.68**		+	+ · · ·	

Table 2 Johansen cointegration test and cointegration relations between performance and concentration

Notes: If the coefficient is significant, it has highlighted the significance of the coding (*) 0.1 (**) 0.05 (***) 0.01. Source: Prepared by author

The argument of negative relationship between concentration and performance can also be found in the work of Leibenstein (1966). Leibenstein (1966) shows, that the main factor for increasing performance is increasing competitive pressures, leading to a decline in market concentration. Lower concentration and thus higher competition leads managers to efforts to improve the company performance, to prevent the exclusion of companies from the market. Higher number of firms in the market allows comparing the company's performance in relation to comparable market players. If as a result of activities carried out by management level of performance is not at the level required by the owners, this may lead to changes in management. This motivates managers to achieve still better results of performance in order to maintain a fixed position in a prosperous business.

As well as Řepková (2012) found that between efficiency and concentration on the Czech banking market, there is long-term negative relationship. Relationship between concentration and efficiency in the banking market has also been studied Yildirim and Philippatos (2007), who

found a negative relationship between concentration and profit efficiency in Central and Eastern Europe in the period from 1993 to 2000.

In contrast to these findings are works of Demsetz (1973), Grigorian and Manole (2002), showing that a higher level of concentration was associated with higher performance.

5 Conclusion

The aim of the paper was to examine relationship between concentration and performance in the US banking market within the period 1966-2013. The performance was measured through ratios (e.g. return on assets and return on equity); and concentration was measured through concentration indices (e.g. Concentration ratio for five largest banks on the market, Herfindahl-Hirschman index, Hall-Tideman index, Rosenbluth index and Entropy index). The comparison of profitability ratios shown, that both methods led to the same conclusion which might be due to the fact, that the basic parameter for their calculation is value of net profit. The comparison of the concentration indices shown, that each method led to the same conclusion which might be due to the fact, that the basis for calculation of all indices was the value of market share of individual banking sectors. The relationship between indicators of performance and indicators of absolute concentration was examined using the Johansen cointegration test.

The cointegration analysis found the negative relationship between concentration and performance in the US banking market during the analyzed period. These results are in line with so called Quiet Life Hypothesis presented in the work of Hicks (1935). According to this hypothesis, higher level of market concentration reduces the bank's efforts to improve performance as managers are not forced to perform activities efficiently, which in turn leads to a decrease in performance. On the other hand, a stronger competitive environment (lower level of concentration) prevents managers to "live quietly", forcing them to constantly look for opportunities to strengthen its position in the market, which will be reflected in the growth of performance.

Acknowledgements

This paper was supported by the Slovak Scientific Grant Agency as part of the research project VEGA 1/0446/15.

References

- AHAMED, M.M. 2013. Market Concentration and Profitability of Indian Banks: Does Size Matter in the Impact of Bad Loans and Bank Capital? In: *GPEN-CGR Annual Conference* 2013 Global Policy, Global Institutions and Global Development.
- AKKOC, S. and VATANSEVER, K. 2013. Fuzzy Performance Evaluation with AHP and Topsis Mehtods: Evidence from Turkish Banking Sector after the Global Financial Crisis. In: *Eurasian Journal of Business and Economics*. No. 11, pp. 53-74.

BAIN, J.S. 1959. Industrial Organization. New York: Wiley.

BIKKER, J.A. and HAAF, K. 2002. Measures of Competition and Concentration in the Banking Industry: A Review of the Literature. In: *Economic and Financial Modelling*. No. 9, pp. 53-98.

- CLAESSENS, S. and LAEVEN, L. 2004. What Drives Bank Competition? Some International Evidence. In: *Journal of Money, Credit and Banking*. No. 3, pp. 563-583.
- DEMSETZ, H. 1973. Industry Structure, Market Rivalry, and Public Policy. In: Journal of Law and economics. pp. 1-9.
- FEDERAL DEPOSIT INSURANCE CORPORATION. 2014. FDIC Database.
- GAVUROVÁ, B. 2011. The Balanced Scorecard System in Enterprise Management. In: *Ekonomický časopis*. No. 2, pp. 163-177.
- GOLDBERG, L. and RAI, A. 1996. The Structure-Performance Relationship in European Banking. In: *Journal of Banking and Finance*. No. 4, pp. 745-771.
- GRIGORIAN, D.A. and MANOLE, V. 2002. Determinants of Commercial Bank Performance in Transition: An Application of Data Envelopment Analysis. World Bank Policy Research Working Paper, 2002. Working Paper No. 2850.
- HALL, M. and TIDEMAN, N. 1967. Measures of Concentration. In: American Statistical Association Journal. No. 317, pp. 162-168.
- HICKS, J. 1935. The Theory of Monopoly. In: Econometrica. No. 3, pp. 1-20.
- KOSMIDOU, K., TANNA, S. and PASIOURAS, F. 2005. Determinants of Profitability of Domestic UK Commercial Banks: Panel Evidence from the Period 1995-2002. In: *Money Macro and Finance (MMF) Research Group Conference*.
- LEIBENSTEIN, H. 1966. Allocative "Efficiency" vs. "X-Efficiency". In: *The American Economic Review*. No. 3, pp. 392-415.
- MARFELS, C. 1971. Absolute and Relative Measures of Concentration Reconsidered. In: *Kyklos.* No. 4, pp. 753-766.
- MASON, E.S. 1939. Price and Production Policies of Large-Scale Enterprise. In: *The American Economic Review*. No. 1, pp.61-74.
- NBS. 2013. Príloha k analýze slovenského finančného sektora za rok 2013.
- POLOUČEK, S. 2006. Bankovnictví. Praha: Nakladateľstvo C.H. Beck.
- ROSENBLUTH, G. 1955. Measures of Concentration. In: Business Concentration and Price Policy. pp. 57-99.
- ŘEPKOVÁ, I. 2012. Konkurence, koncentrace a efektivnost českého bankovního sektoru. Dizertačná práca. Slezská univerzita v Opavě.
- ŘEPKOVÁ, I. and STAVÁREK, D. 2013. Relationship between competition and efficiency in the Czech banking industry. In: *Acta Universitatis Agriculturae et Silvculturae Mendelianae Brunensis*, No. 7, pp. 2701-2707.
- RUMLER, F. and WASCHICZEK, W. 2012. *Have Changes in the Financial Structure Affected Bank Profitability? Evidence for Austria*. Oesterreichische Nationalbank, Working Paper No. 180.
- SMIRLOCK, M. 1985. Evidence on the (Non) Relationship between Concentration and Profitability in Banking. In: *Journal of Money, Credit and Banking*. No. 1, pp. 69-83.
- TREGENNA, F. 2009. The Fat Years: The Structure and Profitability of the US Banking Sector in the Pre-crisis Period. In: *Cambridge Journal of Economics*. No. 4, pp. 609-632.
- YILDIRIM, H.S. and PHILIPPATOS, G.C. 2007. Competition and Contestability in Central and Eastern European Banking Markets. In: *Managerial Finance*. No. 3, pp. 195-209.

Decision-Making Process in Entrepreneurship Environment within the Scope of the Resilience of Regions

GABRIELA KOĽVEKOVÁ¹ – IVETA KOROBANIČOVÁ² - ERIKA LIPTÁKOVÁ³ Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

As for the redefining the regional development, we recommend gathering the good-practices (real-life stories) and gathering the regional data for statistics; afterwards complete the picture and movie about the shift or changes happening in the region. Complementarity of the two principles was already recommended in several other problems, but the broad context or frameworks on how to read together stories and statistics are being suggested such as the one in this very paper, which also includes: (1) a query about the decision-making process of entrepreneurs and the balance among all factors, which are representing the entrepreneurship inside and outside the company. This query starts with a few examples accompanied by basic theories, such as examples of the use of Petri networks (PN) in entrepreneurs' decision making. (2) Examples, such as the one of the dexterous entrepreneur, open the issue of broad context of factors influencing entrepreneurship. Those factors are leading towards the analysis of the national statistics. (3) a broad context, which is reflected in national statistics that had been provided to the reader in respect to changes that the entrepreneur's behaviour must include to the inside processes of decision making, which is being done continuously and in the hope of resilience. The mind of an entrepreneur comes under the scrutiny of many decision-making process in the course of running own business or a family business. The scrutiny in this paper was presented in a few examples divergent ones. Tradition mentioned by the study reported by Dana, Light (2011) is scrutinized differently than investment example (PN). Whichever decision-making process one follows this influences statistical results, which are then often being interpreted somewhat troublesome, as mentioned in various reports, e.g. Global Entrepreneurship Monitor report. The aim of this conceptual overview is to stimulate discussion about what entrepreneurship is, and how it has been analysed so far in connection with the resilience of country, region. Entrepreneurship is widely seen as an important driver of economic development and employment and productivity growth. Also, it is one of the main factors or indicators as factors important for resilience. Despite of wide range in the number of variables considered in the various indicators of resilience, the variables fall into six main categories: socio-economic characteristics and financial resources of individuals, infrastructure, community capacity, innovation and technology and natural environment, institutional capacity of the spatial economic system, the number of enterprises in region and in export industries. For a more complete understanding of how entrepreneurship contributes to economic and societal development, it is important to recognize the contextually embedded quality of entrepreneurial actions and behaviors in national, regional, and city level contexts.

Key words: Petri Network, Entrepreneurship, Resilience, Global Entrepreneurship Monitor, Mind Mapping of Business

JEL Classification: M13, R50, C65

1 Introduction

An entrepreneur, whose traits are known for the sake of this paper, is at its beginnings putting up with entrepreneurship at the establishing phase. In this example the one of the known traits is

¹ Ing. Gabriela Kol'veková, PhD., Němcovej 32, 040 01 Košice, Slovak Republic, gabriela.kolvekova@tuke.sk

² Ing. Iveta Korobaničová, PhD., Němcovej 32, 040 01 Košice, Slovak Republic, iveta.korobanicova@tuke.sk

³ RNDr. Erika Liptáková, PhD., Němcovej 32, 040 01 Košice, Slovak Republic, erika.liptakova@tuke.sk

astonishing for it insists in "dexterity". For instance in a discussion we mention some place, issue or person in the region, in certain distance and our entrepreneur would immediately react with overwhelming details on the issue, place and persons. This trait is most probably called wellinformed or minded. When imaging the brain and its functioning to keep all these data and then their combinations to get the reaction, one must think of networks or mind mapping. Or one could "think of the Schumpeterian entrepreneur as seeking to evolve from a node to a hub in a particular market that will confer monopoly power of some sort." (Foster, 2005) The latter mentioned node and hub in the Schumpeter's theory reflect the entrepreneur in the aforementioned example in real-life world. This example was an inspiration to continue to discover more about the issue, which was done in the scope of the paper that follows.

- Starting the query about the decision-making process of entrepreneurs and the balance among all factors, which are representing the entrepreneurship inside and outside the company. This query starts with a few examples accompanied by basic theories (parts 2.1 and 2.2), such as examples of the use of Petri networks (PN) in entrepreneurs' decision making.
- Examples, such as the one of the dexterous entrepreneur, open the issue of broad context of factors influencing entrepreneurship (part 2.3). Those factors are leading towards the analysis of the national statistics (part 2.4).
- Last, but not least, the paper points out that this broad context are than reflected in national statistics that had been provided to the reader in respect to changes that the entrepreneur's behaviour must include to the inside processes of decision-making, which is being done continuously and in the hope of resilience.

2 Theoretical and practical backgrounds

The Power Law (Barabasi, 2006) is likely to be attached to the mind mapping of business. The inspirational example of the entrepreneur mentioned at the very beginning of the paper was rather representing a mind that follows the power law, where such phenomenon was possible to have mapping of all issues, locations and persons. This mind mapping could be the background of preference to connectivity (Ibid.). It seems to be that the entrepreneur in question is fulfilling the preference to connectivity in certain traits, but which ones are the ones that create the "new" node?

Somewhat (to certain extant) similar paradigm was offered by careful study on entrepreneurial spirit. The cultural heritage of the entrepreneurial spirit was traced in the study carried among the Finland's herders. (Dana and Light, 2011) This study brings up the issue of decision making between the "way of life" and the "way of production". Sometimes it is the same, but sometimes this two diverge as it is the case for mind mapping of business or the networks reflecting the factors, which are representing the entrepreneurship inside and outside the company. Example that provides an inside to the both personal and professional worlds would be the following one, abridged according to Dana and Light (2011): During childhood children were given more responsibility for the animals, those animals were allocated to them and thus they were socialized into the world of reindeer pastoralism. "When the time came to marry, both spouses were in possession of knowledge and enough animals together with the animals given to them as wedding gifts – to make it possible to establish themselves as their own husbandry and perhaps herding unit." (Dana and Light, 2011) The authors lead their concluding remarks towards the sustainable regional development by means of maintaining the cultural tradition. These two examples

(pointed out in the inspiration and the study) support the idea of further mind mapping of business, evolutionary economics as well as the resistance towards changes or shocks in economy also by means of Petri networks.

2.1 Petri network theoretical and practical aspects, rules to use

Petri network could be considered a tool for mathematical representation of discrete distribution system, usually in graphical way. The Petri networks (Trebuňa and Graban, 2010) are used to simplify smaller, but content-rich or complicated decision-making problems as well as other modelling or simulation tools can are used (e.g. BPNM - Business Process Modelling Notation used by IBM and organization OMG – Open Management Group). In order to provide more practical aspects on Petri network, the first task was to describe basic rules of use Petri networks. Later the example for investment follows. Investment is considered to be the activity, which illustrates the factors of the entrepreneurship inside and outside a company.

The deterministic preparation of a process as such is crux of the splendid processes in technically highly developed period, in the time of informatics, automation and optimization of the production process and processes in general, as well. Modelling of process is becoming a presumption of its correct and efficient functioning. There are several professional modelling tools available at the market. These tools offer plentiful functions and options for modelling of various production processes, event systems and processing of events. However, none of them offers such options of analysis that are based on strict mathematic fundamentals as the Petri networks do.

Petri network (PN) is a tool for mathematical representation of discrete distribution systems. For the sake of the graphical visualization one can use an oriented graph with two types of nodes (vertices, points), which are "places" – P and "transitions" - T. Both sets of the nodes, P and T are connected with the sets of edges (arcs, lines), which may obtain evaluation in various integral multiplicity. Generally, it is being assumed that none of the two nodes of the set of places as well as none of the two sets of transitions cannot be linked together with an edge.



Figure 1 Example of Petri Network: A – initial state, B – state after the transition t2 Source: Abridged from Juhás-Lorenz-Desel

As it could be noticed on the illustrative graph – the Petri networks, transitions are usually presented as squares (t1, t2) and places as circles (p1, p2) and are linked with already mentioned oriented edges. State of the network determines its marking exactly – set M. Marking of the network (that is its places) assigns every place in the network number of marks that are also called "tokens". Figure 1 provides tokens as full circles in places p2 and p3. The launching of

concrete transition in Petri network will result in removing the tokens form this places, which are the forerunners in the direction of the edges towards the node and at the same time the tokens to new places are added. These new places are its successors in respect to the orientation of the edge.

Simple general example of Petri network is shown on Figure 1, where picture A represents initial state of the network and picture B demonstrates the start of transition t2, which will cause the loss of the tokens from places p2 and p3 and the gain of token p1 to place, too.

2.2 Practical application of Petri network on investment process

Graphical illustration of the process is shown by Figure 2. The process begins by analysis of the financial market as the first task. Based on this the selection of correct investment follows in the decision gate, from which the process can flow only through one of the outcome lines. The investment is being prepared either for the shares or for the bonds. After the linking of lines in the process the investment itself is done at the market and information on that investment are stored in the data storage. Process is ended. If the transition "Reset" is being entered between the ending and starting space of the network, than this will return token after the accomplishment of the process back to the initial place "Start Node", in order to have the ability to repeat the process again.



Figure 2 Petri Network presentation of investment process Source: Abridged from Juhás-Lorenz-Desel

2.3 Broad context of the factors influencing entrepreneurship

The context of entrepreneurship is as broad as the mind of a businessman or businesswoman. The context was divided to two parts: establishing business and business- maintenance. Anybody practising entrepreneurial activities must set its limits, which is number one in the Figure 3 (can also be considered for an example of Petri network). Figure 3 provides a visual overlap for national indices of GEM – Global Entrepreneurial Monitor - commented later on. For instance from the first contextual point "setting the limits to entrepreneurial activities" to the second point on the route towards business was the index abbreviated PO, i.e. Perceived opportunities. In building up the company the crux would be the unchangeable laws of company Michalowicz (2013) that lead later to official marketing approach and strategy, plans etc.

As can be noticed from the statistics (Table 1) the FFR, i.e. Fear of failure rate was slightly increasing in the years 2011-2014, that also confirms the statistics on Perceived Capabilities – PO

or Entrepreneurship as Desirable Career Choice – EDCC. This both are woven in-between the pro-active attitude of the entrepreneur as an inside factor and many other personal traits, e.g. risk seeking or avoiding as proved by increase of the FFR. If all this was successfully overcome one gets to the concretisation of the plans and its realization. This is best done on quarterly basis. After achieving this phase one can consider the business to be established.



Figure 3 Broad contexts of establishing and maintaining business – showing the overlap of the subject and the indices of GEM Source: Own elaboration

Maintaining the business in the branch requires innovations and the decision making, which is again involving Petri networks, as it will imply already presented investment process. While doing all inevitable tasks, company has to include also the task of corporate social responsibilities that can be done by either adding up to the existing unchangeable laws of company or developing marketing approach. Media Attention for Entrepreneurship (MAE) reflects the idea that the broad context also involves the building of the balance among communication factors "outside in, inside out" of the company. Up-dating the new factor influencing the business management such as the participation in associations, what benefit it offers for business in question. Later generalizing the laws of company and perhaps considering again the limits in regards to the alternative limits of business – starting the process once again.

The Figure actually presents some topics and indices of GEM. The vertical division was done on halves, i.e. establishing and maintaining business. Horizontal division could refer to thirds, according to the key: brain, heart and hands. This illustrates the meaning: brain identifies the visions of business in its limits, plans, position or alternatives. The heart is a vehicle, power of business in its: unchangeable laws, personal traits, and marketing or strategy factors. "Hands on", literally mean achievements, outputs in terms of: identifying the costumers (polarization – another possible example of use for Petri networks), internal processes (pro-active), balance of the inside and outside presentation, the business management.

This broad context already referred to the statistics that will allow the reader to see impacts of incremental steps in business units that lead to success or failure under the assumption of changes of environment in the praxis. The linkage and more insight were presented by authors Voříšek, Pour and Buchalcevová (2015).

2.4 Reflection of broad context of the factors in the national statistics

This Global Entrepreneurship Monitor⁴ (GEM) report provides the results of its sixteenth survey on entrepreneurship held every year across the world (more than 100 countries). The GEM survey generates a variety of relevant primary information on different aspects of entrepreneurship and provides harmonized measures about individuals' attributes and their activities in different phases of venturing (from nascent to start-up, established business and discontinuation). GEM also tracks highly ambitious entrepreneurship (by identifying aspirations to grow among owner-managed businesses and the presence of entrepreneurial employee activity). This project started in 1999 and has included Slovakia since 2011.

The main objectives of this project are:

- Determine the extent to which entrepreneurial activity influences economic growth within individual economies.
- Identify factors which encourage or hinder entrepreneurial activity, especially the relationships between the National Entrepreneurship Conditions, social values, personal attributes and entrepreneurial activity.
- Identify policy implications for enhancing entrepreneurial capacity in an economy.

2.5 GEM Methodology

The team of GEM survey operationalizes entrepreneurship as: "Any attempt at new business or new venture creation, such as self-employment, a new business organization, or the expansion of an existing business, by an individual, a team of individuals, or an established business." (Bosma et al., 2012) GEM is unique because, unlike other surveys, studies conducted at the lowest level and examines the behavior of individuals with regard to the establishment and management of the company. This approach provides more detailed report of the business as the official data of countries. The results of the GEM survey for our country provides a variety of interesting information about entrepreneurship - knowledge that characterize the business environment in Slovakia. GEM monitors entrepreneurial framework conditions in each country through harmonized surveys of adults and experts in the field of entrepreneurship. The National Experts

⁴ The Global Entrepreneurship Monitor was conceived in 1997 by Michael Hay of London Business School and Bill Bygrave of Babson College (Bosma, N. et. al., 2012, p. 9)

survey provides qualitative and subjective information on the state of several framework conditions whose evaluation is not measured by objective and quantitative variables. For the rest of contextual variables, Gem collects each year, objective information from the most reputed sources offering it: World Bank, United Nations, OECD, World Economic Forum and many others. A representative national sample for the Adult Population Survey is minimum 2,000 participants on age range 18 to 99 (if it is not possible, then an age range of 18 to 64 may be use).

Survey are conducted at the same time of year (generally between April and June), using a standardized questionnaire developed by the GEM consortium. The National Experts Survey provides insight into the entrepreneurial start-up environment in each economy with regard to the nine entrepreneurial framework conditions: financing, governmental policies, governmental programs, education and training, research and development transfer, commercial infrastructure, internal market openness, physical infrastructure, cultural and social norms. This survey comprises a minimum of 36 respondents, with four experts drawn from each of the entrepreneurial framework condition categories.

In an empirical study explaining and linking entrepreneurial attitudes and activities for European regions using GEM data, Bosma and Schutjens (2009; 2011) find (only) a weak positive association between regional variations in entrepreneurial attitudes on the one hand and in entrepreneurial activity on the other.

2.6 Results and Discussion - Comparison of GEM indicators with countries of V4

In this section we present the data from GEM model from four countries (V4). The comparison is not completed, because lack of data from Czech Republic from year 2012 and 2014. The following table 1 shows selected indicators and their respective values determined from surveys in 2011-2014. The Figures represent the percentage of the population or of respondents (depending on the indicators) with a positive attitude towards a particular inquiry area. GEM data collection is divided into three parts: the first part is oriented on the entrepreneurial attitudes and perceptions. This part reflects the degree to which individuals in economies tend to appreciate entrepreneurial activity measures the observed involvement of individuals in different phases of entrepreneurial activity. Finally, entrepreneurial aspirations are of key importance in addressing the (socio) economic impact of entrepreneurial behavior.

Based on the table 1, we can see how each of the selected indicators developed in the reporting period. The share of newly established companies from 2011 declined two years (from 14.2% in the year 2011 to 9.5 % in 2013), but in 2014 this share increased slightly (to 10.9%). By the results of Slovak 's GEM report, TEA in Slovakia had a downward trend for the period 2011-2013. According to the Slovak GEM team (Pilková et al., 2011-2014) clear explanation of the downward trend of TEA in Slovakia is difficult. There is no doubt that the components of the external environment, especially the social perception of entrepreneurship, but also the perception of opportunities for starting a business, have an impact on the dynamics of TEA.

The share of entrepreneurs whose main motive for starting a business is necessity has increased during the period 2011-2013, and reached the level of 40% for early stage entrepreneurs. By the (Pilková et al., 2011-2014) it is higher even compared the poorest countries such as Angola, Nigeria, India and so on. The impact of a situation is clearly reflected in the level of

"sophistication" of entrepreneurship, so these entrepreneurs develop less innovative and more replicative entrepreneurship, with the lowest value added.

	2011	2012	2013	2014
Total early-stage Entrepreneurial Activity (TEA ⁵)	14.2	10.2	9.5	10.9
Total early-stage Entrepreneurial Activity for Female Working Age Population	8.1	6.7	7.3	7.4
Total early-stage Entrepreneurial Activity for Male Working Age Population	20.3	13.7	11.7	14.4
Necessity-Driven Entrepreneurial Activity: Relative Prevalence (NDEA ⁶)	28	36	40	32.6
Fear of Failure Rate (FFR ⁷)	32	38	33	36
Perceived Opportunities (PO ⁸)	23	18	16	23.5
Perceived Capabilities (PC ⁹)	53	50	51	54.4
Know Startup Entrepreneur Rate (KSER ¹⁰)	48	42	39	42.6
Media Attention for Entrepreneurship (MAE ¹¹)	55	59	52	52.6
Entrepreneurship as Desirable Career Choice (EDCC ¹²)	55	50	49	45.6

Table 1 Selected GEM indicators in Slovak Republic during the period 2011-2014

Source: Own elaboration based on GEM data

That the percentage of women - entrepreneurs are more or less unchanged (ranges from 6-8 %) (Figure 4A) and the proportion of men - businessmen in the reporting period decreased from 20.3% in 2011 to 14.4 % in 2014 (Figure 4B). The entrepreneurial potential is measured by those entrepreneurs who believe to have knowledge and skills, while they also see entrepreneurial opportunities and are not afraid of failure in the entrepreneurial activity. The perception of business opportunities has a downward year-on-year trend (during the period 2011-2013) and the level of Slovakia achieved 16.1% is below the average of V4 (Figure 4C). On the other hand, this indicator increased from 16.1% (year 2013) to 23.5% (year 2014). The highest indicator was in Poland (31.35%) in 2014. Figure 4D shows that fear of failure rate was increasing in all countries of V4 from year 2011 to 2014. The highest rate was in Poland (51.11%) in 2014 and the lowest rate was in Slovakia (36%). The lowest media attention takes place in Hungary (33.47% in year 2014), see Figure 4F. The indicator of entrepreneurship as desirable career choice has decreased trend year-on-year in Slovakia (55% in year 2011; 45.6% in year 2014) and Hungary (54% in 2011; 47.39% in 2014), see Figure 4E. On the other hand, 63.28% of people in Poland consider starting a business as a desirable career choice.

⁵Percentage of 18-64 population who are either a nascent entrepreneur or owner-manager of a new business

 $^{^{\}rm 6}$ Percentage of those involved in TEA who are involved in entrepreneurship because they had no other option for work

⁷ Percentage of 18-64 population with positive perceived opportunities who indicate that fear of failure would prevent them from setting up a business

⁸ Percentage of 18-64 who see good opportunities to start a firm in the area where they live

⁹ Percentage of 18-64population who believe to have the required skills and knowledge to start a business

¹⁰ Percentage of 18-64 population who personally know someone who started a business in the past two years

¹¹ Percentage of 18-64 population who agree with the statement that in their country, you will often see stories in the public media about successful new business

¹² Percentage of 18-64 population who agree with the statement that in their country, most people consider starting a business as a desirable career choice



Figure 4 Selected GEM indicators in Slovak Republic (SVK), Hungary (HU) and Poland (PL) during the period 2011-2014 Source: Own elaboration

The Slovak Entrepreneurial Profile from GEM report represents a combination of patterns of efficiency-driven and innovation-driven economies. The results of research (Figure 4) show that the entrepreneurial potential in broad sense requires special attention both as a major factor determining the perception of business opportunities as well as a factor affecting the overall entrepreneurial activities in Slovakia. In line with the results of the expert panel survey, the entrepreneurial environment in Slovakia as a whole can be characterized by negative state and therefore also an insufficient support for formation and development of entrepreneurial activity. Entrepreneurial financing in Slovakia in general exhibits rather negative situation with moderate decrease during the years 2011 to 2013. Government policies in terms of bureaucracy and taxes from the entrepreneurship support perspective also exhibit considerably negative state. The issue of transfer from R&D to entrepreneurship belongs to chronical deficiencies of the Slovak entrepreneurial environment, with significantly negative absolute as well as comparative evaluation.



Figure 5 Selected GEM indicators from Expert Panel Surveys in Slovakia Source: Own elaboration

3 Concluding notes

The mind of an entrepreneur comes under the scrutiny of many decision-making process in the course of running own business or a family business. The scrutiny in this paper was presented in a few examples divergent ones. Tradition mentioned by the study reported by Dana, Light (2011) is scrutinized differently than investment example. Whichever decision-making process one follows this influences statistical results, which are then often being interpreted somewhat troublesome, as mentioned above or in the note below¹³. This allows us to recommend that one needs to look for more details or linkage between the indicators and real-life stories as suggested in Figures 1-3. At the same time real-life stories cannot be detached from the overall perspective of the regional development, where the stories are taking place and are having an impact. When redefining the regional development, we recommend gathering the good-practices (real-life stories) and gathering the regional data for statistics; afterwards complete the picture and movie about the shift or changes happening in the region. Complementarity of the two principles was already recommended in several other problems, but the broad context or frameworks on how to read together the stories and statistics are being suggested such as the Figure 3 in this paper.

¹³ Slovak GEM team (Pilková et al., 2011-2014) clear explanation of the downward trend of TEA in Slovakia is difficult

Nonetheless, authors of this paper are aware of the limitations of this framework regarding the resilience aspect.

The aim of this conceptual overview is to stimulate discussion about what entrepreneurship is, and how it has been analysed so far in connection with the resilience of country, region. Entrepreneurship is widely seen as an important driver of economic development and employment and productivity growth. Also, it is one of the main factors or indicators used by Martin (2012), Foster et al. (2007), Koutský et al. (2012) as factors important for resilience. Despite of wide range in the number of variables considered in the various indicators of resilience (Briguglio et al., 2009; Cardona et al., 2008; Cutter et al., 2008 and so on, in: Modica and Reggiani, 2014), the variables fall into six main categories: socio-economic characteristics and financial resources of individuals (pension per capita, personal income, income equality, poverty, and so on), infrastructure, community capacity, innovation and technology and natural environment, institutional capacity of the spatial economic system, the number of enterprises in region and in export industries.

For a more complete understanding of how entrepreneurship contributes to economic and societal development, it is important to recognize the contextually embedded quality of entrepreneurial actions and behaviors in national, regional, and city-level contexts.

Acknowledgements

This paper was supported by the Scientific Grant Agency of the Ministry of Education, Science, Research and Sport of the Slovak Republic as part of the research project VEGA [1/0454/15] "Redefining regional development – shift towards resilience regions"

References

BARABASI, A. L. 2006. V pavučine síti. Vyd. 1. Praha : Paseka, pp. 274.

- BOSMA, N., WENNEKERS, S., AMORÓS, J. E. and GERA. 2012. Entrepreneurs and Entrepreneurial Employees Across the Globe. Extended Report.
- BRIGUGLIO L., CORDINA G., FARRUGIA N. and VELLA S. 2009. Economic vulnerability and resilience: concepts and measurements. Oxf Dev Stud 37(3):229–247. In: MODICA, M. and REGGIANI, A. 2014. Spatial Economic Resilience: Overview and Perspectives. In: *Springer Science+Business Media New York*.
- CARDONA OD, ORDAZ MG, CARREÑO ML, MARULANDA MC and BARBAT AH. 2008. Fiscal impact of future earthquakes and country 's economic resilience evaluation using the disaster deficit index. Paper presented at the 14th World Conference on earthquake engineering, Beijing, China. In: MODICA, M., REGGIANI, A. 2014. Spatial Economic Resilience: Overview and Perspectives. In: Springer Science+Business Media New York.
- DLOUHY, M., FABRY, J., KUNCOVÁ, M. and HLADÍK, T. 2007. Simulace podnikových procesu. Brno.
- DANA, L. P. and LIGHT, I. 2011. Two forms of community entrepreneurship in Finland: Are there differences between Finnish and Sami reindeer husbandry entrepreneurs? *Entrepreneurship and Regional Development*. Vol. 23, No. 5-6, pp. 331-352.
- FOSTER, J. 2005. From simplistic to complex systems in economics. *Cambridge Journal of Economics*. Vol. 29, No. 6, pp. 873-892.

- FOSTER, J. 2007. Case study approach to understanding regional resilience. Working paper 2008–07. Institute of Urban and Regional Development, University of California, Berkeley. In: MODICA, M., REGGIANI, A. 2014. Spatial Economic Resilience: Overview and Perspectives. In: *Springer Science+Business Media New York*.
- JUHÁS, G., LORENZ, R. and DESEL, J. 2009. Unifying Petri Net semantics with Token Flows, In.: Applications and Theory of Petri Nets. LNCS 5606, Paris 2009. Springer Science & Business Media.
- KOUTSKÝ, J., RUMPEL, P., SLACH, O. et al. 2012. Profilace měkkých faktorú regionálního rozvoje jako nástroj posilování regionální odolnosti a adaptability. Certifikovaná metodika Ministerstva pro místní rozvoj. Avalaible on: http://zam.uur.cz/Rohrerova/Certifikovanemetodiky/10-Koutsky-WD-61-07-1.pdf.
- MARTIN, R., GARRETSEN, H. and FINGLETON, B. 2012. Regional economic resilience, hysteresis and recessionary shocks. J Econ Geogr 12:1–32.
- MICHALOWICZ, M. 2013. Podnikateľ na konci role. Jak znovu nastartovat firmu když nevíte kudy dál. Praha. Bluevision.
- MODICA, M. and REGGIANI, A. 2014. Spatial Economic Resilience: Overview and Perspectives. In: Springer Science+Business Media New York.
- TREBUŇA, P. and GRABAN, M. 2010. Princípy Petriho siete ako nástroja pre modelovanie vnútropodnikových procesov. 1 elektronický optický disk (CD-ROM). In: *Trendy a inovatívne prístupy v podnikových procesoch*: 13. medzinárodná vedecká konferencia : zborník príspevkov : 8.12.2010, Košice. - Košice : SjF TU, 2010, pp. 1-7.
- VOŘÍŠEK, J. & POUR, J. and BUCHALCEVOVÁ, A. 2015. Management of business informatics model – principles and practices. In: *E+M Ekonomie a Management*. Vol. 18, No. 3, pp. 160-173.
Spatial Distribution of Economic Activity - Location Quotient

ŠTEFAN KOVÁČ¹ Faculty of Economics, Technical University of Košice Slovak republic

Abstract

The main aim of this paper is to give an overview of spatial distribution of firms in Manufacturing industry in Slovakia. In this paper, we present an analysis which combines the information provided by the Financial Bureau of Slovak republic and Statistical Office of Slovak Republic. As a measure we use Location Quotient with 2 different input variables – numbers of employees and value added in industry. The paper also presents a comparison of results with using different input variables on the same sample. The results of comparison suggest that using different (but replaceable) input variables in concentration indices provides different results on the same observation.

Key words: Location Quotient, Firms, Spatial Distribution, Manufacturing, Value Added, Employment

JEL Classification: R12

1 Introduction

Where economic activity will locate in the future is one of the most important and challenging questions in economics. Progress in technology and moves towards a liberal economic policy create new challenges for theorists, policymakers and business executives (Jovanović, 2007). The study of the location of production (spatial economics) has a long, although somehow meagre history (Krugman, 1998): ...*the theory of international trade is nothing but teaching about international location*. (Ohlin, 1933), ...*trade and location are the two sides of the same coin* (Isard, 1956). We can provide small overview of other economists who deal with location theories or spatial economics, for example: von Thünen, J.H. (1826), Hotteling, H. (1929), Lösch, A. (1954), Perroux, F. (1955), Christaller, W. (1966) , Weber, A. (1969), Myrdal, G. (1971), Maier, G. and Tödtling, F. (2000).

First step to knowing where will economic activity locate in the future is to know where it is located now. Over time, lot of industry concentration indices appeared with one main purpose - to describe the spatial distribution of economic activities. One of the most simple and longest used is Location Quotient (Hoover 1936, Florence 1939). The Location Quotient is a measure designed to reflect the relative importance of an industry in a region as compared to its importance in the nation, this relative importance being judged either in terms of the level of output or the size of employment (Morrison, Smith 1974). As it is stated in literature, we can use various input variables for this purpose. The most used are numbers of employees in industry, value added, revenues or for example ratio of employment and value added. Despite the fact that these variables are considered as equivalent, we expect different results using different input variables.

¹ Ing. Štefan Kováč, Němcovej 32, 040 01 Košice, Slovak Republic, stefan.kovac@tuke.sk

The aim of this paper is to evaluate the spatial distribution of selected sector - Manufacturing - in Slovakia through basic spatial indicators and highlight the differences arising from the use of different input variables. There is two main reasons for this type of research:

- 1. Knowledge of spatial differentiation of economic activities in the country is an important input factor for numerous analysis on the economic but also the political level (Jovanović, 2007; Combes and Overman, 2004; de Dominicis, Arbia, de Groot, 2011).
- 2. Literature is often present false information about defining LQ and that its calculation is made using the number of employees in the region, which can be replaced by other financial indicators (eg. value added, revenues) without changing the results and interpretation of results (Morrison, Smith 1974; Šipikal, Rehák, Labudová, 2010).

2 Methodology

In this paper we evaluate the spatial distribution of Manufacturing sector in Slovakia and we are pointing out the suggestions about use of different input variables in concentration indices. To meet this purpose, we decided to use the following methods.

2.1 Location Quotient

Location Quotient is a technique that allows for the comparison of local area characteristics to the national characteristics (Hoover 1936, Robinson 1998). As we stated above, the Location Quotient is a measure designed to reflect the relative importance of an industry in a region as compared to its importance in the nation, this relative importance being judged either in terms of the level of output or the size of employment (Morrison, Smith 1974).

$$LQ = \frac{\frac{E_{ir}}{E_r}}{\frac{E_{in}}{E_n}} \tag{1}$$

where

 E_{ir} is local employment (value added) in industry *i*, E_r is total local employment (value added) in region *r*, E_{in} is total national employment (value added) in industry *i*, E_n is total national employment (value added).

The value of LQ equalling to 1 means, that the region and the nation are equally specialized in the observed industry. If LQ is less than 1, the output is not sufficient to meet the local demand and imports are needed. Region has a lower concentration in observed industry than the nation. If LQ is greater than 1 (according to some literature more than 1.2) the output is more than sufficient to meet the local demand. It means that the region has a higher concentration in observed industry than the nation.

2.2 Moran's I coefficient of spatial autocorrelation

Spatial autocorrelation is the correlation among values of a single variable strictly attributable to their relatively close locational positions on a two-dimensional (2-D) surface, introducing a deviation from the independent observations assumption of classical statistics (Griffith, 2009). Moran's I is a measure of spatial autocorrelation developed by P. A. P. Moran (1950).

Moran's I is given by:

$$I = \frac{N}{\sum_{i} \sum_{j} \omega_{ij}} \frac{\sum_{i} \sum_{j} \omega_{ij} (X_i - \bar{X}) (X_j - \bar{X})}{\sum_{i} (X_i - \bar{X})^2}$$
(2)

where

N is the number of spatial units indexed by *i* and *j*,

X is the variable of interest,

 \overline{X} is the mean of X,

 ω_{ij} is an element of a matrix of spatial weights.

Moran's I values range from -1 (indicating perfect dispersion) to +1 (indicating perfect correlation/concentraion). A zero value indicates a random spatial pattern.

2.3 LISA - Local Indicator of Spatial Association

Global spatial analysis or global spatial autocorrelation analysis yields only one statistic to summarize the whole study area. LISA helps evaluate the clustering in individual units by calculating Local Moran's I for each spatial unit and evaluating the statistical significance for each I_i

2.4 Dataset and Sources

In our research we have used the data from financial statements of Slovak firms in year 2013. Overall it is represented by 147 053 units. The source of data is Financial Administration Bureau of Slovak Republic. Information given about every unit in this dataset is in following structure:

- Firm
- Region (NUTS3)
- Selected industry (SK-NACE)
- Choosen values from financial statement

In our research are also used employment data for year 2013 given by Statistical Office of the Slovak Republic. Structure of this dataset is following:

- Region (NUTS3)
- Selected industry (SK-NACE)
- Numbers of employees

For data processing we used the following tools: software R, GeoDA.

3 Discussion

We conducted three steps of the analysis. The first was the calculation of Location Quotients for the manufacturing sector in all regions of the country. As input data we used data on employment and value added in the industry. As a second step, we calculated the Moran's I coefficients using the values of Location Quotients. The last step is the calculation of the coefficients of the local spatial autocorrelation (LISA) with both input variables. This showed up the hot spots, cold spots and spatial outliers of our observation.

3.1 Location Quotient

As a first step, we have calculated the value of LQ for manufacturing sector using both mentioned input variables. There is the comparison:



51 regions with Manufacturing industry concentrated



Blue color represents a high level of concentration (LQ value greater than 1 for blue and greater than 1.2 for deep blue). From the visualization of this data it is clear that the results of both analyzes are different. The largest differences are observed in the Košice and Prešov region. Using employment rate, manufacturing industry in these regions is not concentrated at all, but while using data from financial statements - the value added - high levels of concentration of manufacturing industry appears in these regions. Overall, this two measures differ even in 19 cases (13.68% of all observations).

3.2 Moran's I





Figure 4 Moran's I calculated with LQva

We conducted further analysis with levels of Location Quotient. Using the Moran coefficient of spatial autocorrelation on a global scale indicates that there is a spatial autocorrelation of concentrations of industrial production. The results of the spatial analysis can be regarded as equivalent.

3.3 LISA - Local Indicator of Spatial Association

The last step of our analysis is the calculation of the coefficients of the local spatial autocorrelation, which indicates differences between this two approaches to the calculation.

As we can see, both analyzes suggest that in the Žilina and Trenčín region there are hotspots (there are regions with high concentrations of manufacturing surrounded by other regions, where the rate is high). Both analyzes also showed that spatial outliers (what means that region with low level of industry concentration is situated near the region with a high level of industry concentration) is situated in the same region.



Figure 6 LISA calculated with LQva

The difference can be found in the results of quantification of Coldspots (regions with low spatial concentration of industry is near by another regions with low spatial concentrations of industry). Analysis with employment rate showed up, that Košice city region is surrounded by Coldspots, but while using value added as input variable no significant results have been showed.

4 Conclusion

Location quotient analysis identifies the relative specialization of a region in a particular industry, measured by some industry variable (such as employment, number of establishments, average

payroll, or value-added). Using employment as the variable, a location quotient greater than 1 would indicate that a greater percentage of the local workforce is employed in that particular industry than in the reference economy. Calculating the location quotient based on value-added indicates whether the industry is above average in productivity.

This exploratory analysis results suggest that using different (but equivalent - according to literature) input variables in concentration indices is not appropriate and comparable without additional verification. This results point not only to LQ, but also others indices which are based on the same basis of input variables like Hirschman-Herfindahl index, Ellison-Glaeser index etc.

According to the analysis of spatial distribution of Manufacturing industry in Slovakia in year 2013 the results showed up relatively high concentration of this industry across whole country but the differences were spotted while using different input variables. When counting with the number of employees, Manufacturing industry is significantly concentrated mainly in Central and Western Slovakia. With value added as an input variable, we found more industrial concentration also in Eastern Slovakia. In regions of Banská Bystrica, Ružomberok and Zvolen has not been observed any concentration in Manufacturing industry while using both methods. Our observation suggest, that in regions where the values of LQ is greater than 1 (1.2) in both types of calculations is industry concentration at all.

Acknowledgements

This work was supported by the VEGA-1/0454/15 *Redefining regional development - moving towards resilient regions*.

References

- ANSELIN, L. 1995. Local Indicators of Spatial Association LISA. In *Geographical Analysis*. Vol. 27, No. 2, pp.93–115.
- COMBES, P. and OVERMAN, H. 2004. The spatial distribution of economic activities in the European Union. In: *Henderson, V., Thisse, J.F. (Eds.), Handbook of Regional and Urban Economics*. Vol. 4. Elsevier, Amsterdam, pp. 2845–2909. Chapter 64.
- DE DOMINICIS, L., ARBIA, G. and DE GROOT, H. L. F. 2011. Concentration of Manufacturing and Service Sector Activities in Italy: Accounting for Spatial Dependence and Firm Size Distribution. In: *Regional Studies*.
- GRIFFITH, D.A. 2003. Spatial Autocorrelation and Spatial Filtering. New York: Springer.
- HOOVER, E. M. 1936. The measurement of industrial localization. *The Review of Economic Statistics*, pp. 162-171.
- JOVANOVIĆ, M. 2003. Spatial location of firms and industries: an overview of theory, In: *Economia Internazionale*, pp. 23-81.
- KRUGMAN, P. 1998. The New Economic Geography, Now Middle-aged. In: *Regional Studies*. Vol. 45, No.1, pp. 1-7.
- MAIER, G. and TÖDLING, F. 1997. *Regionálna a urbanistická ekonomika: Teória lokalizácie a priestorová štruktúra,* Bratislava: Elita.

- MORAN, P.A.P. 1950. Notes on continuous stochastic phenomena. Biometrika, Vol. 37, pp. 17–23.
- MORISSON, W. I. and SMITH, P. 1974. Nonsurvey Input-Output Techniques at the Small Area Level: an Evaluation. *Journal of Regional Science*. Vol. 14, pp. 1-14.
- ŠIPIKAL, M., REHÁK, Š. and LABUDOVÁ, V. 2010. *Metódy a techniky regionálnej analýzy*. Bratislava: Ekonóm. 153 p.

Qualitative Characteristics of Hedge Funds

MICHAL KRAJČÍK¹ Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

Aim of this paper is to summarize qualitative characteristics which are relevant in process of hedge fund analysis. Our work will also try to identify those qualitative characteristics which are fundamental for decision making in investment process and deal with possible impact of specific qualitative characteristics on future hedge fund performance, risk or other important attribute of hedge fund.

Key words: Hedge Fund, Qualitative Characteristics

JEL Classification: G23

1 Introduction

Hedge fund is an investment fund focusing on absolute returns available to the limited group of accredited investors. Hedge fund may use a variety of investment strategies including the use of short-selling, leverage and financial derivatives. The fund has a special fee structure (20 % performance fee + 2 % management fee). Its control by regulators is limited and fund mainly acts as a limited partnership or as offshore company. Specific rules of hedge fund investing are existence of lock-up period and high water mark.

Hedge fund is one of the three biggest groups of investment funds. Other two related groups are mutual funds and private equity funds.

Hedge fund industry rapidly expanded in last 25 years and became a target for a number of studies. Majority of them focused on quantitative measurement of risk and return characteristics. One of the reasons for this common approach is better quantification of results and possible application of these data in econometrical models.

Qualitative approach is more problematic in the way of interpretation. Despite this problem we try to identify fundamental qualitative characteristics of hedge funds and determine their possible impact on hedge fund investment, both from the side of risks and returns.

This article just briefly outlines these characteristics and possible implications. For deeper analyses of possible consequences and complex conclusions more detail examination of each characteristic will be necessary.

¹Ing. Michal Krajčík, Němcovej 32, 040 01 Košice; Slovak Republic, michal.krajcik@tuke.sk

2 Qualitative characteristics of hedge funds

In this part of paper we will try to identify fundamental qualitative characteristics of hedge funds. Based on information from various sources we identified eight key qualitative characteristics of hedge funds:

- 1. Investment strategy
- 2. Investment management
- 3. Structure of fund
- 4. Domicile
- 5. Size of the fund
- 6. Age of the fund
- 7. Capital participation of management
- 8. Fees

Some of these characteristics are partly quantitative, but in our work we will focus on their qualitative side and implications.

2.1 Background of specific qualitative characteristics

In next part of the work we will closely examine each of eight mentioned qualitative characteristics and we will try to find important implications of specific state of given characteristics for investors, analytics or other subject which interfere with hedge funds.

2.1.1 Investment strategy

Investment strategy of specific hedge fund is one of the most important characteristics. We will divide and examine this characteristic from two views – risk and return profile of identified strategy and reaction of strategy on external factors. Measuring of risks and returns of specific strategy is quantitative characteristics, but we will use quantitative findings from our previous work as a background for better understanding of strategies risk-return profile and later qualitative decision making.

2.1.1.1 Risk and return profile of strategy

As our previous research (Šoltés and Krajčík, 2014) proved, risk and return characteristics of specific strategies are very variable. In our work risk profile was measured by annual downside volatility and return profile was represented by average annual performance. Data were collected with monthly periodicity in years 1997 - 2014. We used classification of analytic company BarclayHedge, which divides hedge funds according to their investment strategy into the 17 categories. All strategy indices are available online at the BarclayHedge web page and are monthly actualised.

We summarized risk and return profile of these 17 strategies in following Figure 1.



Figure 1 Risk and return characteristics of hedge fund strategies Source: Own interpretation of data from http://www.barclayhedge.com/research/indices

We can use knowledge about risk and return profile of specific hedge fund strategy in two ways: 1. Choice of specific group of funds that satisfy our risk-return requirements

This premise is based on different tolerance of risk and different expected return among specific group of investors.

In later search for specific hedge fund investor can focus just on funds from category which fulfill his risk-return requirements. This approach will make his target group for selection smaller and more relevant.

2.1.1.2 Comparison of specific hedge fund with its benchmark

If we clearly identify investment strategy of given hedge fund we can include it to one of mentioned 17 categories and compare funds' performance with its benchmark, which is index of given strategy. If the fund in long term performs better that his index it is clear sign of funds above-average quality. If fund performs worse than its index we should better avoid it and search somewhere else. This comparison is very effective for brief qualitative analyses.

2.1.1.3 Reaction on external factors

Identification of funds strategy helps us also in identification of possible future development of fund with reference to external factors as economic cycle, macro-economic situation, conditions on market with specific asset (for example bonds versus stocks) or direction of whole market (bull versus bear market).

According to the Philips, we can divide hedge fund strategies into the three main groups:

- 1. Opportunistic
- 2. Multi-strategy
- 3. Non-directional

These groups of strategies have different level of dependence on external economic factors. Opportunistic strategies as Long-Short equity, Global macro, Event driven or Emerging markets are most dependent on external economic factors. These strategies can be more volatile in the case of market turbulences, but have also bigger return potential if funds manager use market movements in his favour.

Multi-strategy funds can use all available strategies, so their reaction to market turbulences will be hardly predictable and depends on actual behaviour of fund manager who has no limitations on his trades.

Non-directional strategies as Equity market neutral or arbitrage strategies (Fixed income arbitrage, Convertible arbitrage, Merger arbitrage) should have very small dependence on market turbulences. As our previous research has shown reality is different in some cases. Strategy Fixed income arbitrage and Convertible arbitrage have high downside volatility and therefore are quite risky. But from available data it is deduct if this volatility was caused by market turbulences or by internal riskiness of strategy.

Another approach how to use market movements in investors favour is choice of fund with specific ratio of long and short stock positions. In the case of expected bull market, investor will search mainly funds from categories Long bias or Long-Short. If there are signs of market bubble (for example very high value of market P/E ratio) and we expect significant bear market, most suitable strategy is Short Bias. Funds that are investing according this strategy have net short exposition in stocks and therefore benefit mainly from market downturns.

2.1.2 Investment management

Investment manager is the most important person inside the hedge fund. Performance of fund and safety of investors principal is closely connected to his investment decisions. Therefore it is fundamental to know who is fund's manager, how was his previous career and performance of his investments, how long he manages the fund, what are his strengths and weaknesses and other relevant personal information.

Length of managers' previous career in fund is in our opinion very important indicator. Best hedge funds are managed stable and current investment manager is often also the founder of the fund. Strong individual survive longer than weak and longer record of previous performance better confirm that good performance was not caused just by beginners luck.

On other hand investors should be cautious in case if the fund changed investment manager in previous period. It is always important to understand the background and possible hidden risks/opportunities of this important event.

2.1.3 Structure of fund

In the case of funds' structure, investor should be interested about two facts: if the fund has Open or Closed-end Structure and if the fund is structured under 3(c)(1) or 3(c)(7) exemption from registration under the Investment Company Act of 1940. Second information is applicable in the case of US funds.

Most of the hedge funds are Open-end and allows investors to make withdrawals or additional capital contributions during the investment period. Only limitation of liquidity in this case is Lock-up period, which prevents investors from withdrawals in specified period. This period often lasts between six months and two years.

On other hand, funds which regularly hold illiquid assets are mostly Closed-end. According to the Lore (2015) these funds have fixed duration (usually between five and ten years) and do not allow earlier redemptions. Closed-end funds are illiquid investments and for investor who prefers liquidity are not suitable.

3(c)(1) funds are limited to 100 accredited investors. An accredited investor (if an individual) must have either a minimum of \$1 million net worth or \$200,000 annual income/\$300,000 if combined with spouse, or (if an entity or trust) a minimum of \$5 million net worth. Most startup funds are structured as 3(c)(1) funds, because this form is less capital intensive. 3(c)(7) funds must be owned by qualified purchaser.

Qualified purchaser must have at least \$5 million in net investments if he is an individual or minimum of \$25 million in net investments if he is an entity or trust. 3(c)(7) funds are typically limited to 2000 investors, to avoid registration under the Securities Exchange Act of 1934 as a publicly traded partnership.

2.1.4 Domicile

Based on criteria of domicile, hedge funds can be domestic or offshore. Domestic US hedge funds can act as Limited partnership or Limited Liability Company. Limited partnerships are typically set up in state Delaware because of its special tax regime. According to the analytic company Preqin (2014), 51 % of US hedge funds use for their headquarters state Delaware.

Offshore hedge funds are often set up in places with special tax regulations (tax heavens). Reason is the tax optimization. US funds mostly prefer domiciles at Cayman Islands or British Virgin Islands. Most tax efficient locations for European hedge funds are situated in Luxembourg and Ireland.

Tax optimization is important also from view of investors, because higher taxes paid by fund often decreases funds profitability. On the other hand, investors should be aware of funds with domicile in unstable legal environment. In the case of problems as bankruptcy of fund or legal conflict with fund they can lose their capital.

2.1.5 Size of the fund

According to the number of academic studies, size of hedge fund has impact on funds' performance. Based on the size of the fund we can divide hedge funds into the three groups:

- 1. Small hedge funds (less than \$100 million in assets)
- 2. Medium hedge funds (between \$100 million and \$500 million in assets)
- 3. Large hedge funds (more than \$500 million in assets)

Based on this quantitative classification and with help of data from five major hedge fund databases (BarclayHedge, BarclayCTA, Hedgefund.net, Hedge Fund Research, Morningstar Hedge) Travers (2012) performed Pertrac Study on Hedge Fund Performance which proved

impact of hedge fund size on its performance. According to the study small hedge funds were able to achieve significantly higher returns with just a slightly higher standard deviation. Traverse states these qualitative reasons for his results:

- 1. Small hedge funds are more nimble.
- 2. Small hedge funds have wider set of investment opportunities due to their size.
- 3. Small hedge funds can use wider range of investment strategies, because some strategies have maximal capital threshold.

These advantages explains popularity of small funds between qualified investors and explain why many successful funds set maximum amount of assets under management and after getting to maximal level restrict the additional capital inflows. Therefore investors should better search smaller hedge funds with better future potential.

2.1.6 Age of the fund

Age of the fund belongs also to the qualitative characteristics which influence funds' performance and riskiness. Traverses Pertrac Study on Hedge Fund Performance proved that age of the fund influences its performance. Funds were divided into three groups: young funds (less than two years history), mid-age funds (from two to four years history) and mature funds (more than four years history). Young funds were able to achieve significantly higher returns with lower standard deviation. As Travers (2012) states, portfolio managers of young funds are incentivized to perform well so that they can establish and grow their business. More established funds sometimes avoid taking risk to maintain their business and to protect their reputation.

On other hand younger funds are more risky because of shorter record of results. In this case we should apply same logics as in the case of fund managers' history. Longer history of the fund proves its ability to survive in changing investment environment and in global means safer investment.

2.1.7 Capital participation of management

Amount of capital invested by fund managers into the fund is very good indicator mainly from the view of the risk. It is proven that people act with own capital much wiser and safety than with capital that belong to someone else. Big part of the funds' assets belonging to the fund managers decreases possible moral hazard and makes investment more conservative. Therefore it is better to focus on funds with higher capital participation of funds' management.

2.1.8 Fees

As we mentioned before, structure of hedge fund fees is specific and consists from 2 % management fee and additional fee of 20 % from created profit (performance fee). If the fund reached negative performance, only 2 % management fee is applied. Profit participation works as significant motivation for funds' managers to increase portfolios value but can lead also to the moral hazard, because negative fees in the case of negative performance does not exist. According to the Jilek (2006) this moral hazard could be limited by High-water mark rule. This rule applies after previous hedge funds' loss making period and allows calculating performance fee just after the value of funds' assets gets over the level before losses (over the High-water mark).

In recent years some hedge funds tried to attract investors with lower than standard fees. According to the Preqin (2010) just 38% of single manager hedge funds charge 2 % + 20 % fee. Managers are becoming more flexible with their fee structures. They either charge lower management or performance fees or reduce both in an attempt to attract investors and retain a competitive advantage.

Although return is not known in advance, with higher fees it will be definitely decreased by higher haircut. A higher fee decreases net profit (gross profit - fees) from investment. Therefore investors should choose funds with lower fees. Of course they should choose just from funds that fulfill other important decision making criteria.

3 Conclusions

Based on previous analyses of hedge funds' qualitative characteristics we will try to make short conclusion to each of them.

Probably the most important qualitative characteristic of hedge fund is its investment strategy. We can use it for better understanding of risk-return profile of specific strategy as a whole, for comparison of specific hedge fund with its benchmark (which is funds' strategy index) and for choice of most suitable strategy with reference to changing external factors as market turbulences or trends.

It is also very important to know the investment management of the fund. Longer history of the fund managers' positive returns increases the chance that is was result of his above-average skills. Previous changes in funds management could indicate some problems and therefore investor should closely examine the reasons for this event.

In the case of funds structure most important fact for investors is if the fund is Open-end (plus what is the length of Lock-up period) or Closed-end. Long Lock-up period or Closed-end structure has negative impact on liquidity of investment.

Investors should consider pros and cons of funds domicile, while tax heavens offers tax optimization, but in some cases can be associated with worse law enforcement.

Size of the fund has impact on funds' performance, while small funds are more flexible in their investment strategy and have competitive advantage because of more suitable investment opportunities.

Research shows that younger funds perform better than older. Reason is probably higher motivation. On other hand they are connected with higher unpredictability and shorter record of previous performance, what means higher risk for investors.

Larger capital participation of the funds management should decrease risk of moral hazard and make investment more safety.

Fees play important role in investment decision, because they are only part of net return known in advance. Therefore investors should look for hedge funds with lowest possible fees.

These conclusions about hedge fund qualitative characteristics offer just brief summary of possible implications and suggestions for deeper research of each characteristics.

References

BARCLAYHEDGE. 2014. *Hedge fund indices* [online]. Available at: <<u>http://www.barclayhedge.com/research/hedge-funds-indices.html></u>.

GLADIŠ, D. 2005. Naučte se investovat. Grada.

INEICHEN, A. 2003. Absolute returns. Wiley.

INEICHEN, A. 2007. Asymmetric returns. Wiley.

JÍLEK, J. 2006. Deriváty, hedžové fondy, offshorové spoločnosti. Grada.

LO, A. 2010. Hedge Funds. Princeton University Press.

- LORE, J. 2015. Forming and operating a hedge fund. [online]. Available at: http://static1.squarespace.com/static/550b1da7e4b03feef7f4a0f0/t/55463f71e4b099a7d9296 8f1/1430667121455/Hedge+Fund+Book+5-1-15.pdf> [30.8.2015].
- MURA, L. and BULECA, J. 2012. Evaluation of Financing Possibilities of Small and Medium Industrial Enterprises. *Procedia Economics and Finance*. Vol. 3/2012, pp. 217-222.
- MURA, L., BULECA, J. and HAJDUOVA, Z. 2015. Quantitative financial analysis of small and medium food enterprises in a developing country. In *Transformation in business & economics*, Vol. 1, pp. 214-224.
- PHILIPS, CH. 2006. Understanding alternative investments: A primer on hedge fund evaluation [online]. Available at: https://personal.vanguard.com/pdf/s554.pdf> [15.8.2015].
- PREQIN. 2014. *Hedge Fund Domiciles* [online]. Available at: <https://www.preqin.com/docs/newsletters/hf/Preqin_HFSL_May_2013_Fund_Domiciles.pd f> [20.8.2015].
- PREQIN RESEARCH REPORT. 2010. *Hedge Funds: The Fee Debate An End to "2 & 20"?* Available at: https://www.preqin.com/docs/reports/Preqin_HF_T&C_April_2010.pdf [23.8.2015].
- RAISOVÁ, M., BÁNOCIOVÁ, A. 2012. Issues of Slovak Business Environment. In: *Procedia Economics and Finance : Emerging Markets Queries in Finance and Business*. Vol. 3/2012, pp. 1223-1228.
- STEFANINI, F. 2006. Investment strategies of hedge funds. Wiley.
- ŠOLTÉS, M. 2010. Relationship of speed certificates and inverse vertical ratio call back spread option strategy. In: *E+M Ekonomie a Management*. Vol. 2/2010, pp. 119-124.
- ŠOLTÉS, M. and KRAJČÍK, M. 2014. Profitability and risk characteristics of hedge fund strategies. In *Information Technology Applications*. Vol. 2/2014, pp. 87-98.
- SZABO, Z., ŠOLTÉS, M., HERMAN, E. 2013. Innovative Capacity and Performance of Transition Economies: Comparative Study at the Level of Enterprises. In: E+M Ekonomie a Management. Vol. 1/2013, pp. 52-68.
- TALEB, N. 2014. Antifragile. Random House. Citadella.
- TRAVERS, F. 2012. Hedge Fund Analysis. Wiley.
- VOLKER, G. and ŠOLTÉS M., 2008. Do multi hedge funds generate an added value? A detailed analysis. In: *Transactions of the Universities of Košice*. Vol. 4/2008, pp. 74-78.

Impact of Shadow Economy on Fiscal Imbalance of V4 Countries

ANDREA KRALIK Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

Shadow economy represents a hidden area of real economy and therefore its quantification is not easy, exact or definite. The MIMIC model, generally considered to be the most relevant and objective tool will be used to measure the extent of shadow economy in the V4 countries over the period of 10 years from 2004 to 2013. Such period provides sufficient background for analysing the trend of shadow economy and for explaining its causes. Subsequently, by comparing the shadow economy data with the figures of state deficit and public debt of V4 countries, we analyse the extent and the strength of shadow economy impact on fiscal imbalance of mentioned countries.

Key words: Shadow economy, Budget deficit, Public debt, Fiscal Imbalance

JEL Classification: E26, H26, H62, O17

1 Introduction

Fiscal imbalance, in its short term form as a budget deficit or in its long term form as a public debt, has become an urgent topic of most worlds' economies. Despite the implementation of various saving programs by individual governments, the expenditures still exceed the revenues and therefore more professionals are looking up at the revenues side of budget with the intention to maximize the revenues. The biggest share of revenues is represented by collected taxes and their amount is influenced by the shadow economy, mainly by tax evasion and tax avoidance. In this paper we concentrate on analysis of relation between shadow economy and fiscal imbalance on the example of V4 countries throughout the period of years 2004 - 2013. The goal is to provide the overview of extent and trend of shadow economy and fiscal imbalance, with comparison of their interrelations and explanation of impact of shadow economy on both forms of fiscal imbalance.

2 State deficit and public debt trends from the perspective of shadow economy

A constant growth of the public expenses has caused the tautness of the public budgets in most of the developed countries, which led to a debt crisis. International institutions, political representatives as well as professional individuals have started to concentrate on solving this serious socio-economic problem. As the expenditure side of budget has its limits, which are already reached by many countries, it is the revenue side that offers lately more realistic ways of solving the short term as well as the long term fiscal imbalance.

The biggest part of the public revenues is created mainly by taxes and these offer few options of increasing the revenues. However, the amount of collected taxes does not represent 100% of the payable current taxes and this fact is caused, among the other factors, also by the shadow economy and more specifically by its parts – tax avoidance and tax evasion.

2.1 Shadow Economy and its Quantification

The shadow economy represents the economy that exists and functions in parallel to the real economy. However, as stated in its name, all of its activities are performed in the shade of the real economy, which means without the possibility to precisely calculate its extent.

Schneider and Enste (2000) define the shadow economy as "...all economic activities which contribute to the official GDP, but are unreported." The professional publications often use a term "hidden" economy as an equivalent to a shadow economy, which is, according to Orviská (2013), due to the fact that for business units which participate on the activities related to this type of economy, it is beneficial to hide such practice and stay in the "shade" of the real economy, which is indirectly influenced by them.

The extent of tax avoidance and tax evasion is measured by the extent of the shadow economy, most often reported as a percentage of GDP of a given economy. As we are talking about the shadow and hidden economy, it cannot be expected that its quantification will be exact and precise. Therefore when talking about quantification of shadow economy, it is more of an estimate rather than the exact extent.

Fassmann (2007) defines four main groups of methods used for estimating the size of shadow economy as:

- 1. direct methods,
- 2. indirect methods,
- 3. monetary method,
- 4. model approach.

The last one is generally considered to be the most complex one, because while the previous methods assume that there is only one cause of the shadow economy and only one indicator which reflects all of the effects of the shadow economy, the model approach cumulates more causes (e.g. tax burden, expected punishment, moral, relation between citizens and state, state regulation extent, etc.) and works with many indicators of the shadow economy (e.g. monetary indicator, labor market). However, even this approach is not generally applicable because requires a big amount of data that are not available for all countries (the problem is mainly with developing and transition economies) and also these estimates are usually statistically unstable as a small change in their specification or in the value of indicator will significantly impact the final estimate.

The model approach for estimating the size of shadow economy was applied also by Schneider and Enste, in the form of Multiple Indicators Multiple Causes Model, so called MIMIC model. This model considers the shadow economy as a latent variable. This latent variable relates on one hand to causal variables, which are considered to be the key factors of shadow economy and on the other hand to indicative variables, which are derived from a latent variable. Although this model has its disadvantages, such as instability of estimated coefficients, questionable reliability and availability of variables, it is generally considered to be one of the best estimates of the size of shadow economy.

In this paper we describe the relation between the shadow economy and fiscal imbalance of V4 countries. To be able to estimate the extent of this impact and show its trend, firstly we quantify the size of shadow economy of V4 countries for the period from 2004 until 2013.

The Figure 1 shows the size and the trend of shadow economy individually in each of V4 countries during the period from 2004 until 2013, as well as their average. Estimated shadow economy in all four countries has a declining trend and during the entire period it is always Poland that has the highest estimated shadow economy, followed by Hungary, Czech Republic and the lowest shadow economy is assumed to be in Slovakia. Each of these countries had decreased the estimated size of their shadow economy from the first until the last year of the tracked period by 3 percentage points on average, which makes it for V4 group on average decrease from 22.4 % in 2004 to 19.1% in 2013, as shown in Figure 1.



Figure 1 V4 group and shadow economy

Compared to developed countries of the European Union, the estimated shadow economy in Slovakia and Czech Republic is relatively low, while Poland and Hungary belong to the countries with the highest estimated shadow economy. The average size of V4's shadow economy in 2013 is comparable with the average size of European Union's shadow economy, which is assumed to be at 18.76% GDP.

2.2 Fiscal Imbalance

Fiscal imbalance is created as a result of difference between the amount of obtained and the amount of used financial funds in a period of time. Fiscal imbalance shown in a given fiscal year is reported as a budget deficit and later, in the long term, as a public debt. Therefore we distinguish between a short term and a long term fiscal imbalance.

A short term fiscal imbalance is created as a difference between revenues and expenditures of the state budget. If the revenues and expenditures are equal, we talk about balanced budget, which is in most cases more ideal rather than a real situation. Imbalanced state budget is shown in the form of surplus budget (when revenues exceed expenditures) or in the form of deficit budget (when expenditures are greater than revenues). The Figure 2 shows the average trend and size of revenues, expenses and budget's deficit in V4 countries within the period from 2004 up to 2013.



CEFE 2015 - Central European Conference in Finance and Economics

Figure 2 V4 group and budget

As shown in Figure 2, the average budget revenues in V4 countries grew from 2004 till 2008, when they reached 272 billion EUR and then due to the upcoming crisis fell in 2009 to 234 billion EUR. The revenues trend in the following years was relatively stable, with total revenues between 256.9 billion to 281.7 billion EUR. According to Eurostat, the revenues reported as a percentage of GDP were in 2013 the highest in Hungary (47.7%), followed by the Czech Republic (40.9%), Poland (37.5%) and Slovakia (35.9%).

The trend of average budget expenses in V4 countries was very similar to the one of revenues. The revenues grew from 2004 till 2008, up to the value of 294.9 billion EUR. The expenses in 2009 were reported at only 275.3 billion EUR, which was caused mainly due to decreased expenses in Poland as a result of decision to reduce administrative costs and investment during the crisis. In the following years 2010 - 2013 was the total amount of budget expenses of V4 countries in the amount between 300.8 billion and 304.5 billion EUR. In relative terms, the highest expenses in 2013 were reported in Hungary (50% GDP) and the lowest in Slovakia (38.7% GDP).

The budget deficit in V4 countries was in the period 2004 - 2013 reported between 2.2% GDP (in 2007) and 6.7% GDP (in 2009). In 2013 was the deficit of V4 countries at 3.3% GDP, with the biggest share of Poland (4.3% GDP) and the lowest in Slovakia (1.5% GDP).

The budget deficit topic is very closely linked to a long term fiscal imbalance – public debt. While the budget deficit is relatively easily visible and controlled by the government, the public debt represents a more complex problem, with the serious macroeconomic consequences. The traditional definition of public debt sees it as cumulative budget deficits of previous years. For the purpose of this paper we use the public debt's definition by Eurostat (ESA 95), which defines the public debt as "the sum of external obligations (debts) of the government and public sector agencies", where external obligations are understood to be "the debt or outstanding (unpaid) financial liabilities arising from past borrowings." To understand the impact of shadow economy on the public debt, we need to first clarify the causes of debt creation and factors influencing its growth in general. As already mentioned, there is undeniable link between the budget deficit and public debt and therefore the first group of factors represents budgetary causes. Further in this paper we compare the trend of shadow economy, budget deficit and public debt of V4 countries to get an overview of the extent of budgetary causes' impact on the public debt of V4 countries in the period from 2004 till 2013. The public debt is however influenced also by extra-budgetary factors (e.g. wars), by large investments (for which the state does not have sufficient funds), by debt assumption of other entities or of previous periods, etc.

In Figure 3 we report public debt of V4 countries individually by each country and their total average, as percentage of GDP. Although the political and economic situation of these 4 countries is over the tracked years very similar, the public debt evolution divides them in 2 groups – Hungary and "V3 countries". However generally speaking, the average public debt of all 4 countries has an increasing trend, with an exception of years 2006 and 2007, when public debt of the Czech Republic and Slovakia decreased and affected the total average.

As shown in Figure 3, Hungary was the only of V4 countries that did not meet the Maastricht criteria for the public debt at the maximum level of 60 % GDP in the tracked period, besides year 2004, when its public debt was for the last time below 60% GDP, at 58.8% GDP. In 2011 Hungary implemented Structural Reform Program of public finances, with the intention to support its economic growth and minimize its budget deficit and public debt. Hungarian public debt is then reported with the decreasing trend, but still at the higher percentage of GDP then before crises year 2008.

Poland reported the second highest public debt (as a percentage of GDP) out of V4 countries in period 2004 - 2013, with the lowest debt of 45.0% GDP (in 2007) and the highest debt of 55.7% GDP (in 2013). Its debt in general, except for period of year 2007, had a decreasing trend. Poland as the only of V4 countries incorporated in its Constitution that in case that its public debt crosses the level of 55% of GDP, the country undergoes the dramatic saving measures. During the tracked period that level was exceeded only once, in the last year 2013, when its public debt reached 55.7% GDP.

The public debt of the Czech Republic and Slovakia followed the same trend – in years 2004 - 2007 constantly decreased and then due to the crisis increased in the following years. The public debt of the Czech Republic reached in 2013 level of 45.7% GDP and the public debt of Slovakia the level of 54.6% GDP.

The average public debt of V4 countries balanced between 43.1% GDP (in 2007) and 56.5% GDP (in 2013), following the trend of public debt in Slovakia and in the Czech Republic, with the percentage rates very similar to the public debt of Slovakia.



CEFE 2015 - Central European Conference in Finance and Economics

Figure 3 V4 group and public debt

2.3 The Analysis of Fiscal Imbalance in the light of Shadow Economy

As already explained above, tax evasion and tax avoidance are measured through the extent of shadow economy. Taxes represent the highest share of budget revenues and therefore tax evasion and tax avoidance decrease the amount of collected taxes and subsequently decrease the total budgetary revenues. From that view the shadow economy in general influences the budget deficit (due to lower revenues) and impacts the public debt of a given economy.

The question is what the extent of this reliance is. As the size of shadow economy is more of an estimate rather than an exact number, we perform the analysis by comparing the trends of public debt, budget deficit and shadow economy of V4 countries.

The curves of public debt, budget deficit and shadow economy of V4 countries throughout the period 2004 - 2013, measured as average percentage of GDP, are in Figure 4 applied together in one graph.

To prove any dependence between the extent of shadow economy and fiscal imbalance, we compare the trend of shadow economy and the trend of public debt. To simplify the trends, the curve of the shadow economy is decreasing, while the curve of the public debt is increasing over the time. They report the common downward trend only in 2006 - 2007 and then common upward trend in 2008 - 2009, where the upcoming crisis worsened most of the macroeconomic indicators. With that said, Figure 4 does not show any strong influence or dependence between the public debt and shadow economy.

As a next step we compare in Figure 4 the trends of shadow economy and budget deficit, to dis/prove the impact of shadow economy on a short term fiscal imbalance. The common downward trend is followed by both curves in 2004 - 2007, then between 2008 and 2009 both indicators worsened their trends and in period 2010 - 2013 the shadow economy constantly decreases, while the budget deficit decreases with the exception of 2012, when it dropped to -3,76% GDP.





Figure 4 V4 group and public debt, shadow economy and budget deficit

The trends of shadow economy and budget deficit of V4 countries followed very similar trend in tracked period 2004 - 2013, which leads to a result that shadow economy, which directly impacts the amount of collected taxes – revenues of state budget, strongly influences the final budget deficit. The impact of shadow economy on public debt is undeniable, as the amount of collected taxes can change the level of public debt, however its extent is smaller than expected. That is due to the fact that budgetary causes of public debt creation and its growth did not represent the only type of causes and were significantly connected with other causes, such as investments, extrabudgetary causes, etc., in creating the public debt in V4 countries within the period 2004 - 2013.

3 Conclusion

Shadow economy exists parallel to a real economy as its hidden part and all activities performed within shadow economy contribute to the official GDP, but are unreported. The extent of shadow economy is only estimated, but it logically decreases the amount of collected taxes, mainly through tax evasion and tax avoidance. The impact of shadow economy on fiscal imbalance is in this paper analysed on the example of V4 countries throughout the period 2004 - 2013, by comparing the trends of budget deficit – a short term fiscal imbalance and public debt – a long term fiscal imbalance, where the common trend is clearly seen only between shadow economy and budget deficit. That explains that in V4 countries is the level of budget deficit strongly dependent on revenues and the impact of shadow economy is proven by the fact that downward trend of shadow economy's curve is supported by the almost constant downward trend of budget deficit's curve. The impact of shadow economy on a long term fiscal imbalance exists, but in much weaker extent than on a short term fiscal imbalance. That is due to the fact that budgetary causes of public debt (which include the effects of shadow economy), function together with other factors, such as extrabudgetary causes, large investments (for which the state does not have sufficient funds), debt assumption of other entities or of previous periods, etc. Therefore the impact of shadow economy on fiscal imbalance is unequivocally proven, but the size of this impact is much larger in case of a short term fiscal imbalance than in case of a long term fiscal imbalance, where this impact is weakened by other non-budgetary factors.

References

- ALESINA, A. and PEROTTI, R. 1995. The Political Economy of Budget Deficits. In: NBER Working Paper Series, No. 4637. National Bureau of Economic Research. Cambridge, February 1995.
- ANDREJOVSKÁ, A. and BULECA, J. 2012. Vplyv tržieb na výsledok hospodárenia vo výrobnom podniku. In: *National and Regional Economics 9*, International Conference Journal: 26th-27th September, 2012, Herl'any, Slovakia. - Košice: TU, 2012, pp. 1-7.
- ANDREJOVSKÁ, A. and MIHÓKOVÁ, L. 2015. Developments of VAT rates in EU countries in the context of harmonization and fiscal consolidation. In: *Acta universitatis agriculturae et silviculturae Mendelianae brunensis.* 2015. Vol. 63, No. 2, pp. 487-498.
- BERNHEIM, B. D. 1989. A Neoclassical Perpective on Budget Deficits. In: *Journal of Economic Perspectives*. Spring, 1989. Vol. 3, No. 2, pp. 55-72.
- BAJUS, R. 2011. Vývoj DPH v krajinách V4. In: *Finančný manažment a controlling v praxi*. Vol. 4, No. 12, pp. 720-723.
- BÁNOCIOVÁ, A. 2013. Ekonomické súvislosti daňových únikov pri DPH. Košice: Technická univerzita, 2013. 97 p.
- BUCHANAN, J. M. 2002. The Balanced Budget Amendment: Clarifying The Arguments. *ROWLEY, CH. K. – SHUGHART, W. F. – TOLLISON, R. D. The Economics of Budget Deficits*. Cheltenham, Northampton: Edward Elgar, 2002, pp. 118-136.
- EUROPEAN COMISSION. 2002. *ESA 95 manual on government deficit and debt*. Luxembourg: European Communities, 2002. 243 p.
- EUROPEAN COMISSION. 2014. General Government Data General Government Revenue, Expenditure, Balances and Gross Debt. [online]. [cit. 2014-11-26] Available online: <http://ec.europa.eu/economy_finance/db_indicators/gen_gov_data/documents/2014/spring2 014_country_en.pdf>.
- FASSMANN, M. 2007. Stínová ekonomika a práce na černo. Praha: Sondy, 2007. 358 p.
- INTERNATIONAL MONETARY FUND. 2001. Government Finance Statistics Manual. Washington: IMF Publishing, 2001. 185 p.
- ORVISKÁ, M. 2013. Daňové úniky a tieňová ekonomika: Širšie implikácie v podnikaní a financiách. Inauguračná prednáška. Košice: Technická univerzita v Košiciach, Ekonomická fakulta, 2013. 71 p.
- SCHNEIDER, F. and ENSTE, D. H. 2000. Shadow Economies: Size, Causes, and Consequences. In: *Journal of Economic Literature*. [online]. 2000. Vol. 38, No. 1 [cit. 2014-11-26] Available online: http://faculty.nps.edu/relooney/Schneider.pdf.
- SCHNEIDER, F. 2013. Size and Development of the Shadow Economy of 31 European and 5 other OECD Countries from 2003 to 2013: A Further Decline. [online]. [cit. 2014-11-26] Available online:<http://www.econ.jku.at/members/Schneider/files/publications/2013/ShadEcEurope3 1_Jan2013.pdf>.

From Operational through Strategic and Expert Purchasing in a Firm

MARTIN KUBAČKA¹ Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

The choice of the proper type of an organizational structure of purchasing team has a major impact on the motivation and performance of purchasing teams and consequently on the actual economic results of the company. The paper crosses the sections of operational through strategic and expert purchasing. The approach of ABC analysis was used to determine three categories of items from real auction data and compare savings from strategic purchasing to total average savings taking into account number of items in auction and total purchasing turnover. Results of this paper can supplement the existing research in the area of e-procurement.

Key words: Operational, Strategic, Expert Purchasing, Sourcing

JEL Classification: M2

1 Introduction

During the past three decades the purchase has acquired a significant position and represents one of the basic business functions of the company. It had been often overlooked however it offers an excellent opportunity to improve the firm's competitive position. Its main task is to effectively ensure all production and non-enterprise processes and should contribute to the firm's competitive goals. Major point in the recognition of purchasing strategy occurred when Porter in 1980 emphasized the importance of the buyer in his model of the five forces (Carr and Smeltzer, 1997). According to (Lukoszová, 2004) the purchase is defined as one of the fundamental feature of the enterprise regardless its origin (manufacturing plant, business venture or services). Another definition says that purchasing is obtaining from external sources all goods and services which are necessary for running, maintaining and managing the company's primary and support activities at the most favourable conditions (Weele, 2010). It also important to mention a term procurement that is a wider and more accurate term than purchasing and represents the process of obtaining goods or services in any way.

2 Theoretical background

Literature on the issue of purchasing has historically defined two organizational structures: centralized and decentralized structures. A centralized purchasing structure has all the major purchasing activities managed by a single department, while the decentralized structure has several purchase units services divided into different divisions.

¹ Ing. Martin Kubačka, Němcovej 32, 040 01 Košice, Slovak Republic, martin.kubacka@tuke.sk

Organization and management of the purchasing team has a major impact on its motivation and performance and consequently on the actual economic results of the company. The theory is in this case much different than practice and there is no universal solution because it is always necessary to respect the specific factors within the company. According to the author (Otýs, 2014) the factors affecting the organization and management of the purchasing team include: *focus and size of the company, corporate policy, customs, traditions and the informal culture, historical position of purchase within the company and personal characteristics of managers and purchasers.*

2.1 Strategic and operational purchasing

According to (Carr and Smeltzer, 1997) strategic purchasing refers to the planning process as part of the strategic management process. This one then refers to the process of setting goals, establishing strategies, analyzing the environment, evaluating strategies, implementing and controlling strategies. However operational purchasing is defined as day-to-day purchasing-related activities (Ellram and Carr, 1994).

In terms of organization purchasing teams possible solutions according to (Otýs, 2014) are as follows:

- All purchasing staff do everything together
- Purchasing managers carry out strategic purchasing and purchasers underneath operational purchase
- Part of the purchasing team makes strategic and the other part operational purchase
- *Commodity teams* practice shows us that the optimal variant of the commodity mini teams that are 2-3 groups of buyers with competence for a particular group of commodities. The advantages of such an organization can include incentive buyers, maximum utilization of information at all stages of the purchasing process, as well as specialty commodity purchasers.

Purchasing activities within strategic sourcing	 Management of relationships with major suppliers Development and improvement of electronic purchasing systems The implementation of best practices in corporate purchasing Negotiating contracts with suppliers Supply management major commodities 	
Purchasing activities within operational sourcing	 Management of transaction operations with suppliers Use of an electronic procurement systems to purchase through electronic catalogues, auctions or tenders Generating outputs Evaluation of suppliers performance 	

Table 1 Strategic and operational sourcing

Source: Rai University (2015)

The following figure (Figure 1) shows us some other examples of strategic purchasing.



Source: Cirkovský (2013)

2.2 Expert purchasing

According to (Vašek, 2014) expert in the area of purchasing is the one who thanks to its extensive experience, expertise and training has special skills and knowledge which far exceeds the other buyers. Among the features of such an expert we can include: *extensive knowledge of the issue, the ability to determine when normal operating procedures and when no longer, creativity, the ability to identify the true nature of the problem and ignore irrelevant information, the ability to decompose a complex problem to solve in part, self-confidence, adaptability (ability to adapt the methods of decision making in a given situation), <i>resistance to stress, communication skills and acceptance of responsibility for success but also for unsuccessful decisions.*

In the area of expertise of the purchase were conducted various experiments. Authors (Tazelaar and Snijders, 2004) conducted an experiment in which buyers had, on the basis of the information provided to determine the likelihood that the project encountered problems. The result was very interesting, they found that the longer the experience, the worse the outcome. All you grow with seniority was confident that the correct answer. The following graph shows this paradox.



According to other authors (Ericsson and Towne, 2010) it is crucial to take into account the theory of expertise. Their study is based on empirical research in different fields such as music, chess or typing on typewriter. They pointed out that the development of expert knowledge can have three stages:

- Expert performance insusceptible automation but noticeable continual improvement
- *Ragged development of the expertise* automating a higher level
- *Current level of knowledge* automated decision making



Source: Ericsson and Towne (2010)

The following chapter presents us the research problem resulting from issue mentioned above. It deals with the problem if it is possible to say that the higher position of the purchaser the better his performance (better savings achieved in for instance electronic auctions) or the higher positioned purchase the better savings.

3 Research methodology

My research is based on real e-auction data from Czech software provider NAR marketing conducted in their e-auction tool PROebiz. The dataset includes the electronic auctions of two public transport companies – one in Slovak republic and one in Czech Republic in the years 2011-2012. Data included e-auction cases with missing data that had to be cleared. My goal is to analyse strategic and operational purchasing among electronic auctions according to the ABC analysis and compare savings of strategic purchasing.

As stated author (Cirkovský, 2013) ABC analysis is a very simple technique based on the 80/20 rule of Italian economist Vilfredo Pareto. It helps the purchasers to exactly and mathematically assess which items of goods and suppliers are crucial and what or whom he should pay special attention. It classifies individual commodities, suppliers and items into three categories according to their importance:

- Category A core/strategic items for the organization having the essential items about 20% and 80% of the turnover of purchasing
- Category B medium important items, approximately 15% of the items and 15% of the purchasing turnover
- Category C a large number of important items likely to be few low-volume purchasing opportunities and compensation, approximately 65% of the rest of the approximate 5% of the purchasing.

However, it is important to say that the 80/20 division in ABC analysis is not absolute and can differ. Allocation of the share of items into categories and their share of turnover shows the following figure (Figure 4).



Figure 4 ABC analysis Source: Cirkovský (2013)

The following graph shows us the savings resulted from ABC analysis of electronic auctions conducted by Slovak and Czech public transport company during the years 2011 and 2012. It compares relative frequencies of average savings (savings from all performed e-auctions) and savings resulted from strategic purchasing. The approach of penetration of 20% number of items and 80% turnover has been used.

The following hypotheses for comparing the savings from e-auctions among operational and strategic and purchasing have been set:

*H*₀: *There are no differences between savings resulted from strategic and operational purchasing.*

 H_a : There is a significant level of difference between savings resulted from strategic and operational purchasing.



Figure 5 Average savings and strategic purchase savings

It is obvious that purchasing of strategic items brought lower savings (in both companies at the level approximately 16%) however total savings from all e-auctions reached higher values (in Slovak company almost 20% and in Czech even almost 30%).

Table	2 Comparison	of strategic purchase
-------	--------------	-----------------------

Strategic purchase	Number of items	Turnover
CZ	11.40%	45.43%
SK	20.15%	74.44%

The Table 2 shows us the ratio of turnover and number of items in electronic auction in case of strategic purchase. In Slovak company the ratio almost copies the division of ABC analysis

however in Czech company it is a lower (only 11.40% of 20% in number of items and only 45.43% in turnover).

4 Conclusion

All this transforms to increased performance of the purchasing, economy of the whole company and consequently on the more respect of managers to the purchase department. The factor of organizational infrastructure and expertise of the procurement team could also influence the choice of e-auction type – the more experienced and capable teams are more likely to choose the right type of auction to achieve the best results (Smeltzer and Carr, 2002).

The goal of this article was to prove whether the assumption that expert and strategic purchase managers achieve higher savings can be confirmed. It was demonstrated on real data that it is not true. There could be several reasons for that: firstly operational purchasing is performed on day-to-day basis and becomes a everyday routine for buyers, strategic and expert purchase managers sometimes negotiate even after the end of electronic auction and that is the scope for their further savings.

However, further research needs to be done in this area. The factor of organizational infrastructure and expertise of the procurement team seems to be very essential and this procedure could be a subject for future research activity.

Acknowledgements

This research was supported by the national project VEGA 1/0855/14 "Determinants of efficient purchasing supported by electronic solutions" financed by Ministry of Education, Science, Research and Sport of the Slovak Republic.

References

- CARR AMELIA S. and SMELTZER LARRY, R. 1997. In: European Journal of Purchasing & Supply Management. Vol.1997, pp. 199–207.
- CIRKOVSKÝ J. 2013. Nejlepší vyjednávač je váš počítač. Available at: http://www.eaukcebenefico.cz/wp-content/uploads/Nejlepší-vyjednávač-je-váš-počítač.pdf>.
- ELLRAM LISA, M. and CARR, A. 1994. Strategic Purchasing: A History and Review of the Literature. In: *International Journal of Purchasing and Materials Management*. Spring (1994). Vol. 30, No. 2, pp. 10.
- ERICSSON ANDERS, K., and TOWNE, TYLER J. 2010. Expertise. Wiley Interdisciplinary Reviews: Cognitive Science. 1.3, pp. 404-416.
- LUKOSZOVÁ, X. 2004. *Nákup a jeho řízení*. Učebnice pro ekonomické a obchodně podnikatelské fakulty. Computer press, Brno.
- OTÝS, K. 2014. Organizace a řízení nákupního tímu. Ebiz forum 2014 v Ostrave.
- RAI UNIVERSITY. 2015. *Purchase Management*. Available at: http://www.slideshare.net/raiuniversity/mba-ii-pmomunit26-purchase-management-a

- SMELTZER LARRY, R. and CARR, A. 2002. The relationship between information technology use and buyer-supplier relationships: an exploratory analysis of the buying firm's perspective. In: *Engineering Management*. Vol. 49, No. 3.
- TAZELAAR, F. and SNIJDERS, CH. 2004. The myth of purchasing professionals' expertise. More evidence on whether computers can make better procurement decisions. In: *Journal of Purchasing & Supply Management*. Vol. 10 (2004), pp. 211–222.

VAŠEK, J. 2014. Kdo je to expert v nákupu. Ebiz forum 2014 v Ostrave.

WEELE VAN, A. 2010. Purchasing and supply chain management. Analysis, Strategy, Planning and Practice. Cengage Learning EMEA.

Specifics of Company Valuation of IT Companies

TIM LANGENSTEIN¹ - MARTIN UŽÍK² ¹Technical University of Košice, Faculty of Economics Slovak Republic ²Berlin School of Economics and Law Institution Germany

Abstract

The evaluation of companies poses fundamental challenges on science and praxis. While there is widely accepted methodological knowledge in theory, in praxis sufficient application -oriented opportunities are missing. In thiscontext two essential parameters are playing a decisive role: This is on the one hand data quality and –quantity. On the other hand the correct selection of suitable valuation methods. Besides the Intangible Assets that often exist in IT companies, inadequacies in the selection of valuation procedures appear. Out of the theoretically presented valuation procedures three procedures have been chosen and as part of an empirical study specific data of the IT company from Germany have been assessed over a period from 1.1.2005 to 31.12.2014. It became obvious that the Multiples either under- or overvalue significantly

Key words: Microfinance, Financial Sector, Microloans, Socially Responsible Investments

JEL Classification: D40, G14

1 Introduction

The fundamental objective of the business valuation is the measuring of a value of a company in its entirety or by individual sub-areas. To meet this objective, there is a need to define concepts and to systematize the basic development of business valuation. As a result, the meaning of the term "Value" should first be defined and delineated by the term "Price" used often wrongly synonymous. Then, the historical development of the valuation will be shown on the basis of the Anglo-American history. The term "Value" is one of the most ambiguous terms in business administration. He may be the numerical expression of a variable which regardless is called by their substantive importance value, but also the basis of the community, such as the fundamental values of our economic and social order. (Bretzke, 1975)

The benefits that a good for an economic subject creates, however, represents the economic value of a good. Exchange values of goods not only depend on their cost, but are based on the individual benefit assessments of prospective customers. (Käfer, 1969)

The term "Price" has always the characteristic of a convention. It is a two-sided judgement about the economic value of a good and formed in negotiations or on supply and demand on free capital markets. The price is determined considerably by the benefit estimate of the respective buyers and sellers. (Institut der Wirtschaftsprüfer, 2009)

¹ Ing. Tim Langenstein, Němcovej 32, 040 01 Košice, Slovak Republic, tim.Langenstein@ebootis.de

² Prof. Dr. Martin Užík, Badensche Straße 50-51; 10825 Berlin, Germany; martin.uzik@hwr-berlin.de

However, companies are highly heterogeneous goods for which usually, due to the small number of buyers and sellers, no market price exists. There is an incomplete competitive market which can regularly be the expression of a bilateral monopoly. A price can be determined only through a process of negotiation. The measured value is therefore a factor which is incorporated into the pricing in the business valuation, but not identical with the purchase or sale price of a company. (Münstermann, 1970)

2 Company Valuation Models

In the context of the progressive development of the business knowledge new procedures have emerged continuously in the valuation of companies in order to meet the growing level of knowledge of science. While in Germany the income approach represented the decisive factor for a long time, in the last two decades methods based on investment theory or the comparison with publicly listed companies have found their ways into German valuation theory and in particular in the evaluation practice. With the advent of the mentioned evaluation processes, however, a heated debate erupted as to which procedure should generally be preferred. In this context, the facts that there are neither only one correct company value nor only one correct method to determine this value. (Moxter, 1983)

The value of a company depends on many factors, including in particular a precise prognosis for success. Furthermore, there are numerous discretions within the methods arising from divergent court decisions as well as the subjective judgments of the evaluator. (Drukarczyk and Schüler, 2009)



Figure 1 Business valuation methods

For the sake of completeness, it will briefly discuss the systematic classification of business valuation methods in the United States. In the US, a distinction is made between a market-oriented (market approach), success-oriented (income approach) and cost-oriented (asset based approach)

approach. Surprisingly, the market approach, which is mainly based on historic data or actually paid market prices, it is the most widely used approach in the US. The income approach is based on an assessment of the future success of the company. The German income approach as well as the DCF-method can be subsumed under it. The asset based approach is based on the assumption that the costs arising for the establishment of an enterprise, allow conclusions on the value of the company. This approach includes the Single valuation methods. (Pratt, 2008)

3 Special features of the forecast of Software-companies

3.1 Specifics of the sector

The software industry is characterized by three main aspects; short product life cycles, small time intervals between adjacent product releases and a high rate of innovation, ie a large number of new technologies, development tools and standards. The reasons for this unbroken dynamics are particularly in the increasing convergence of information, communications and media technologies. A variety of new communications and connectivity options, new types of equipment and a change the supply and demand structure permanently.

In addition, the still existing remains of Moore's Law, which states, that, the number of transistors in a dense integrated circuit has doubled approximately every two years. Primarily this statement is true for the hardware industry, but the demand to more powerful applications increases with more powerful hardware. Due to this, the statement can also be transmitted also to the software industry. (Klosterberg, 2010)

Moreover, the relations of the software industry change through new ways of software marketing. Cloud computing blurs the boundary between product and service providers and also generates a number of new business models and market niches. Companies in the software market must due to the many and continuous change processes be flexible and innovative in order to maintain itself in the long term the market. (Buxmann, Diefenbach and Hess, 2013)

3.2 Characteristics of a Software company

In addition to the special features of the software industry, a number of characteristics can be observed in the valuation of the software manufacturing companies, which should be taken into account.

Software companies can generate revenue in different ways. In addition to marketing the software product itself, additional services around the software product are common revenue streams. The conventional ways of marketing are the license sale, rental and the marketing of upgrades. Services around the software product include the maintenance, the support for the user during use of the product or the provision of software for third parties (Service providing). (Klosterberg, 2010)

In addition, an established sales channel can also be used for cross selling. Software companies often are companies that sell only one product or product bundle. Single-product Company are exposed to a particular risk structure, because the entire company's success depends on a product or market. If the market or the product does not meet the expectations, the invested funds are often lost. The reasons can be numerous. There may be a shift in demand, there are a substitute programs by competitors and/or on open source basis or patent problems occur. (Klosterberg, 2010)

Despite all risks, software companies and especially young software companies have a huge potential to increase their value and are therefore a popular target of private equity companies. (Arundale, 2005)



Figure 2 Revenue streams of a software company

The various innovations and resulting product developments are the engine of the dynamics in the software industry. Young software companies have typically no reserves. The company's survival is dependent on the current economic situation. As the founders of a software companies are mostly very technology-affine and take over the management at the same, it is common that deficits exist in company management, sales and marketing. Furthermore, the company's survival is highly dependent on its key personnel. (Klosterberg, 2010)

4 Empirical Study

Basing on the above an empirical evaluation study of the german IT-company is presented in the following. The german IT-company, located in Northrhine-Westphalia, was founded 1982 by the german family. To date, the company has remained a family business. Since more than 30 years they develop and implement powerful software systems on base of business requirements in the sectors Merchandise Management/PPS, Accounting/Controlling, HR and Time Management, as well as eBusiness. The focus of development though lies on ERP-Systems. Enterprise-Resource-Planning (ERP) means here the entrepreneurial task to schedule and manage resources as capital, staff, equipment, material, information- and communication technique and IT-Systems timely and appropriate in line with the company's object. An efficient operational value-adding process and a constantly optimised management of the business and operational procedures shall be guaranteed. The aim of the analysis is to determine the value of the german IT-company with appropriate methods.

4.1 Data

The assessment period extends for 10 years, starting on 1 January 2005 and ending on 31 December 2014. The data provided by the german IT-company include the entire detailed accounting data. Those are aggregated with the focus on the accounting data that are relevant for the evaluation. Therefore revenues, personnel costs, operating costs, EBIT, other costs, annual profit/loss, liabilities and the equity are used in an aggregated and comprehensive form. The data are considered on a quarterly basis. As a further data input data from the Bloomberg database are used to obtain evaluation-specific input-numbers. On the one hand information about the Country Risk Premium for Germany is observed. The data are presented from 1.7.2008 to 15.7.2015. As the valuation of the company starts already in 2005 those data must be approximated. You can observe a significant development for the two most important parameters, Market Return and Risk Free.



Figure 3 Country Risk Premium for Germany (Market Return and Risk Free Rate)

Apart from those two factors another value is required for the calculation of the equity costs. This is the Beta-value. For simplification purposes the Beta of the big publicly listed competitor, SAP SE is used for the calculation at this point.

4.2 Methodology

In accordance to the procedure firstly the suitable valuation methods are identified. Eligible for the german IT-company are the Net Income-Valuation Method, the Comparable Company Analysis and the Residual Income Model.

4.2.1 Net Income Valuation

Two main input variables are required for the valuation. That is the Net Income and the Capital Cost Rate. As this is an equity-approach the direct result of the calculation is the equity value. The Net Income is calculated by determining aggregated annual figures for three future periods and the
Terminal Value period as a forecast value. In concrete terms this means that for the valuation date 31.3.2005 the first Net Income forecast value is set as the 31.3.2006. For the second and third forecast year the aggregated annual figures to the 31.3.2007 and 31.3.2008 are used for the valuation. Finally the 31.3.2009 is the Terminal Value. For the valuation date 30.6.2005, as for all other valuation dates of the whole period under study, the procedure is analogical. That means that the first three forecast values of the Net Income correspond to the aggregated annual values of the 30.6.2006, 30.6.2007 and 30.6.2008. The Terminal Value bases on the Net Income of 30.6.2009.

In regards to the premises relevant to the valuation it is also assumed that the company value (generally the equity value) is determined by the maximum of the calculated value and the value of 1 Euro. Therefore negative company values are excluded. This is essential for these analyses as the company has negative business results. The following example demonstrates the calculation for the valuation date 31.12.2007. For this year the company shows a positive Net Income for the first time of the assessment period.

$$equity \ value_{t_0} = \sum_{t=1}^{n \to \infty} \frac{Net \ Income_t}{\left(1 + r_t^{CAPM}\right)^t} \tag{1}$$

$$= \frac{-859.273,3EUR}{(1+0,11044)^{1}} + \frac{83.224,72EUR}{(1+0,11044)^{2}} + \frac{-188.650,56EUR}{(1+0,11044)^{3}} + \frac{131.186,97EUR}{0,11044} = 23.376,34EUR$$

For the calculation of the CAPM the data for the Country Risk Premium are used as shown above. Also, for determining the Beta-value the Beta-value of the competitor SAP SE is been used approximately. For this the weekly yields for the last two historical years are determined on bases of calendar weeks each to the valuation date.

For each valuation date a new Beta-value is calculated. Additionally the Beta is used due to the Bloome-Transformation as adjusted Beta for the valuation. Here is assumed that the Beta-value moves towards the market-Beta on the long term. Therefore the market-Beta is weighted with one third and the raw Beta that was determined by the regression analysis with two thirds.



Figure 4 Beta SAP SE (7.1.2013 to 29.12.2014 weekly returns; DAX is Market Portfolio)

4.2.2 Comparable Company Analysis

With the Comparable Company Analysis the multipliers EV-Sales and EV-EBIT are selected. Theses multiples are used as stock market multiples for the software industry on base of the data of the Finance-Magazine.



Figure 5 Multiples Source: Finance Magazin 2014

As a relevant business parameter the forecast value of the first year of the future is always been used for the valuation. For the valuation date 31.3.2005 this is the 31.3.2006. Also, because of the negative EBIT figures the maximum of one Euro and the calculated company value was determined

by the EV-EBIT-Multiples. In the following the valuation for the 31.3.2005 on base of the EV-Sales-Multiple is illustrated as a representative.

$$equity \ value_{t_0} = Multiple_{31,3,2005}^{EV-Sales} * Sales_{31,3,2006}^{IT-company} - Debt_{31,3,2005}^{IT-company}$$
(2)

 $equity \ value_{t_0} = 1,62 * 7.114.296,82EUR - 1.604.704EUR = 9.920.457,2EUR$

4.2.3 Residual Income Model

Analogue to the chosen methodology of the forecast values for this study the future numbers are used as forecast values for the valuation by the Residual Income Model. In concrete terms this means that for the valuation date 31.3.2005 the 31.3.2006 will be set as first Net Income forecast value. For the second and third forecast year the aggregated annual figures to the 31.3.2007 and 31.3.2008 are used for the valuation. Finally the 31.3.2009 is set as the Terminal Value. For the valuation date of the 30.6.2005, as well as for all the other valuation dates of the entire assessment period, the procedure is analogue. As also in this case the negative Net Income plays an important role, the maximum of one Euro and the calculated values is always been used for the valuation. As a representative the determination of the Residual Income Values (RIV) for the valuation date 31.12.2005 is illustrated.

Valuation Date	31.12.2005					
Tax Rate	30%	_				
			31.12.2006	31.12.2007	31.12.2008	31.12.2009
Book Value of Equity	3.625.000,00		2.388.975,57€	1.404.218,50€	370.434,39€	407.622,96€
		_				
rCAPM	12,4%		31.12.2006	31.12.2007	31.12.2008	31.12.2009
EAT (Net Income)		-	785.523,53€ -	687.864,47€ -	859.273,30€	83.224,72€
Equity Charge = Cost of Equity (in EUR)		_	450.500,90€	296.892,59€	174.510,81€	46.036,15€
Residual Income		-	1.236.024,43 € -	984.757,06€ -	1.033.784,11€	37.188,57€
		_				
Period			1,00	2,00	3,00	4,00
PV(RI)		-	1.099.395,80€ -	779.081,94€ -	727.462,99€	210.573,12€
RIV	1.229.632.38€					

Figure 6 RIM Valuation for 31.12.2005

4.3 Results

The determined company values reveal a very volatile picture. The equity values of the german ITcompany fluctuate between one to almost 28 million Euros. This is a broad range of values.

It is therefore recommended to have a second closer look at the detailed results. It shows that with creating an average company value on base of equal weighting all valuation methods a quite consistent and plausible picture of the values over the time period can be drawn. The company values on Equity Base vary between 2 million EUR to 9 million EUR. These values are definitely plausible. Furthermore the RIM seems to be also appropriate to show the value of the equity of the german IT-company.



Figure 7 Graph Valuation german IT-company

On the other hand the Multiple Method seems to be entirely unsuitable. On the one hand the EV-Sales-Multiples results in an overvaluation for the whole period under review. On the other hand the EV-EBIT-Multiples understate the company, particularly for the years with no positive EBIT. Especially the patents and the Intangible Know-How of the company are neither stated in the books nor shown in the earlier cash flows.

5 Conclusion

The objective of the present Paper was the presentation of the different valuation procedures and the simultaneous depiction of valuation specifics of IT companies. Besides the Intangible Assets that often exist in IT companies, inadequacies in the selection of valuation procedures appear. Out of the theoretically presented valuation procedures three procedures have been chosen and as part of an empirical study specific data of the german IT-company have been assessed over a period from 1.1.2005 to 31.12.2014. It became obvious that the Multiples either under- or overvalue significantly. The Income Approach on the other hand was not always able to state a positive company value because of the negative net income. At the end only an average company value could be determined as a suitable Proxy for the market value of the german IT-company, or the Residual Income Model procedure could be identified as the only valuation method with acceptable statements. Finally it remains to conclude results for the valuation sector. It is essential to use the same analysis procedure as used in this study for larger samples of stock-listed companies to get more plausible lines of arguments for the selection of suitable valuation models of IT companies.

References

- ARUNDALE, K. 2005. *Money for Growth The European Technology Investment Report 2005*. PwC-Studie, London.
- BRETZKE, W.R. 1975. Wertbegriff, Aufgabenstellung und formale Logik einer entscheidungsorientierten Unternehmensbewertung. In: *ZfB* 1975, pp. 497-502.

- BUXMANN, P, DIEFENBACH, H. AND HESS, T. 2013. The Software Industry Economic Principles, Strategies, Perspectives. Heidelberg, 2013.
- DRUKARCZYK, J. AND SCHÜLER, A. 2009. Unternehmensbewertung. 6. Edition, München 2009.
- INSTITUT DER WIRTSCHAFTSPRÜFER 2008. *IDW Standard: Grundsätze zur Durchführung von Unternehmensbewertungen* (IDW 2008).
- KÄFER, K. 1969. Substanz und Ertrag bei der Unternehmensbewertung. In: *Betriebswirtschaftliche Information, Entscheidung und Kontrolle, Busse von Colbe/Sieben*. Wiesbaden 1969, pp. 295-357.
- KLOSTERBERG, M. 2010. Bewertung von Software-Unternehmen. In: Branchenorientierte Unternehmensbewertung. 2. Edition, München, 2007, pp. 255-373.
- MOXTER, A. 1983. Grundsätze ordnungsmäßiger Unternehmensbewertung. 2. Edition, Wiesbaden 1983.
- MÜNSTERMANN, H. 1970. Wert und Bewertung der Unternehmung. 3. Edition, Wiesbaden 1970.
- PRATT, S. 2008. Valuing a Business The Analysis and Appraisal of Closely Held Companies. New York 2008.

Microfinance

TIM LANGENSTEIN¹ Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

An estimation of World Bank suggests that approximately 1.1 billion people (WB, 2015), have less that one dollar available per day for living. Many of these people work in the informal economy, be it agriculture, production of goods and services or as a tradesman (Erhardt (1996).² The substantial combat of poverty of these people in developing countries by income raises with the help of custom-tailored financial services is the main goal of microfinance. Financial products are offered to people and they are exactly tailored to single people of individual households. These people often have to experience restrictions due to their poverty in accessing suitable instruments, which could open up their way into self-employment, for example.

Key words: Microfinance, Financial Sector, Microloans, Socially Responsible Investments

JEL Classification: D40, G14

1 Introduction

The first microfinance institutions were founded in developing countries out of the understanding, that lacking start-up capital for income generating occupations is the main problem for poverty. The microfinance-sector's difficulty lies in the fact that potential customers of this financing-form do not have regular incomes and savings available. Thus, the main approach of microfinancing is fighting poverty. As this topic is not on the agenda of banks and financial institutions, it was ignored in the past. Nevertheless, continuously growing investment volumes raise hope, that this sector will be absorbed by mainstream. This analysis aims at pointing out the financial sector's reasons and incentives. An introduction into the microfinance-sector will be followed by a debate regarding the strongly growing diffusion of microloans. In this context, main drivers and trends of demand side shall be discussed. Following this, the analysis will give an overview about various investments and therefrom resulting branches' trends, which will be the main part of this analysis. It tries to indicate chances and risks of these investment possibilities. Based on the prior part, the results will finally be summarized and an outlook for the future will be given.

2 Definition and basic idea of microfinance

The supply of microfinance is mainly based on three pillars of financial services, namely loan granting (micro loans), mobilisation of savings (micro savings) and the offering of insurances (micro insurance). An important reason for the raising interest in microfinance is the provable success of this financial concept. The year 2005 was called "international year of microloans" by the UN. By dealing with this topic it became obvious, that there are differences between

¹ Ing. Tim Langenstein; In der Schanz 58, 47608 Geldern, Germany; Tim.Langenstein@ebootis.de

 $^{^2}$ The informal sector is characterized in contrast to the formal sector, which associated companies are not registered, pay no taxes and are not subject to regulatory supervision. Cf. Erhardt (1996), p. 5

microfinance in developing countries and microfinance in industrial countries. In order to better display the origination of microfinance, this study will give a general overview on the beginnings and the goals of microfinance. Later the study will focus on microfinance investments. In Germany, most of the people have a giro account, cash free payments with EC - or credit card is very common and online banking enables quick payments from home. Unfortunately most people in many parts of the world do not have access to the most basic financial services. Every credit grantor demands material security. Poor people do not have securities available, such as property, plots or other assets. In order to give people in developing countries a chance, micro loans exist. Converted, the loans granted consist of volumes between 20 and 1500 Dollars (Dreher, 2006). Interest on micro loans is approximately 20% per year. Local credit grantors demand approximately 50% interest per year. Such high interest rates are common in rural areas, because the nearest bank is usually far away and poor people do not get loans anyway. Hence, people do not have the possibility to get a loan (Sütterlin, 2007). The basic idea of microloans is the connection of economic and social aspects. People shall not only be helped financially, but in the long run, there shall be a way out of poverty.

3 Microloans

The model of micro loans has reached Africa and Latin America, but also Europe. Germany supports as one of the biggest grantors the setup of the micro credit system. By order of the German Ministry of Development, for example the KfW bank or the German "Investitions- und Entwicklungsgesellschaft"(DEG) grants loans in order to secure microfinance organizations or they even take over shares. (Hesse, 2007)

Also NGOs, charitable foundations of the banking sector and bank associations engage themselves. Oikocredit, set up in 1975 is one example.³ 2004 Germany supported microfinancing with approximately 108.8 million Euros, according to the ministry of development. (Without, 2006) Since the end of 1970s around the globe and independent from each other, microfinance models were developed. The successful concept of previously mentioned Grameen Bank is characterized by simple and cost efficient handling as well as a high standardization, which reduces transaction costs significantly. By the flexible target-group-specific procedure default risk is reduced. (Yunus, 2006)

It can be shown, that poor people, especially women have an excellent repayment probability. Additionally, experiences with microfinance models state, that poor people have the ability to set up savings and that their demand for saving products is higher than for loans. One further experience is that for poor people not the interest rate, but the quick and unbureaucratic loan access is important (Bundesminister für wirtschaftliche Zusammenarbeit und Entwicklung, 2005). Microfinance products are nowadays offered by a wide range of different institutions, called MFI (microfinance institutions). These consist of financial self-help groups (SHG) (Sütterlin, 2007), NGOs and semi-formal financial institutions, private and public banks, special departments of commercial banks, local and corporate small banks but also specialized micro banks. By now, poor people also have a demand for insurance products, so that this area gains importance more and more. (Bundesminister für wirtschaftliche Zusammenarbeit und Entwicklung, 2005)

³ Oikocredit is an internationally active credit cooperative headquartered in Amersfoort (Netherlands)

4 The Market for Microfinance

Investments into microfinance projects rate among the so called "socially responsible investments $(SRIs)^4$ and have been experiencing raising growth rates for many years. The reason for this trend is the fact that SRIs are investment possibilities, which exhibit a dual yield profile.⁵ Besides an attractive financial risk-yield profile, these investments follow up a social investment-goal, for example tackling poverty. These characteristics of a win-win situation are the main reason why the market for socially responsible investments, especially microfinancing, grows disproportionately. In 2005, the investment sum of SRIs was \$ 2.3 trillion in the USA and \in 1 trillion in Europe. (DB Research, 2008)



Figure 1 Microfinance development

Figure 1 shows the significant increase of microfinance investments in the past years. Financial experts forecast an increase of investments up to approximately \$ 20 billion until 2015. These forecasts are based on the following assumptions:

- 1. Microfinance investments will develop to a niche investment, which will increasingly be demanded by private investors
- 2. Also, the demand of commercial oriented institutional investors for microfinance investments will grow out of reasons concerning portfolio diversification. Additionally, after some time a critical number of microfinance institutions will be able to absorb foreign financial resources efficiently.

The previously mentioned assumptions are an indicator that the microfinance sector is currently in a process of transformation. This process is marked by a continuously growing importance of market-based refinancing sources for microfinance institutes. Originally, MFIs used to finance themselves by donations, subsidized loans or development funds. Nowadays some MFIs have worked with securitization, issued shares or bonds. At the same time, the interest of private and institutional investors for microfinance investments is growing. These specific investments enable

⁴ The SRIs are investments that take into account ethical values and social components of the investor, in addition to yield criteria. Often spoken also by ecological and socially responsible investment

⁵ The dual return profile allows it to pursue a dual objective of investment investors. This combines social and inancial income. The social benefit is primarily in the contribution of poverty reduction

social surplus value by tackling poverty and other developmental target settings on the one hand. On the other hand, the attractive risk-yield-profile tempts many private and commercial investors from all around the world. This profile is characterized by stable revenues und very low default rates at the MFIs. Further, there is a very low correlation to established capital markets. Thus, microfinance investments suit ideally to well-elaborated portfolio diversification. (Bouma, Jeucken, and Klinkers, 2001)

Parallel to the previously mentioned increasing rates of microfinance investments, the overall loan size of MFIs has experienced disproportional growth rates as well. It climbed from approximately \$ 4 billion in 2001 to more than \$ 60 billion in 2014. The main reason for such a positive development is the improved access of leading MFIs to market based refinancing sources. These usually comprise national savings and domestic and foreign debt instruments. (Schneeweiß, 2014).

The MFIs state of development strongly depends on the finance structure of the respective country. Whereas for example savings have a high importance for refinancing in Asia, their share in Africa is very low. In Eastern Europe, MFIs refinance themselves by loans and debt instruments primarily. It shall be mentioned, that newly founded MFIs are mostly dependent of donations and subsidized capital contributions. On the other hand, developed MFIs display a higher debt rate. This rate results from fund inflows of domestic as well as foreign creditors.



Especially MFIs of the first category refinance their loan granting to a major part with savings. When determining the ideal refinancing structure of a MFI different internal and external factors are taken into consideration.

Internal factors are primarily:

- Growth rates of loan portfolio
- Growth rates of savings

External factors are:

- Legal framework of a country
- Supply of commercial and subsidized loans
- Openness of respective national finance system

Additionally, costs and duration of the different financing sources are to be included into the determination of the ideal financing structure. Savings are considered as cheap financing sources in most of the countries. Unsecured and subsequent loans are more expensive, where the emission of shares is considered as the most costly type of fund acquisition.

The figure above illustrates the connection between financing costs and duration. While the duration of savings displays a short-term duration and is connected to very low financing costs, debenture bonds have medium-term duration and lower financing costs. The emission of shares enables MFIs follow up a long-time refinancing strategy.



Source: Dieckmann

In the last years not only the range of investor's groups has increased, but also the range of microfinance investment products. Wide spread are especially structured debenture bonds. These use a mixture of equity instruments, mezzanine capital, other debt instruments and guaranties. Financial experts estimate, that only in 2009 more than 75 microfinance investment vehicles (MIV) existed in the market. The trend is rising.

In General, three different forms of MIVs can be differentiated. The microfinance development funds are to be mentioned in the first place. These funds have a clear developmental target setting. Thus, they are set and administrated by nonprofit-oriented organizations. The goal is the inflation-adjusted capital preservation. The financial yield has a minor role. These investment vehicles grant subsidized loans to microfinance institutes. Investors are primarily foundations, private donors and companies. Usually, microfinance developmental funds go without granting equity free of charge which is free equity capital in the form of grants or donations.

The second group of investment vehicles pursues not only a social yield but also a moderate financial yield. Usually, this is below the market-based revenues. These investment groups are labelled commercial oriented MIVs.

The purely commercially oriented MIVs are the third group. Here, the social yield is subordinated to the financial yield. The private and institutional investors follow up determined financial targetyields. By the purchase of junior-tranches of CDOs the investors have a higher risk and thus, the financial pressure is higher than for the socially oriented investors. Besides the higher transparency requirements, the investment process is more formalized.

The advantage of such a structure with a debt instrument is that single tranches with an individual risk-yield-profile can be generated. This is how different investment groups can be addressed. (Bierbaum, 2008) This structure of risks enables some investors to invest in developing countries. The following figure visualizes the structuring process by using a fictive example.



Figure 4: Structuring example of MIN Source: Dieckmann

5 Conclusion

This Paper makes clear that the microfinance sector is still in a state of transformation. The strengthened engagement of private and institutional investors plays a significant role. The special feature of the investments in microfinance projects is characterized by a dual yield-profile. On the one hand it allows investors to follow a social investment goal. On the other hand it offers an attractive risk-yield-profile. Despite the fast growing growth-rates the microfinance sector suffers from an enormous financing gap, which can be numbered at \$ 250 billion. (Dieckmann, 2007)

The reduction of this gap displays an enormous challenge for the finance sector. There are first indicators that a higher number of institutional investors could be ready, to take over the risky junior- and intermediate-tranches of CDOs and therefore attract further private and institutional investors. By the possibility of portfolio diversification, microfinance investments are stronger demanded by commercial and institutional investors. This trend has led to the significant growth of investment size of this asset class. Institutional and private investors have decupled their capital flows into the microfinance sector since the last decade. This is based on the assumption that the microfinance investments will become a niche-investment, which will increasingly be demanded by private investors. Due to regulatory changes, private investors will increasingly take notice of this investment possibility. Further, the microfinance sector will profit from the generally increasing importance of SRIs. Commercially oriented institutions, which consist of pension funds or trusts, will in future out of portfolio diversification reasons stronger invest in this field. By the expected capital inflow the investment vehicles will generate more growth. Also, the diversity of microfinance investment products will increase continuously.

References

- BIERBAUM, D. 2008. So investiert die Welt-Globale Trends in der Vermögensanlage. GWV Fachverlage GmbH, Wiesbaden.
- BOUMA, J., JEUCKEN, M. and KLINKERS, L. 2001. Sustainable Banking The Greening of Finance.
- BUNDESMINISTER FÜR WIRTSCHAFTLICHE ZUSAMMENARBEIT UND ENTWICKLUNG. 2005. Der Beitrag von Mikrofinanzierung zur Erreichung der Millennium Development Goals (MDGs) und des Aktionsprogramms Armut, Eschborn 2005.
- DEUTSCHE BANK RESEARCH. 2008. Mikrofinanz Investments vom 10.01.2008.
- DREHER, M. 2006. *Mikrokredite: Kleines Geld, große Wirkung*. Online: http://www.spiegel.de/wirtschaft/mikrokredite-kleines-geld-grosse-wirkung-a-428291.html>.
- DIECKMANN, R. 2007. Microfinance An emerging investment opportunity.
- ERHARDT, W. 1996. Die Nachfrage von Kleinunternehmen in Entwicklungsländern nach Finanzdienstleistungen, Stuttgart.
- HESSE, A. 2007. Sustainable Development Management- Politik-und Geschäftsfeld-Strategien für Banken. SD-M Eigenverlag, Münster.
- SCHNEEWEIß, A. 2014. Jenseits von Mikrokrediten Geldanlagen und Entwicklungsförderung.
- SÜTTERLIN, S. 2007. Mein Wort zählt<< *Mikrokredite: Kleines Kapital-große Wirkung, hrsg. von VENRO*. Brandes & Aspel Verlag GmbH, Frankfurt a.M.
- WITHOUT, A. 2006. Armutsbekämpfung, Stichwort: Kleinkredite. Online: http://www.rp-online.de/politik/ausland/stichwort-kleinkredite-aid-1.2314362>.
- YUNUS, M. 2006. Für eine Welt ohne Armut. Verlagsgruppe Lübbe GmbH & Co.KG, Bergisch Gladbach.

Factors of Smart Cities Influencing Startup Performance

MAREK LAVČÁK¹ – OTO HUDEC² Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

Startup companies have experienced an extreme growth in the recent years. Popularity of innovative entrepreneurship, amount of investments into innovations and potential reinforcement of economic growth has attracted the attention of corporate sector as well as government institutions and local municipalities. Creation of suitable environment for innovative entrepreneurship and peculiar start-ups has become much more significant over the last 15 years. From the academic point of view, this topic is rather new. Regarding the local self-governments, the creation of suitable environment and concept of the ecosystem for startups represent only one of the many key issues of city's development. Smart city is another distinctive movement that comes to the core. The main question dealt with in this paper is to what extent the targets related to the implementation of smart cities concept relates to the process of start-up ecosystem creation. Is there any relation between the indicators observing the level of smart cities and the factors based on which the suitability of startup ecosystems are evaluated? The link between both concepts is assumed based on the close interconnection of both approaches and IT technologies and computerisation of natural environment of the given city.

Key words: Smart City, Start-up, Scosystem, Start-up Performance, Location Determinants

JEL Classification: E02, L26, M13

1 Definition of Startup

More detailed analysis of suitability of the city's environment and characteristic features for startup company establishment is provided by defining the term start-up. According to Steve Blank, American entrepreneurs, investor and mentor working in Silicon Valley, *startup* is an organization formed to search for a repeatable and scalable business model. It is worth to mention that the term *startup* cannot be used for any new project of innovative nature. According to Paul Graham (investor and co-founder of Y-combinator), despite the element of innovations, it is also important that the startup project responds to a real problem in an innovative way while observing the conditions of extreme growth, scalability and global ambitions (Graham, 2006). The definition of startup in this article is also consistent with the approach of Innovation Driven Entity (IDE), a company that uses innovative technology, disrupts existing business models and has a global outlook.

2 Startup Ecosystem of a City

Twenty years ago, almost all tech startups were created in startup ecosystems like Silicon Valley and Boston. Today, technology entrepreneurship is a global phenomenon, with startup ecosystems similar to Silicon Valley rapidly emerging all around the world. Up to this date, Silicon Valley serves as a benchmark for other cities as well as for startups 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

¹ Ing. Marek Lavčák, Němcovej 32, 040 01 Košice, Slovak Republic, marek.lavcak@tuke.sk

² prof. RNDr. Oto HUDEC, CSc., Němcovej 32, 040 01 Košice, Slovak Republic, oto.hudec@tuke.sk

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 regardless of what they come from. Demand for innovations from the companies is met by the offer of professionally oriented universities and their graduates (Saxenian, 1985). Other regional ecosystems try to find inspiration in Silicon Valley. 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.

The essential question is why a particular place has become appropriate for the establishment of innovative business entities or rather specific forms of entrepreneurship such as startup projects. Positive influences such as localization and urbanization factors or even economies of scale are confirmed to be the basic factors for establishment and movement of companies within all kinds of regions (Gries and Naudé, 2008). They reflect the inherent features of the environment that stimulate the economic growth of new as well as existing companies through decrease of distribution and production costs and presence of high-quality work force. In the case there is an infrastructure in a form of networks, relationships, knowledge base, companies of similar specialization or industry, suitable conditions from the beginning of their existence, the potential of success for startup companies is higher (Beise and Stahl, 1998). The business environment as well as a capital in a form of specific financial sources suitable for financing start projects of different areas 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 startups as well. Generosity of the place and a tendency to accept new creative ideas are also very important. 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 enter into new cooperation. (Davidsson and Honig, 2003)

With regard to previous reasoning, many interesting questions may be raised. Are new startup communities established in the capitals (with the present impact of urbanization, higher availability of public resources, universities and wide range of companies looking for innovations) or, similarly to the creative industries, in post-industrial urban landscapes? 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 startup 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 startup 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 when the universities for the first time started to form tech-transfer offices and when other components of the city's tech-support infrastructure got put into place.
- 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 startup ecosystem is The Boulder thesis (Feld, 2012) consisting of four key components:

- 1. **Entrepreneurs must lead the startup community** Universities, investors, government, companies and media are important when forming an ecosystem, however, they play only the supporting role. Only the visionary entrepreneurs have the predispositions to lead the ecosystem and engage themselves in it actively.
- 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. The startup community must be inclusive of anyone who wants to participate in it. -People and ideas must be allowed to move freely within the community. Creation of the right kind of porous, hyper-connected and unstructured community, and over time, it will become larger, stronger and more sustainable than any community that is based on exclusivity.
- 4. The startup community must have continual activities that engage the entire entrepreneurial stack To engage the entrepreneurs, stimulate connections among community members and maintain vibrancy of the ecosystem, value-creating activities that draw people together, all the time are needed. All entrepreneur-focused events and activities, either formal or informal energize the whole community (Yining Wu, 2013).

Up to this date, Silicon Valley serves as a benchmark for other cities as well as for startups 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 regardless of what they come from. Demand for innovations from the companies is met by the offer of professionally oriented universities and their graduates (Saxenian, 1985). Other regional ecosystems try to find inspiration in Silicon Valley. 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.

The evaluation of suitability of local ecosystem is most commonly carried out based on The 2015 Global Startup Ecosystem Ranking prepared by Compass that portrays 20 most suitable urban ecosystems for startup establishment. The ranking of the most suitable cities for starting innovative entrepreneurs is formed based on five components: Performance, Funding, Talent, Market Reach, and Startup Experience. The ranking gives the individual components an order using order indicators and the final order is set based on the weighted average of the orders in individual components. The figure below depicts the final 20 ranks evaluated as the most successful in creation of startup support ecosystem in 2015. Performance represents the most significant component of all, therefore, it was chosen for the explained variable in the correlation analysis.

3 Definition of Smart City

A narrow definition of Smart city concept may help in understanding the scope of the presented paper. Although several different definitions of term *smart city* have been given in the past, most of them focus on the role of communication infrastructure of the city. However, this bias reflects the time period when the smart city label gained interest, viz. the early 1990s, when the ICTs first reached a wide audience in European countries. Hence, in our opinion, the stress on the internet as 'the' smart city identifier no longer suffices.

We believe a city to be smart when *investments in human and social capital and traditional* (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance. (Caragliu, Del Bo and Nijkamp, 2011)

Several procedures, methods and groups of indicators are used to measure the city's smartness. For the purposes of the paper, we will use the IESE Cities in motion index 2015. It is an overall index which includes more than 60 individual indicators divided into 10 groups: Economy, Human capital, Social cohesion, Environment, Public management, Governance, Urban planning, International outreach, Technology and Mobility and Transportation. The final index is subsequently calculated as a weighted average of indicators representing individual groups. IESE Cities in movement index 2015 is an overall index defining the extent and success of implementation of the "smart cities" concept. The final ratings gives an order to 147 cities of the world. (Schaffers, 2011)

Regarding the extensiveness of the indicator groups and the fact that within the final rankings there is an order of individual cities available, this index represents the most suitable alternative for the purposes of the paper.

4 Methodology

The main question of the paper deals with how the factors expressing implementation of the "smart city" concept on the given territories and the indicators of startup ecosystem ratings. Their interconnection is investigated using two seemingly not related databases. The final order in both above mentioned rankings is set based on the weighted order coefficients, averaged and calculated into a final indicator which determines the order in the total rating of both databases.

The first problem that needs to be solved is the creation of a common point for both rankings. The most suitable method from this point of view is to compare the two ratings and selection of parts of them that are present in both rankings. The 2015 Global Startup Ecosystem Ranking includes 20 items in the city group, 17of which are also present in IESE Cities in movement index 2015. The comparison was carried out in an optical manner. In order to find the answer to the question how individual factors expressing the implementation of the "smart city" concept on the given territory and indicators of start-up ecosystem, we have to choose the explanatory and response variables. Performance module that describes the overall performance of the startup support

ecosystem (how successful the city is in production of startup companies) represents the most widespread and apt indicator within The 2015 Global Startup Ecosystem Ranking. It is therefore chosen to be the response variable. The question is which groups of IESE Cities in movement index 2015 groups have an impact on the response variable. In order to ensure a detailed analysis, all the modules of Cities in movement index (Economy, Human Capital, Environment, Governance, International Outreach, Technology, Mobility and Transportation) will be chosen to be the explanatory variables. The correlation analysis will be used to analyse the interconnections between explanatory and response variables. Since both rankings are set based on the order (order/evaluation within the given module, one of the non-parametric method – Spearman's correlation coefficient – will be used in order to create a correlation matrix. Spearman's correlation coefficient works with the order of assessed data and may take values (-1, 1). A value reaching -1 expresses negative dependence between variables, which means that the increasing value of the explanatory variable have a negative impact on the increase of the response variable. Value reaching 1 expresses a positive dependence between the variables.

DELL's computer software Statistica will be used for the correlation matrix. After defining the variables, program will automatically calculate the correlation matrix based on the order of indices within the rankings using the Spearman's correlation coefficient between explanatory and response variables.

Table 1 Technical University of Košice, Faculty of Economics

p <.05	Performance	Economy	Human Capital	Social Cohesion	Environment	Public Management	Governance	Urban Planning	International Outreach	Technology	Mobility and Transportation
Performance	1.000000	0.330882	0.549020	-0,333333	-0.0833333	8,632353	-0.203431	0,185163	0.218137	0,281863	0.262255
Economy		1,0000000	0.0998524	-0,338235	0.075980	0,458333	-0.051471	0,454175	0,627451	0,549020	0,889796
Human Capital			1.000000	-0.352941	0.139706	0,571078	0.007353	0,427958	0,507353	0,608529	0,737843
Social Cohesion				1.000000	0.356824	0.051471	0.883627	0,217045	-0,262255	-0.235294	-0.247549
Enviroment					1.000000	0,210784	0.05031#	0,024525	0,602545	8,563275	0.230392
Public Management		-			1000 A.A.B.	1,000000	0,340039	0.502759	0,367647	0,250000	0.404412
Governance		-					1.000000	0.170448	0,301471	0,220588	0.049020
Urban Planning								1,000000	0.025761	0.232988	0.572655
International Outreach									1,000000	8,710784	0,620098
Technology										1.005008	6,625008
Mobility and Transportation											1.000000

5 Results

Defining the conditions and setting the variables in the computer program Statistica helped us create a correlation matrix with the following values of Spearman's correlation coefficient.

We highlighted the strong and positive correlations directly in the correlation matrix. The highest values of Spearman's correlation coefficient in connection with the "performance" module were observed in human capital and public management. Values of coefficient in the given dimensions represent 0.549 and 0.632. These values can be considered as significant, which means that the change of "human capital" dimension will change the order of "performance" module in 54.9% and the change of "public management" dimension will change the order og the given city in "performance" module in 63.2%.

In order to present a more precise interpretation of results of the correlation analysis, we will examine the individual index dimensions. "Human capital" component from IESE Cities in movement index 2015, the positive change to 54.9% of which will have a positive impact on the order of "performance" module, comprises of the following items:

Population with secondary and higher education	PHS
Number of top-level business schools	MBAR
Flow of international students	IFS
The number of universities	WUR
Number of museums per 100,000 inhab.	NM
Number of art galleries per 100,000 inhab.	NAG
Spending on leisure and recreation	CER

 Table 2 Technical University of Košice, Faculty of Economics

The result of correlation analysis serves as a starting point for the following research of particular items within the investigated Cities in movement index dimension. Regarding the "human capital" dimension, the most important items that tend to have a positive impact on startup ecosystem of the given city include population with secondary and higher education (PHS), number of top-level business schools (MBAR), flow of international students (IFS), the number of universities (WUR), number of art galleries per 100 000 inhabitants (NAG). These items describe the level of education, inclusiveness of the city worldwide and inclination to creativity and public interest in art and creative industries.

"Public management" dimension, the positive change of which will change the order of "performance" startups of the given city in 63.2%. It comprises of the following items:

e e e e e e e e e e e e e e e e e e e	
Tax ration in relation to the commercial benefits	TAX
The level of central bank reserves	TR
The level reservs per capita	TRPC
Type of government	TG
Local government scandals reported in the media	SC
Number of embassies	NE
Number of Twitter users listed in prominent Twitter directiories	NDTU

 Table 3 Correlation matrix combining Smart cities dimensions and City's Startup Performance

The whole dimension comprises of financial health, taxation, type and system of local government and their trustworthiness in relation to the public as well as inclusiveness of the city on a lower government level.

Significant positive correlation, i.e. the increase in indicators, was observed in both above mentioned dimensions Cities in movement index will cause a positive change of "performance" indicator within The 2015 Global Startup Ecosystem Ranking index.

p <0,05	Performance	Economy	Human Capital	Social Cohesion	Environment	Public Management	Governance	Urban Planning	International Outreach	Technology	Mobility and Transportation
Performance	1.000000	0,330882	0,549020	0,1033333	-0.0833333	0,632353	-0,203431	0,185163	0.218137	0,281863	0,262255
Economy		1,020030	9,808824	-B,338235	0,075980	0,458333	-0,051471	0,494175	0,627401	0,549020	0,889706
Human Capital	1.1		1.003500	-0.352341	0.139706	0.571078	0.007353	0,427950	0,507353	0.690529	0.732043
Social Cohesion				1.003200	0.300824	0.051471	0,693627	0,217045	-0,262255	-0,235294	-0.247548
Enviroment					1,000000	0.210784	0,659114	0.024525	0,682941	0.561275	0.230392
Public Management						1.000000	0,348039	8,507755	0,367647	0,250000	0.404412
Governance							1,000300	9,17044B	0,301471	D.220588	0,049020
Urban Flanning							-	1.000000	0.025751	0.232906	0,572655
International Outreach									1.000000	0.710784	0,620098
Technology										1,000000	0,625000
Mobility and Transportation											1,000000

Table 4 Technical University of Košice, Faculty of Economics

It is a very interesting fact that the "social cohesion" dimension negatively correlates with the order of city within the "performance" indicator. This item represents the social level, safety and comfort of the city as such. The following indices are included in this dimension:

Ratio of deaths per 100 000 inhabitants	RD
Crime index	CI
Health Index	НСІ
The unemployment rate	EBU
GINI Index	GIN
The price of property as a percentage	PPIR

This item represents the social level, safety and comfort of the city as such.

6 Conclusions

The paper tries to answer the basic question asked by local governments and leading institutions of local and regional policy. How to combine partial objectives policy of municipal ecosystems management and build a suitable environment for innovative entrepreneurship, taking the continuous implementation of the "smart city" concept into account. In order to answer this question, it was necessary to determine at what point the individual concepts are related to each other. Owing to the correlation analysis based on Spearmen's correlation coefficient examining rank correlation of explanatory and response variables, the positive correlations between Startup ecosystem performance and "human capital" and "public management" dimensions of Cities in movement index. Improving the items included in this dimension should have a positive effect on the performance of the city's startup ecosystem. The contents of this summary indicator shows that the level of education, inclusiveness of the city, inclination to creativity, the level of local governments, the type of economic activities and the tax burden on the environment have a positive impact on the development of suitable and efficient ecosystem for startups.

On the other hand, the results of the correlation analysis revealed that social cohesion is negatively correlated in relation to the performance of the local startup ecosystem, which is considered very interesting. Social cohesion expresses the social comfort as well as the safety level of the city. It is a paradox that in this case we observed a negative correlation, which means that the cities with lower level of social cohesion are more suitable and more successful in creating startup ecosystems.

This fact may arise from the definition of startup mentioned in the introductory part of the paper. These companies are established under conditions characterized by extreme uncertainty, which is represented by low level of social cohesion and degree of discomfort in the given city. For the purposes of the research, the highest priority is given especially to this fact since the factors negatively influencing the level and effectiveness of the suitable ecosystem creation are much more interesting than those that have a positive impact on the creation of suitable environment for innovative entrepreneurship.

References

- GRIES, T. and NAUDE, W. 2009. *Entrepreneurship and regional economic growth: towards a general theory of start-ups. Innovation.* The European Journal of Social Science Research, Vol. 2, No. 3, pp. 309-328.
- BIRLEY, S. 1986. *The role of networks in the entrepreneurial process*. Journal of business venturing. Vol. 1, No. 1, pp. 107-117.
- FLORIDA, R. 2002. The Rise of the Crative Class-and how it's transforming work, leisure, community and every day life. New York.
- BAUM, D. The Relationship Between Social Exclusion And Spatial Segregation In Urbanised Modern Societies. Ecspress.
- WACH, K. 2008. Impact of the regional business environment on the development of small and medium-sized enterprises in Southern Poland. In: *Cracow University of Economics Conference Proceedings*.
- SAXENIAN, A. 1985. Silicon Valley and Route 128: regional prototypes or historic exceptions. Urban Affairs Annual Reviews. Vol. 28, pp. 81-105.
- TIERNEY, J. 2014. *How to Create a Tech Startup Scene If You're Not in Silicon Valley*. The Atlantic. Retrieved from the http://www.theatlantic.com/business/archive/2014/12/how-to-create-a-tech-start-up-scene-if-youre-not-in-silicon-valley/384024>.
- GRAHAM, P. 2006. *How to be silicon valley*.. Paul Graham,. Retrieved from ">http://www.paulgraham.com/sili
- BLANK, S., and DORF, B. 2012. The startup owner's manual. K&S; Ranch.
- YINING WU BRIAN. 2013. *Startup Communities Crash Course The Boulder Thesis*.Retrieved from <<u>http://www.startupcommunities.ca/2013/05/01</u>/startup-communities-explained-the-boulder-thesis/>.
- ZAR, J. H. 1972. *Significance testing of the Spearman rank correlation coefficient*. Journal of the American Statistical Association, Vol. 67, No.339, pp.578-580.
- SCHAFFERS, H. et al. "Smart Cities and the Future Internet: Towards Cooperation Frameworks for Open Innovation." Future Internet Assembly 6656, 2011, pp. 431-446.
- NEIROTTI, P., DE MARCO, A., CAGLIANO, A. C., MANGANO, G., and SCORRANO, F. 2014. *Current trends in Smart City initiatives: Some stylised facts*. Cities, Vol.38, pp. 25-36.
- CARAGLIU, A., DEL BO, C., and NIJKAMP, P. 2011. *Smart cities in Europe*. Journal of urban technology. Vol. 18, No. 2, pp. 65-82.
- WORLD ECONOMIC FORUM. 2015. *Global Information Technology Report Network Readiness Index*. Retrieved from http://reports.weforum.org/global-information-technology-report-2015/network-readiness-index/.

FLORIDA, R. 2005. Cities and the creative class. Routledge.

SOKOL, M. 2013. Silicon Valley in Eastern Slovakia? Neoliberalism, Post-Socialism and the Knowledge Economy. Europe-Asia Studies. Vol. 65, No. 7, pp. 1324-1343.

Selected Factors of Employees' Job Satisfaction and Business Profile of Enterprises – Results of Own Research

ANNA LEMAŃSKA-MAJDZIK¹ Czestochowa University of Technology, Faculty of Management Poland

Abstract

Employees' job satisfaction depends on a number of factors and affects employees' commitment to their work. A high level of job satisfaction contributes to an effective performance of professional duties, which is closely connected with the functioning of an enterprise and affects its operating results, and often also its success. The aim of this paper is to present the results of an own survey conducted in 2015 on a group of 158 enterprises carrying out business activity across Poland, which allowed to identify determinants of employees' job satisfaction in different groups of enterprises depending on a business activity profile. The survey revealed dependencies that can be observed in the group of production, services and trade companies.

Key words: Job Satisfaction, Work Satisfaction, Satisfaction Factors, Success of an Organisation

JEL Classification: J28, M1

1 Introduction

Job satisfaction is a much explored phenomenon in academic literature. Extensive research shows job satisfaction factors as varied determinants, which can refer practically to all spheres related with modern organizations and their employees. It is also a fact that employees' job satisfaction is a factor determining the success of the whole organization, from sole traders, self-employed, through the SME sector to large corporations. A satisfied employee works more efficiently, which affects not only the financial result of the enterprise but also the overall success of the whole organization. Finding regularities concerning job satisfaction factors in groups of enterprises with different business activity profiles seems to be still a topical subject of discussions and research, as in a turbulent environment more and more organizations fight for a good employee to ensure themselves a success. Thus, the knowledge of employees' preferences and expectations becomes the key to management of organizations.

The aim of the paper is to attempt to determine job satisfaction factors of employees working in enterprises with different profiles of activity. A survey conducted on a group of 158 employees of Polish enterprises gave an answer to the question of whether there is a different range of factors of employees' job satisfaction in enterprises with different business profiles.

¹ Anna Lemańska-Majdzik, Ph.D., ul. Armii Krajowej 19 B, 42-200 Częstochowa, Poland, lemanska@zim.pcz.pl

2 Job satisfaction determinants of employees in enterprises with different business profiles

Employees' satisfaction is defined as a positive attitude to the company, co-workers and the work they do. This concept refers to the sphere of expectations of those employed (Rostkowski, 2004). According to R. Mrówka (2000), job satisfaction is a motivator, and an effective use of motivators as management instruments gives managers, or owners of enterprises, competitive advantage. Competitiveness of enterprises, i.e. their rivalry, competition to secure a place in the market, is the most important mechanism leading to the economic development of a country. Polish enterprises that want to compete on the global market should better use and more effectively develop their human capital (Okręglicka 2014).

Job satisfaction, according to G. Bartkowiak (2009), depends on a number of factors, which can be divided into two groups: factors that directly and indirectly influence employees' satisfaction. Meanwhile, L. M. Saari and T. A. Judge (2004) stress that job satisfaction is a product of numerous factors, resulting, among other things, from employees' conduct, or positive or negative attitude to the work they perform. Groups of different factors, such as: employees' needs and desires, social relations, including atmosphere at the workplace, leaders' style and quality of management, including trust in leaders (Yang, 2012), level of remuneration, and general terms of employment, are perceived as determinants affecting job satisfaction (Byars and Rue, 1997; Moorhead and Griffin, 1999). Employees' job satisfaction has a significant impact on the functioning of an organization, including turnover of staff and financial result of an enterprise (Moorhead, Griffin, 1999). The significance of factors impacting employees' job satisfaction may be connected with the position held and the type of work performed. A set of factors indicated by operational workers will be different from that indicated by qualified specialists or employees who take independent decisions. Differences will also occur in the case of company owners, who have significantly different expectations towards their organizations compared with employees (Springer 2011).

It is often stressed in academic literature that job satisfaction is more about the attitude than conduct of the employee. Attitude, according to Robins and Coulter (2005), which results from job satisfaction, is a consequence of employees' behaviour, affected by regularity of the work performed, achievement of better efficiency or loyalty to the organization (after: Vukonjanski, Terek, and Gligorović, 2014). Job satisfaction could be defined as a 'pleasurable emotional state resulting from the appraisal of one's job' (Weiss, 2002). High level of job satisfaction significantly corresponds with a high level of an employee's involvement, their loyalty, stability of employment and low absence (Carter, 2012). The level of employees' identification with the company, their approach connected with the established organization culture, the atmosphere and managerial style of the supervisors. These factors determine the efficiency and efficacy of the activities and company development (Lemańska-Majdzik and Sipa, 2015).

Research by Zavyalova and Kucherov (2010) shows that there is a relationship between organizational culture and the satisfaction of employees of trading companies. Organizational culture is a factor that impacts work and may contribute to the creation of a psychological agreement between the employer and the employee. The level of general job satisfaction results, according to the authors, from a high level of the organizational culture, which is reflected,

among other things, in organizational integrity. There is a direct linear correlation between job satisfaction level and the level of organizational culture integrity.

In enterprises that provide services, it is important to maintain an existing external group of satisfied customers who will constantly use the services provided by the enterprise. According to Mahmood, Attiq and Azam (2014), this is possible if an organization has satisfied employees, who show a high level of job satisfaction. Behaviour of an employee with a high level of job satisfaction has an impact on good relations with customers, which in turn determine a customer's choice of an enterprise whose services they want to use. Studies of Polish services companies by M. Juchnowicz (1998) show that employees in the sector of services achieve high job satisfaction and declare a low level of burnout. At the same time, they are willing to improve their skills. These features have a positive impact on the value of human capital in the sector of services.

Similar observations apply to commercial companies, where employees often have a direct contact with the company's customers. J. G. Barnes (2001) stresses that satisfied employees (salesmen) "generate" satisfied customers, which directly leads to an increase in sales and improvement in the company's profitability. It is thus important that an employee representing a given enterprise has a high level of job satisfaction. Giedraitis (2014) stresses that managers of commercial companies, in order to ensure effective decision-making, should make sure that there is high quality and accurate information in the company, which has a direct impact on relations with employees.

Job satisfaction of employees in the manufacturing sector depends on such factors as the supervision and character of the superior, system for rewarding employees, atmosphere at the workplace, human relations, character and type of work and good communication at work. These determinants make job satisfaction in this sector higher than e.g. in the sector of educational services (Vukonjanski, Terek and Gligorović, 2014). Studies presented in the literature on the subject show that in the manufacturing sector, employees' job satisfaction is also affected by introduced technologies and the level of innovativeness. It has been found out that introduction of new technologies and a high level of innovativeness of an organization can affect employees' job satisfaction (Yu, Shen and Lewark, 2012), which results from their involvement in work, while the emotional state of employees as their reaction to the introduction of innovations affects the success of technological innovations (Ghani, Jayabalan, 2000). Meanwhile Sim, Curatola and Rogers (2011) stress that employees' satisfaction affecting the success of an organization depends on overall support for employees, e.g. through training courses and possibility of improving professional qualifications (Gorzeń-Mitka, 2013). Moreover, HR practices may contribute to an increase in the level of job satisfaction, which eventually increases organisational performance (Appelbaum, Bailey, Berg and Kalleberg, 2000). Studies show that training courses organized to support the professional development of employees of manufacturing and industrial enterprises (Georgellis, Lange (2007) as well as HR planning are closely related with employees' job satisfaction and have a positive impact on job satisfaction, and thereby employees' performance (Absar, Azim, Balasundaram and Akhter, 2010).

Job satisfaction is one of numerous factors influencing organizational effects, including productivity at work, which in turn has an impact on an increase in productivity in manufacturing enterprises (Judge, Thoresen, Bono and Patton, 2001). We can thus conclude that manufacturing

enterprises showing a high level of work efficiency have a high percentage of highly satisfied employees. It is thus worth conducting research into satisfaction of employees in various groups of enterprises to identify their preferences with regard to job satisfaction factors, which, as the review of literature shows, impacts success of an organization.

2.1 Research methodology

The aim of the study was to present determinants of job satisfaction of employees in enterprises operating on the territory of Poland depending on the type of business activity, i.e. in manufacturing, services and commercial companies, and to answer the question: Does the type of business activity conducted by an enterprise determine a range of factors of job satisfaction? The study used a purposive research sampling. It was conducted in I 2015 on a group of 158 employees working in small, medium-sized and large enterprises operating on the territory of Poland. Based on the research material gathered it was established that the study had been conducted in four voivodeships. The research tool was a questionnaire survey, which consisted of 13 closed questions. The study should be treated as pilot research, but the size of the research group allows initial conclusions to be drawn and regularities to be found. The findings of the study presented in the paper represent a fragment of broader empirical studies.

In order to determine the factors influencing employees' satisfaction in different groups of enterprises, 9 determinants, selected based on a review of literature on the subject, were subjected to diagnosis. For analysis of the material gathered, a 5-level Likert scale was used, which allowed the authors to obtain a more detailed opinion on the impact of determinants on employees' satisfaction. The distribution of the answers received by the profile of business activity of an enterprise was analysed using the Kruskal-Wallis test and Dunn post-hoc test. Test probability p<0.05 was considered as significant, whereas test probability p<0.01 was considered as highly significant. The results were analysed using the statistical application PQStat ver. 1.6.

2.2 Survey findings

The survey shows that all employees, regardless of the type of business activity conducted by a company, most often indicated the following factors influencing job satisfaction: working conditions, and sense of security, which scored more than 4.0 on a 5-point Likert scale. On the other hand, the factors least often indicated by employees included: investments in the development of an employee, possibility of promotion, development of career and additional benefits, which scored on average 3.27, 3.24 and 3.00 (Graph 1). What's interesting, remuneration and system of rewarding employees - the factors that are often perceived in literature as those determining job satisfaction - were not indicated as the most important, impacting job satisfaction of the employees surveyed.

The respondents were mainly working in services – this type of activity accounted for almost 37% of all types of activity, followed by manufacturing (25.3%) and commercial companies (16.5%), whereas 21.2% of enterprises indicated a mixed type of activity, with the biggest group of commercial and services companies.



Source: Own processing

Among employees of the different groups of enterprises, which for the purpose of the survey were divided into manufacturing, commercial and services companies, the selected job satisfaction determinants were indicated at similar levels, i.e. the determinants that were most often indicated by employees of manufacturing enterprises included: policy towards employees, which scored 4.2, atmosphere at the workplace, which scored 4.1, working conditions and sense of security, scoring 3.95 on a 5-level Likert scale. The determinants that were most often indicated by employees of commercial enterprises included: working conditions, sense of security, possibility of promotion and development of professional career - all of them scored 4.0 on the scale assumed in the study (Figure 2).

The results showing employees' assessment of the level of satisfaction with working conditions differed significantly (p<0.05) among the groups of enterprises distinguished by the type of business activity. The lowest assessment, which was 3.95 on average, referred to manufacturing companies and was statistically significant (p=0.0342) but lower than the average of 4.14 recorded for the group of services enterprises. The results showing the assessment regarding the factors of remuneration and policy towards employees also differed in a statistically significant way (p<0.05) among the groups distinguished by the type of business activity. In the case of remuneration, the lowest average assessment, 3.15, referred to manufacturing enterprises, whereas the highest one, 3.70, was recorded for services companies. In the case of policy towards employees, the lowest average assessment, which was 3.70, referred to services companies, whereas the highest one, 4.20, was recorded for manufacturing enterprises. In the case of the job satisfaction factor of possibility of promotion, development of professional career, statistically highly significant differences (p<0.01) were found out among the different groups distinguished by the type of business activity: the lowest average assessment, which was 3.03, referred to services companies, whereas the highest average, 4.00, was recorded for commercial companies, which achieved significantly higher results than companies providing services (p=0.0013) and manufacturing companies (p=0.0289) (Table 1).



CEFE 2015 - Central European Conference in Finance and Economics

Figure 2 Level of the selected determinants of employees' job satisfaction in different groups of enterprises Source: Own processing

Job satisfaction determinants	Kruskal-Wallis test		
working conditions	H=8.63	p=0.0347	
remuneration	H=10.51	p=0.0147	
sense of security	H=0.16	p=0.9830	
policy towards employees	H=8.61	p=0.0350	
atmosphere at work	H=2.27	p=0.5182	
systemof rewarding employees, bonuses, etc.	H=0.77	p=0.8556	
possibility of promotion, development of career	H=14.28	p=0.0025	
investments in the development of an employee	H=4.42	p=0.2191	
additional benefits for an employee	H=0.69	p=0.8749	

Table 1 Job satisfaction determinants and the profile of business activity of enterprises

Source: Own work based on survey

In the case of assessments of such satisfaction affecting determinants as: sense of security, atmosphere at the workplace, system of rewarding employees, investments in the development of an employee and additional benefits, no significant differences were found out among the groups of manufacturing, commercial and services companies.

3 Conclusion

The aim of the survey of a group of enterprises operating across Poland was to show job satisfaction determinants of employees in enterprises depending on the type of business activity,

i.e. in manufacturing, services and commercial companies. The survey enabled the identification of the most important factors impacting job satisfaction of employees in the different, selected groups of enterprises conducting manufacturing, commercial or services activity (Table 2).

Table 2 The most important determinants of employees' job satisfaction and business profile of an enterprise

Type of a company's activity	The most important factors of employees' job satisfaction		
Manufacturing	policy towards employees		
Manufacturing	working conditions		
Trada	working conditions		
Trade	possibility of promotion, development of career		
Somulaas	working conditions		
Services	policy towards employees		

Source: Own work based on survey

Summing up, the most important factors of job satisfaction among employees of manufacturing enterprises are the same as those among employees of services companies, but arranged in a different order. Meanwhile, in the case of employees of commercial companies, apart from working conditions, which were indicated by all the respondents, the satisfaction affecting factors also include possibility of promotion and possibility of the development of professional career, which may result from the fact that employees of manufacturing companies notice a path of career and see possibilities of their development, whereas in the group of services or commercial companies the development of career is limited. It can also be concluded that there are no clear differences in the overall choice of job satisfaction factors of employees working in different enterprises in terms of business profile.

It is worth making an attempt in the future to conduct similar studies on a larger, representative group of enterprises in order to find regularities and formulate recommendations for those managing enterprises with different business activity profiles.

References

- ABSAR, M., AZIM, M., BALASUNDARAM, N. and AKHTER, S. 2010. Impact of Human Resources Practices on Job Satisfaction: Evidence from Manufacturing Firms in Bangladesh. Petroleum - Gas University of Ploiesti Bulletin, In: *Economic Sciences Series* [serial online]. June 2010. Vol. 62, No. 2, pp. 31 – 42.
- APPELLABUM, E., BAILEY, T., BERG, P. and KALLEBERG, A. 2000. *Manufacturing advantage: Why high-performance work systems pay off.* Ithaca, New York: Cornell University Press.
- BARNES, J.G. 2001. Secrets of Customer Relationship Management: It's All About How You Make Them Feel, New York: McGraw-Hill.
- BARTKOWIAK, G. 2009. Człowiek w Pracy. Od Stresu do Sukcesu w Organizacji. Warszawa: PWE.
- CARTER, M.R. and TOURANGEAU, A.E. 2012. Staying in nursing: what factors determine whether nurses intend to remain employed? In: *Journal of Advanced Nursing*. Vol. 68, No. 7, pp. 1589 1600.

- GEORGELLIS, Y. and LANGE, T. 2007. Participation in continuous, on-the-job training and the impact on job satisfaction: longitudinal evidence from the German labour market. In: *The International Journal of Human Resource Management*. Vol. 18, No. 6, pp. 969–985.
- GHANI, K.A. and JAYABALAN, V. Advanced Manufacturing, Technology and planned organizational change. In: *Journal of High Technology Management Research*. Vol. 11, pp. 1 18.
- GIEDRAITIS, A. 2014. Expression of business environment changes in trading company: Research of users' opinion. In: *Regional Formation & Development Studies*. Vol. 14, pp. 53– 63.
- GORZEŃ-MITKA, I. 2013. Doskonalenie jako paradygmat zarządzania współczesnym przedsiębiorstwem, In: *Problemy doskonalenia zarządzania przedsiębiorstwem*. GORZEŃ-MITKA I. (ed.). Częstochowa: Sekcja Wydaw. WZ PCzęst.
- JUCHNOWICZ, M. 1998. Satysfakcja z pracy w sektorze usług w realiach polskiej gospodarki. In: Management Decision, Vol. 36, pp. 63 – 75.
- JUDGE, T.A., THORESEN, C.J., BONO, J.E. and PATTON, G.K. 2001. The job satisfaction job performance relationship: A qualitative and quantitative review. In: *Psychological Bulletin*. Vol. 127, pp. 376 407.
- LEMAŃSKA-MAJDZIK, A., SIPA, M. 2015. Selected Aspects of Family Company Management in Employees View in Poland. In: *Aktualne problemy podnikovej sfery*. 2015. Bratislava: Vydavateľstvo EKONOM.
- MAHMOOD, S., ATTIQ, S. and AZAM, R. 2014. Motivational Needs, Core-Self-Evaluations and their Link with Job Satisfaction: Evidence from Telecom Sector of Pakistan. In: *Pakistan Journal of Commerce & Social Sciences* [serial online]. January 2014; Vol. 8, No. 1, pp. 149–169.
- MOORHEAD, G. and GRIFFIN, R.W. 1999. Organizational behavior Managing people and organizations. Delhi: AITBS Publishers & Distributors.
- MRÓWKA, R. 2000. Badanie satysfakcji pracowników w organizacji gospodarczej. In: Nowoczesne przedsiębiorstwo – strategii działania, rozwoju i konkurencji. Vol. 1. Warszawa: Kolegium Zarządzania i Finansów SGH.
- OKRĘGLICKA, M. 2014. Adoption and Use of ICT as a Factor of Development of Small and Medium-sized Enterprises in Poland. In: *Przedsiębiorczość i Zarządzanie*. Vol. 15, No. 7, Part 1, pp. 393 – 405.
- ROSTKOWSKI, T. 2004. Nowoczesne metody zarządzania zasobami ludzkimi. Warszawa: Difin. SAARI, L.M., JUDGE, T. A. 2004. Employee attitudes and job satisfaction. In: *Human Resource Management*. Vol. 43, No. 4, pp. 395 407.
- SIM, K.L., CURATOLA, A.P. and ROGERS, J.W. 2011. Job security, job satisfaction, effortreward equity and lean manufacturing: a field study. In: *Proceedings for the Northeast Region Decision Sciences Institute (NEDSI)*. pp. 1231–1255.
- SPRINGER, A. 2011. Wybrane czynniki kształtujące satysfakcję pracownika. In: *Problemy zarządzania*. Vol. 9, No. 4(34), pp. 162 180.
- VUKONJANSKI, J., EDIT, T. and GLIGOROVIĆ, B. 2014. Job Satisfaction Of Men And Women Employed In Manufacturing Sector And Education In Serbia. In: Singidunum Journal of Applied Sciences. Vol. 11, No. 1, pp. 25 – 33.

- WEISS, H.M. 2002. Deconstructing job satisfaction: separating evaluations, beliefs and affective experiences. In: *Human Resource Management Review*. Vol. 12, No. 2, pp. 173 94.
- YANG, Y.-F. 2012. Studies of transformational leadership in consumer service: leadership trust and the mediating - moderating role of cooperative conflict management. In: *Psychological Reports*. Vol. 110, No. 1, pp. 315 – 337.
- YU, N., SHEN, L.M. and LEWARK, S. 2012. Gender differences on the job satisfaction in the phase of implementing advanced manufacturing technology in the Chinese manufacturing firms. In: *Work*. Vol. 41, Feb. 2, pp. 4320 4322.
- ZAVYALOVA, E. and KUCHEROV, D. 2010. Relationship between organizational culture and job satisfaction in Russian business enterprises. In: *Human Resource Development International*. Vol. 13, No.2, pp. 225 – 235.

Barriers to and Presumptions for Development of Innovation Activities in SME in the Slovak Republic

ĽUBICA LESÁKOVÁ¹

Matej Bel University in Banská Bystrica, Faculty of Economics Slovak Republic

Abstract

Small and medium enterprises are forced to make innovations, because they are under permanent pressure of competitors at the market. From this point of view the ability to compete in innovations plays very important role as a factor of their competitiveness. Through the last year (2014) we have conducted at our faculty the empirical research in small and medium enterprise's sector in the SR oriented on evaluation of innovation activities in small and medium enterprises in Slovakia as well as on identifying the main barriers and formulating the main presumptions to develop innovation activities. Partial results of the above mentioned research are presented in the article. The paper was elaborated as a part of the VEGA project 1/0494/15 "The research of factors influencing the successfulness of innovative small and medium-sized enterprises in the Slovak Republic".

Key words: Small and Medium Enterprises, Innovations, Barriers, Presumptions, Slovak Republic

JEL Classification: L26, O31

1 Introduction

With the development of innovation processes in all types of enterprises, it is evident the growing role of innovations also in small and medium enterprises (SMS). The ability to compete in innovations plays very important role as a factor of their competitiveness. Many examples confirm that SME create a space for innovation, nevertheless managers in SME in Slovakia indicate many barriers to develop innovation activities. The aim of the article is to present the result of empirical research oriented on evaluation of innovation activities in SME in Slovakia as well as on identifying main barriers and formulating main presumptions to develop innovation activities in SME in Slovakia.

2 Innovations in small and medium enterprises in the Slovak Republic – empirical research

In the year 2014 we carried out (with the team of co-operators of the Economics Faculty of Matej Bel University in Banska Bystrica) empirical research aimed at innovation activities in small and medium-sized enterprises in the Slovak Republic. The research was aimed at three areas: evaluation of innovation activities of SME in Slovakia, identifying the barriers of their development and formulating the presumptions of the development of innovation activity in SME of the SR. The research was conducted by the questionnaires. The questionnaire consisted of three groups of questions in the harmony with the research goal. It was distributed via electronic

¹ prof. Ing. Ľubica Lesáková, PhD., Tajovského 10, 975 90 Banská Bystrica, Slovak Republic, lubica.lesakova@umb.sk

mail. Selective sample was created by 527 enterprises, 384 of them were small and 143 mediumsized enterprises.

The sample of selected set was observed on the level of two attributes that means the size of an enterprise and the region in which the enterprise exists. Representativeness of the sample was verified statistically by means of non-parametric test – chi-square test. The test confirmed a representative sample of selected set. From the overall number of enterprises more than 40% of enterprises worked in industrial branches (engineering, woodworking, electro technology, chemistry, and rubber industries). A third of enterprises were active in the sector of market services, 20% were from building industry and 10% acted in information-communication technologies.

The first part of questionnaire survey was aimed at the innovation activities of small and medium-sized enterprises in the SR. We verified the extent of innovation activities in SME, the reasons of their innovation activity, and also which type of innovations were carried out in the last five years.

For the question, if SME practise innovation activities, 174 enterprises responded positively from the overall number of 527 enterprises (33.02 %), 112 of which were small and 62 medium-sized enterprises. Together 353 enterprises (272 small and 81 medium-sized) stated that they do not practise any type of innovation activities, while they try to act in the market without changes in entrepreneurial activity and they trust to their entrepreneurial strategy. It is a paradox finding out that even in spite of the fact the enterprises consider innovations for inevitable part of their entrepreneurial activity, they do not realize them. We can find a possible explanation in the lack of financial means for their realization and in the decision of enterprises to prefer the relative certainty of present running process of entrepreneurial activity to the risk from investigating into Innovations.

Enterprise/Realization of Innovation	Yes	No
Small Enterprises	112	272
Medium-sized Enterprises	62	81

|--|

In the following question we tried to find out main reasons for slovak SME to realize innovations. We were interested in what the reasons are considered as the most significant, which mostly motivate them towards the innovation activity. At this question the managers of SME could mark several answers. Most of them stated that the most important reason of their innovation activity is the changing need of customers as well as the possibilities of making the production process effective, exactly the process of providing the services. Up to 65% of respondents (112 of 174) consider these two reasons for the most important ones.

Reasons of innovation activity	Share of overall number of enterprises
Changing needs of customers	64.36 %
Making production process more effective	64.36 %

Table 2 Reasons of Innovation Activity of Small and Medium-sized Enterprises

CEFE 2015 - Central European Conference in Finance and Economics

Strengthening competition	61.49 %
Effort to penetrate new markets	28.16 %
Expansion of entrepreneurial activity	26.43 %
Others	1.03 %

Strengthening competition equally belongs to the significant reasons of innovation activity. More than 60% of respondents consider strengthening competition for an important impulse of their innovation activities. A presumption was confirmed, that the growth of competition presses enterprises to search the ways to the growth of their effectiveness and to changes. It follows from the results that outside stimuli, such as the competitive strength and strength of customers, as well as inside factor of effectivity of production process (or services providing process) influence most significantly the decision-making process of innovation in SME.

Further important reason for innovation activity of SME of the SR is the effort to penetrate new markets (28.16 % of enterprises). These reasons come out of the inside of an enterprise, from his willingness to improve its position at the market, and thus to keep the customers, or to gain new ones.

It is obvious that not all SME in Slovakia realize innovations in the same measure. Therefore, we were interested in what type of innovation is carried out by SME. We found out which type of innovations – product, process, organizational or marketing – they introduced in the years 2009 - 2013.

Type of innovation concerning	Number of Enterprises
Product	42
Process	67
Organizational	37
Marketing	28

Table 3 Types of Innovations in Small and Medium-sized Enterprises

Most of enterprises involved in the research have introduced process innovations for last 5 years. We can mention those enterprises which performed the change and effectiveness of production processes, introduced new production system, improved information and communication technologies, etc. Equally important are also those concerning product innovations. There were found the activities connected with the production of new production line, improvement of existing products, introducing new goods and services into a market, etc. Up to 24,1 % of enterprises said that they introduced product innovation. Less often they introduce non-technological innovations in the sense of organizational and marketing innovations. Up to 22 % of small and medium-sized enterprises performed actually organizational innovation. Among the enterprises with organizational innovations we included those which introduced changes in work organization or the new organizational methods. Only 16.2 % of enterprises have done marketing innovations (new methods of sale, new distribution channels, product promotion, etc.).

The result of our research – the share of enterprises with innovation activities is corresponding with the data given in Statistical Yearbook of the Slovak Republic. The share of enterprises with

innovation activities is still very low; in the year 2012 it was by small enterprises 27.7 % and by medium-sized enterprises it was 37.7 %. One of the partial aims of our research was therefore to identify the main barriers to develop innovation activities in small and medium enterprises in Slovakia.

3 Barriers to develop innovation activities in small and medium enterprises in the SR - the results of questionnaire survey

The second part of a survey was finding out and analysing the main barriers of innovation activity in small and medium-sized enterprises in the Slovak Republic. This question was discussed not only by SME that realize innovations, but as well those enterprises without innovation activity. Innovative enterprises can provide information on barriers, they really meet when realizing innovation activities. On the other hand innovatively inactive enterprises will provide the reasons for innovation activities they do not perform.

We divided the barriers of innovation activity in SME into three groups from the viewpoint of their significance and influence upon innovation activities of SME. The division of barriers according to significance was carried out by means of statistical programme of SPSS (Friedman's and Wilcoxon's test).

Barriers with a significant influence

On the basis of research results and statistical analysis we included in the barriers with significant influence: high costs on innovation activity, lack of financial means in an enterprise and quality of infrastructure for innovations.

High costs for innovation activities are the main barrier belonging to this group. The research confirmed that realization of innovation activities is connected with high costs. Respondents evaluate them as a main significant barrier. Nevertheless, managers of enterprises should take into consideration that innovation is a prerequisite for obtaining a favourable position in the future.

Type of barrier	Significance of barrier in %
High costs on innovations	83
Lack of financial means for innovations	81
Quality of infrastructure for innovations	72

Table 4 Significance of Barriers in Percentage

The second barrier within the group of important barriers is the lack of financial sources. The majority of SME in SR considers the problems with the accessibility of financial sources for the most expressive factors limiting the innovation activities of SME. Enterprises introduced negative experience when they were acquiring means from the funds of the European Union, structural funds, or other public financial sources (bureaucratic demand, administration, corruption, ineffective redistribution of means, as well as ignorance of their drawing). The main external source of funding the innovation activities remain the structural funds through the priority axes of the Operational Programme Competitiveness and Economic Growth (Ministry of Economy) and the Operational Programme Research and Development (Ministry of Education). The two Ministries and their agencies (due to strict implementation of the Competence Act)

cooperate insufficiently, which leads to fragmentation and implementation deficiencies. The problems with acquiring the financial means force SME to innovate predominantly from their own financial sources.

The third important barrier is the quality of infrastructure for innovation. Respondents expressed critical attitude to the existence and activities of institutions supporting innovation activities as well as to the support of the rise and development of innovative SME from the side of the state. Critical is viewed that in Slovak regions the higher territorial units (VÚC) do not have innovation structures; there is no scheme for effective management of the state innovation policy and regional innovation strategies. An institutional framework for a more efficient connection between industry and selected services and results of research and development and practice is missing. The intention to create the regional innovation centres was to ensure implementation of the regional and state innovation policy in regions in order to assure the growth of competitiveness, reduction of regional disparities and growth of regional employment development of innovation tools at the regional level. Slow implementation, lack of coordination and consensus among the relevant ministries appears to be critical. Respondents were very critical to the long-term absence of creating regional innovation centres, which should help to start the cooperation between SME on the one side and universities, research centres, technological parks on the other side, as well as to be helpful in the process of establishing the clusters.

Barriers with averagely significant influence

The second group of barriers is created by the barriers with averagely significant influence on innovation activities. On the basis of research results we included to this group lack of qualified employees (human resources), absence of cooperation with other subjects in the field of innovation activities, lack of the information about the market and lack of information about technologies.

Qualified human resources belong to one of the most important factor determining innovation activity. Managers of SME identified the lack of qualified employees as the barrier with average significant influence. In the Innovation Strategy of the Slovak Republic for the years 2014 – 2020 was indicated as the second priority "High-quality human resources". Of special importance is the measure oriented on innovation education for SME. The objective is to provide education and training to firms and entrepreneurs in the area of innovation activities. The reason for the adoption of this measure is a low level of innovation activities and creativity of businesses with SME falling in the category of low innovative enterprises, in particular. A series of special training courses on innovative activities and special practices and procedures will to be organised under this measure. Educational activities will be carried out in cooperation with cluster organisations, industrial chambers and associations operating in Slovakia, as well as with higher territorial units and municipalities.

According the research the absence of cooperation with other subjects in the field of innovation activities could be included into the group of averagely significant barrier. The cooperation of SME with other subjects in the field of innovation activities brings several synergic effects to the enterprise. The most important of them is common sharing of knowledge and simpler approach to the latest know-how, common sharing of capacities, lower demands for financial sources, etc.

The third barrier belonging to this group is the lack of information about markets. Managing innovations is highly demanding for information support. The enterprises that decide to invest financial means for the analysis of a market significantly limit this barrier and make the whole process of innovation activities easier. (Lesáková, 2010)

Type of barrier	Significance of barrier in %
Lack of qualified employees	61
Absence of cooperation with other subjects in the field of innovation activities	48
Lack of information about the markets	37
Lack of information about technologies	34

 Table 5 Significance of Barriers – Barrier with Averagely Significant Influence

The last averagely significant barrier in SME of SR is according to the results of our research the lack of information about the latest technologies. More than a third of respondents consider it for one of the important barriers of the development of innovation activities in SME. The remaining number of respondents is well informed about technologies, they are able to analyse the new trends in technologies, and therefore they do not view a barrier influencing innovation activities of SME in this field.

Barriers with little significant influence

The last two identified barriers are characterized by small influence on innovation activities of SME in SR. They include the aversion of employees towards changes and uncertain demand for the results of innovation activities.

The first barrier – the aversion of employees towards changes – does not influence significantly innovation development, according to SME of SR. The aversion of employees towards innovations can be eliminated by the creation of suitable pro-innovation atmosphere, motivating and supporting creative ideas of employees.

Table 6 Significance of Barriers – Barriers with Little S	ignificant Influence

Type of barrier	Significance of barrier in %
Aversion of employees towards changes	12
Uncertain demand for the results of innovation activities	12

Approximately the same level of significance has been reached by the uncertain demand for the results of innovation activities. Many SME are afraid that financial means spent on innovation activities need not bring positive results. However, it is necessary to realize that each entrepreneurial activity is connected with uncertainty and possible failure. Managers of enterprises should take into consideration that innovation is a prerequisite for obtaining a favourable position in the future global economy.
4 Presumptions for the development of innovation activities in small and medium enterprises in the Slovak Republic

In the following part we conclude briefly the results of our research aimed at the identification of basic presumptions for the development of innovation activities in the SME in Slovakia. We aimed at inside and outside pre-conditions and by means of questions in the third part of the questionnaire we revealed their importance for small and medium-sized enterprises. Through the analysis we summed them up as follows.

The question, which basic presumptions have to be fulfilled so that the enterprises could realize the innovation activities, was answered that there are 6 basic presumptions.

As the first one they said was the *high-quality human resources*. Quality management, as well as employees able to think creatively and implement innovations in their activities, represent one of the most important presumptions of the development of innovation activity of an enterprise (Berchicci, 2009). Management must be able to lead and direct the thoughts and ideas in the enterprise, to search and use talents, be aware of the fact that the enterprise will be successful due to being distinguished by the human resources (Lesáková, 2010). From the viewpoint of employees pro-active approach is expected, as well as the ability to learn and implement knowledge in the innovation activity. Remuneration of employees for their innovation ideas is a significant motivator and presumption for the increased effort of employees when searching for new, innovative solutions.

The second presumption that was stated by the respondents is the *sufficient financial sources*. The enterprises declared the need to simplify the approach to financial sources, liquidation of huge administrative demand and bureaucracy connected with acquiring financial means from the European funds (structural funds) or from other public sources. For the future it will be necessary to mobilise all financial sources in the area of innovation support in order to ensure that innovation activities performed by business entities receive the same level of funding as those in advanced EU countries. In connection with efforts towards the most effective use of allocated financial resources, an indirect state aid need to be provided to profit-generating projects implemented by SMEs, i.e. financial engineering instruments such as guarantee funds, credit funds, venture capital funds and municipal development funds. There is an enormous interest of responsible institutions in coordination with the Ministry of Finance of the Slovak Republic to apply the upgraded model of usage of innovative financial tools in order to support innovation activities in SME.

As the third presumption for the development of innovation activity was stated the *cooperation and participation of SME in networks and clusters*. Innovation process of higher level calls for improvement of interaction between small and medium enterprises, research institutions and universities and for creation of various effective networks and partnerships (Bessant and Tidd, 2009). Building partnership is a way how to be involved into innovation activities. In the Innovation strategy of the SR for the years 2014-2020 was indicated as one of the main measure the support to innovative industrial cluster organisations. The purpose is to improve competitiveness through support to selected activities of industrial cluster organisations, with a view to promoting joint industrial activities in selected areas. It could help in supporting cluster

activities which contribute to increasing the competitiveness of the innovative cluster organisation's member companies.

According to our survey results, the fourth presumption is the suitable environment. It is necessary to create an *innovative environment* in the SR that eliminates weaknesses in the area of research and innovation (R&I) and develops mostly opportunities which create the conditions for fundamental enhancement of innovative environment. A critical element is above all the autonomous functioning of sectors of education, R&I and business practice, which results into different understanding of R&I. Of special importance is the creation of linkages between MNCs' R&I and domestic businesses R&I framework (including the SME), and increasing interest of businesses and industrial clusters in rebuilding of industrial R&I structures (entities). Successful implementation of innovation strategy requires a structural change of current competencies in the management of research and innovation in the SR and a principle manoeuvre in cultural change of innovative environment.

Some managers agreed on the fact that without *well created vision and clearly formulated aims* the innovation activity in SME is limited. The pre-condition for clearly formulated aims is the vision corresponding to the possibilities of an enterprise and responding to the situation on the market (Pitra, 2006).

The important pre-condition identified on the basis of responses is the *willingness of enterprises to innovate*. This is inevitable, even if it is connected with certain risk. At present many innovative SME are successful and perspective, and vice-versa many enterprises without innovative activity are getting into financial problems. The willingness to innovate should be accompanied by such an environment that will support the rise of innovation activities (Lesáková, 2013). Due to this fact innovation activities will be introduced faster and at the same time several barriers that could retard the rise of innovation activities will be limited.

5 Conclusion

Small and medium enterprises realize the importance of innovation in their entrepreneurial activity and the necessity to overcome all the barriers to develop innovation activity. They are forced to make innovations, because they are under permanent pressure of competitors at the market. From this point of view the ability to compete in innovations plays very important role as a factor of their competitiveness.

Present period is usually marked as that of innovation imperative. In today's entrepreneurial practice innovations must be natural part of any entrepreneurship. The innovations become central outcome and basis of creating new entrepreneurial opportunities. Respecting the today current principle "innovate, or you die" we can say that the improvement of competing position of an enterprise and sustaining its long-term and dynamic development are the main motion power of changes.

Acknowledgements

The paper was elaborated as a part of VEGA project 1/0494/15 "The research of factors influencing the successfulness of innovative small and medium-sized enterprises in the Slovak Republic".

References

- BERCHICCI, L. 2009. *Innovating for Sustainability*. London: MPG Books Ltd., Bodmin, Great Britain, 2009, pp. 232.
- BESSANT, J. and TIDD, J. 2009. *Innovation and entrepreneurship*. Chichester: John Wiley&Sons Ltd, West Sussex, Englland, 2009.
- INOVAČNÁ STRATÉGIA SLOVENSKEJ REPUBLIKY NA ROKY 2014 2020. Bratislava : Ministerstvo hospodárstva SR, 2013.
- LESÁKOVÁ, Ľ. 2013. Behavioural norms as an element supporting creativity and innovation in small and medium enterprises. In: *Contemporary challenges towards management III.* Katowice: Wydawnictwo Uniwersytetu Slaskiego, 2013, pp. 99 107.
- LESÁKOVÁ, D. et al. 2010. *Strategický marketingový manažment*. Bratislava: Vydavateľstvo SPRINT, 2010.
- LESÁKOVÁ, Ľ. 2010. Key attributes of innovation activities in small and medium enterprises sector in Slovakia. Banská Bystrica : Faculty of Economics, Matej Bel University, 2010, pp. 15-32.
- PITRA, Z. 2006. *Management inovačních aktivit*. Praha: Vydavatelství Professional Publishing, 2006.
- STATISTICAL YEARBOOK OF THE SLOVAK REPUBLIC. Bratislava : Statistical Office of the SR, 2014.

Forecast of Long-term Care Employment

IVAN LICHNER¹ - MAREK RADVANSKÝ² Institute of Economic Research, Slovak Academy of Sciences Slovak Republic

Abstract

This paper focuses on current and future development in the sector of long-term care (LTC) services provision in Slovakia in light of ongoing population ageing process. Simple methodology that connects results of LTC needs forecasts and employment in the sectors providing formal LTC was developed to forecast future expansion demand Analysis of age structure of LTC sectors (Residential care and Social work activities without accommodation) employees were used to approximate the future replacement demand. Analysis revealed that future expansion and replacement demand in the sector will cause need for significant changes in the current structure of education system.

Key words: Population Ageing, Long-term Care, Forecast, Shortage of Skills

JEL Classification: J23, J11

1 Introduction

Over the coming decade share of population in economic active age in Slovakia according to Eurostat projections³ will decrease from 71% in 2015 to approximately 57%. Share of children under 15 years will remain relatively more stable, but with expected decrease in total population their total numbers will drop significantly. On the other hand share of 65+ years population will more than double over the same period – from 14% in 2015 to 31% in 2050. In 2030 this share will reach 21%, thus already over coming decade significant growth in demand for long-term care (LTC) services would be expected. This will inevitably bring also new challenges that will need to be faced by the society and policymakers, but effective measures should change those challenges into opportunities. Higher number of elderly in population will create more job opportunities in Health and also LTC sectors. This will create increasing pressures on public expenditures on Health and Social care system.

¹ Ing. Ivan Lichner, PhD., Šancová 56, Bratislava, Slovak Republic, ivan.lichner@savba.sk

² Ing. Marek Radvanský, PhD., Šancová 56, Bratislava, Slovak Republic, marek.radvansky@savba.sk

³ EUROPOP 2013 – Main scenario



Figure 1 Demographic development

In this paper we will focus on development in the sectors of Residential care activities and Social work activities without accommodation. In those sectors majority of formal long-term care services is provided. Employment in sector of Residential care was growing relatively steadily since 2008 and until 2014 number of employees in the sector increased by more than 40%. On the other hand number of employees in the sector of Social work without accommodation drop by almost 20% over the first two years of the crisis period. Employment in this sector increased between years 2010 and 2014 by more than 50% partially as reaction to more positive economic development and also due to existing and ever growing demand for this type of services. Even with such sharp increase in employment in those sectors over past years, majority of the care was provided at home, according to Radvanský and Lichner (2014) it was more than 86% of total care.



Figure 2 Number of employed in Residential care activities and Social work activities without accommodation

Age structure of employees in sectors that are providing LTC services is somehow worrying as approximately 50% of employed in those sectors is more than 45 years old. In 2014 almost 20% of workers in those sectors were more than 55 years old. Thus almost 14 thousand employees in this sector will retire in less than 10 years and employers will need to look for new people on the labour market to replace them. Due to the fact that age structure of LTC sector workers has

negative skewness, educational system production of professionals with appropriate skills and knowledge will need to increase rapidly over coming decade.



Figure 3 Age structure of Residential care and Social care activities

From the gender point of view vast majority of workers in the sectors providing formal LTC comprises of women. Share of men was highest in 2008 on the level of almost 15% since then its share was in range between 9 - 11%. Also majority of the care provided at home (formally or informally) is provided by women, e.g.: Repková (2008) states that 82% of personal care allowances is paid to women.



Figure 4 Gender structure of LTC workers

Over the recent years positive development in numbers of employed in sectors of Residential care and Social work was encountered. This development was accompanied with growing numbers of people in need of care, majority of which is 65+. According to Radvanský and Lichner (2014) in 2012 150-237 thousand people⁴ over 65 were in need of care in Slovakia. Those authors in their paper also forecasted growth in the needs for LTC up to year 2030, expected growth would be approximately 70-72% between 2012 and 2030. This represents additional 100-165 thousand people over 65 in need of care.

 $^{^{\}rm 4}$ 149.7 thousand EHIS data, 237 thousand SILC data and 224,7 thousand UPSVaR data

2 Methodology

To forecast future expansion demand for employees in Residential care and Social work sectors on the basis of growing cohorts of people in need we built a simple statistical model. This model is using information about the past development of needs for LTC (care recipients) and number of employees (care givers) in the given sectors. Based on this we were able to calculate the number of formal care givers per 1000 people in need of LTC.



Figure 5 Number of formal care givers per 1000 people in need of LTC

Future development of LTC needs from Radvanský and Lichner (2014) served as basis for estimation of future need of additional workers in Residential care and Social work resulting from growing numbers of 65+ in need of LTC. To forecast expansion demand for workers providing LTC in sectors of Residential care and Social work we assumed that productivity in those sectors will increase by 2% per year as result of technological progress and more effective management. Thus number of care givers per 1000 people in need would decrease slightly over time, although it had increased over recent period. This past increase is attributable to two main factors, first is that not only persons in need of LTC are using the services of those two sectors and secondly efforts of care providers to increase the quality of the services.

3 Results

In this section we present the results obtained by the utilization of the methodology described in the previous part. We can see that in the following years either additional workers in sectors of Residential care and Social work providing care for people in need of LTC will be needed or higher progress in productivity in those sectors will occur. As third option remains more care provided on informal basis at home by relatives, but this phenomena has wide range of negative effects on economic growth and labour market.

Utilization of three different underlying data sources to estimate the future need for LTC in Radvanský and Lichner (2014) resulted in three possible paths of expansion demand in each of two sectors of interest. Results indicates that in Residential care sector 900 - 1800 new employees would need to be hired to meet the growing demand for the LTC services. In the sector of Social work similar development resulting from population ageing would be expected with estimated expansion demand at level of 1000 - 2000 new employees per year. Over the

coming decade 25 - 29 thousand people would find job in the sectors of Residential care (11.6-13.6 thousand) and Social work activities without accommodation (13.5-15.7 thousand).



Figure 6 Expansion demand forecast in Residential care and Social work, employees per year

4 Discussion

Growing demand for LTC services resulting from population ageing will inevitably need to be satisfied by the output of educational system or institutions providing training. As it was highlighted earlier age structure in the sectors of interest would highly probably result in the retirement of approximately 14,000 people over coming 10 years. This figure together with expected increase in overall employment in those sectors represent in total 39 - 43 thousand people with very special skills and knowledge that will be demanded at labour market over coming decade.



Figure 7 Education structure of LTC workers, 2014

In 2014 at secondary education level only two programmes providing education relevant for LTC were opened: Nursing care in health facilities and social care with 262 students and 64 graduates, and tutor-nursing work with 179 students and 43 graduates. Majority of employees in the sectors providing LTC services have secondary education thus more programmes providing students with skills applicable in the sector and/or more students in current programmes is extremely needed in light of expected future demographic development.

At tertiary level of education numbers were looking much better with more than 6,000 graduates from Social work programmes. Almost 3,200 in the Bachelor level programmes and around 60 in Doctoral level programmes. As currently in Slovakia Bachelor level programmes do not provide education fully applicable at labour market majority of graduates in those programmes continue to study at Master level thus approximately 2,800 people were entering labour market with Masters diploma at Social work in 2014. Over past 5 years more than 16 thousand people graduated at Master level from Social work programmes. In the sectors of Residential care and Social work activities without accommodation only around 8,500 employees had tertiary education in 2014. This indicates that only small share of graduates from Social work are employed in LTC providing sector and that those programmes are not providing education appropriate for work in sector of Social work activities or students studying those programmes are not willing to work in the LTC provision.

5 Conclusions

Expected development in the number of people in need of LTC is worrying and much more emphasis need to be given to this issue. In this paper we highlighted current situation in the sector and with relatively simple methodology were able to approximate future need of LTC workers. Sectors of Residential care and Social work activities without accommodation were identified as main providers of LTC services in Slovakia. In those sectors recently relatively significant inflow of workers has been recorded, more than 7 thousand in Residential care and more than 12 thousand in Social work over last 5 years.

Age structure of employed in the sectors providing LTC services is not well balanced and during the next decade more than 13 thousand people working in sector will retire and need to be replaced by new workers. Over the same period of time according to our estimates 25 - 29 thousand additional employees compared to current level of employment need to be hired in the sector. This would be accompanied by the large investments in building of new facilities providing LTC care as those available currently have limited capacity.

Analysis of education system output with special attention on the programmes providing education appropriate to LTC provision revealed future complications that would be encountered without significant modifications of current education system set-up. As major problem was identified lack of secondary education level programmes providing appropriate knowledge and skills. While majority of employees in LTC sectors have secondary education level this indicates that they had to undergo additional education/training activities and/or gained those skills over their professional careers what indicates ineffectiveness in the education system set-up.

Tertiary education level graduates from programmes that would be providing skills and knowledge for LTC services is at relatively satisfactory level, but majority of those were not

finding their careers in sectors providing LTC services. This indicates necessity to adjust the programmes curriculum to be more linked with labour market needs.

Acknowledgements

This work was supported by the Slovak Research and Development Agency under the contracts No. APVV-0135-10 and APVV-14-0324.

References

- Act No. 576/2004 Coll. on healthcare, health-related services and on the amendment and supplementing of certain laws.
- Act No. 599/2003 Coll. on assistance in material need and on the amendment and supplementing of certain laws.
- BODNÁROVÁ, B., FILADELFIOVÁ, J. and GERBERY, D. 2005. Výskum potrieb a poskytovania služieb pre rodiny zabezpečujúce starostlivosť o závislých členov. Bratislava: SŠPR.

EUROPEAN COMMISSION 2010. Joint Report on Health Systems. Occational papers 74.

- HEALTH STATISTICS YEARBOOK OF THE SLOVAK REPUBLIC (NHIC) 2000-2011. Available on: http://www.nczisk.sk/Publikacie/Edicia_roceniek/Pages/default.aspx.
- LIPSZYC, B., SAIL, E. and XAVIER, A. 2012. Long-term care need, use and expenditure in *EU*-27. European commission, Economic Papers 469, November 2012.
- OECD 2012. *Health at a Glance: Europe 2012, OECD Publishing.* Available on: http://ec.europa.eu/health/reports/docs/health_glance_2012_en.pdf>.
- OECD HEALTH DATA 2012. Available on: http://www.oecd.org/health/health-systems/oecdhealthdata2012.htm>.
- RADVANSKÝ, M. and LICHNER, I. 2014. Impact of ageing on long term care demand and supply in Slovakia : NEUJOBS country report. In: *NEUJOBS Working Paper*, 26.02.2014, No. D 12.2, pp. 1- 26.
- REPKOVÁ, K. 2008. *Situácia rodinných opatrovateľov/liek vo svelte sociálnych štatistík.* Priebežná výskumná správa VÚ č. 2403. Bratislava: IVPR.
- REPKOVÁ, K., BEDNÁRIK, R., BRICHTOVÁ, L. and SEDLÁKOVÁ, D. 2011. *Dlhodobá* starostlivosť o starších ľudí na Slovensku a v Európe. Správa, riadenie a financovanie. Bratislava: IVPR.
- REPKOVÁ, K. and PÁNIKOVÁ, L. 2010. Podpora neformálne opatrujúcich osôb odporúčania pre sociálno-politickú prax. VÚ č. 2406. Bratislava: IVPR.
- VAŇO, B., BLEHA, B. and ŠPROCHA, B. 2013. *Updated demographic forecast of Slovakia up to 2060.* Slovak research demographic centre. Available on: <www.vdc.sk>.

Increasing Capacity of Information Systems and Health Economics: Vision of the Modern Healthcare

VIKTÓRIA LUKÁČOVÁ¹ Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

The innovation in eHealth in Europe is the way forward to ensure better health and better safer care for EU citizens, patients, health and care professionals but also health organisations and public authories. This review summarises the way how to apply the big data and health economics in EU and to ensure more transparency and empowerment, more efficient and sustainable health and care system, better responsive public administrations, new business opportunities, and a more competitive European economy that can benefit from international trade in eHealth. In addition, we introduce the vision of the modern healthcare for close future in Slovakia and eHealth vision by means of modern informational and communication technologies in EU.

Key words: Big Data, Information System, Health economics, Vision

JEL Classification: I15, I18

1 Big Data - collective name for the increasing capacity of information systems

Since the beginning of time, most people have been isolated, without information about or access to the best health practices. In the last decade, this situation has changed completely: through the spread of networks. Nowadays, the healthcare is something that is potentially available to everyone; all across the world, we are beginning to see healthcare workers collecting health information. The use of Big Data in health is a new and exciting field, full of promising case examples, but as we known it is not as fully tested as most health and medical systems. (Pentland, Reid and Heibeck, 2013). A big-data revolution is under way in health care. Start with the vastly increased supply of information. Most of all pharmaceutical companies have been aggregating years of research and development data into medical databases, while payors and providers have digitized their patient records. In parallel, recent technical advances have made it easier to collect and analyze information from multiple sources—a major benefit in health care, since data for a single patient may come from various payors, hospitals, laboratories, and physician offices. In this new environment, health-care stakeholders have greater incentives to compile and Exchange information. While health-care costs may be paramount in big data's rise, clinical trends also play a role. (Kayyali, Knott and Kuiken, 2013)

2 Health economics

Economics is the science of scarcity. The application of health economics reflects a universal desire to obtain maximum value for money by ensuring not just the clinical effectiveness, but also the cost-effectiveness of healthcare provision. Achieving 'value for money' implies either a desire to achieve a predetermined objective at least cost or a desire to maximise the benefit to the

¹ Ing. Viktória Lukáčová, Němcovej 32, 040 01 Košice, Slovak Republic, viktoria.lukacova@tuke.sk

population of patients served from a limited amount of resources. This requires services to be evaluated for 'cost-effectiveness'. An associated concept is that of efficiency, which measures how well resources are used in order to achieve a desired outcome. The opportunity cost represents an invaluable mode of thought in health economics, as it makes clear the explicit trade-offs that underlie resource use in the health services. The true cost of using scarce healthcare resources in one manner is their unavailability to fund alternative beneficial services. All economic evaluations have a common structure which involves explicit measurement of inputs ('costs') and outcomes ('benefits'). It is evident, that health economics can help to inform and improve decisionmaking through the systematic and objective application of 'applied common sense'. Such 'applied common sense', which symmetrically balances costs and benefits, represents a valuable mode of thinking for decision-makers, irrespective of whether a formal economic evaluation is undertaken. (Haycox, 2009)

3 Background Point in the Health Sector

While healthcare is the biggest service industry on the globe, it has yet to realize the full potential of the e-business revolution in the form of e-health. This is due to many reasons, including the fact that the healthcare industry is faced with many complex challenges in trying to deliver cost-effective, high-value, accessible healthcare and has traditionally been slow to embrace new business techniques and technologies. Given that e-health to a great extent is a macro-level concern that has far reaching micro-level implications, this topic first develops a framework to assess a country's preparedness with respect to embracing e-health (i.e., the application of e-commerce to healthcare) and from this, an e-health preparedness grid to facilitate the assessment of any e-health initiative. Taken together, the integrative framework and preparedness grid provide useful and necessary tools to enable successful e-health initiatives to ensue by helping country and/or organization within a country to identify and thus address areas that require further attention in order for it to undertake a successful e-health initiative. (Wickramasinghe, Fadlalla, Geisler and Schaffer, 2005)

The need for a reformation of the health sector formed one of the priorities since the beginning of the 1990s. Reforms of the health sector in the Slovak Republic started with the "Velvet revolution" in 1989 and their objective was to transform the socialist health sector into a system oriented more on market. Healthcare system was defined by the generous scope of the provided services, where the demand as well as supply exceeded the available sources. These contradictions caused the constant growth of deficit, growing debts and prolonging waiting periods. Financial problems reached the top in 2002. In 2003, legislative changes in the health care system were introduced, targeting the reduction of the role and influence of the state, restructuring and changes in ownership of healthcare system within the current pluralistic health insurance system and pluralistic principle of the reallocation mechanism is economically uneven. Investments into the healthcare infrastructure were performed in the previous period. (Operational Programme Health 2007-2013; Ministry of Health of the Slovak Republic, 2015).

4 eHealth Programme in Slovak Republic

The position of the Slovak Republic in the EU is not satisfactory in terms of successful implementation of eHealth. The backwardness of the Slovak Republic in comparison with other developed countries concerning eHealth activities is estimated to be 7-10 years. Slovakia tries to

improve this state by National eHealth Implementation Programme (PieH). In 2008, the Ministry of Health of the SR began its preparation with the government's approval of the material eHealth Strategic Goals. The eHealth Implementation Programme is a strategy aimed at electronisation of health services in the Slovak Republic and it is implemented through several projects. Currently, there are being implemented the following projects: National Project **Electronic Health Services** (**EHS**, known as **eSO1** as well) financed from European Structural Funds by means of Operation Programme "Informatisation of Society" (OPIS, 2015).

Within eSO1 the following shall be performed:

- launch of National Health Portal with basic information;
- development and launch of the following applications (within pilot operation): Citizen Health eBook, ePrescription, eMedication, eAllocation;
- creating conditions for integration of healthcare providers information systems (IS HCP) with national eHealth solution, verifying integration with IS HCP during pilot operation.

The National Project **Electronic Health Services-Extension of Functionality and Services** financed from European Structural Funds by means of Operation Programme "Informatisation of Society" (OPIS). (eHealth_Programme electronic health care (eHealth Programme), 2015)

The fundamental objectives of the National Project are:

- data consolidation of medicine and knowledge database;
- provision of administration and data updating of medicine and knowledge database;
- expansion of mechanisms for the protection of personal data of a specific category with expanded functionality and range of electronic health services;
- new functionalities of electronic health services.

5 Vision of a modern healthcare and *e*Health vision

The vision of a modern healthcare is to promote health quality of citizens and achieve growth of their satisfaction with the health system funded from public sources. *e*Health vision is coherent with the vision of modern healthcare by provision of qualitative, modern, available, and cost effective health services. Furthemore, by means of modern informational and communication technologies to support quality improvement and effectivity of all provided health services, reduce errors and duplicities, administrative burden of healthcare and patients, increase citizen satisfaction with the health system funded from public sources. In addition, to enable creation of new forms of provided health services, and provide participating parties with relevant information for decision making and monitoring activities in requested time and quality. Implementation of the Government, contributes to fulfilling of citizen expectations in range of improving healthcare quality provision, in range of promoting effectivity of public health system, and increasing of healthcare service availability for citizens (Hamilton, 2013) *e*Health vision shall be fulfilled by means of achieving four strategic targets, as follows:

- 1. Creation of legal, normative and architectonic *e*Health frame
- 2. Creation of safe infrastructure for realization of vision and mission of *e*Health
- 3. Informatization of processes and services in system of healthcare from public sources
- 4. Support of new processes and forms of healthcare and health services

This promise still remains largely unfulfilled, as expressed by Estonian President Toomas Hendrik Ilves, Chair of the independent high-level eHealth Task Force: "We know that in healthcare we lag at least 10 years behind virtually every other area in the implementation of IT solutions. We know from a wide range of other services that information technology applications can radically revolutionise and improve the way we do things" (2012)

The first eHealth Action Plan3 was adopted in 2004. Since then, the European Commission has been developing targeted policy initiatives aimed at fostering widespread adoption of eHealth throughout the EU4. Member States have dynamically responded by demonstrating a high level of commitment to the eHealth policy agenda, notably through their participation in major large scale pilot projects such as epSOS5. The adoption in 2011 of the Directive on the Application of Patients' Rights in Cross Border Healthcare6 and its Article 14 establishing the eHealth Network, marked a further step towards formal cooperation on eHealth, with the aim to maximise social and economic benefits through interoperability and the implementation of eHealth systems. Notwithstanding this substantial progress, barriers continue to exist that need to be addressed in order to reap all the benefits from a fully mature and interoperable eHealth system in Europe. The new eHealth Action Plan aims at addressing and removing these barriers. It clarifies the policy domain and outlines the vision for eHealth in Europe, in line with the objectives of the Europe 2020 Strategy and the Digital Agenda for Europe8. It presents and consolidates actions to deliver the opportunities that eHealth can offer, describes the EU's role and encourages Member States and stakeholders to work together. Horizon 2020 and the upcoming Health Programme 2014-2020 will contribute to the aims of the EIP AHA (European Innovation Partnership on Active and Healthy Ageing). During the period 2014-2020, research and innovation will be supported under "Health, demographic change and wellbeing" of Horizon 2020, in the areas of:

- an ICT and computational science and engineering framework for digital, personalised, and predictive medicine, including advanced modelling and simulation;
- innovative instruments, tools and methods for unlocking the value of data and for advanced analytics, diagnostics and decision making;
- new digital media, web and mobile technologies and applications, as well as digital instruments that integrate healthcare and social care systems and support health promotion
- and prevention;
- eHealth systems and services with strong user involvement, focusing on interoperability and the integration of emerging patient-centric technologies for cost-effective healthcare. From 2012, the Commission encourages Member States involvement in the EIP AHA to help them develop and share their national (including regional) eHealth strategies, taking into account international recommendations, and deploying promising solutions for active and healthy ageing at a larger scale (eHealth Action Plan 2012-2020 Innovative healthcare for the 21st century).

Table 1 High level SWOT analysis for eHealth

Strengths of eHealth

- Support of Government SR
- Support of MoH SR
- Good availability and quality of internet.
- Interest in IT in healthcare.

Weaknesses of eHealth

- Skepticism of health public towards
- eHealth based on current results.
- Lack of successful pilot applications
- of eHealth.

- High number of infrastructure, HW and SW suppliers.
- Appropriate price level of affordable HW and SW.
- Completed first phase of building hospital IS.
- Informatization of all units of GP collection of health data from all citizens
- Introduction of modern hospital IS.
- Existence of health registries.

Opportunities of eHealth

- Cost reduction by increased effectivity, eliminated duplicities, errors and their impacts.

Cost reduction by data insertion to system where data (digital) image is created.Increased interest of citizens about their

health.

- Increased information rate of all actors of healthcare provision through NHP.

- Effective pressure of public health on prevention of diseases.

- Skip generation of older health systems and implement latest technologies.

- Increased attractivity of healthcare provision

in SR also for other EU citizens resulting in gaining extra sources.

- Active inclusion to EU initiatives in eHealth.

- Possibility to use EU funds for eHealth.

- Mobility of healthcare in SR and EU.

- Introduction of electronic identificators for patients and health professionals.

- Possibility to offer new health services.

- Possibility to create an updated picture of health status in real time.

- Uploading patient data in real time on the site

of first contact enables monitoring of all

actors participating in proposed data model.

- Minimum up-to-date investment to eHealth. - Failing of up-to-date plans and tasks of eHealth. - Insufficient legal support. - Low rate of Internet connection in outpatient units. - Missing secured infrastructure. - Missing eHealth standards (for EHR, EDS, ..) - Limited interoperability of systems. Threats for eHealth - Lack of adequate financial coverage for eHealth infrastructure and projects. - Wrong proposed infrastructure. - Ineffective finance usage in eHealth. - Underestimation of legal and standardization process. - Underestimation of data collection importance in the new infrastructure of GP - Incompleteness of eHealth architecture and data model in infrastructure of GP. - Insufficient level of personal data protection. - Lack of sources for IS of healthcare providers. - Limited interoperability of healthcare IS in SR as a result of missing standards. - Limited interoperability of healthcare IS with EU as a result of missing EU standards. - Reduced effectivity of certain activities as a result of their inconsistent informatization. - Dehumanization of healthcare. - Unsatisfied excessive expectations of public from eHealth.

- Possibility to improve prevention, diagnostics	
and treatment, more successful care at life	
threatening events and epidemies.	
- Overcome biases of current understanding of	
saving sources to maximize outcomes for	

6 Conclusion

Data in health would bring enormous economic returns by lightening the burden on healthcare system and increasing the productivity of effected individuals. The real world evidence of the data can be achieved in a botton-up way by involving prominent economists and researchers from clinical science together with researchers from industry and patients. Europe has great resources, and it possess first class biotechnology clusters which could form partnerships with pharmaceutical industry to exploit novel ideas. Such investment, the state support of individual countries, fruitful networking activity of research groups around Europe, and close cooperation with physitions, patients and citizers can strongly improve the eHealth system.

References

- EHEALTH_PROGRAMME ELECTRONIC HEALTH CARE. eHealth Programme. Available at: http://www.ezdravotnictvo.sk/en/eHealth_Programme/Pages/default.aspx.
- EHEALTH ACTION PLAN 2012-2020. Innovative healthcare for the 21st century.
- HAMILTON, C. 2013. Strategic targets of eHealth key tool of public governance informatization in frame of healthcare in Slovakia.
- HAYCOX, A. and WALKER, A. 2009. What is health economics? and What is costminimisation analysis?
- KAYYALI, B., KNOTT, D. and KUIKEN, S. 2013. *The big-data revolution in US health care: accelerating value and innovation*. McKinsey Global Institute.
- OPERATIONAL PROGRAMME HEALTH 2007-2013. Ministry of Health of the Slovak Republic.
- PENTLAND, A., REID, T. G. and HEIBECK, T. 2013. *Revolutionizing medicine and public health*. Big data and health.
- WICKRAMASINGHE, N. S., FADLALLA, A. M., GEISLER, E. and SCHAFFER, J. L. 2005. *A framework for assessing e-health preparedness*. Int. J. Electronic Healthcare.

Macroeconomic Imbalance of Employment in the Context of latest Crises in SR

SLAVOMÍRA MARTINKOVÁ¹ – EMÍLIA JAKUBÍKOVÁ² Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

Submitted article is dedicated to the development of macroeconomic imbalance - unemployment in the context of the latest crises in the Slovak Republic. Selected indicator is observed in Slovakia from 2007, the official beginning of the crisis, until 2015. In order to solve the negative movement of selected indicator the Government of the Slovak Republic adopted anti-crisis measures in the referenced period. We are watching the trend of indicator at the labor market and also the effect of selected fiscal measures within the selected period. This paper focuses on the evaluation of analysis that show the efficiency, directness and cost of selected anti-crisis measures adopted to solve the unemployment.

Key words: Employment, Unemployment, Anti-crisis Measures, Active Labor Market Policies

JEL Classification: E240

1 Introduction

The impact of several trends of technology markets and globalization, was firstly assessed positively, but in the recent years we are facing adverse consequences of the crisis which has affected the development of the economic cycle. More details of the latest period are described for example in the work of Workie et al. (2009) and Morvay (2014), who capture the negative effects of the crisis that hit the macro-economic as well as micro-economic level of the most developed countries of the world, without exemption of the Slovak Republic (hereinafter SR).

Solution of the macroeconomic balance disorders is addressing several questions regarding the unemployment. Regression of the indicator led to more quantitative as well as structural changes. The increase of unemployment is a serious problem for the Slovak Republic.

The present work deals with the analysis of unemployment and its solution by selected anti-crisis measures adopted by the Government in regards to employment. It focuses on the implementation of measures through active labor market policies (hereinafter ALMPs). This paper focuses on the evaluation of the analyses that show the efficiency, directness and cost of selected anti-crisis measures adopted by the Government for the solution of the negative tendency of macroeconomic imbalance - unemployment. We process the data from Statistical Office of the SR and Central Office of Labour, Social Affairs and Family of the SR (hereinafter COLSAaF), who monitor developments in the labor market from 2007, which is the official beginning of the crisis in the world, until February 2015.

¹ doc. Ing. Emília Jakubíková, CSc., Němcovej 32, 040 01 Košice, Slovak Republic, emilia.jakubikova@tuke.sk

²Ing. Slavomíra Martinková, Němcovej 32, 040 01 Košice, Slovak Republic, slavomira.martinkova@tuke.sk

2 Impact of the latest Crises on Macroeconomic Indicator - Unemployment

The fourth global recession represents by IMF (2009) the deepest and the widest range of recessions up to now. It began as a combination of crises - the mortgage, economic, debt and financial, which was reflected as a systemic crisis. Samuelson – Nordhaus (2000) highlight the general consequences of the crisis especially in the area of employment. Studies of the Organisation for Economic Co-operation and Development OECD drove the attention to the channels through which the crisis expanded elsewhere. One of the three channels is linked right to the decline participation of the workforce and an increase in structural unemployment. (Workie et al., 2009) Macroeconomic balance disorders are shown primarily as inflation and unemployment.

International Labor Office ILO (2015) defines unemployment as an incomplete use of labor in economic activity. It represents an imbalance between lower labor demand and higher labor supply. Mankiw (2000) writes that economists have devoted a lot of effort to document the length of unemployment, because its duration is very important for assessing its severity. The natural rate of unemployment represents such normal rate, around which in the measuring range there is a number of such people who do not have jobs. In practice, we encounter with the natural rate 3 - 12%. Unemployment is in a fiscal policy reflected in the demands on the state budget for unemployment benefits. In the area of employment state policy aims to create new jobs and employment opportunities. (Vincúr et al., 2007)

The need to deal with effects of the crisis led Slovakia to monitor the economy in order to achieve macroeconomic balance. Expansion of the crisis to Slovak Republic was the reason why the Government of Slovakia adopted 62 anti-crisis measures, the aim of which was on one hand to stimulate the demand and to maintain employment, and on the other hand a long-term sustainability of public finances. Appropriate criteria for selecting measures and instruments to achieve them describes the Ministry of Finance of Slovak Republic (2009) in terms of focusing on the measures already taken; minimal impact on public finances; respect to the preferences of population; long-term sustainability and the combination of the structural policies. The measures of finance politic are analyzed through ALMPs. In the question of employment it is its role to effectively transfer funds to selected state contributions which form the labor market. The first package was focused on short-term goals that are achievable within one year, it contained 27 measures and was approved by the Government Resolution No. 808/2008. (MoE SR) The second anti-crisis package included 11 measures targeted to mitigate the effects of the financial crisis on employment. It was approved by the Government Resolution No. 969/2008. At the same time the deterioration of the employment has led to the fact that with the resolution No. 100/2009 was approved a separate proposal of measures to mitigate the effects of the global financial crisis and economic crisis on employment, which was focused on the area of passive and active labor market policies. (MoE) The third package of 24 measures was adopted in February 2009. It was completely implemented to mitigate the impact of the economic crisis. Its role was to support domestic demand, to stimulate investment and promote business environment. The package was approved by the Resolution No. 125/2009. (MoE)

2.1 Applied Methods and Data

The purpose of this paper is to evaluate the development of the indicator of unemployment in Slovakia. We are analyzing the quarterly indicator of unemployment, since August 2007 until

February 2015. Its development is directed to the predetermined quantitative (numbers of the unemployed, the unemployment rate) and qualitative criteria (development candidates based on age, preference of employers).

2.2 Analysis of Macroeconomic Imbalances – Unemployment

The Slovak economy reached in 2007 the highest real GDP growth (10.5%). The level of unemployment was 8.89% and also in the next period it was steadily declining. The graph below (Figure 1) shows the movement of the unemployment rate in % according to the Labour Force Sample Survey (LFSS hereinafter), the development of the registered unemployment rate, and outflow of jobseekers from labor offices.



Figure 1 Unemployment rate by LFSS and the registered unemployment rate in % in the period 2007 – 2015 Source: Own data processing

The increase of the unemployment rate persisted with variations until the middle of 2013. According to LFSS, the highest growth rate of the indicator occurred in the third quarter of 2009 (23.40%). We observe the first positive development of the growth rate of unemployment in the first quarter of 2010 (a decline of 4.30%), then also in the second quarter of 2011 (a decrease of 2.38%), in the second quarter of 2012 (dropped by 3.08%) and second quarter 2013 (a decline of 2.93%).

The difference between the registered unemployment rate and the rate calculated from the total number of jobseekers is affected by the outflow of jobseekers. Statistics of the offices of Labour distinguish between two basic causes of outflow of jobseekers – he was either placed in the labor market or was eliminated for non-cooperation. The biggest difference between the selected rates is observed in the first quarter of 2010. Similarly, in that period we see the highest number of people located in the labor market, up to 68% from the outflow of jobseekers. The difference between outflow and inflow of jobseekers affects the unemployment rate in case that the outflow of jobseekers was higher than inflow of jobseekers. By highlighted framing of the column we record the quarters in which it was that way.

From the quantitative considerations, the analysis of indicator is drawn based on the number of jobseekers divided into groups according to length of registration at labour offices to all registered jobseekers ratio (Table 1). During the reporting period, the number of jobseekers increased and their structure by the length of registration at labour offices changed too. In the beginning of the crisis we see the growth in category of jobseekers who had been registered with the labour office up to three months. The tendency of stagnation of labour market caused a

gradual increase in other categories from 6 to 12, 24 and even more months. Problematic group are people registered with the labour offices for more than one year who currently represent almost half of all applicants.

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total jobseekers	249,011	232,428	351,991	382,181	391,457	408,129	413,731	383,454	376,270
From this: To 3 months	21.4%	24.5%	26.1%	19.4%	19.7%	16.9%	16.1%	15.9%	16.4%
4 – 12 months	26.5%	27.6%	39.0%	34.6%	32.3%	33.3%	32.1%	29.7%	29.5%
13 – 24 months	13.3%	12.3%	11.9%	21.7%	17.8%	18.1%	18.2%	17.5%	16.0%
25 – 36 months	7.9%	6.9%	4.9%	7.0%	11.6%	9.5%	9.9%	10.5%	10.5%
37 – 48 months	6.7%	5.0%	3.1%	3.4%	4.8%	7.6%	6.4%	6.9%	7.1%
Above 48 months	24.2%	23.7%	15.0%	14.0%	13.8%	14.5%	17.3%	19.6%	20.6%

Table 1 The average number of jobseekers in the period 2007 – 2015

Source: Own data processing

Based on age we classify five age categories shown in the chart below (Figure 2). The most significant indicator tracks the growth rate in the second quarter of 2009 in all selected categories. In the last quarter of 2009, an annual growth rate of the unemployment in the category up to 20 years was 54.8%, in the category of 20 - 24 years it was 87.1%, in the category of 25 - 39 years it was 46.7%, in the category of 40 - 54 years it was 64.3% and above 55 years it was 76.8%.



Figure 2 Annual rate of the unemployment in the selected categories in % in the period 2007 – 2015 Source: Own data processing

The high unemployment rate and at the same time low number of applicants in these categories is probably due to the low number of employed people who are under the age of 20. This may indicate two reasons – either a high percentage of students, which has a very positive impact on the future of economy of the country, or it leads to the conclusion that a young unskilled people cannot find the enforcement on the labour market.

Under the new trends in the labour market caused by the latest crises we see the structural changes in the form of changes in forms of employment. The graph (Figure 3) shows the growth rate of the workers, employees and entrepreneurs, expressed in %. A significant change occurred

in the period before the crisis, when the number of entrepreneurs doubled, measured on the entire amount of working people.





In the first half of 2009, the crisis already resulted in several companies that responded by the decline in employment. Pre-crisis increase in self-employed people might occur because the country was underpowered in self-employment, or because of the adopted measures of the Government taken for the reduction of social contributions burden, by reducing labor costs, or by the circumvention of the labor law. In the recent period we observe fluctuating development in number of entrepreneurs as well as employees.

2.3 Presentation of Results

In the selected period the development in the labour market was influenced mainly by economically active people of age 25 - 34 years. Only slightly it was influenced by young people under 24 year- old, who prefer to improve their education and older people of age 55 and over, who were affected by the social security system with the possibility of early retirement. The precrisis decreasing status of indicator of unemployment in Slovakia has changed its direction around the second half of 2008, since when it was growing with variations by middle of 2013. The highest growth rate of unemployment indicator is seen in the third quarter of 2009. At that time the crisis resulted in an increasing number of unemployed due to the liquidation of enterprises. In the first quarter 2010, the SR approved the most anti-crisis measures to solve the unemployment and country also tightened the requirements for jobseeking. In this period we observe the highest number of people located in the labor market. The period of the last two years before that, in which we see a large inflow of jobseekers as well as outflow of jobseekers is indicating a process of creative destruction. The main reason for this phenomenon can be in the improvement of labor market conditions in both the EU – 28 and the SR.

From the quantitative point of view, the analysis of indicator is drawn based on the length of registration of jobseeker with Labour offices, where we see the increasing number of jobseekers and, at the same time, the structure of jobseekers registered with labour offices has changed, too. In particular, the problematic group is represented by persons registered with labor offices for more than one year who currently represent nearly half of the candidates. There might be many reasons for that, such as failing in the process of creating new job opportunities and insufficient and unattractive wages for their work. In terms of age of jobseekers, the indicator was growing in all categories, while one year after expansion of the crisis the pace of growth of unemployment rate was the most significant in the category of people who are 20 - 24 year-olds and above 55.

2.4. Selected Adopted Fiscal Measures to Solve Unemployment in Slovakia

For the solution of negative situation within the selected period we observe the course of the fiscal measures adopted by the Government that were implemented in Act No. 5/2004 on employment services and amending and supplementing certain acts as amended. The Government of SR implemented several anti-crises measures in the area of employment. They focused on creating and sustaining social enterprises, maintaining employment, supporting motivation to find and start a new job, supporting the processors and vendors of the local agricultural products, and creating new jobs.

ALMP is classifying the measures as following:

- 1. measures for creating new jobs, §§ 49, 50c, 50e, 50g, 50h;
- 2. measures for preserving an existing jobs, §§ 50d, 53;
- 3. measures for increasing employability of job-seekers. §§ 50f, 50i. (COLSAaF, 2010)

The overview of government measures to mitigate the effects of the economic crisis is outlined below.

One of the most expensive measures is measure number 63 defined as: "To promote the creation and maintenance of social enterprises, with an emphasis on creating municipal social enterprises within the Employment Services Act and with the announcement of the calls for demand-driven projects". The aim of this measures is to create more favourable conditions for the emergence of social enterprise by unfasten conditions for their creation. This benefit was applied in the form as described in §50c already in 2007, whereby government planned effectiveness of this measure from January 2009. Employees of social enterprises were able to ask for the allowance before they started the new job. During the selected periods there were also some changes in the conditions for providing that allowance. The contribution was requested mainly by disadvantaged jobseekers over the age of 50.

For the most effective anti-crisis measure in employment is considered a measure number 64 with the definition: "To support the maintenance of employment by an employer who solves the consequences of the global financial crisis". The aim of measures was to assist the employer in case of serious operational reasons, with wage compensation of at least 60% in order to avoid or limit the dismissal of its staff and it was to a maximum of 60 days. To request this allowance was possible for a disadvantaged and any other applicants registered at the labour office. This measure is integrated in a contribution for a job creation §50e. During the financial crisis particularly disadvantaged jobseekers, and especially long-term unemployed jobseekers and young people up to 25 year-olds were supported by this contribution. The measure contributed to the impulse to integrate even disadvantaged jobseekers at the labour market as well as to increase job creation especially in districts with higher unemployment rates. On the negative side is the fact that the contribution was one of the more expensive stimulus of the labour market.

Further, 65th anti-crisis measure was approved by the government in order "to promote the motivation to find and accept a job". It is a contribution amounting to 22% of the average wage in the Slovak Republic during the first year of employment and 11% in the second year to those candidates who fulfil the conditions for its receipt. During the period, particularly long-term job-seekers registered with labour office were interested in this measure. The measure is associated with a contribution to the employee's wage §50f.

Under the influence of the crisis in 2009, labour demand stabilized also because of the adoption of measures to preserve existing jobs. Contribution to support a maintaining of employment and allowance for commuting to work, in the form of 66th measure was approved by the government in order to *"Intensify inter-regional labour mobility"*. The aim was to remove barriers related to commuting to work away from their permanent residence, with a preferences to give a higher contributions when commuting to work only shorter distance. It is a contribution to support the retention of employment §50d, an allowance for commuting to work §53 and a contribution to support regional and local employment §50i.

The purpose of the measure number 67 was "to encourage processors and vendors of domestic agricultural products". The aim was to provide candidates who meet the conditions for granting this allowance an advance payment for mandatory health insurance for a period of two years. After the expiry of 18 months after the start of self-employment, a social insurance is also paid for them for six months. It is a measure in the form of a contribution to self-employment in the area of processing and selling agricultural products from the jobseekers side §49. There was no interest about this contribution in the selected period.

Contribution to support self-employment §50g was adopted as the 68th measure with the definition "to create more favourable conditions for self-employment" and it represents the benefits in terms of administrative simplification, in order to promote self-employment.

Allocation of the most effective adopted anti-crisis measures, their resources, their actual expenditure and their fulfilment is indicated in Table 2.

Tuble 2 The most encentre unit ensis measures for employment in Six							
Measures	\$§	Resources	Real expenditure	% of impletion			
To promote the creation and maintenance of social enterprises	§ 50c	229 million EUR	4.8 million EUR	2.10%			
To support the maintenance of employment	§ 50d	28 million EUR	4.9 million EUR	17.3%			
Contribution to the employee salary	§ 50f	25 million EUR	0.4 million EUR	1.70%			
Allowance for commuting to work	§ 53	11 million EUR	12.5 million EUR	113.4%			
Contribution to job creation	§ 50e	12 million EUR	29.4 million EUR	244.4%			
Total		305 million EUR	52 million EUR	17.05%			

 Table 2 The most effective anti-crisis measures for employment in SR

Source: Workie et al., 2012

Despite the low number of measures the area of employment was from the financial point of view the most costly one. Ministry of Economy predicted the use of 300 million EUR to create about 120,000 new jobs provided through ALMPs. The real expenses were accounted for 52 million EUR, which represents a fulfilment at the level of 17.05%. In the period from 2009 to 2010 more than 456,000 people applied for the help based on the anti-crisis measures of the labour market. According to the presented evaluation of the analytical report from 2011, the number of actually supported persons was in accordance with the planned number, but the amount of real expenditure actually represented only one-sixth of predicted planned expenditure, and it is because available measures had varied interest. Some were not even implemented, some measures had only a formal character, and some would have been implemented even without the crisis. (Workie et al., 2012)

In the analytical report of COLSAaF we meet an opinion that the effectiveness of the instruments could be improved by adopting legislative regulations concerning an equal amount of the contribution. Evaluation of the measures implemented by the government was performed in 2010. We meet with the statement that whereby on the most measures taken by the Slovak Government were not allocated financial resources, their performance did not have an impact on the public administration budget. It should be noted that the measures were mostly of a formal nature and effectiveness of their performance to mitigate the impact of the crisis is questionable. The development of measures was mainly influenced by the prospect of economic actors and emphasis was placed on economic instruments and measures in the field of employment, lower support was given in the public sector. Because the government engaged various relevant institutions in different measures, it slightly divided resulting negative consequences and potential failures to the various groups.

3 Conclusion

We observe an all-over increase in unemployment in general, while this trend was significantly enhanced in the latest global financial crisis. After 2008 we see the increasing unemployment in quantitative and qualitative terms in the SR. The number of registered jobseekers was continuously increasing and the increase is particularly marked in the categories of jobseekers registered up to three months, long-term unemployed people, in the category of persons of age 20 – 24 years and above 50 years. During the period a number of structural changes in employment and in preferences of employment were conducted. The question that remains open is to tackle the long-term unemployment.

Despite the adoption of anti-crisis package of measures in 2008 and 2009, with effect to promote the employment of disadvantaged jobseekers, the macroeconomic indicator continues to fall. On the most measures taken by the Slovak Government were not allocated financial resources so their performance did not have an impact on the public administration budget. Many measures are characterized mostly formally and effectiveness of their implementation to mitigate the negative effects of the crisis on the Slovak economy is questionable. To influence the balance of employment it is possible to conclude that the government should carry out analysis of the labour market and to that adapt an approval of the measures on the granting of allowances.

References

- Act No. 5/2004 on employment services and amending and supplementing certain acts as amended.
- CLASSENS, S. and KOSE, M. A. 2009. What Is a Recession? In: *IMF and NBER*. Washington D.C.: Finance & Development A quarterly magazine of the IMF. March 2009. Vol. 46, No 1.
- ILO. Labour standards. 2015. International Labour Organization. 1995 2015 [online].
- MANKIW, N. G. 2000. Zásady ekonómie. Praha : GRADA Publishing, 2000. Pp. 796.
- MoE SR 2011. Analytická správa o dopadoch finančnej a hospodárskej krízy Bratislava: MoE 2011, pp. 10.
- MoE SR 2010. Stratégia vývoja domáceho dopytu ako hlavného stimulačného predpokladu pre budúce podnikateľské prostredie a nástroja na riešenie dosahov globálnej svetovej recesie. pp. 48 s.

- MORVAY, K. et al. 2014. *Hospodársky vývoj Slovenska v roku 2012 a výhľad do roku 2014*. 1.vyd. Bratislava : Repro-print 2013, pp. 145.
- SAMUELSON, P. and NORDHAUS, W. 2000. Ekonómia. Bratislava : ELITA, 2000, pp. 820.
- VINCÚR, P. et al. 2007. Teória a prax hospodárskej politiky. Bratislava : Sprint. 2007, pp. 432.
- WORKIE, M. T. et al. 2009. Vývoj a perspektívy svetovej ekonomiky. Globálna finančná kríza: príčiny náklady východiská. Bratislava : Repro-Print, 2009, pp. 280.
- WORKIE, M.T. et al. 2012. Determinanty ekonomického rastu a konkurencieschopnosti: výzvy a príležitosti. Bratislava : Repro-Print, 2012, pp. 256.
- COLSAaF. 2010. *Realizácia nástrojov aktívnej politiky trhu práce v roku 2010*. Bratislava : Central Office of Labour, Social Affairs and Family of the SR April 2011. 102 p.
- COLSAaF. 2015. Quarterly statistics. Bratislava: Central Office of Labour, Social Affairs and Family of the SR. 2015.

Fee Policy Analysis of Private Pension Schemes of Selected Countries

NIKOLA MEŠAROVÁ¹ – JÁN ŠEBO² – MATEJ BALCO³ Matej Bel University in Banská Bystrica, Faculty of Economics Slovak Republic

Abstract

This paper highlights the types of fees and costs of private pension scheme and formation of fee policy in general by using a value chain approach. It also presents the consequences of fee policy on the total savings in private pension scheme. The main objective of the paper is expression of fee policy burden related to a variety of financial products provided in different pension schemes in Slovakia and abroad (Romania, Latvia, Estonia, Poland). The ambition of paper is to solve the question of fees significance as the main determinant that influence on the real added value of savings schemes provided by the private sector. In this work we identify the parameters defining the typical saver and charges paid during the period of saving.

Key words: DC Pension Schemes, Fee Policy, Bootstrap Methods, Charge Ratio

JEL Classification: D14, D81, E21, G18, G23

1 Introduction

Fully funded pension schemes become a new paradigm for pension systems reformers across the world. Sup-ported by many international organizations, the design of new DC schemes is based on a mantra of shifting risks onto savers (policyholders) under the assumption that longer investment (saving) horizon will smooth the risks (mostly market risk) over time. Accepting these risks, the saver will profit by higher accumulated wealth at time of retirement. Most of these design premises have significant shortfalls when facing the reality.

Pension reforms in many Central and Eastern European countries supported World bank approach and introduced DC fully funded pension pillars. Many of these countries have reverted their reforms after financial crisis in 2008 led especially by issues in PAYG pillars. Financial pressures on PAYG pillars increased political risk in DC pillars and many savers were advised to move back to PAYG pillar or to use bond pension funds as a "safe" pension vehicle to secure retirement income.

Several CEE countries such as Slovakia, Poland, Estonia, Lithuania, Romania, Croatia or Hungary have, however, actually cut contribution rates in DC schemes or in some way disadvantaged the DC plans as a response to the crisis of 2008. And even those DC systems, which operate uninterrupted, invest rather conservatively; holding majority of their assets in instruments with

¹ Ing. Nikola Mešarová, Tajovskeho 10, 97590 Banská Bystrica, Slovak Republic, nikola.mesarova@umb.sk

² doc. JUDr. Ing., PhD., Ján Šebo, Tajovskeho 10, 97590 Banská Bystrica, Slovak Republic, jan.sebo@umb.sk

³ Ing. Matej Balco, Tajovskeho 10, 97590 Banská Bystrica, Slovak Republic, matej.balco@umb.sk

relatively low return potential such as bonds or short-term notes (Salou et al., 2012). Analyzing the portfolio structure of bond pension funds across CEE countries leads to a finding that state and government bonds are the dominant investments of bond pension funds.

Other part that is a subject of relatively frequent intervention is a fee policy implied onto pension funds providers. However the impact of implied fee policy on savers remains unexplained even if this topic is extensively elaborated in theory and research. Fee structures are complex and, generally speaking, poorly understood by consumers. Accumulated capital at the end of saving period is subject to exponential impact of fees. However, the real impact of different types of fees varies significantly.

This paper discusses fee structure and level of charges applied by pension companies operating on private pension markets in five countries – Slovakia, Romania, Poland, Estonia, and Latvia. These countries have more than 10 years of experience with introduction and existence of DC pension schemes. Theory as well as some empirical studies suggests that 1% annual charges are likely to reduce final pension pot on individual account balances by around 20% on average over 40 year saving horizon (Whitehouse, 2000; Bikker and De Dreu, 2009). CEE countries, which implemented private DC saving schemes, have typically relied on price controls to keep charges in check. All the countries in this study rely on price caps in some form or the other. Our paper attempts to fill the gap in our knowledge and summarizes what is known on charges and costs in CEE countries after the second pillar introduction. We apply standard reduction in assets approach suggested by several asset management and pension finance seminal studies.

The paper is organized as follows. The next Section 2 discusses the knowledge drawn from existing literature on fees and charges applied in private DC pension schemes. Section 3 presents fee structure in analyzed countries and applied methodology for examining the effect of fees from the point of individual retirement account. Section 4 discusses the emerging understanding regarding impact of fees on a final level of pension pot and presents preliminary conclusions and emerging lessons.

2 Literature review

The basic assumption for pension reforms in CEE countries was, except to lower the pressure on public PAYG schemes, that it would prove more attractive to the contributors, who would be more willing to contribute to their own funds than to the public system (Dobronogov and Murthi, 2005). The costs of administering individual pension accounts may be high, especially in systems which are fairly decentralized and operate on the lines of the retail financial services industry (James, Smalhout, and Vittas, 2001; Murthi, Orszag, and Orszag, 2001). When passed on as fees, high costs may substantially lower the return on pension saving, thus reducing the attractiveness of the second pillar and, in the extreme, exposing individuals to poverty in old age. In addition, most second-pillars provide some form of public guarantee (e.g. through a minimum pension or a minimum rate of return provision), so costs and fees affect the size of governments' contingent liabilities.

There are a number of publications that examine fees in individual account DC pension schemes around the world (e.g. Whitehouse, 2000; Dobronogov and Murthi, 2005; James, Smalhout and Vittas, 2001). Two important conclusions can be drawn from the results of these studies. One is that significant economies of scale may be attained in the administration of pension funds, and the

other is that there are large differences in fees across countries and pension plans. Given the significant fee differences across pension funds and the huge cumulative impact of additional charges, reduction of accumulated capital due to the fee policy implied by pension providers should receive more attention. The paper does not present details of the reforms or the functioning of the DC pension schemes in particular countries; rather it focuses on drawing conclusions regarding charges and costs from cross-country analysis. We follow the literature and use the term "charges" or "fees" to refer to costs paid by savers for the administration and management of their second-pillar individual retirement saving accounts.

2.1 Fee structure of private DC pension schemes

Generally speaking, fees applied in the asset industry can be either fixed or variable. Fixed fee is characterized by the fact that the price does not depend neither on the level of contribution nor on the fund. One of the advantages of fixed fee is that the price is easy for savers to understand and compare, and, as the amount collected by pension companies increases with the number of contributors. However, this design is considered to be regressive and, consequently, elicits a negative effect on workers with lower incomes, as it is impossible to generate cross subsidies between subscribers with higher income and those with lower income (Tapia and Yermo, 2008). Variable fee may take the form of a percentage of the flow, of either payments or contributions, or of the stock, as a percentage of the amount managed or as a percentage of the cumulative assets turnover. Variable fee on the flow (usually shown as a % of contribution or accumulated assets) is the most common and is found in most of private DC schemes analyzed in our paper.

Variable fees charged to the contribution keep a direct relationship with collection fees and guarantee an even flow of revenue for pension companies. However, the main criticisms of this type of fee are that it generates a lack of incentives for better investments and punishes heavily those savers with high levels of contributions. Additionally, pension companies do not collect revenues from people who do not contribute, but pension companies would still have to bear the cost of administering these people's funds. Variable fees tied to the value of savings accumulated on individual retirement account follow the same advantages for pension companies, while at the same time equally impacting savers based on their value of saving account.

A performance fee is commonly calculated as a percentage of investment returns, either over realized or unrealized excess returns (or both). The rationale for performance fees is that they provide an incentive for professional fund managers to generate positive excess returns. Performance fees therefore typically create a skewed – call option like – incentive structure. As the professional manager typically only profits from positive excess returns but do not suffer from losses, it may incentivize to take excessive risks to generate high returns (Goetzmann, Ingersoll and Ross, 2003).

Additionally, pension companies may also charge exit fees when workers transfer their individual accounts to another pension company. Exit fees may be fixed or operate on a sliding scale with loyalty being rewarded with lower fees on exit (Tapia and Yermo, 2008).

The structure of fees adopted in the countries under our analysis is fairly complex; however there are similarities in the technical calculation allowing us to compare their impact. Countries typically permit a range of fees and charges, including:

a) up-front fee (entry fee, contribution fee);

- b) management fee (asset management fee);
- c) custodian fees;
- d) fee on investment returns (performance fee);
- e) exit fees (switching fees, redemption fees).

We are aware of limitation of the presented list and understand that this is not the comprehensive list of fees that can be applied in the private DC pension schemes. For a more literature presenting types of fees, we refer to Blake (2006), Tapia and Yermo (2008) or Hernandez and Stewart (2008). Most of the CEE countries, including those analyzed further, have established maximum limits on the fees that pension funds can charge to ensure that administrative costs do not reduce the retirement income of participants. The problem with set maximum limits on fees is the risk that governments set the wrong ceiling. Too high a limit would be ineffectual. Too low a ceiling might mean that fund managers could not cover their costs. This will restrict competition and choice. It could even lead to the failure of weaker providers, undermining public confidence in the system (Tapia and Yermo, 2008). There is also evidence that charge ceilings can become de facto charge minima as well. This implies that price competition, beyond meeting the regulatory requirement, might be limited, at least in the short term. Understanding this regulatory risk in setting fee limits is one of the areas of our research interest.

2.2 Impact of fees on accumulated savings

The amount by which the accumulated savings are reduced is known as the charge ratio. Charge ratio measures the impact that any type of administrative charge can have on the final balance (for example after 40 years) of an individual retirement account compared to the hypothetical amount of savings that could be obtained if no administrative fees were charged at all (Hernandez and Stewart, 2008). This measure has been used to compare administrative charges in Latin America and in other countries with privately managed retirement savings accounts (Whitehouse, 2000).

The other comparative indicator referred to in this report is the equivalent fee rate. This measure is related to the charge ratio but stated as an annual ratio for comparative purposes. The relationship between these two measures is shown in Figure 1, which compares in the horizontal axis the charge as a percentage of assets (or reduction in yield) and in the vertical axis the charge ratio (or reduction in assets), which shows the effect this charge would have on the final pension value (the charge ratio).

Figure 1 shows that even low charges on assets build up over the long period of a pension investment can reduce the pension value substantially. For example, a charge on assets of 1% can reduce the value of the pension by around 20% (Whitehouse, 2001). However, we claim that taking into account the fee structure and stochastic aspect of some charges (especially the success fee), charge ratio is higher than originally though.

We also assume, that the slope of curve is not concave as originally presented by Whitehouse (2001) or assumed by Hernandez and Stewart (2008). Having in mind the impact of particular fees on accumulated savings, if management or success fees play dominant role in a pension provider fee structure, we claim that the curve is convex (see also Šebo and Virdzek, 2013).



Figure 1 Relationship between Charge ratio and Equivalent Fee Source: Whitehouse, E.R. (2001) "Administrative charges for funded pensions: comparison and assessment of 13 countries", OECD

Another aspect of fees is their impact on economic behavior of agents. While the behavior of asset managers under the different fee structure is quite known, behavior of demand side actors is usually tied to the taxation theory. Tax theory recognizes the income substitution effect (see for example Šebo at al., 2014). Under the effect, saver is motivated to avoid the tax by substituting the higher taxed goods by lower taxed substitutes. This behavior should be, however, considered suboptimal for saving schemes (Šebo and Virdzek, 2013).

Income effect is directly tied to the decreasing level of accumulated savings. Taking into account cumulative effect of charges, the overall impact of applied fee structure could decrease the accumulated savings to a level close to poverty. However, these wider socio-economic aspects should be analyzed in a connection to the default options set in legislature. In our study, we do not pay attention to this significant aspect of private DC schemes and refer to many existing studies on this topic (see for example Salou et al., 2012; Šebo et al., 2014).

3 Research methodology and data

Analyzing the impact of fees applied in analyzed DC pension schemes require to define the structure and level of particular fees applied. Second task is to define a saving scheme model which incorporates the fee structure and presents expected value of savings with and without the fees. Last part of the research is to estimate the cumulative impact of fees using charge ratio or sometimes called "reduction in assets (premium)".

In our research, we compare five countries, which introduced the second pillars: Slovakia, Romania, Estonia, Latvia and Poland. We are aware of changes in fee structure and level of fees during last 10 years. For our research, we used the most recent fees identified in the national legislation and pension fund statues of respective pension funds providers.

Table 1 presents the fee structure applied by pension funds providers in respective countries in 2015.

Fee structure	Slovakia	Romania	Estonia	Latvia	Poland	
Management fee $(F^M)^{**}$	0.3 %	0.6 %	1.36 %	1 %	0.57 %	
Depository fee $(F^D)^{**}$	0.035 %	-	0.18 %	0.082 %	0.012 %	
Performance fee $(F^P)^{***}$	10.00 %	-	-	1 %	-	
Entry fee $(F^E)^*$	1.25 %	2.5 %	-	1 %	3.5 %	
Transfer (switching) fee $(F^T)^{****}$	-	3.5 % - 5 %	-	-	-	
Redemption fee (exit fee) $(F^R)^{****}$	-	-	1 %	0.18 %	-	

Table 1 Fee structure of pension funds providers in second pillar of analyzed countries

* Entry fee is expressed as a % of new contributions

** Ongoing charges (Management fee and Custodian fee) are expressed on annual basis

*** Performance fee is expressed as a % of the pension unit value change

**** Transfer and exit fees are expressed as a % of accumulated savings

Source: Own research based on national legislature and pension fund statues, 2015

Further, we design a model of saving scheme, where individual as well as policy parameters are set. Individual parameters are connected to the defining the level of salary used as a contribution base and level of monthly contributions. Even if we understand the random nature of income influenced by permanent and transitory shocks (Guvenen, 2009), for sake of comparison and in order to control for impact of fees, we used static input variables for life-cycle income path.

In order to define retirement wealth in form of accumulated savings (s_T) we have created a savings model were an individual deposits once a month a τ_t -part of his monthly salary w_t adjusted for impact of entry fees (F_t^U) to a pension fund for a period of t (1, ..., T). The budget-constraint equations read as follows:

$$s_{t+1} = s_t \left(r^F(t, t+1) \right) + \frac{w_{t+1}\tau_{t+1}}{1+F_t^U} \tag{1}$$

where $r^{F}(t, t + 1)$ are the net after management, custodian and performance (if applied) fees monthly returns of pension fund in the time interval [t; t + 1).

Gross monthly returns (r) are generated using 96.5 years of daily historical data on equity returns in US. The data for historical equity returns for Dow Jones since January 1900 till December 2014 were retrieved from the Federal Reserve Economic Data database of Federal Reserve Bank of St. Louis (FRED, 2015).

However, in analyzed countries, the returns are presented as "net of fees", which means that we have to calculate the fess that are applied directly to the value of the assets under management of a respective pension fund. These ongoing charges cover management fee and custodian fee (F_t^P) and performance fee (F_t^P) .

In order to express the impact of ongoing fees on the value of savings, we can simply reduce the monthly return by ongoing fees charged to the pension fund assets. If the pension fund assets are redistributed by the number of issued pension units, that the impact of ongoing management fees (management and custodian) on a monthly return (change in the value of one pension unit) can be

expressed as follows:

$$r_t^{F^{M;D}} = r_t^s - \frac{F^M + F^D}{n^Y}$$
(2)

where n^{γ} is the number of periods (e.g. business days, months, quarters,...) per year for which the returns are generated.

The last fee that is usually applied is a performance fee. This fee rewards the pension fund manager for achieving positive returns if certain conditions are met. If the return for a tested period is negative, than the success fee usually equals 0. If the return for a tested period is positive, performance fee can be charged by pension fund manager. To calculate the performance fee, we need to create additional variable accommodating the value of pension fund assets. In analyzed countries, pension fund assets are distributed on individual retirement accounts based on the number of pension units. Each pension unit is valuated on a periodical basis, which gives a current (or accounting) value of pension unit (*CVPU*). Logically, the value of one pension unit is than subject to achieved investment returns and ongoing fees. Formula for the returns after ongoing fees and impact of performance fee (r_t^F) can be calculated as follows:

$$r_{t}^{F} = \frac{r_{t}^{F^{M}}}{1 + \left(F^{P}\left(\frac{CVPU_{t-1}\left(1 + r_{t}^{F^{M}}\right)}{\max CVPU_{t-m}} - 1\right)\right)}$$
(3)

where max $CVPU_{t-m}$ represents the maximum (highest) value of CVPU looking *m* periods backward. In our analysis, parameter *m* is set to 36 months (3 years).

To perform simulations using historical returns, we apply a moving block bootstrapping method (Vogel & Shallcross, 1996). The basic idea of the block bootstrap is closely related to the i.i.d. nonparametric bootstrap. Both procedures are based on drawing observations with replacement. In the block bootstrap, instead of relying on single observations, blocks of consecutive observations are drawn. This is done to capture the dependence structure of neighbored observations. This method allowed us to overcome the problem with capturing close relations among inflation, bond returns, and many other macroeconomic parameters influencing other parts of the model (life-cycle income) during the whole savings period. It has been shown that this approach works for a large class of stationary processes (Gilbert and Troitzsch, 2005). The blocks of consecutive observations are drawn with replacement from a set of blocks. By construction, the bootstrap time series has a nonstationary (conditional) distribution.

The moving blocks bootstrap is a simple resampling algorithm, which can replace the parametric time series models, avoiding model selection and only requiring an estimate of the moving block length (*l*). In our case, the block length (*l*) is 40 consecutive years, i.e. the full career and saving (investment) horizon of an individual saver. For each unit of a block bootstrap, a vector of variables is defined. Pulling consecutive block of data out from the database of 94 years of monthly data of variables, each block (*k*) than consists of variable observations (X_{k-1+1}), j = 1, ..., l. Then the simulation is performed for each block (*k*). In total we have performed 1000 simulations for each of defined country specific fee policies using the same blocks and simulation sequences (simulation

seeds). Simulations are performed in the MS Excel environment using Palisade @RISK software allowing us to define the model and control for additional input variable.

In order to control for impact of fee policy on a final value of savings, we assume that a hypothetical saver contributes for a 40-year long working carrier uninterruptedly. The monthly wage (w_t) is growing linearly 2% p.a. and the contribution (τ_t) is at 4%. At the same time, we assume that a saver continuously saves in the selected fund and performs no switching during the saving period. The results are presented in form of histograms, where the impact of fee policy applied to the final value of savings is presented in form of charge ratio using formulas above.

4 Results and Discussion

The results are presented according to analyzed country specific fee policies. For Slovakia, we conclude that under the defined methodology, the proportion of paid fees on accumulated assets, and respective charge ratio, varies significantly with mean of 15.82%, 28.84% respectively. Detailed results are presented in the Figure 2 below.



Figure 2 Paid fees and respective Charge ratio - Slovakia Source: Own calculations based on MikroSIM model, 2015

One can see the vastly different distribution when considering two approaches. Leptokurtic distribution skewed to the right when considering the paid fees as a % of accumulated assets is in a steep contrast to the charge ratio distribution. The difference in values and distributions can be analyzed further by looking at particular fees (see Table 2 below).

Table 2 Impact of particular fees on accumulated assets - Slovaki

Output	Histogram	Min	Mean	Max	5%	95%
Paid fees as a % of accumulated assets	1096 4096	11.42%	15.84%	38.98%	11.55%	25.93%
Charge ratio	20%	21.49%	28.84%	39.22%	22.32%	37.77%

Management fee	1% 9%	1.96%	4.14%	8.49%	2.39%	6.46%
Depository fee	0,1% 0,9%	0.20%	0.41%	0.85%	0.24%	0.65%
Performance fee	5% 30%	6.74%	10.75%	28.02%	7.44%	18.36%
Entry fee	0,0% 1,8%	0.19%	0.54%	1.62%	0.24%	1.12%

Source: Own calculations based on MikroSIM model, 2015

Interesting finding is the impact of performance on a total amount of accumulated assets, where it surpassed even the management fee deemed to have the highest impact. On the other hand, performance fee is highly sensitive to the returns and if the portfolio returns would assume different distribution of returns, impact of performance fee would differ significantly. More detailed analysis using sensitivity tests is required to understand the dependence of performance fee on other aspects, like returns' distribution, reset period (*m*) and length of saving period (see suggestions of Goetzmann, Ingersoll and Ross, 2003).

Romania has different fee policy, where management fee is the dominant type of fee and logically has major impact on a reduction of accumulated assets. Again, the two approaches generated different distributions (Figure 3).



Figure 3 Paid fees and respective Charge ratio - Romania Source: Own calculations based on MikroSIM model, 2015

Impact of particular fees applied in Romania is presented in the Table 3.

Output	Histogram	Min	Mean	Max	5%	95%
Paid fees as a % of accumulated assets	2% 20%	3.96%	9.12%	19.71%	4.80%	14.64%
Charge ratio	14%	14.98%	17.90%	21.43%	15.19%	20.81%
Management fee	2%	3.62%	8.12%	16.67%	4.42%	13.09%
Entry fee	0,0% 3,5%	0.34%	1.00%	3.04%	0.42%	2.11%

 Table 3 Impact of particular fees on accumulated assets - Romania

Source: Own calculations based on MikroSIM model, 2015

We can conclude that management fee applied by Romanian pension funds providers is the dominant source of pension assets reduction and accounts for more than 85% of total fees paid. However, the correlation of paid management fees and charge ratio is not clear. In this respect, deeper analysis is needed to investigate the relationship.

Estonian fee policy is one of the highest among investigated countries. The difference between the distribution of paid fees and charge ratio is presented below on Figure 4.





Considering fee structure in Estonia, the Table 4 below presents impact of particular fees on a final value of accumulated assets.

Output	Histogram	Min	Mean	Max	5%	95%
Paid fees as a % of accumulated assets	10% 50%	10.90%	23.36%	46.42%	13.25%	36.67%
Charge ratio	30%	34.13%	43.29%	54.67%	34.72%	52.76%
Management fee	5% 45%	8.73%	19.74%	40.11%	10.81%	31.49%
Depository fee	1,0% 5,5%	1.15%	2.61%	5.30%	1.43%	4.16%
Exit fee	1,010101010101% ▼	1.01%	1.01%	1.01%	1.01%	1.01%

Table 4 Impact of particular fees on accumulated assets - Estonia

Source: Own calculations based on MikroSIM model, 2015

Latvian pension funds providers use relatively wide fee structure, where management fee is deemed to have the highest impact. Figure 5 presents the distribution of paid fees and charge ratio in Latvian second pillar pension funds. Following Table 5 presents detailed information on impact of particular fees charged to the second pillar savers in Latvia.




Output	Histogram	Min	Mean	Max	5%	95%
Paid fees as a % of accumulated assets	5% 40%	7.97%	16.81%	35.23%	9.66%	26.40%
Charge ratio	2496	25.29%	31.66%	39.70%	25.79%	38.27%
Management fee	596 30%	6.26%	14.02%	28.66%	7.74%	22.53%
Depository fee	0,4% 2,4%	0.51%	1.15%	2.35%	0.63%	1.85%
Performance fee	0,5% 3,0%	0.61%	1.01%	2.72%	0.70%	1.79%
Entry fee	0,0% 1,4%	0.15%	0.45%	1.33%	0.19%	0.92%
Exit fee	0,180324584252%	0.18%	0.18%	0.18%	0.18%	0.18%

Table 5 Impact of particular fees on accumulated assets - Latvia

Source: Own calculations based on MikroSIM model, 2015

Poland as our last country investigated has presumably one of the lowest fee policies. However, management fee is again dominant fee in the fee structure. Figure 6 and respective Table 6 provide more information of fees paid, respective charge ratio and following impact of particular fees.



Figure 6 Paid fees and respective Charge ratio - Poland Source: Own calculations based on MikroSIM model, 2015

Output	Histogram	Min	Mean	Max	5%	95%
Paid fees as a % of accumulated assets	2% 22%	3.99%	9.28%	20.44%	4.95%	14.93%
Charge ratio	15% 23%	15.78%	18.63%	22.07%	15.99%	21.47%
Management fee	296 1696	3.43%	7.70%	15.82%	4.21%	12.27%
Depository fee	0,05% 0,35%	0.07%	0.16%	0.33%	0.09%	0.26%
Entry fee	0,0% 4,5%	0.47%	1.41%	4.29%	0.59%	2.93%

Table 6 Impact of particular fees on accumulated assets - Poland

Source: Own calculations based on MikroSIM model, 2015

Poland fees has lowest dispersion when considering charge ratio, which could be presented as the most stable fees under uncertain returns of managed assets.

5 Conclusions

Results of the analysis suggest that the detriment to savers is even bigger than the findings of Hernandez and Stewart (2008). So we conclude that 1% of fees (equivalent ratio) applied on the NAV (AuM) on an annual basis exceeds significantly Hernandez and Stewart (2008) proclaimed charge ratio of 20% over the 40-years saving period. However, detailed analysis of particular fees in connection to uncertain portfolio returns are needed to objectively investigate the dispute.

Another interesting approach would be to use Monte Carlo simulations to determine closely distribution of impact of fees. At the same time, we plan to continue with investigation of mutual relationship among various fees and returns. We do not intend to replicate existing studies which cover the asset management side (for example Alda and Ferruz, 2012), instead we plan to investigate the demand side and policy implications for the political risk associated with the existence of second pillars in CEE countries.

Acknowledgements

This work was supported by:

The Slovak Research and Development Agency under the contract No. APVV-0465-12. 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-1/0669/14. KEGA under the grant No. 007UMB-4/2014.

References

- ALDA, M. and FERRUZ, L. 2012. The Role of Fees in Pension Fund Performance. Evidence from Spain. In: *Czech Journal of Economics and Finance*, Vol. 62. Available at: http://journal.fsv.cuni.cz/mag/article/show/id/1262>.
- BLAKE, D. 2006. Pension Finance. Chichester: John Wiley & Sons Ltd., Pension Institute.
- DOBRONOGOV A. and MURTHI M. 2005. Administrative fees and costs of mandatory private pensions in transition economies. In: *Journal of Pension Economics and Finance*, Vol. 4, No. 1, pp. 31–56.
- FRED. 2015. *DJIA price index from January 1919 to January 2014*. [statistics]. Available from .">http://research.stlouisfed.org/fred-addin/>.
- GILBERT, N. and TROITZSCH, K., 2005. *Simulation for Social Scientist. Second Edition*. Berkshire: Open University Press. ISBN 0-335-21600-5.
- GOETZMANN, W.N., J.E. INGERSOLL JR. and ROSS, S.A., 2003, High water marks, In: *Journal of Finance*, Vol. 58, No. 4, pp 1685-717.
- GUVENEN, F. 2009. An empirical investigation of labor income processes. In: *Review of Economic Dynamics*, Vol. 12, pp 58-79.
- HERNANDEZ, D. G. and STEWART, F., 2008. Comparison of Costs and Fees in Countries with Private Defined Contribution Pension Systems. IOPS Working Paper No. 6. [online] <http://www.oecd.org/site/iops/41269747.pdf>.
- JACOB, A., BIKKER and DREU, J. 2001. Operating costs of pension funds, the impact of scale, governance, and plan design. In: *Journal of Pension Economics and Finance*. Vol. 8, pp 63-89.
- JAMES, E., SMALHOUT, J. and VITAS, D. 2001. Administrative costs and the organization of individual account systems: a comparative perspective. In: *Robert Holzmann and Joseph Stiglitz (eds), New Ideas about Old Age Security.* Washington, DC: The World Bank.
- MEŠAROVÁ, N. 2014. Je sporenie drahé? (časť II.) In: Sporenie a investovanie. Vol. 4.
- MURTHI, M., ORSZAG, J. M., and ORSZAG, P. R. 2001. Administrative costs under a decentralized approach to individual accounts: lessons from the United Kingdom. In: *Robert Holzmann and Joseph Stiglitz (eds), New Ideas about Old Age Security*. Washington, DC: The World Bank.
- SALOU, J. M., YERMO, J., PAYET, S. and DESPALINS, R. 2012. *Pension markets in focus*. Paris: OECD, Retrieved from http://www.oecd.org/daf/fin/private-pensions/PensionMarketsInFocus2012.pdf>.
- ŠEBO, J., ŠEBOVÁ, Ľ. and VIRDZEK, T. 2014. Challenges in Slovak PAYG and DC schemes. In: Szcepanski-Brzeczek-Gajowiak (ed.): Social security systems: Against the challenges of demographics and markets. Poznan: Publishing House of Poznan University of Technology, pp. 71 – 87.
- ŠEBO, J. and VIRDZEK, T. 2013. Dismantling the myths about the pension funds' performance from the savers perspective. In: *Szczepański, M. (ed.) Pension reforms Comparison and evaluation*. Poznan: Publishing House of Poznan University of Technology.
- TAPIA, W. and YERMO, J. 2008. Fees in individual account pension systems: A Cross-Country
Comparison.OECD,
OECD,
PpPp23.Online:
Online:
<http://www.oecd.org/finance/privatepensions/41488510.pdf>.

- VOGEL, R. M. and SHALLCROSS, A. L. 1996. The moving blocks bootstrap versus parametric time series models. In: *Water Resources Research*. Vol. 32, No. 6, pp 1875–1882. Available at: http://onlinelibrary.wiley.com/doi/10.1029/96WR00928/full>.
- WHITEHOUSE, E. 2000. Paying for pensions. An international comparison of administrative
charges in funded retirement-income systems. In: FSA OCCASIONAL PAPERS IN
FINANCIAL REGULATION. Available at:
<http://papers.ssrn.com/sol3/papers.cfm?abstract id=427980>.
- WHITEHOUSE, E. 2001. "Administrative charges for funded pensions: comparison and assessment of 13 countries". In: *OECD, Private Pension Systems: Administrative Costs and Reforms*. Private Pensions Series, Paris.

Comparison of Estimated VAT Gap in the Slovak Republic

LUCIA MIHÓKOVÁ¹ – RADOVAN DRÁB² - OĽGA KMEŤOVÁ³ Technical University of Košice, Faculty of Economics Slovak Republic Pavol Josef Šafarik University of Košice, Faculty of Public Administration Slovak Republic University of Economics in Bratislava, Faculty of Business Economics with seat in Košice Slovak Republic

Abstract

Tax evasion is decreasing the overall countries' budget tax revenues. Therefore is the estimations of the size of economic entities' hidden and illegal activities by using different methods is a topis that is current, significant and desirable and of interest to the state authorities and also to auhors of the presented contribution. This paper is focused on the estimation of tax evasion through value added tax gap identification in the Slovak Republic in 2007-2011. The estimation is performed through two indirect methods based on quantitative approach for measuring tax evasion based on ,,top-down" approach. Contribution also analyses and compares the resulting estimates with foreign research. Based on the resulting estimates can be stated that given the specificity and accuracy of the methods it is not possible to accurately quantify tax evasion.

Key words: Value Added Tax, Gap, Theoretical VAT Liability, Methods of Gap Estimation

JEL Classification: H2, H26

1 Introduction

The problem of tax evasion and fraud, which are often causes of economic crime in recent years was amplified by recent global crisis. Tax evasion has become a major problem for the countries in the world and the Slovak Republic (hereinafter SR) is no exception. Tax evasion is therefore a topic that is being discussed by state representatives, as well as the academic community and general public both nationally and internationally (European Commission, 2014). Given the fact that tax evasion and fraud do reduce tax collection and thereby contribute to negative development of the volume of total revenue from taxes and contribute to the deterioration of the fiscal balance of countries, does tax effectiveness and tax complexity represent one of the current world topics (Šinkyříková and Soukopová, 2012).

Estimation of the illegal and covert activities size is a difficult and complex problem. It is necessary that for the gap estimates should be such procedures used, under which the given authority could take necessary and effective measures. Estimate of tax evasion is confronted with several problems that lead to inaccuracies and differences in findings, thus estimates vary both between countries over time and also for different countries at the same time (Kubátová, 2012; Orviská et al., 2006).

¹ Ing. Lucia Mihóková, PhD., Němcovej 32, 040 01 Košice, Slovak Republic, lucia.mihokova@tuke.sk

² Ing. Radovan Dráb, PhD., Popradská 66, 040 11 Košice, Slovak Republic, radovan.drab@upjs.sk

³ JUDr. Oľga Kmeťová, CSc., Tajovského 13, 040 01 Košice, Slovak Republic, olga.kmetova@euke.sk

The basic problem in the analysis of tax evasion, is a lack of relevant and reliable data on the performance of taxpayers (Alm, 2012). Each tax evasion estimation method is specific and besides its strengths also weaknesses that can lead to overestimation or underestimation of expected tax evasion.

2 Research objective, materials and methods

A significant source of the countries tax revenue and an important tool in terms of fiscal policy (according to criteria of impact on the public budget) is the value added tax (VAT). This is given by fiscal reasons, "hidden" tax burden and relatively simple tax selection, control and administration (Široký, 2012; Široký and Kovářová, 2010; Blundell, 2009; etc.). Over the years, VAT has become a major and significant source of revenue for all member states and is considered as the "growth friendly tax" (European Commission, 2011; AGS, 2011). Value added tax, however, is most prone to tax fraud and evasion. Tax evasion on VAT represent a high proportion of total tax evasion in countries (in the EU in 2011 tax evasion amounted to 193 bn. Euros (1.5% of EU GDP) (CASE, 2013). In the view of this the attention is devoted to the tax allowance.

The main objective of this paper is an estimation of tax evasion in the Slovak Republic within the period prescribed by the two selected quantitative methods, to analyze and compare the resulting estimates of each other and then confront them with estimates of evasion of VAT in selected foreign and domestic investigations.

In line with the main paper objective is the paper structured into two main parts. The first part of this article presents the existing approaches for shadow economy and tax evasion estimation, and provides an overview of selected domestic and international research to estimate evasion of VAT through quantitative and qualitative methods. Theoretical knowledge and literature review are processed using the method of synthesis and based on available book publications of Slovak and Czech origin (e.g. Kubátová, 2012; Široký, 2012; Vilhelm, 2013; Bánociová, 2009, etc.) of several foreign articles and publications of authors (e.g. Levaggi and Menoncin, 2012; Gemmel and Hasseldine, 2012; Kirchler et al., 2003; Green, 2009; Ene, 2011; etc.) available in online scientific databases, as well as research of tax evasion developed by national and international bodies or authorities (e.g. OECD, 2002; HMRC, 2011; European Commission, 2014; etc.).

The second part of the article focuses on the estimation, analysis and mutual comparison of tax evasion on VAT in Slovakia in the specified period 2007-2011 using two selected quantitative methods based on top-down approach (method of supply and use tables and the gross method). The estimate is expressed in the form of VAT tax gaps, which are characterized as the differences between the theoretical and actual tax revenues. The resulting findings allow to point out the loss of revenue from VAT and the ability of efficient collection of revenues from VAT in Slovakia. Methodology of the tax evasion estimation using both methods is further characterized in the following part of the article. Mutual comparison of estimates obtained using two different methods allows to highlight the differences in estimates and to identify shortcomings of presented methods. The resulting estimates are then confronted with the existing domestic and international research, which allows to identify differences and to reveal divergence factors and propose measures to clarify and improve the estimates. As the research method used in the second part of the article is the analytic-synthetic method. Statistical analysis of secondary data (obtained from the world input-output database tables (WIOD), Eurostat and the Statistical Office of the Slovak Republic

(SO SR) is provided using mathematical and statistical methods supported by statistical programs and software. To meet the objective several universal method as analysis, synthesis, induction, deduction are used. Statistical methods, in the form of descriptive statistics and graphical and numerical data description and specific mathematical methods are used.

3 Theoretical aspects of tax evasion and quantitative measurement methods

The topic of tax evasion is, as the Cowell (1985) states, the theme which, like pornography, exalts a mixture of outrage, curiosity and admiration. The topic of tax evasion is of interest to theoretical and empirical studies for nearly half a century, and since the first systematic work of authors Allingham and Sandmo (1972), which is considered a classic paper on tax evasion, number of research in this area significantly expanded (e.g. Kolm, 1973; Yitzhaki 1974; McCaleb, 1976 In: Cowell, 1985; Andreoni, Erard, and Feinstein, 1998; Slemrod and Yitzhaki, 2002; Sandmo, 2005 In: Alm, 2012; etc.). Professional domestic and foreign literature also in the present (e.g. Engel et al., 1999; Schneider and Enste, 2000; Schneider, 2000; Orviská and Hudson, 2003; Široký, 2012; Green, 2009; Bánociová 2009; Kubátová, 2012; Murphy, 2010; etc.) highlight the diversity in understanding the tax evasion and its measurement, as they reflect a moral aspect on social norms, rational choice of the taxpayer and understanding of the principles of justice, the psychological aspect of fraud, social and economic conditions of taxpayer or legal dimension. Based on the different approaches of these authors, it is possible for tax evasion to be labeled as illegal, unlawful and intentional conduct which is part of the shadow economy and represents the difference between the tax collected and the tax which should be granted and paid, while when unveiling of the case the taxpayer is subject to sanctions. Authors (e.g. Orviská and Hudson, 2003; Alm, 2012; etc.) at the same time agree that tax evasion constitutes a significant part of the economic system and has significant negative consequences, since it is a source of serious losses of countries' public income and can cause an increase in the tax burden of taxpayers and undermine fiscal policy. Although there is some controversy in the definition of tax evasion and the shadow economy, their size has currently an increasing trend not only in the EU or OECD but has become a global problem. In particular, the burden of direct and indirect taxes, the complexity of the entire tax and social system, the intensity of government regulation are known as major causes of sprawl of illegal or hidden economic activities (Nam, Parsche and Shaden, 2001).

When estimating and analyzing tax evasion and the shadow economy different types of empirical methods are used, which range from a direct survey to a sophisticated, dynamic econometric models (Nam, Parsche and Shaden, 2001). Classification of these methods varies among authors. Schneider (2000) distinguish three different groups of approaches: microeconomic approaches (based on surveys among taxpayers and tax auditing; e.g. Kirchler et al., 2003; Toder, 2007), macroeconomic approaches (calculating the discrepancies between income and expenditure statistics, the monetary approach based on the Fisher quantity equation, the popular currency demand method measuring the correlation between the currency demand and the tax pressure and and the physical input method observing relations between (official and unofficial) GDP and electricity consumption; e.g. Gemmel and Hasseldine, 2012; Porqueras et al., 2011; Hanousek and Palda, 2006) and (dynamic) multiple-indicators and multiple-causes econometric models (e.g. Frey and Weck-Hannemann, 1983). Schneider and Enste (2000) distinguish two basic method leves: direct methods (corresponding to a microeconomic approach) and indirect methods (macroeconomic approach corresponding to tax evasion estimates). Novysedlák and Palkovičová (2012) in the classification of methods for measuring tax evasion added terms of the

macroeconomic approach -. "Top-down approach" and microeconomic approach -. "Botom-up approach". Georgiou (2007) provides a taxonomy of methods for measuring the shadow economy and tax evasion and summary of the specific criticisms of the various methodologies, in which he distinguishes 14 methods, divided into six groups: direct surveys / audits, monetary measures, income and expenditures measure, indirect non-monetary indicators, MIMIC / Latent variable model and Labour Market Measures. All of the above methods (direct, indirect and model approach) Alm (2012) assigns to a group of traditional methods, which are often replaced by a group of modern approaches (containing the creativity of researchers in measuring tax evasion).

Research in the field of tax evasion on VAT are not only focused on the tax gaps estimation, but cover a broad range of research problems in the evasion of VAT. The question of tax evasion emergence was discussed by Pickhardts and Prinz (2014), who declare that the conduct of the taxpayer affects tax evasion and fulfillment of tax obligations. In particular, the interaction between the various entities involved in the taxing process plays an important role in tax compliance. The main point of economists is the development of new approaches to model the situation how dynamic behavior can promote or prevent tax evasion. A similar problem is also addressed by Levaggi and Menoncin (2012), which state that the optimal tax evasion can be either positive or negative function of the tax rate that depends on the form of penalties in case of detection of tax evasion. Kirchler et al. (2003) together with a team formed to study based on a sample of 252 different population groups such as: officials, business students, businessmen, lawyers and small businesses, and examined perceptions of tax evasion and tax avoidance. Results of the study pointed to the diversity of problem perceptions. Illegal tax evasion were perceived rather negatively, tax avoidance as neutral and legall tax evasion as positive. Little attention is paid to the impact of political factors on tax evasion (Kim, 2008), who created the model of tax evasion with regard to the interaction between the tax authorities and the government. The model showed that tax evasion is influenced by the intention of the government to manage the economy.

4 Estimation and comparison of VAT Gap in the Slovak Republic

As the European Commission (2014) stated, regardless of the difficulty in forecasting tax evasion and different research results, there is a consensus among countries that tax evasion is a serious problem that requires concrete actions at all levels, both European and national.

4.1 Methodology of research

Methodology of the tax evasion estimation on value added tax (using the method of supply and use tables and the gross method) is as follows:

1. Creation of a database - The data required to estimate the total theoretical VAT revenue in the SR method using supply and use tables are drawn from the global database input-output tables (WIOD), Eurostat and the Statistical Office. Data on final consumption of households by COICOP and the producer price index have been drawn from the Statistical Office. For setting tax rates was used the publication of the European Commission: TAXUD and national legislation for value added tax (Law on Value Added Tax 222/2004 Coll.). The data required to estimate the theoretical VAT revenue in Slovakia using the gross method is derived from the national accounts provided by the Slovak Statistical Office, obtained both through the available databases, as well as direct communication with the authorities. The various modifications of GDP were used for sector accounts respectively. Accounts for individual institutional sectors.

The original intention of the article was the estimation of the tax gap in VAT period 2003-2013. Given the limited availability of data by the method of supply and use tables, the difficulty of calculating and comparability of the resulting estimates of both methods was in order to unify the timeframe specified period 2007-2011 selected.

An estimate of the tax gap in the VAT selected by using both methods was calculated as the difference between theoretical VAT yield and the actual yield from VAT. The second step was based on the estimates above, the theoretical VAT revenue.

2. The total theoretical VAT revenue

a) an estimate of the theoretical yield using the method of supply and use tables:

Theoretical VAT revenue was in the method of supply and use tables constructed as a sum of the partial theoretical revenues consisting of the theoretical revenue component of household final consumption, the component of intermediate consumption and revenue from gross fixed capital formation (for details on estimating individual earnings see Reckon LLP (2009) and CASE (2013). By estimations certain limitations in terms of data availability been taken into account and on the basis of that several necessary modifications for the purpose of applicability of the conditions of SR have been made.

b) Estimation of the theoretical yield gross method:

The gross method is based on macroeconomic statistics of national accounts. Calculation of theoretical VAT revenue is determined by the underlying macroeconomic equation (detailed example in Novysedlák and Palkovičová, 2012). Theoretical VAT revenue is determined by the product of the theoretical tax base (gradually adjusted GDP on those items not subject to tax and extended to items which are subject to tax) and the implicit tax rate.

3. Obtaining data on actual acrualised revenues from VAT in Slovakia.

4. Quantification of the tax gap - the difference between the theoretical quantification of revenues from VAT and the actual acrualised VAT revenues.

5. Application of additional adjustments and assumptions - for the final calculation were considered some adjustments (as part of the present contribution analyzes the resulting estimates).
6. Analysis of the resulting estimates of the VAT tax gap in Slovak Republic and their comparison with the resulting fiscal gap estimates presented in selected foreign researches.

4.2 Analysis and comparison of estimated VAT Gap in the SR using method of supply and use tables

Quantification of the tax gap using the method of supply and use tables was carried out in steps (1st to 6th), as set out in the research methodology in the previous part of the article. The paper presents the resulting estimates of the total value of theoretical VAT revenues, as it is not due to extensiveness able to present all partial calculations of the individual components of the theoretical yield. On the basis of the estimates results can be stated that the progress of the assessed VAT tax gap was on a downward trend until 2008. Between 2009 and 2010 stagnated at almost the same level and in 2011 a significant growth was recorded. In absolute terms during the period the values varied between 2,071.36 million EUR and -3,867.73 million EUR. In relative terms, it reached a value in the range of 31.75% to -45.09%. Average tax gap for the period is 40%. (Table 1). The theoretical VAT revenue grew faster than tax revenues since 2008, it does not vary much on the contrary in the period from 2008 until 2010 where a slight decline in tax revenues was recorded. A slight increase took place in 2011, but not as much as the growth of theoretical VAT revenue, which is ultimately reflected on the size of the VAT tax gap in that year. On this basis, it can be assumed that the VAT gap has an increasing trend since 2010.

The resulting estimates of the tax gap for VAT using the method of supply and use tables were compared with foreign studies, which deal with the estimation of tax gaps on VAT in the EU Member States (CASE, 2013). The study lists Slovakia in the group of EU countries with high VAT tax gaps. According to its estimates, the average gap of VAT in the years 2000 to 2011 was around 29%. In the crisis years, the gap under the influence of persistent negative trend in tax revenues has deepened, reaching a level of more than 30%. According to that study the dependency of Slovakia on income tax arising from the household sector is higher than the EU average, although the high level of tax gaps makes it difficult to estimate the economic importance of that percentage. Comparison of the resulting estimates are indicated Table 1 and Figure 1 and 2.

Year	Total Th VAT L (VT	neoretical Liability [TL]	VAT Receipts		VAT Gap in mil. eur		VAT Gap in % VTTL	
	CASE	OR	CASE	OR	CASE	OR	CASE	OR
2007	6,003	6,740.88	4,104.00	3,699.00	1,856	3,041.88	36.00	45.10
2008	6,585	6,524.86	4,621.00	4,453.50	1,964	2,071.36	31.00	31.75
2009	6,615	7,014.09	4,221.30	4,221.30	2,393	2,792.79	49.00	39.82
2010	6,795	6,945.44	4,182.10	4,182.10	2,613	2,763.34	48.00	39.79
2011	7,484	8,578.63	4,710.90	4,710.90	2,711	3,867.73	48.00	45.09

Table 1 The resulting estimates of the tax gap for VAT using the method of supply and use tables

Source: Authors; Note: OR – Own research; CASE: Results published in: CASE (2013)

When comparing the own estimates of the tax gap with those from CASE (2013) study, it can be seen that own estimates of the tax gap VAT are comparable with the results of the study under consideration. The resulting differences in the resulting estimates may be caused by various factors such as: different data sources-database statistical methodology and the limited availability of data, the method of calculation, usage of different classification of products and their weights in the consumer basket, abstraction or exclusion of taxable products. The reason for this difference may also be due to additional adjustments that study CASE (2013) uses and so not considered by own estimations due to the unavailability of data (e.g. enterprise expenditure on representation, the threshold for registration for VAT, restrictions on the rights to deduct VAT on commercial vehicles and fuel, etc.). All the above factors affect the resulting differences in the estimates of theoretical VAT revenue and, ultimately, the size of the tax gap estimates.



Analysis of the tax gap share on GDP in 2007-2011 (Figure 2) shows the percentage of GDP that could be obtained by elimination of tax evasion. Based on the resulting estimates of CASE study (2013), the share of the tax gap on GDP varies up to 4.1% of GDP (in 2011). Own estimates of the tax gap record higher values of the share on GDP up to 5.5% of GDP (in 2011). Therefore, it can be concluded that in case of papers own estimates by the elimination of tax evasion could be savings

of an average of 4.4% of GDP expected and according to a study CASE (2013) on an average of 3.6% of GDP.

4.3 Analysis and comparison of estimated VAT Gap in the SR using gross method

The second method used for estimation was the gross method. Since the method is relatively simple, the results are not always accurate, and therefore is this method used more often as a complementary way to more sophisticated forms. Quantification of the tax gap was carried out in steps (1st to 6th), as set out in the methodology of the research paper. The first step was the gradual modification of the individual components of GDP (basic macroeconomic balance equation) determination of the theoretical tax base. Gross method characterization and definition of the procedure can be found in Zídková (2014). In the second step implicit tax rate was identified. More suitable option would be the use of the weighted tax rate WAR (taking into account any tax base), but these data are not normally published by the statistical office, and therefore for the calculation a simplified implicit rate was used (taking into account all the rates and exemptions relating to VAT in the national economy). Limitation of the theoretical basis presented, therefore the final values of their estimates are shown in table below (Table 2). Comparison of the theoretical basis and the implicit rate of VAT is included in the contributions as analytical comments.

Year	Total T VAT (V	`heoretical Liability TTL)	VAT Receipts		VAT Gap in mil. eur		VAT Gap in % VTTL	
	IFP	OR	IFP	OR	IFP	OR	IFP	OR
2007	5,699	4,591	4,147	3,699	1,552	892	27.2	19.4
2008	6,343	5,455	4,621	4,454	1,722	1,002	27.1	19.7
2009	6,267	5,197	4,221	4,221	2,046	975	32.6	17.0
2010	6,248	5,094	4,182	4,182	2,066	912	33.1	21.8
2011		5,735		4,711		1,024		21.7

Table 2 The resulting estimates of the tax gap for VAT using the gross method

Source: Authors; Note: OR – Own research, IFP – Results published in: Novysedlák and Palkovičová (2012)

Resulting own estimates were compared with the domestic research Novysedlák and Palkovičová (2012), which was focused on the VAT tax loss and VAT tax gaps estimation in the period from 2000 to 2010 for Slovakia, using the estimation method for general by adjusting of nominal GDP. As authors state, VAT is the most important source of revenue for the state in recent years but the development of VAT revenues do not reflect the trend of macroeconomic growth. The resulting mismatch authors attributable to increase in tax evasion. According to authors' estimates, VAT gap had an increasing trend and on an average in the years 2000 to 2010 was around 30%. During the crisis years (2008-2010), has the gap under the influence of persistent negative trend in tax revenues deepened, reaching a level of more than 33%.

The study considers period from 2000 to 2010, for comparison purposes estimates for the years 2007 to 2010 were selected. According to comparison may be within the theoretical bases stated that the differences are not significant, but some differences are present. This can be the result of different data sources used for the calculations or inaccuracies incurred as a result of rounding. Differences in the calculations are caused also by the different level of the average VAT rate, as in the study Novysedlák and Palkovičová (2012) implicit VAT rate was used in the calculation of weighted average VAT rate. Estimated implicit VAT rate is lower on average by 5 percentage

points. These facts are ultimately reflected in quantification of the theoretical VAT revenue. The final estimate of the theoretical yield is lower than the study states. Another cause of the differences in the estimates could be the different acrualised values of VAT tax revenues. Between 2009 and 2010, both approaches used the same revenues, but the differences in the estimates of the tax gap have even aggravated as can be seen in Figure 3.



Analysis of the share of the tax gap on GDP in 2007-2011 (Figure 4) shows the percentage of GDP that could be obtained by eliminating tax evasion. Based on the graphic representation of the development of VAT share on GDP can be noted that, according to studies Novysedlák and Palkovičová (2012), the share of the tax gap on GDP rised to 3.4% of GDP (in 2011). Own estimates of the tax gap indicates recorded a lower value share on GDP up to 1.5% (in 2011). On this basis, therefore, it can be concluded that in the case of own estimates, the elimination of tax evasion could save an average of only 1.5% of GDP, according to a study of Istitut of Financial Policy is the average of 2.7% of GDP.

5 Conclusion

Given the fact that tax evasion and fraud reduced tax collection, thereby contributing to the negative development of the volume of total revenue from taxes and contribute to the deterioration of the fiscal balance of countries it is justified for continuous monitoring and evaluation of the size of the tax evasion incurred and the efficiency of collection of tax revenues. Given the fact that value added tax is a significant source of revenues for all member states and is the most prone to tax fraud and evasion, is the attention of this contribution paid to tax evasion on VAT.

The main objective of the article was to estimate tax evasion in the Slovak Republic within the period prescribed by the two selected quantitative methods and to analyze and compare the resulting estimates of each method and then confront them with estimates of evasion of VAT in selected foreign and domestic researches.

In the first part of this paper were the existing approaches to estimate the shadow economy and tax evasion presented and a summary of selected domestic and international research on VAT tax evasion estimation through quantitative and qualitative methods. The second part, was aimed at estimating, analyzing and comparing tax evasion on VAT in Slovakia in the specified period 2007-2011 that allowed authors to point out the loss of revenues from VAT and the ability of efficient collection of revenues from VAT in Slovakia. Estimation of tax evasion on VAT was expressed in the form of VAT tax gap by using two selected quantitative methods based on top-down approach (method of supply and use tables and the gross method). Estimations resulting from these method

showed considerable differences in the resulting estimates of VAT tax gaps. The average VAT gap estimated using the method of supply and use tables is around 40% and for gross method at 20%. Especially in the case of the supply and use tables method the tax gap recorded a growing trend, especially since 2009, when there was an increase in its size by 13% till 2011. In the case of gross methods the increase in the tax gap was recorded in 2010. Regarding the differences in resulting estimates of the tax gap in the VAT can be the research of McLaren (2008) confirmed, that given the specificity and accuracy of the methods it is not possible to accurately quantify tax evasion and the resulting estimates should be taken with caution and reconsider their explanatory power. Despite the shortcomings of both methods can be based on the resulting estimates of tax gaps assumed that methods using supply and use tables are more accurate. Among the reasons for innaccurancies may be the complexity in the formation of theoretical tax base (input data in the form of supply and use tables and national accounts), determination of tax rates (weighted VAT rate to all goods and services in different industrial sectors) and distinguishion between the types used for final consumption and intermediate goods included.

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 VEGA 1/0967/15: *Approaches for fiscal imbalance solution in terms of the EU and in the context of the systemic crisis*.

References

- ALLINGHAM, M.G., SANDMO, A. 1972. Income tax evasion: A theoretical analysis. In: *Journal of Public Economics*. 1, University of Pennsylvania, Philadelphia.
- ANNUAL GROWTH SURVEY. 2011. Summary of the economic analysis and messages. European Commission MEMO/11/11. Electronic document. [Online]. Available online at: ">http://europa.eu/rapid/press-release_MEMO-11-11_en.htm?locale=en>">http://europa.eu/rapid/press-release_MEMO-11-11_en.htm?locale=en>">http://europa.eu/rapid/press-release_MEMO-11-11_en.htm?locale=en>">http://europa.eu/rapid/press-release_MEMO-11-11_en.htm?locale=en>">http://europa.eu/rapid/press-release_MEMO-11-11_en.htm?locale=en>">http://europa.eu/rapid/press-release_MEMO-11-11_en.htm?locale=en>">http://europa.eu/rapid/press-release_MEMO-11-11_en.htm?locale=en>">http://europa.eu/rapid/press-release_MEMO-11-11_en.htm?locale=en>">http://europa.eu/rapid/press-release_MEMO-11-11_en.htm?locale=en>">http://europa.eu/rapid/press-release_MEMO-11-11_en.htm?locale=en>">http://europa.eu/rapid/press-release_MEMO-11-11_en.htm?locale=en>">http://europa.eu/rapid/press-release_MEMO-11-11_en.htm?locale=en>">http://europa.eu/rapid/press-release_MEMO-11-11_en.htm?locale=en>">http://europa.eu/rapid/press-release_MEMO-11-11_en.htm?locale=en>">http://europa.eu/rapid/press-release_MEMO-11-11_en.htm?locale=en>">http://europa.eu/rapid/press-release_MEMO-11-11_en.htm?locale=en>">http://europa.eu/rapid/press-release_MEMO-11-11_en.htm?locale=en>">http://europa.eu/rapid/press-release_MEMO-11-11_en.htm?locale=en>">http://europa.eu/rapid/press-release_MEMO-11-11_en.htm?locale=en>">http://europa.eu/rapid/press-release_MEMO-11-11_en.htm?locale=en>">http://europa.eu/rapid/press-release_MEMO-11-11_en.htm?locale=en>">http://europa.eu/rapid/press-release_MEMO-11-11_en.htm?locale=en>">http://europa.eu/rapid/press-release_MEMO-11-11_en.htm?locale=en>">http://europa.eu/rapid/press-release_MEMO-11-11_en.htm?locale=en>">http://europa.eu/rapid/press-release_MEMO-11-11_en.htm?locale=en>">http://europa.eu/rapid/press-release_mEMO-11-11_en.htm?locale=en>">http://europa.eu/rapid/press-release_mEMO-11-11-11_en.htm?locale=en
- ALM, J. 2012. Measuring, Explaining and Controlling Tax Evasion: Lessons from Theory, Experiments, and Field Studies. Tulane University, Tulan Economics Working Paper Series.
- BÁNOCIOVÁ, A. 2009. Analýza dane z pridanej hodnoty v SR. In: *E+M Ekonomie a management*. Vol. 4, pp. 104 -115.
- BLUNDELL, R. 2009. Assessing the Temporary VAT CUT Policy in the UK. In: *Fiscal studies*. Vol. 30, No. 1, pp. 31–38.
- CASE. 2013. Study to quantify and analyse the VAT gap in the EU-25 Member States Final Report. TAXUD.
- COWELL, F.A. 1985. The economic Analysis of Tax Evasion. In: *Bulletin of Economic Research*. Vol. 37, No. 3, pp.163 193.
- ENE, C. M. 2011. Tax Evasion-Between legal and illegal mechanisms of the underground economy. In: *Internal Auditing & Risk Management*. Anul VI, Vol. 4, No. 24.
- ENGEL, E., and HINES, J.R.Jr. 1999. Understanding tax evasion dynamics. *Working Paper 6903*, (National Bureau of Economic Research).
- EUROPEAN COMMISSION. 2011. Taxation trends in the European Union. Focus on the crisis: The main impacts on EU tax system. Luxembourg : Publications Office of the European Union, Directorate-General for Taxation and Customs Union and Eurostat.
- EUROPEAN COMMISSION. 2014. Tax Reforms in EU Member States Tax policy challenges for economic growth and fiscal sustainability. Report European Economy 6/2014.

- FREY, B.S. and WECK-HANNEMANN. 1983. Estimating the Shadow Economy: A "Naive" Approach. In: *Oxford Economic Papers*, Vol. 35, pp. 23-44.
- GEMMEL, N. and HASSELDINE, J. 2012. The Tax Gap: A Methodological Review. Working Papers in Public Finance, Wroking Paper, No. 09/2012.
- GEORGIOU, G.M. 2007. Measuring the Size of the Informal Economy: A Critical Review. Central bank of Cyprus. [online], Available online: <http://www.centralbank.gov.cy/media/pdf/NPWPE No1 052007 .pdf>.
- GREEN, S. 2009. What is Wrong with Tax Evasion?. In: *Houston Business and Tax Law Journal*. Forthcoming, Rugters School of Law-Newark, Research Papers Series Paper No: 045.
- HANOUSEK, J. and PALDA, F. 2006. Vývoj daňových úniků v ČR: Analýza pomocí markovských řetězců. In: *Finance a úvěr*. Vol. 56, No. 3-4, pp. 127-151.
- HMRC. 2011. *Measuring Tax Gaps 2011*. [Online]. Available online at: <<u>http://www.hmrc.gov.uk/stats/mtg-2011.pdf</u>>.
- KIM, S. 2008. Does political intention affects tax evasion?. In: *Journal of Policy Modeling*. No. 30, pp. 401-415.
- KIRCHLER, E., MACIEJOVSKY, B. and SCHNEIDER, F. 2003. Everyday representation of tax avoidance, tax evasion and tax flight: Do legal differences mater?. In: *Journal of Economic Psychology*. No. 24, pp. 535-553.
- KUBÁTOVÁ, K. 2012. Vliv daňových a výdajových nástrojú na mikroekonomickou a makroekonomickou efektívnost. Praha: Wolters Kluwer ČR, s. 152.
- LEVAGGI, R. and MENONCIN, F. 2012. Tax audits, fines and optimal tax evasion in a dynamic context. In: *Economics Letter*, No. 117.
- MCLAREN, J. 2008. The distinction between tax avoidance ans tax evasion has become blurred in Australia: why has it happened?. In: *Journal of the Australassian Tax Teachers Association*.
- MURPHY, R. 2010. Tax avoidance, evasion, compliance and planning. Tax research UK, Richard Murphy on tax and economics.
- NAM, W. CH., PARSCHE, R. and SHADEN, B. 2001. Measurement of Value Added Tax Evasion in Selected EU Countries on the Basis of National Account Data. CESifo Working Paper, No. 431.
- NOVYSEDLÁK, V. and PALKOVIČOVÁ, J. 2012. The estimate of the value added tax revenue loss. *Economic Analysis 25.* Institute for Financial Policy The Ministry of Finance of the Slovak republic.
- OECD. 2002. *Measuring the Non-Observed Economy: A Handbook*. Paris: OECD Publications. [Online]. Available at:<http://www.oecd.org/std/na/1963116.pdf>.
- ORVISKÁ, M., CAPLANOVA, A., MEDVED, J. and HUDSON, J. 2006. A cross-section approach to measuring the shadow economy. In: *Journal of Policy Modeling*. Vol. 28, pp. 713-724.
- ORVISKÁ, M. and HUDSON, J. 2003. Tax evasion, civic duty and the law abiding citizen. In: *European Journal of Political Economy*. Vol. 19, pp. 83-102.
- PICKHARDTS, M. and PRINZ, A. 2014. Behavioral Dynamics of the tax evasion-A survey. In: *Journal of Economic Psychology*. No. 40, pp. 19.
- PORQUERAS, P.G., ALVA, A.P. and WALLER, CH. 2011. *Quantifying the Shadow Economy: Measurement with Theory*, Federal Reserve of St. Louis, 2011.
- RECKON LLP. 2009. Study to quantify and analyse the VAT gap in the EU-25 Member States, 2009, [Online]. Available online at: <http://ec.europa.eu/taxation_customs/resources/documents/taxation/tax_cooperation/combating_tax fraud/reckon report sep2009.pdf>.
- SCHNEIDER, F. 2000a. Illegal Activities, But Still Value Added Ones (?): Size, Causes and Measurement of the Shadow Economies All over the World. *CESifo Working Paper, No. 305.*

- SCHNEIDER, F. and ENSTE D. 2000. Shadow Economies: Size, Causes, and Consequences. In: *The Journal of Economic Literature*. Vol. 38, No. 1, pp. 77-114.
- ŠINKYŘÍKOVÁ .T. and SOUKOPOVÁ, J. 2012. Impact of standard rate of Vat on Tax mix in EU 27. In: *Acta Univ. Agric. Silvic. Mendelianae Brunen.*, LX (7): 369–378.

ŠIROKÝ, J. 2012. Daně v Evropské unii. 5. vyd. Praha: Linde.

- ŠIROKÝ, J. and KOVÁŘOVÁ, A. 2010. The Causes of Changes in the Rates of Value Added Tax in the Czech Republic and their Possible Impacts. In: *ACTA VŠFS: Economic Studies and Analyses*. Vol. 2, No. 4, pp. 126-139.
- TODER, E. 2007. *What is tax gap*? Urban Institut. [Online]. Available online at: <http://www.urban.org/UploadedPDF/1001112_tax_gap.pdf. [Accessed 2015, May8].>

VILHELM, D. 2013. Tieňová ekonomika a národné účty. 1. vyd., Bratislava: Vydavateľský dom ELITA.

ZÍDKOVÁ, H. 2014. Diskuse metod odhadů DPH. In: *Acta Oeconomica Pragensia*. Vol. 22, No. 4, pp. 3-15.

The Use of the Internet and ICT in Business Processing in 2014: a Comparative Analysis

HANA MOHELSKA¹ – ANDREA VOKALOVA² University of Hradec Králové, Faculty of Informatics and Management Czech Republic

Abstract

Effective way and use of the Internet and connected ICT by nowadays enterprises is very popular topic for different studies. Information and Communication Technologies represent a significant competitive advantage for Small and Medium-sized Enterprises (abbreviated as SME). According to the latest survey of the Czech Statistical Office, in 2014 the SME's use of ICT has achieved results comparable to Large Enterprises (abbreviated as LE). The most popular technology for the Czech SME is the Internet, which is mainly used for activities related to public administration as well as in the banking and financial services. Other activities are associated with paid advertising, communication and telephony or staff training. The use of the Internet in order to manage complete submission is not popular. On the other hand, in 2013, the Internet was used for these activities by eight of ten enterprises. This represents a very high figure given that in 2007 it was only one fifth of all business. This possibility is often used by the LEs. In 2013 was used this opportunity by a majority of all enterprises (covered by 95%. For the Small enterprises the portion was covered by 75%. This article aims to analyse the current state of the research questions, based on the results of its own analysis to show the indispensability of the Internet usage for the Czech SMEs and LEs as well as the most popular services and technologies to suggest the trend of future development for further research. The aim of this paper is to introduce the most used Internet services and the most frequent business processes connected with the Internet usage among the Czech SMEs, which are worth it not only saving costs and time, but also bring great opportunity for their competition with their biggest rivals - LEs.

Key words: Internet, Business, Processing, ICT, SME, LE, Czech Republic

JEL Classification: M150, M190

1 Introduction

Thank to the digital era and a phenomenon called an "Information society" are today companies experiencing great technological advances in software, everyday processing in business now partake within the Internet. In the last 20 years the role of the Internet, PC and mobile technologies are rapidly growing, and computer education or learning technology is increasing. But the process of implementation is usually very cost-demanding (Pasca, 2014).

The Internet is a global network of computers (or other connected devices, such as laptops, tablets, smart phone) that allows individual and business users around the world to share information and other resources and to conduct business transactions. More specifically, the Internet is an interconnected network of networks, where each host - a computer directly connected to the Internet - has a number of other computers connected to it. When a user connects to the Internet to access information and services, he or she is considered to be online.

¹ doc. Ing. Hana Mohelska, Ph.D., Rokitanskeho 62, 500 03 Hradec Kralove, Czech Republic,

hana.mohelska@uhk.cz

² Ing. Andrea Vokalova, Rokitanskeho 62, 500 03 Hradec Kralove, Czech Republic, andrea.vokalova@uhk.cz

All computers and mobile devices, including tablets and smart phones, home and business personal computers, and supercomputers used by government, researchers or enterprises share a common method of communicating known as a protocol (Shelly and Campbell, 2012). The basic thing, currently necessary for any enterprise (it does not matter on the particular size of the enterprise) on the Internet is an enterprise's webpage or website. From a technical point of view the web page means an electronic document created in HTML coding that serves as a set of instructions to the browser used to view it. This code defines the structure and content of the webpage, and may include text, images, and links to other web pages or files. On the other hand, the term website means a web page or a set of interconnected web pages, usually including a homepage and generally located on the same server. Web sites are typically prepared and maintained as a collection of information by a person, group or organization (EAHD, 2006).

Other great discoveries of the current Internet and information era are mobile devices and technologies. We use the term mobile devices for information and communication devices that have been developed for mobile use. Thus, the category of mobile devices encompasses a wide spectrum of appliances (Khalil, 2008). There are several advantages for mobile devices that are adopted by different enterprises. The most important advantage provided by these technologies, is portable and easy accessible from any place and any time needed. Thank to these characteristics an employee on a business trip can via Internet easily read, modify or print business reports, e-mails or software available on the company's server or on private clouds. The most usage combinations of mobile devices are combinations with a mobile phone. The second largest group uses a mobile phone with a Netbook (or a laptop). The other often used mobile devices are: notebooks (laptops), smartphones (e.g., an iPhone, a BlackBerry or a Samsung), tablets or GPS locators (Mohelska, 2010).

The key objective of this paper is to evaluate and analyse the current state of using the Internet and its services and technologies for various business processes. The business process can be any activity provided by enterprise and its employees. The typical business process is accounting, banking services or employee training or education. All these activities are often much cost and time demanding. These costs can be reduced by the Internet technology and associated services. For example, employee training with expensive lecturers can be replaced by e-learning. Elearning is defined as the application of new multimedia technologies and Internet in education to improve its quality by enhancing the access to resources, services, information exchange and cooperation (Kopecky, 2006). The total amount of online education is also increasing and affecting many areas, including training. There are many e-learning programs and e-learning incorporated to the conventional teaching methods. This trend is inevitable, since the popularity of online communication and social networking has been a phenomenon in recent years (Mohelska and Sokolova, 2014).

The Internet and connected technologies or services significantly changed our way of thinking, working, processing and communicating. Today's companies must follow this trend and continue in adopting new products, services, technologies or business processes according to customer's needs and wishes. Especially, the Small and Medium-sized enterprises are influenced by limited budget on these innovations compared to LEs. The Czech SMEs can gain financial support thanks to the EU and its Structural Funds. Especially for innovations, education, employment, research and other possible activities they can draw the EU endowments. These endowments can

be used for improving an ICT infrastructure, developing a new product or staff training (Vokalova and Poulova, 2015).

The paper evaluates the most popular Internet services and technologies used by the Czech SMEs (mainly web page and social media). The second research question is aimed at analysing the current usage of mobile devices and services within these SMEs. The most frequent business processes and activities supported by the Internet and modern ICTs will be examined at the end of this text. The contribution of the paper is to evaluate and recommend the best services and technologies supporting business processing in the Czech SMEs in order to improve their competitiveness with bigger LEs and save costs.

2 Comparative Analysis

The data were collected for the 2000 -2014 period by the Czech Statistical Office (abbreviated as CSO) and it can be directly accessed from the CSO web page (CSO, 2014). The basic research method used in this article is analysis and comparing among Small, Medium and Large-sized enterprises.

The first research question of presenting analysis is dealing with the most important trace (website) of any company in the nowadays Internet environment and its profile on social media. This service contents basic information about the organization, its line of business, management board, contacts and any other aspects important for employees, customers or business partners. For basic purposes of this analysis is evaluated only the companies, which maintain their own webpage. In 2000, there were only 40% of all enterprises with their own web page. After 14 years, this value has doubled (covered by 83% of all organizations). In 2014, the structure of Small, Medium and Large-sized enterprises shows that more than 80% of them have their own web page. The highest value was accomplished by LEs (covered by 93.8%), but Medium-sized enterprises are almost catching LEs by a similar 91.2 % (see Figure 1).



Figure 1 Web Pages and Social Media Profiles among all the Czech Enterprises in 2014



Figure 2 All Enterprises provides ICT remote access to employees in 2014

The second question is focused on all enterprises (in the Czech Republic) that provide their employees remote access – mainly for working outside the office on business trips or for flexible working arrangements (e.g. Home office, teleworking etc.). As the weakest form of ICT both in SMEs and LEs is IT – Large companies have many employees and also large and expensive ICT infrastructure. This can be solved by a phenomenon called a virtualization, which enables working through a server without a physical need of a PC. Virtualization can create an artificial view that many computers are a single computing resource or that a single machine is really many individual computers. It can make a single large storage resource appear to be many smaller ones or make many smaller storage devices appear to be a single device (Kusnetzky, 2011). Quite important is growing usage of mobile devices in all enterprises. Small enterprises gain 60%, Medium 85% and Large 96% (shown in Figure 2). These areas of ICT should be used more, especially in the Czech SMEs. Mobile devices save costs and employee's time, so in present time and future many enterprises must invest in this technology. With mobile technologies are also associated cloud computing or services. A cloud can interact with a client (user or application) in a variety of ways, through capabilities called services. Across the web, three major types, or models, of services have emerged (such as Software as a service, Platform as a service and Infrastructure as a service) (Jamsa, 2012).

The key objective of this article is to evaluate and recommend the best technology and services for integrating more business processes, in order to save time and costs, both in the Czech SMEs and LEs. What are the most frequently used in business activities supported by the Internet in Czech enterprises? Most companies use the Internet for banking and financial services. The total amount is 93%, Small enterprises gain 92%, Medium 97% and Large enterprises cover 96% (see Figure 3). These results show that Medium-sized enterprises are in this activity more active than their bigger competitors (LEs). Other activities operated via the Internet are: paid advertising, telephony and communication, staff training (e.g., in the form of e-learning). Paid advertising is mostly used by Medium-sized enterprises (covered by 47%) and LEs (46%). Telephony and communication were accomplished through the Internet by a third of all Czech enterprises. This number is constantly increasing. More than half of LEs (precisely 56%) realized telephoning and

communication via Internet. This conclusion was awaited by authors, because Large-sized enterprises have a lot of employees and telephony over the Internet is much cheaper than phone provider's prices. The Czech SMEs should learn from LEs and incorporated telephoning over the Internet. Last business process that can significantly save costs is staff training. Expenditures in staff training are one of the most expensive costs in every organization. Specialized trainings and courses teach by lecturers are costly, especially for SMEs than for LEs. SMEs should follow LEs and integrate more e-learning programmes and applications. More than half of LEs is using staff training (covered by 55%). On the other hand, only 18% of Small-sized enterprises and 29% of Medium-sized enterprises implement staff training over the Internet.

SMEs and LEs also access other business processes over the Internet, mainly in connection with public administration. The typical representative of this mentioned activity is: taxing (tax returns), insurance and customs duty. These processes could be an objective analysed in following research or article.



Figure 3 Enterprises and their use of Internet for selected business activities in 2014

3 Conclusion

A phenomenon called the Internet has changed our way of thinking and also our daily living. The Czech Small and Medium-sized enterprises fights for their own place on the market and for customers. Large-sized enterprises have an advantage, because of their size, financial budget, number of loyal customers and international support of their home and multinational partnership. Modern ICT and services available over the Internet represent a unique opportunity SMEs in order to win their place on the market and to compete with LEs. The biggest challenge for them is to improve their web pages and customize them for mobile devices. Also a social media activity in SMEs should be better as it is in LEs. As for IT, the Czech Small-sized enterprise should work on their IT infrastructure and adopt in more cases flexible mobile devices. Flexibility, portability and mobility are the key aspects for all the Czech SMEs. From the business processing point of view, the SMEs (mainly the Medium-sized companies) are great in banking and financial services and paid advertising accomplished over the Internet. On the other hand, activities such as

telephony and communication or staff training supported by the Internet is weaker than in LEs. These business processes can save a lot of money and time that is why the nowadays SMEs must adopt them. Also other processing necessary for line of business and organization should be viewed and improved by adopting modern ICT, mobile devices, cloud services and all the features, which the Internet provides.

Acknowledgements

The paper was written with the support of the specific project grant named "Determinanty Ovlivňující Pracovní Spokojenost" and is granted by the University of Hradec Králové, Czech Republic.

References

- EDITORS OF THE AMERICAN HERITAGE DICTIONARY. 2006. *High Definition: An A to Z Guide to Personal, Technology, Houghton Mifflin Harcourt*, pp. 32-33.
- CSO THE CZECH STATISTICAL OFFICE. 2014. Available online: http://www.statistikaamy.cz/2015/02/internet-je-pro-podniky-nepostradatelny/>.
- JAMSA, K. 2012. Cloud Computing. Jones & Bartlett Publishers, pp. 6-7.
- KHALIL, I. 2008. Handbook of Research on Mobile Multimedia. In: *IGI Global research collection*. Second Edition, IGI Global, pp. 77 -78.
- KOPECKY, K. 2006. E-learning (nejen) pro pedagogy. Olomouc: HANEX.
- KUSNETZKY, D. 2011. *Virtualization: A Manager's Guide*. Real Time Books. O'Reilly Media, Inc., pp. 1-2.
- MOHELSKA, H. 2010. Mobile Devices and Localization. In: *Procedia Computer Science 3*, pp. 434-438.
- MOHELSKA, H. and SOKOLOVA, M. 2014. Effectiveness of Using E-learning for Business Disciplines: the Case of Introductory Management Course. In: *E+M Ekonomie a Management*, Vol.17, No.1, pp. 82-21.
- PASCA, E. M. 2014. Integration of the Roma Population in and through Education. In: *European Educational Experiences Original, Procedia Social and Behavioural Sciences*. Vol. 142, pp. 512-517.
- SHELLY, G.B. and CAMPBELL, J. 2012. *Discovering the Internet: Complete Concepts and Techniques*. Shelly Cashman series. 4th Edition, Cengage Learning, pp. 2-3.
- VOKALOVA, A. and POULOVA, P. 2015. The Support of employment and education of the EU Endowment draw at Selected Regional Authorities of NUTS 2 North-East Cohesion Region in the 2007-2013 Programming Period.18th International Colloquium on Regional Sciences in Hustopece, pp. 329-336.
- JAMSA, K. 2012. Cloud Computing, Jones & Bartlett Publishers, pp. 6-7.

Using the Balanced Scorecard Model in Manufacturing Company

SILVIA MRÁZKOVÁ¹ Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

Companies nowadays are facing great competition and have to be able to cope with continuous changes. They have to use the sources effectively and do not forget or abandon the value of intellectual capital. This article based on a case study of concrete enterprise describes the process of implementation of Balanced Scorecard model in Slovak manufacturing company. BSC model used in this article balances performance indicators in four basic perspectives financial perspective, customer perspective, perspective of internal processes and learning and growth perspective. Example of the analyzed company demonstrates an important steps during the process of implementation.

Key words: Balanced Scorecard, Strategy Map, Strategic Targets, Performance Indicators

JEL Classification: M190

1 Introduction

Business environment in Slovakia is continuously changing. Companies have to make greater efforts than before to maintain their market share. Domestic and foreign competitors are becoming more powerful and customers are permanently increasing their expectations and needs. Traditional methods, where performance is measured by financial results are becoming obsolete and modern approaches based on strategic planning come into the foreground. Ability to effectively formulate the strategy is a challenging task for many companies not only in Slovakia. To sustain in a long term, company has to invest time and human capital in education and training of an employees, take care of relationships with customers and suppliers and create high-quality and meaningful base of data.

2 Theoretical Background

Many companies have a problem to measure their performance or performance measures they use do not correspond with the real situation. Several authors criticize using not appropriate evaluation methods based primarily on financial and cost results. They emphasize an influence of non-financial measurements and company's performance and effectiveness indicators (Lynch and Cross, 1991; Ittner and Larcker, 1998). Considering this fact, Robert Kaplan and David Norton (1992) published an article about a new concept of performance measurement that balances financial and no-financial measures; value of tangible and intangible assets. They suggested four traditional perspectives, in which performance measurement indicators should be defined. Perspectives included areas of finance, customers, internal processes, and employees learning and growth (Kaplan and Norton, 1996).

¹ Ing. Silvia Mrázková, Němcovej 32, 040 01 Košice, Slovak Republic, silvia.mrazkova@tuke.sk

Use of Balanced Scorecard models is currently worldwide growing. They are used not only in large multinational companies. Also small and medium-sized enterprises, non-for-profit organizations, healthcare organizations and organizations of public sector want to benefit from long term planning and translate their strategy into an action. However, usual problem of a companies is focusing on achieving financial targets without considering importance of intangible assets and monitoring of non-financial site of the company. If companies want to improve the management of their intangible assets, they have to find a system of their measurement (Kaplan, 2008).

3 Methodology

Paper presents a case study of a manufacturing company, for which initial proposal of Balanced Scorecard has been suggested. The proposal was structured in five steps according to Horváth and Partners (2007). Suggestions are based on detailed analysis of the company including financial performance analysis, and analysis of internal and external environment (SWOT analysis, PEST analysis, Porter's five forces analysis).

The most challenging part of the whole implementation process was the building of Balanced Scorecard – set of measures that should truly evaluate performance. In this step, it was necessary to define strategic targets and performance indicators. These are used to measure meeting of targets and strategic actions, which should help to reach the desired state.

4 Case Study

Initial proposal has been prepared for Slovak manufacturing company that had no previous experience with similar concept before. In suggesting Balanced Scorecard for the company, we have decided to use top-down approach of implementing business strategy. This means that strategic decisions should be done by members of top management. Such an approach has several advantages – first of all it simplifies the communication in the company. Everything was done after the careful analysis and always in cooperation with the member of management.

4.1 Analysis of company's environment

Suggestions we did when implementing Balanced Scorecard were based on quantitative and qualitative analysis of company's environment. Qualitative analysis consisted of SWOT analysis, external measures were taken into account using PEST analysis and competitive position was expressed after the use of Porter's five forces analysis.

Lee and Ko (2000) emphasize the importance of SWOT analysis when establishing Balanced Scorecard. *"By linking the SWOT analysis with the Balanced Scorecard, an organization can balance its strengths against its competitions' weaknesses, and optimise its opportunities within the market"* (Lee and Ko, 2000). In SWOT analysis we evaluated strengths and weaknesses, opportunities and threats of the company. Statements in these categories are not always weighted equally. Therefore, we assigned a points between 1 - 5 to each mentioned statement. (1 for the lowest importance and 5 for the most important factor). Subsequently, we were able to draw the results graphically.



Figure 1 SWOT analysis Source: Own editing

Figure 1**Chyba! Nenašiel sa žiaden zdroj odkazov.** shows that the company has more weaknesses than strengths, however, it disposes more opportunities than threats. Company is not strong enough to take an advantage from all opportunities, therefore, it should use the strategy of alliance and join with other businesses in the industry.

PEST analysis was used to know the impact of political,economic, socio-cultural, and technological factors on the company's development. And lastly, we examined the competition using the Porter's five forces analysis.

4.2 Process of Implementation

When implementing Balanced Scorecard, we have chosen five-step-process defined by Horváth & Partners (2007). It consists of:

- 1. definition of organizational prerequisites,
- 2. clarification of strategy,
- 3. building Balanced Scorecard,
- 4. identification of roll-out process and,
- 5. putting the Balanced Scorecard to work.

In first step, we adopted original Balanced Scorecard perspectives suggested by authors of this method Robert Kaplan and David Norton (1996) - financial perspective, customer perspective, perspective of internal processes and learning and growth perspective.

Basic assumption of successful implementation of this model is clearly defined strategy, which reflects vision and mission statement of the company as well as its values. "*The Balanced Scorecard translates an organization's mission and strategy into a comprehensive set of performance measures that provide the framework for a strategic measurement and management system*" (Kaplan and Norton, 1996). Therefore was strategy definition our main task in second step of this process. Vision and mission reflect the ideas of company owners about the future of the company, long term strategic targets as well as basic philosophy of the company. Values represent the main priorities the company adheres to. Third, the most extensive part of the whole process was building Balanced Scorecard. Sequence of steps is shown in a Figure 2.



Figure 2 Development process of Balanced Scorecard Source: Own editing according to Horváth and Partners (2007)

For each of the perspectives we have defined two to four strategic targets. All of them were drawn in a strategy map. The strategy map is a visual representation of cause and effect relationships between the components of organizational strategy. Strategic relationships depicted in the map (Figure 3) form the basis for developing a balanced system of indicators. This consists of short-term and long-term measurements. The cause-effect relations have an upward direction. First, we examined a learning and growth perspective, than perspective of internal processes and customer perspective, and lastly financial perspective. Each target had to be joined with at least one another. This emphasizes the importance of each target for the whole.

For each of the targets, we have set up a table showing necessary elements in which we were interested. These include:

- name of the strategy target and its short description,
- several indicators that helped us to measure performance,
- strategic actions that will help to implement Balanced Scorecard in a company.

Indicators consisted of a mixture of financial as well as non-financial measurements. They were described by available information, such as their:

- name, which is also its brief description,
- achieved value of the indicator for the year 2014,
- planned value of the indicator in term of five years,
- units, in which the indicator is expressed, and
- weight of the indicator.

Apart from these is than necessary to define:

- person responsible for setting a target value,
- assumptions that form the basis for determining targets,
- data base,
- computerized calculation of indicators,
- action when planned value is exceeded.



To make the output easier understandable, we have suggested an overall index expressing performance of individual strategic targets. Our index is based on similar performance index of Girmanová, Mikloš, Palfy, Petrík, Sütöová and Šolc (2009). The main advantage is that we avoided several potential problems:

- Within the targets, different measurements had different importance. We have taken this into an account and introduced a weighted evaluation of each of the measurement. Typically, indicators measuring an outcome are weighted higher than indicators measuring a process.
- Values were expressed in different units and measured at different periodicity. Small increase of one indicator can indicate better improvement than significant increase of another indicator. For this reason, we have created a table of critical values in which each indicator was assigned 1 to 5 points based on the current performance. Desired/planned target value was represented by five points.

Table 1 contains the results of graphical evaluation of objectives in different perspectives of Balanced Scorecard. Red sign represents unsatisfying value of index (value of index is lower than 3.5 points). Values from interval (3.5; 5) are acceptable and marked as yellow. In case that value

of individual indicators within the target achieves or exceeds planned value, green sign is assigned to the target.

Target	Index	Status	Target	Index	Status
U1	3.2	•	Z1	3.2	•
U2	2.64	•	Z2	4.4	\land
U3	3.1	•	Z3	2.5	•
I1	4	\land	Z4	3	•
12	3.55	\land	F1	3.95	\land
13	3.1	•	F2	5	•
I4	2.5	•			

 Table 1 Evaluation of strategic targets based on the overall index

Source: Own editing

Only one indicator in case of target F2 shows us desired result. The reason is that the indices were calculated in time of Balanced Scorecard compilation and in almost all cases is company supposed to make a progress. The best situation is in a financial perspective. However, company should make a greater effort in learning and growth perspective as well as in customer perspective.

The last two steps of Balanced Scorecard implementation, identification of roll-out process and putting the Balanced Scorecard to work are related to an application of Balanced Scorecard in further organizational units of the company, use of Balanced Scorecard software, which allows more complicated operations and outputs, delegation of responsibilities and many others.

5 Conclusion

Balanced Scorecard implementation project consists of several consecutive steps. In the first step, we analyzed a company, what helped us to know its financial situation, its strengths and weaknesses, opportunities and threats, external environment as well as competition in the sector. After it, we went through process that enables systematic implementation. Balanced Scorecard is used as a very effective tool for performance measurement and company management. It should improve company's operations and allows to respond and solve problems more efficiently and with less staff involved. In general, advantages should overweight disadvantages, such as higher financial costs and necessity of very high management and project team commitment. Therefore, it is applicable mostly for big enterprises, however, also small enterprises can benefit from strategy map visualization or use of simplified performance measurement methods.

References

GIRMANOVÁ, L., MIKLOŠ, V., PALFY, P., PETRÍK, J. SÜTÖOVÁ, A. and ŠOLC, M. 2009. Nástroje a metódy manažérstva kvality (Návody na cvičenia z predmetu Integrovaný manažérsky systém). Košice: Katedra integrovaného inžinierstva, Hutnícka fakulta, TUKE.

- HORVÁTH and PARTNERS. 2007. Balanced Scorecard umsetzen. Stuttgart: Schäffer-Poeschel Verlag.
- ITTNER, C.D. and LARCKER, D.F. 1998. Are nonfinancial measures leading indicators of financial performance? An analysis of customer satisfaction. In: *Journal of Accounting Research*, Vol. 36, pp. 1–46.
- KAPLAN, R.S. 2008. Conceptual Foundations of the Balanced Scorecard. In: *Handbook of Management Accounting Research*, Vol. 3, pp. 1253–1269.
- KAPLAN, R.S. and NORTON, D.P. 1992. The Balanced Scorecard Measures that drive performance. In: *Harvard Business Review*, Vol. 1992 Jan/Feb, pp. 71-79.
- KAPLAN, R.S. and NORTON, D.P. 1996. *The Balanced Scorecard: Translating Strategy Into Action*. 2. Edition. Harvard College. ISBN 0-87584-651-3.
- LEE, S.F. and KO, A.S.O. 2000. Building balanced scorecard with SWOT analysis, and implementing Sun Tzu's The Art of Business Management Strategies on QFD methodology. In: *Managerial Auditing Journal*, Vol. 15/1/2, pp. 68±76.
- LYNCH, R.L. and CROSS, K.F. 1991. Measure Up! In: Blackwell Publishers. London, UK.

UNIVERSITY E-LEARNING EVOLUTION - New Paradigm for New "Sharing Knowledge" like Enterprises

STEFANO MUSTICA¹ Link Campus University Italy

Abstract

The constant changes in technology, culture and economy are making/forcing the different Italian Universities think over some teaching and learning strategies which, some time ago, being suitable, were utilized everywhere. As a consequence, it creates a break between the traditional method, 'docenza ex cathedra", characterized by "de visu" lessons, exclusively managed by the Professor, and the new didactic method, characterized by virtual and interactive learning spaces, where the very centre of didactic activities is transferred to the students. In so doing, students become leading actors in the learning process but, above all, they collaborate with professors and tutors, in order to create knowledge through these interactions. In this direction we present University model where could be possible, apply typical enterprises sharing knowledge.

Key words: E-Learning, Sharing Knowledge, Enterprises

JEL Classification: indicate appropriate JEL classification codes

1 Introduction

The knowledge sharing is for the enterprises a must for a good work, to get to the success. In this direction we want to present you University model where could be possible, apply typical enterprises sharing knowledge.

The constant changes in technology, culture and economy are making/forcing the different Italian Universities think over some teaching and learning strategies which, some time ago, being suitable, were utilized everywhere. In particular, technological evolution is causing many repercussions directly on the model of knowledge transfer and emission. As a consequence, it creates a break between the traditional method, 'docenza ex cathedra", characterized by "de visu" lessons, exclusively managed by the Professor, and the new didactic method, characterized by virtual and interactive learning spaces, where the very centre of didactic activities is transferred to the students.

In so doing, students become leading actors in the learning process but, above all, they collaborate with professors and tutors, in order to create knowledge through these interactions.

2 Our innovation willpower

University being an organization guided by knowledge and aiming to the development of a new kind of knowledge, is going to operate within the fast progress of information technology and communication. Here, the universities have to obtain the abilities and technologies able to improve

¹ Prof. Stefano Mustica, full contact address, e-mail addresses

and elevate the process of teaching and learning, increasing the opportunities (the ability of managing and boosting knowledge) for professors and students to communicate and collaborate.

This University is aware of how the effect of technologies on the University world is and will be total, and it will influence all the activities (included didactic methods, contents and research) and the organization itself, asking for significant changes in the way of teaching and doing research. Effectively, this strategy will activate new systems based on a different way of approaching didactic activities, based on the Internet (learning management system, learning environment, learning object, MOOC) as well as on the teachers training towards these new technologies. The first goal is to completely remove the current distinction between "classical learning and E-learning", creating the conditions to make all the students (attending and distance learning students) work best, realizing the so-called "blended Learning", carrying out classical teaching activities combined with distance learning activities.

The University is going to work for the creation of the right conditions to be able to communicate the learning, based on the new generation Internet, giving the students the opportunity to interact with each other and with professors. In so doing, the University learning will have its social role back. 20 years ago, during the first distance learning activities, this knowledge role, was almost lost, so, from now on, it will operate towards the creation of virtual communities able to establish collaborative ways of learning.

The Universities have to be a changing Universities because systems change and so do the communicative models and the cultural process. Students will have to learn within a hybrid system including books/lecture notes and also new technologies.

So, we have offered a new E-learning model, in which all the potentialities of new communication technology are combined with all the strong points of traditional training, which is never excluded in this model. We call it "blended education/learning".

The Internet areas concern:

- The possibility for the student to have learning activities interacting with teachers, students, tutors and other students.
- The possibility to attend lectures, and also to watch them again through video streaming.
- The possibility to have some services combined with the studying, oriented to support the students' formative experience: learnings, didactic materials, online registrar's office, etc.
- The creation of a University centre supporting didactic innovations.
- The creation of all the technical conditions related to the management of adult users, whose learning needs a specific way, different to any other pedagogical model.
- The definition of assessment criteria, also based on new technologies, appropriate to the new learning methods and the different student typologies, young, adult, worker (it is necessary in order to give them the opportunity to enter the High Training and the University, and to create an assessment system regarding the peculiarity/specificity of adult students or working students).
- The creation of virtual spaces where to generate the "collaborative learning", where students feel they are part of a community which can give them a new kind of support.
- The possibility to examine and create didactic answers oriented to an "active participation" and "interaction with the new media and not only with frontal lectures attendance.

Once and for all, the University thinks that the difference between attending students and distance learners must be passed. In a world where virtuality and communication technologies are always changing, the stress has to be put on the indispensability to participate, within the virtual systems:

- making the student usually interact with the professors, which is sometimes lacking in traditional teaching,
- making the student develop a cooperative mentality, always receiving positive spur from the professor and/or the other students through his participation,
- allowing (in the virtual class) students to know their colleagues better, asking questions and learning from their professor and colleagues' answers,
- the learning process and the teaching systems will have to change: the complete involvement of the students will orient didactics and will personalize the student learning ways,
- the constant use of the Internet is going to create the habit to see the Internet as a source of useful materials and documents,
- the student will understand how to judge the various Internet resources and to make a selection from the available materials.

Lastly, we will be necessary to create preparation conditions for the new challenges: the teachers will have to adapt their competence and knowledge to these new models based on the distance learning. The teacher role will be re-evaluated, not only towards the new teaching models, but also planning their courses (contents and time/deadlines) and deciding at first how to manage all the online activities. Teachers will pay particular attention to the forums, which represent an important e-learning part, that is where the interactive aspect will be expressed most. Teachers will be specialized in managing forums and picking out the most important topics, in order to ask for more absorbing and exhaustive debates. Teachers will be trained to participate, and, most of all, they will be asked to learn not to transfer the "class mentality" to E-learning spaces. This is because our first goal is to create a collaborative mentality which is functional to learning.

This is in adherence to the recommendations of the Commission for Modernization to Higher Education, which wants, by 2020, all the teachers to have a certified pedagogical education (and also andragogic) to be followed by continuous refresher courses. In particular, teachers will have to learn to:

- 1. Create and edit digital audios.
- 2. Use blogs and wiki to produce new learning platforms.
- 3. Use digital images, audiovisual contents and videos (in class and the virtual class).
- 4. Learn the essential elements of infographics in order to visually stimulate students.
- 5. Use the social nets.
- 6. Create and distribute presentations.
- 7. Create a e-portfolio of contents.
- 8. Be aware of online security.
- 9. Be able to highlight plagiarism among the students' works.
- 10. Know something about royalties.
- 11. Create online questionnaires and surveys.
- 12. Be able to use collaboration tools.
- 13. Use mobile devices.
- 14. Determine digital teaching resources.

- 15. Be able to use online graphic organization systems.
- 16. Be able to search on the Internet (semantic web based search engine).
- 17. Use tools to share files and documents with students.

So, this new educational paradigm gives the teacher a leading role, as he is considered to have the obligation and duty to implement the use of technological systems. Here, the digital abilities training becomes an educational need, consolidating the learning process through new technologies, giving a surplus value in the different subjects and creating at the same time, a teaching environment which is revealing and important to the students of the Digital Age.

The current paradigm of University E-learning teaching/learning based on the "simulation of what happens in a class" (video lessons), has to be reversed in order to achieve a new system in which the University student is the real author, thanks to technologies, which become a clever studying partner and make their contribution, together with other subjects, (professors, tutors, other students) to the cooperative learning.

The traditional academic proposal thinks that it is enough to train students just about the subject contents, often aiming to classical culture and not to professionalism. Actually, practice and professional competence can never be just an employment of university knowledge (typically theoretic) and our current proposal of University learning systems knows it.

The more the university education is general/generalized, the less it will be effective. And this project wants to follow through this last consideration, creating a technological architecture which will be able to:

- make the learning informal, based on concrete and practical cases, experience, remark, conversation, problem-solving and activities progress,
- propose dismantled contents (not formalized, not sequential), just open and dynamic contents, with the possibility to make students participate to the contents choice, so, a non-planned way, adapting to the changing learning context in which it is put (we start from dynamic concept maps which are the systems through which professors will judge students' cognitive progress),
- overcome the dependency on third party, making the students responsible for their end result, so students, even if still helped by tutors and or professors, will be responsible for their own learning and the consequent professional usefulness,
- increase the value of divergent/differing thoughts, creativity, personal goals, the transformation of teaching input into something which has a personal usefulness,
- making the teacher role (who is always there, ready to help, to correct any mistakes and explain again) accepted by anyone involved. Everybody will "teach" sharing his own personal knowledge, experiences, stimulating and participating to a positive conversation, namely a real collaborative learning. In so doing, the simple "class" is going to become a real learning community.

3 Conclusion

Today, all e-learning platforms let students upload educational materials and at the same time make them communicate with each other. This kind of communication is useful for collaborative learning, but educational material is still something cold, aseptic, though it could also be interactive. And this penalizes a series of aspects that should be encouraged by distance learning:

- The improvement of online research skills;
- The improvement of critical writing skills;
- The ability to analyze and examine unknown information in depth.

Uploaded materials are very often restricted, limited to predetermined works, without taking into account, for example, the importance of interdisciplinary during the learning phase. We believe that these reflections prevent the achievement of one of the main purposes of distance learning that is to encourage students to do independent research activities examining in depth the aspects they liked most, increasing their own learning motivation.

In so doing, personalization becomes the most important element in distance learning process. And it also becomes the basis of the teaching and learning model that we are offering. Architecturally, our technological model includes the so-called "Biblioteca centrale" (central library) which will be the information repository (learning objects). These single objects joining will create the Libraryhub, conglomerated objects that make up the knowledge about of a specific content. Our central library allows students to take single learning objects and move/copy them within other Libraryhubs, optimizing its use. These library hubs (which contents are very practical and not theoretical) will be graphically supported by a personalized system, managed by every single student (i-hub). It will allow users to personally and creatively create and arrange his personal knowledge about a given argument. In the meantime, the teacher /tutor will have the possibility to enter the single ihubs, in order to supervise the knowledge and understanding level and, if need be, he or she will be able to personalize the information through his/her corrections on the single i-hubs. The i-hub (when powered) will turn out to be a sort of mental gap of the students, which will permit a graphic self-assessment. Every time the map adds new contents, the student will perceive his knowledge increase (graphically and visually). At the end of the studying course, the mental map will be the topic of the final exam. Through the map, the teachers will understand the students' knowledge level of all the contents, having at the same time a complete visual map. In so doing, we will overtake the classical assessment criteria based on random questions/answers, definitely not able to evaluate the real knowledge.

CEFE 2015 - Central European Conference in Finance and Economics



Figure 1 Architecture of sharing knowledge

- 1. It is very vast, i.e. it contains much more material than can possibly be assigned for a course in order to motivate the student to personalize his or her research; thus many courses can be derived from one HUB.
- 2. It is especially designed to harness all the opportunities of the digital platform: the subject matter is exploded and atomized, and its components appear all in enticing graphics and specially designed images on the first page. All the themes that the subject matter comprises are thus visible synchronically on the home page and each leads the other pages where the themes are treated in increasing depth. Upon opening the home page and browsing the themes the student can start building up his or her own conceptual map of the elements that comprise the subject matter;
- 3. The Hub is highly personalized and interactive: each student accesses it with her own username and password and as the student starts using it its software tracks its use by each student. This is for the benefit of the student himself who at any time can check the various steps that he has taken to reach at certain results;
- 4. The HUB has produced very encouraging results in the virtual classroom: its design and structure appeal to the student of the electronic age as she immediately finds very familiar tools she uses daily both in her work and her entertainment. Professors who taught courses with the HUB invariably report that students love its concept and enjoy spending time on it. They find it much more effective than just the simple platform.

In the online HUB learning experience the student must be pro-active, must learn how to do research, and develops critical abilities in the selection of materials relevant to the question. Last but not least, the students greatly improves his or her writing skills thanks to the weekly paper assignments.

International Business and Coaching in Women Enterprises and Financing Sources of Women Enterprises

RENÁTA NEŠPORKOVÁ¹ – RŮŽENA DVOŘÁČKOVÁ² Business and Law School Czech Republic

Abstract

The aim of the paper is to deal with the availability and impact of coaching and financial resources for business women within the international context, while based on the theoretical and methodological background and conducted research. The authors assume that the availability of both the coaching and the financial resources for women entrepreneurs are rather limited if compared to men. The women's approach to doing business - a higher aversion to taking risk, fear of debt – and its impact on doing business are discussed. The financial resources closely relate to the main target of the financial management - maximizing the company value, the women owned business included. The analysis of current studies (mostly international), comparison of selected segments of the Czech business environment and creation of key assumptions for the implementation of follow-up research in the Czech Republic are presented.

Key words: Business Woman, Funding, Coaching and Funding Availability, Business Woman Support

JEL Classification: G20, J71, M10

1 Introduction

Your Researches focused on the women s approaches to business start ups, business, and entrepreneurship (IPSOS, 2014) provided comparative and revealed sometimes rather alarming results especially from the fields of finance and coaching, the fields the authors are devoted to.

The woman who successfully managed the prologue phase and took the decision to set up the business has started the ongoing process of overcoming and/or combating negative aspects related to successful business start up and running the business. Business barriers met by women entering the world of business may involve gender prejudice, lack of finance, legislative issues, lack of knowledge on how to run the business successfully, unfriendly or competitive market, lack of mentoring and coaching, lack of ability to manage a work–life balance.

Out of all the challenges the women starting their business frequently meet at the very beginning is the issue of obtaining capital, it means finance resources for the starts ups. They tend to apply for the loans of approximately ten hundreds of thousands, the amount not considered attractive by banks. The loans of higher amounts are not affordable for women due the lack of guaranty. Since women usually do not own adequate property for the loan provision, their own savings and 3F

¹ Ing. Renáta Nešporková, Ph.D., MBA, Michálkovická 1810/181, 710 00 Ostrava, Czech Republic, renata.nesporkova@vsp.cz

² Mgr. Růžena Dvořáčková, Michálkovická 1810/181, 710 00 Ostrava, Czech Republic, ruzena.dvorackova@vsp.cz

loans are the most common finance resources. A variety of subsidies or grants, or tender and grant calls supporting entrepreneurship, and financial support offered by labor offices may be perceived as a way for the solution; but these do offer opportunities but also red tape burden for the beneficiaries.

Lack of knowledge and experience influence the business setting up process and its outcomes. At the very beginning these influences can have the negative impact on the quality and development of business plan, calculations, e.g. costs and/or investments return, financial analysis, costs calculations, product price setting. Soft skills, like communication skills, presentation skills, low self-confidence are listed as other challenges women have to face.

Though the offer of a variety of courses and education material for the business women "beginners" seems to be wide, even endless, the women's attitude to finance seems to remain rather unchanged for decades. Women seem to stick on the attitude which is rather unsupportive for their ambitions. (iPODNIKATEL.CZ, 2011)

Region	2009	2014	Change (%)
Prague	110 351	123 901	12.28
Central Bohemia	75 605	89 913	18.92
South West	74 191	81 570	9.95
North West	64 000	66 883	4.50
North East	87 559	97 454	11.30
South East	89 533	100 462	12.21
Central Moravia	63 993	70 921	10.83
Morava Silesia	65 413	69 264	5.89
Total	630 645	700 368	11.06

Table 1 Growth of the number of business women in regions (2009-2014)

Source: AMSP (2015)



Figure 1 Growth of the number of business women in regions (2009-2014) Source: AMSP (2015)
Table 1 and Figure 1 show:

- Trends in sole traders (self employed), the number of self employed in main activities decreases, while the number of self employed in secondary activities increases.
- The number of entrepreneurs has been stable since 2011, while the number of women entrepreneurs significantly increases.
- 50'% of entrepreneurs (individual) are active.
- The number of business subjects (legal entity) gradually increased by 1/3 in the 5 year period
- The number of foreign entrepreneurs (the rate to Czech ones) remains constant.
- The number of licenses per person increased. Men have more licenses covering more fields, but the number of men remains the same. The number of women increased as well as the range and number, of their activities.
- The number of trade licenses and craft licenses dramatically increased in women businesses. We can see similar, but not as much dramatic trends with men.
- More licenses are provided to still existing / working businessmen. More licenses are provided to women starting a new business for the first time.
- Entrepreneurs are eager to start more demanding activities.
- The business women can be found in the regions of Prague, Northern Moravia and Southern Moravia (in city agglomerations of Prague, Brno and Ostrava. Dynamic trends occur in Central Bohemia. (AMSP, 2015)

2 Women and money

Statistics gained form a variety of studies depict that only 11% women consider making money the most important life issues. The list of women priorities starts with children (53%), self-sufficiency (46%) and spouse relationship (35%). Promotion as a key life factor was mentioned by 14% women. And out of this number only a half states that they work to be independent and not to make a career, which might be considered a glass ceiling. Research results revealed that women even if with higher education background are rewarded by 20% lower salaries if compared to men.

The way women deal with money seems to be surprising: women represent 44% private investors. 75% women place emphasis on responsibility during decision making processes, urge on one's own personal responsibility or responsibility divided between the woman and her partner/s. Women are afraid or at least aware of risks related to investments, but after being advised by experts, they change the attitude to money investing. Being aware of risks they indulge in, for instance, betting on the stock market while finding it attractive for its appeal, charm of playing and enjoyment, while men tend to make risky investment for the only sake: to increase the value. (Oko, 2015)

National Center for Woman and Retirement Research, American society, released the result on women's life standard related to finance management:

- 47% women aged over 50 are single (it means they are financially responsible for their own lives),
- 50% marriages result in divorces, During the first year after the divorce the women's standard of life decreases by 73%,
- 3 out 4 of older people living in poverty are women,

- 7 out 10 women live in poverty for some period of their lives,
- 90% women are /will be responsible for the finance management for some period during their lives, even though 79% women have not sufficient / adequate knowledge on finance,
- 20 % women only will be financially independent in retirement.

Women strive for the equality during the whole life, but they lack "financial intelligence" and strategic approach to the financial security of themselves. Unfortunately it is the financial independence that should be one of the most important life matter for women, as being seen within the framework of researches and supported by released figures.

What are the reasons of the alarming results?

- Women let men deal with the money.
- Women believe dealing with money is hard or complicated.
- Women suffer from emotional discomfort when dealing with money.
- Women are influenced by the way they were brought up.
- Women do not think about their future. (Kalina, 2015).

In many cases the financial literacy and its level may have resulted from some clichés typically and repeatedly reproduced and accepted also by women:

- To earn money you have to work hard.
- To talk about money is bad.
- Rich people are not good people
- Dreams cannot make money.
- You can never have money enough. (Černá, 2015)

3 Women, coaching, finance

Coaching is defined as "a method of tackfull and considerate influencing". Maren Fischer-Epe says "coaching is a combination of individual counseling, personal feedback and a kind of training for practical outcomes; with the purpose is to reach professional and personal development. "Coaching is a tool available for self improvement and it can have the same effect as psychotherapy or mentoring. The change, if occurred and accepted, does not result from psychological or psychotherapeutic theories but springs out off the path the person succeeds to find for himself to reach the aim. (Whitmore, 2007)

International federation of coaches defines coaching as "the *partnership with the client during the creative process provoking thinking and inspiring the client to maximalise his personal and professional potential*". Though personal and professional fields are considered by clients to be the key areas, it s clear that the areas interfere. Women typically seek personal coaching, emphasis is placed on coaching for WLB and coaching for teamwork. Women understand that regular meetings with coaches provide them different perspectives through which they can apply different views, opportunities and new problem solutions different from those they are used to or they insist on. Women understand that inner barriers are much harder to overcome or beat, compared to the outer ones. There exists only one inner barrier whatever you call it: it might be labeled as fear of failure, insufficient level of self confidence, lack of trust in yourself, low self esteem, actually the barrier preventing humans to develop their potential. (Whitmore, 2009)

In Moravia Silesian region a study of business women was conducted. The region is typical for its rather low number of business women if compared to other regions of the Czech Republic (Table 1). The aim was to find out in which areas business women were interested to develop their skills. Fifty business women, sole traders (self-employed) aged 22 to 62 years, participated in anonymous questioning, with the 100% recovery rate.

The questioning related to women's needs, wants, ways, areas of coaching, mentoring, education, shadowing. For the introductory question *"Which form of self education have you already participated in? Participants were offered the following replies:* coaching, mentoring, education, shadowing, counseling, psychological counseling, the main areas the research was focused on. Majority of business women took part in education courses (80%), then in counseling and shadowing (50%), psychological counseling (10%), coaching (5%) and mentoring (0%).

The question related to **forms of self education business** women would be interested in, revealed the interest in all of the listed ones: education (80%), counseling and shadowing (50%), psychological counseling (50%), **coaching (80%)**, with rather low interest in mentoring (10%). Business women were also asked about the **fields they had already been trained.** From the offered choice they stated general psychological counseling (40%), work with the subordinates (50%), legislative issues (90%), personal counseling (conflict management) (60%), personal counseling (spouse relationship, family (75%), professional, specialization, counseling (65%), **financial management (60%)**, work-life balance coaching (75%).

Business women were asked about their plans or exploitation of current opportunities. No matter whether the women had been trained before women expressed that they would like to continue in or take the opportunity for: general psychological counseling (30%), work with subordinates (40%), legislation issues (60%), personal counseling (conflict solving) (60%), personal counseling (spouse partnership, family) (75%), professional, specialization, counseling (50%), financial management (80%), work-life balance (80%).

4 Finance resources for business women

The number of business women was generally increasing during the last decade. The American Express states that in the period from 1997 till 2012 the number of women owned businesses increased by 54%. Similar situation occurs even in the Czech Republic. In 2014, 40% new licenses were provided to women. Currently over 2 million persons are license owners, 35% being women. (Bisnode, 2015)

Getting the financial resources for the start ups is more difficult for women if compared to men. Colemann and Ronn define obstacles which the women owned businesses only typically meet. During the first year of the business existence women get 80% lower capital if compared to men. Business women say that getting the capital was the most difficult challenge for them.

Examination of women entrepreneurs and external capital is important for several reasons. First, this area of inquiry reflects observations that women are increasingly entering business ownership, yet women-owned firms are on average smaller, less profitable, and less likely to grow (Industry Canada, 2015). Women-owned firms tend to be smaller, and often less oriented to growth (Carter, 2002; Clife, 1998; Orser and Hogarth-Scott; 2003). And the fact is that women

cannot or do not employ risk capital to facilitate growth and survival, goals of prosperity, and the ability of women to attain economic self-sufficiency may be compromised.

Financial resources available for business women:

- a) Personal savings
- b) Bank loans

The women view the scarcity of finance resources and depict difficulties related to the matter. The availability of loans for women is rather restricted, Coleman and Robb say. If the women want to succeed they have to develop a profound business plan, they have to show off "clean and clear" credit history, and excellent credit score. There still exists the premise that women-owned businesses receive less favorable debt financing treatment than male-owned firms. (Coleman and Robb, 2012)

c) Personal loans – family, friends

These can be classified as prioritized resources but we strongly suggest women to sign up a written contract with precisely and in detail described conditions on the money provision. Interests and payment methods and due dates must be embedded as well.

d) Venture Capital and Business Angels

To get the finance by this way the ownership of the part of the company is supposed to be transferred to the donator (changed in favor of donator). Coleman and Robb say that a very low percentage of women prefer this way of financing, which might be related to the kind of business the women run. Typically the women do not focus on the "growth" of the company but they are more interested in and involved in retail and services. The companies focused basically on the growth are the domain of men, these operate mainly in technologies, sciences, the fields that generally attract risk investors. (Coleman and Robb, 2012)

e) Crowdfunding

This kind of current funding can be another resource. Its popularity and success are closely related to social networks, and the explosive and extensive trends occurring in IT technologies. Originally the capital was pooled for arts mainly, nowadays for any entrepreneurial activities.

- f) Grants, subsides, project finance
- g) Doing business during maternity leave

We can also define the resources which are totally inappropriate for starting up business:

- a) Credit cards most credit cards charge high interests, pretty high price for starting up a business. These are easily accessible and easily turn into debts.
- b) Pension and life insurance these products aim at the specific life period. Withdrawing the money from the insurance products is not efficient (life insurance) and may cause dramatic impact on individual's life (pension provision). (Hannon, 2015)

Best practice for the targeted financing is being currently represented by Capital Diversity Fund set up by the corporation IntelCapital in the amount of 125 million dollars. Intel plans are to make investment via the fund into technological startups run by women and marginalized individuals. The aim is to support workforce, which reflects and responds to the current status in

the society ad its labor market. This kind of support will bring the benefit not only for the beneficiary, but for the whole economy, Intel believes.

The research conducted by Babson College revealed that only 15% American companies financed by venture capital have women representatives in their executive teams. Not more than 3% of total venture capital goes into companies run by women. In the Czech Republic you can find 14% companies owned by women. (Louda, 2015)

4.1 Financial effects – women and the financial status of the company

Women represented in boards of directors and supervisory boards of the Czech stock companies have a positive impact on the company stability. These companies are classified less risky if taking into account ROE success (Bisnode, 2015). The counseling company Bisnode made the analysis on the women's influence in the controlling and managing departments of the stock companies on the financial status of the companies based on ROE. The research was conducted in all Czech stock companies with the positive own capital and five member board of directors and supervisory boards, which represents almost 20% stock companies within the Czech Republic (4722 in total). The average ROE of companies with women in boards of directors and supervisory boards is better than in companies with men only. The fact is that the mean ROE results dramatically get worse if the number of women in the company decreases. Some of companies with men only often reach bed results and high losses and these can even overwhelm the total positive results of successful companies with men only. This result from risk taking, it is generally true, that higher risk brings a little bit higher profit, but majority of companies lose so much, that "men's" companies are classified as worse on the average if compared to "sex mixed" companies. So, women represented in boards of directors or supervisory boards cost the company some money but from the long term perspective this investment is worth its value. The positive outcome of women representation in the management was also proved in the company profitability. (Bisnode, 2015)

5 Conclusion

The global research results are repeatedly confirming that business women still miss information from the field of finance and work life balance. Education and coaching courses attract business women since these are perceived as the prerequisite for their self development and the development of the business as well. While mentoring is not viewed much needed, education generally (viewed as traditional forms within the lifelong learning) and coaching (viewed as a modern form) were depicted by business women as efficient and needed. The authors suggest focusing on the field of finance resources, since business women critically view the scarcity of knowledge in the field, and on coaching in prospective research studies. If considering the idea that women are relatively disadvantaged, the research in which both sexes are represented in the cross gender comparison could be also conducted.

References

AMSP. 2015. Srovnávací analýza podnikatelů a podnikatelek v letech 2009-2014. [online]. [cit. 2015-06-18]. Available online: <http://www.amsp.cz/uploads/dokumenty_2015/Aktuality/Analyza_zeny_vs_muzi_podnika ni_AMSP_CR.pdf>.

- BISNODE. 2015. Ženy v byznyse fungují jako pojistka proti výrazné ztrátě. [online]. [cit. 2015-06-11]. Available online: http://www.bisnode.cz/tiskove-zpravy/zeny-v-byznyse-funguji-jako-pojistka-proti-vyrazne-ztrate/>.
- COLEMAN, S. and ROBB, A.M. 2012. Financing Strategies for Women -Owned Firms. Kaufmann Foundation, Rising Tide.
- ČERNÁ, L. 2015. *Jste finančně nemocní?* [online]. [cit. 2015-06-11]. Available online: http://www.mujvztah.cz/jste-financne-nemocni/>.
- HANNON, K. 2015. 8 *Great Sources of Financing for Women Starting a Business*. [online]. [cit. 2015-06-11]. Available online: http://www.nextavenue.org/8-great-sources-financing-women-starting-business/>.
- iPODNIKATEL.CZ. 2011. *Co brání ženám v podnikání* . [online]. [cit. 2015-06-11]. Available online: http://www.ipodnikatel.cz/Podnikam-jako/co-brani-zenam-v-podnikani.html
- IPSOS. 2014. *Postoje žen k podnikání*. [online]. [cit. 2015-06-11]. Available online: http://www.amsp.cz/uploads/Pruzkumy/Pruzkum_podnikani_zen.pdf/
- KALINA, A. 2015. *Kam se podělo mých 10.000.000?* [online]. [cit. 2015-06-11]. Available online: http://www.mujvztah.cz/kam-se-podelo-mych-10-000-000/>.
- LOUDA, P. 2015. *Podnikající ženy dostanou peníze od Intelu. Jde o miliardy*. [online]. [cit. 2015-06-10]. Available online: http://computerworld.cz/aktuality/podnikajici-zeny-dostanou-penize-od-intelu-jde-o-miliardy-52107>.
- MADAME BUSINESS. Loni bylo 40% nových živnostenských listů vydáno ženám. Duben 2015, s.7.
- MINISTRY OF INDUSTRY AND TRADE OF THE CZECH REPUBLIC. 2015..[online]. [cit. 2015-06-10]. Available online: http://www.mpo.cz/default_en.html.
- OKO. 2015. *Ženy a peníze*. [online]. [cit. 2015-06-11]. Available online: http://oko.yin.cz/29/zeny-a-penize/
- SUCHÝ, J., NÁHLOVSKÝ, P. 2007. Koučování v manažerské praxi. Praha: Grada Publishing.
- TRNKOVÁ, J., I. 2012. Život je teď. Bea Benková. Praha: Agentura Fáma v edici 21 dnů.
- WHITMORE, J. 2009. Koučování. Praha : Management Pres.
- WHITMORE, J. 2007. Koučování. Rozvoj osobnosti a zvyšování výkonnosti. Praha: Management Press.
- ZEM. 2015. *Jak získat peníze a moc? Nejbohatší žena světa vám poradí*. [online]. [cit. 2015-06-11]. Available online: http://www.jenzeny.cz/sex-vztahy/jak-ziskat-penize-a-moc-nejbohatsi-zena-sveta-vam-poradi-1263.html>.

Arts and Culture in the Czech Republic: Financing, Management and Business

RENÁTA NEŠPORKOVÁ¹ – RŮŽENA DVOŘÁČKOVÁ² Business and Law School Czech Republic

Abstract

The contribution deals with financing, management and business in the area of arts and culture. Arts management is described and discussed. The authors believe that multi resources financing is the optimal model for the financial management. Current system of financing is considered obsolete and changes in leg station are supported with the outcome of setting up new forms of business public legal institutions. Fundraising is being supported after the findings on low levels of support by municipalities, towns, government. Specific features of business in arts and culture are described, especially positives and negatives met by nonprofit SMEs in organization, personnel, financial, sale and art-production areas. The authors bring to the fore issues to discuss, and suggestions for further research in arts management, international comparison included.

Key words: Fundraising, Entrepreneurship, Business, Financing, Arts Management, Culture

JEL Classification: M10, G30, R10

1 Introduction

Entrepreneurship and management in arts is the topic rather neglected in researches, though economic and financial aspects belong to most relevant aspect the institutions dealing with arts have to deal with. The management task to run the institution effectively and efficiently remains a difficult task due to few specific and relevant aspects of the field of arts.

The aim of the contribution is to reveal information on the current situation within the Czech Republic, while based on theoretical and methodological outcomes, and to present suggestions and recommendations for further research in the field, based on the analysis of the current status. The authors' fundamentals by Giepo Hagoort, Vladimír Vojík, Jaromír Veber, Otto Obst and James H.Donnelly were used.

The topics of financial resources (fundraising, crowd funding, and subsidies), specific features of management and business in institutions dealing with arts in the Czech Republic with the main concern on nonprofit organizations, small and medium sized business focused on theatre performances are covered. The authors tried to identify positives and negatives, challenges and bottlenecks in the areas: controlling, finance, sales, personnel, production and organization. Managerial skills missed in the area are described, and in the final issues to be discussed and suggestions for further research can be found.

¹ Ing. Renáta Nešporková, Ph.D., MBA, Michálkovická 1810/181, 71000 Ostrava, Czech Republic, renata.nesporkova@vsp.cz

² Mgr. Růžena Dvořáčková, Michálkovická 1810/181, 71000 Ostrava, Czech Republic, ruzena.dvorackova@vsp.cz

2 The Czech Republic: Business in the Arts

Being "the artist" is not embedded in any professional status within the Czech Republic. The arts is defined by law (121/2000 Sb.). The law stipulates definitions of arts, protective policy and measures, checks the artists performances. Public artistic performances are restricted and defined by a range of statutes and regulations.

Artistic performance can be provided individuals, but more frequently more persons are involved, so the functional management is demanded. Both commercial and nonprofit organizations are regarded suitable for this kind of business.

Within the Czech Republic you can currently find a variety of nonprofit organizations- societies, funds, institutions, church non profits, charitable societies, funded institutions, towns, municipalities, etc (neziskovky.cz, 2015), and any commercial forms – physical entity, free lances, limited liability companies, stock company, societies.

Obligatory data for each of them include - identification number, bank account, trade list, trade registry entry, financial authority, tax office, health insurance registry, social insurance registry, acting in compliance with the author's law.

3 Finance resources

Financial support for the artistic area involves subsidies by government, specific subsidies for specific kind of organization, fundraising. The institutions operating in the area of arts typically utilize multi resourcing.

The below chart depicts financial management of theatres by municipalities and regions. Finance flowing into this area is a part of the municipalities, regions and government budgets.

3.1 Finance and theatres

Theatres were denationalized in 1991, and the transformation process has not been completed. In 2003 the government set up a Program of the governmental support of professional theatres and professional symphonic orchestras and choirs with the budget of 100 mil. Kč (never realized). The objective was to reach systematic approach of the government to pooling money from individual budgets of municipalities, regions and towns. In Table 1 you can see current numbers in financing by towns, regions and in total. Český Těšín and Jihlava are the exception within the Czech Republic, since only these two towns theatre activities are financed by regions by 99 %. Other towns are financed by towns.

Resource	Financial support of theatres	Average rate in %
Town	84 - 97 %	93
Region	0.3 – 9.9 %	4
Program	60 - 70 mil.Kč	3
Total		100

Table	1	Financial	resources	in	CR

Source: Burian (2015)

From the geographical point of view the governmental support flows into Prague (600 mil.Kč), while 60 mil Kč is distributed within the Czech Republic only (10%).

Developments and trends 1995-2014 in the area of artistic activities (theatres namely) can be seen in Table 2. Table 2 and Table 3 describes year to year indexes of selected aspects. It is fairly clear that the trend of the selected aspects fluctuates and has decreasing tendency in all aspects in 2014.

				period			
Aspect	1995	2000	2005	2010	2012	2013	2014
Number of theatres	89	118	121	151	153	152	144
Capacity (number of seats)	30,015	30,223	34,863	36,648	36,789	39,616	38,439
Number of visitors per seat	175	152	143	158	155	149	144
Number of performances in CR	18,527	21,997	24,563	26,883	27,526	27,500	26,045

Table 2 Year to year indexes of selected aspects

Source: NIPOS

Table 3 Year to year indexes of selected aspects

		index	
Aspects	2014/1995	2014/2010	2014/2013
Number of theatres	1.62	0.95	0.95
Capacity (number of seats)	1.28	1.05	0.97
Number of visitors per seat	0.82	0.91	0.97
Number of performances in CR	1.41	0.97	0.95

Source: NIPOS

3.2 Financial resources from municipalities

Municipalities and towns support cultural and artistic activities from their budgets. In a pilot study the authors focused on two towns. The choice can be regarded as a random one, though there are some links between the authors' employer and towns in the field of lifelong learning. The budget taken into consideration was that for the period 2011-2015, the data available from integrated information centre of the government register (IISSP) and the Central system of accounting information (CSÚIS). Towns are located in the Moravia Silesian Region.

Table 4 Bohumín: Financial support of cultural and artistic activities

Bohumín	Costs in total tis.Kč	Costs on culture tis.Kč	Costs on culture %
2015	718,907	15,577	2.17
2014	705,478	14,724	2.09
2013	562,981	14,375	2.55
2012	542,496	15,121	2.79
2011	633,231	14,864	2.35

Source: https://www.mesto-bohumin.cz/cz/samosprava/rozpocet-mesta/

Hlučín	Costs in total tis.Kč	Costs on culture tis.Kč	Costs on culture %
2015	300,048	9,966.5	3.32
2014	233,254	8,532.5	3.66
2013	231,879	10,436.5	4.50
2012	223,302	10,289	4.61
2011	400,583	8,628.3	2.15

Table 5 Hlučín: Financial support of cultural and artistic activities

Source:http://www.hlucin.cz/pro-obcany/samosprava/hospodareni-mesta/hospodareni-mesta.html

The support of cultural and artistic activities from the whole budget seems to be rather minimalistic: within the range from 2.09 % (Bohumín 2014) to 4.61 % (Hlučín 2012). The highest amount of finance 15,577 mil. Kč (is going to be invested) can be noticed in Bohumín in 2015, while the lowest investment of 8,532 mil Kč in Hlučín in 2014 (Table 4 and Table 5).

3.3 Fundraising for the institutions operating in the arts and culture

Fundraising, being understood as "getting or pooling the money" includes a variety of approaches and ways to get the financial and other support for the individual or organization activities. To make fundraising successful you need to set and meet many conditions within the organization and towards the public and prospective donors. For nongovernmental and nonprofit organization or organizations dependent on grants and subsidies the fundraising represents the efficient way how to finance their activities, since these organization are totally unable to cover 100% costs. Fundraising is based on governmental grants, subsidies from a variety of funds (EU funds), funds support, support by private individuals and companies. Generally, fundraising is getting the financial resources from investors at the stock and bond markets. Each organization with the ambition to be successful needs a plan for getting the financial resources to ensure its smooth running. Active, aim focused, and systematic approach is a must. Fundraising for nonprofit organizations is based on the principles of: Principle of complexity; Principle of involvement; Principle of action; Principle of strategy; Principle of training others; Principle of truth; Principle of optimism; Principle of saying thank you; Principle of outcomes. (Boukal, Vávrová, 2007)

Business fundraising means collaboration of nonprofit organist ion with the companies as their donors. The nonprofit organization should wonder about the reasons of the company's willingness to cooperate, since the reasons might be a part of the promotion strategy, a way to invest money, or tax relief. Cooperation with non profits may be tradition for some companies, international included. Another aspect non profits may be interested in is the reason why the companies rejected the plea for support. In the Czech Republic non profits are not trusted; the companies admit lack of knowledge about this kind of "business". (Novotný, 2006)

Representatives of non profits must be well prepared for the fundraising meetings with prospective partners:

- They should be well informed about the nonprofit and the company; names, positions of both sides.
- They should be neat.
- They should ask for financial support in a very polite way.
- They should ask for appropriate amount of money and appropriate deadlines.

- They should talk with enthusiasm.
- They should focus on future, not only at the near money.
- They should encourage the donor to be generous, not to have remorse of the companies are unable to provide support.
- They should have appropriate and relevant information about the project.
- They should not tell lies.
- They should be informed about the donor activities.
- They should not threaten the donor.
- They should keep the speech consistent.
- They should not beg.
- They should not come late.
- They should not ask for money after the project finished.
- They should deal with decision makers.
- They should not ask for inappropriate issues.

If it were not for the efficient fundraising the cultural activities and artistic activities would not exist, there would be no conditions for creative work (Artslexikon, 2015).

3.4 Governmental subsidy

Governmental subsidies can be obtained from the Státní fond kultury ČR., stipulated by the law, regulation on O Státním fondu kultury ČR č. 239/1992 Sb. § 8 which allows supporting the list of activities, cultural projects:

- Support to develop, realize and release activities of great value.
- Publishing in non periodical and periodical publications.
- Getting, maintenance and preserving cultural heritage and pieces of collections.
- Exhibitions and lecturing.
- Promoting the Czech culture in abroad.
- Organizing cultural festival, shows and related cultural activities.
- Supporting cultural projects for developing cultures of in the Czech Republic.
- Supporting non professional artistic activities with great artistic value.
- Protecting, maintaining and completing librarian fund.

Financial support is granted as purposeful grants, or loans of financial support, these may cover two thirds of the planned costs, saving and preserving cultural heritage being the exception: the grant may cover nine tenths of the planned costs. Fund can also act as the guaranty for the bank loan for the project stipulated by law.

3.5 Pros and cons of business in the arts

Non profits active in artistic activities suffer from many bottlenecks - low motivation of donors, low limit for tax deduction, subsidy offered for one year only, inequality in relationship with the state, attitude of public towards non profits, low trust of citizens towards non profits.

Positives of SMEs in the arts can be found in three areas:

- Organization and management Simple organization structure allows direct controlling and immediate check; Head manager is directly involved in controlling, information flows are not disarrayed; Lower costs; Faster reaction to customer needs; Efficient cooperation within the space and time framework; Support from local municipalities; Flexible decision making.
- Human resources Direct contact between the manager, owner and staff; Not anonymous, possibility to compare performance, feedback;Loyalty to company; Active involvement in running, decision making on individual activities; Hiring the staff actors/dancers for individual performance, lower costs.
- Production Opportunity to focus on specific product, nontraditional approaches included; Fast adaptation in case of urgent plan changes; Operational approach towards purchase of inputs; market fluctuation, seasonal differences not being taken into account; Cooperation across various fields of arts; Active involvement in innovation process.
- Sales and marketing Focus on local and specific market needs; Educates customers and prepares tailored made marketing activities with lower costs; Personal contact with customers, flexibility in reactions to needs; Operational reactions to changes in plans of performance, fashion, season, taste.
- Financial management-;Lower capital investment for setting up a business; More financial recourses represent lower risk when developing business plans;;Hiring the staff means lower costs; Outsourcing.

Cons of SMEs in the arts are found in three areas:

- Financial management Difficult access to capital; Delays in cash flow; Low assets share in tangible and intangible property, which means low depreciation; Lack of payment discipline → which means cash flow problems; Necessity to respect norms, which means higher costs.
- Production High rate of labor; Lower quality of technical equipment.
- Human resources controlling Lack of social benefits; No regular working hours; Lack of personnel and intercompany regulations; Lower level of human resources performance.
- Sales and marketing Lower opportunity to influence demand; Limited market; Competition of ,,XD cinemas", discotheques, big screen TVs, Limited resources for advertising.
- Organization and controlling High level of intuition and improvisation; Low managerial skills and knowledge; Superiority of ,,artistic" management; Bohemian approach towards problem solving; Unwillingness to cooperate with other organizations dealing with arts; No strategy; Short term planning (Vojík, 2008).

4 Specific features of management in arts

"Manager" can be described as a person with competences for performing active controlling activity "Arts Management" is the discipline related to management, and applied in the field of arts and culture (Vojík, 2008).

Management typically associated with industrial and for profit companies can, if applied in arts and culture fail. Arts and culture include artistic, cultural, historical performances and related services, developed, presented and disseminated by theatres, visual art, design, architecture, music, opera, film, multimedia, cybernetic arts, cultural heritage). Organizations dealing with culture have specific character and the ambition of management is to interrelate rules of general management with distinctions of arts. DiMaggio describes three pressure trends occurring in culture. Relationship between management (to manage organization and its process problems) and expertise is number one (to manage the quality) resulting in a number of disputes and conflicts, also due to not defined level of expertise (number two). Opportunity for the career promotion of arts managers at the labor market is minimal. Arts management is not described as a profession, it is considered to be a job category only (Hagoort, 2009).

4.1 Setting the strategy

Strategic management in arts was dealt with by B. M. Bank and V. B. Morris in 1993 in the research of five nonprofit organizations. The study revealed that organizations missed the strategy, thus resulting in missing the direction. Some had the strategy published, but not followed. Porter emphasis difficulties of applying economic aspects into arts and culture, and draws attention to distinctive features in arts: unsure position of key art managers, short term projects, tension between the public taste and cultural trends. Wettersröm recommends paying attention to internal factors, esthetic background of audience, and coordination of internal approaches in developing a project).

Once the organization decides to set up a strategy, relevant factors must be analyzed. Project management seems to be ideal. Table 6 describes phases of strategic projects (Hagoort, 2009). Organization can be classified as small, medium and big ones, but still to set up the strategy we have to know:

- Who is the owner, founder, supervisor?
- Who support activities?
- Who are donors?
- Who else contributes?
- Who is competition?
- Who will enjoy our success and failure?
- Who minds our activities?
- Who can teach us? (Vojik, 2008).

These organization frequently strive for life, they focus on arts, neglect financial, political and infrastructural aspects. Strategy setting up and strategy implementation faces permanent resistance: to changes, a decision making process, and ways manager logical strategic choices bring in life. Managers often do not realize that current success cannot be taken for granted, and does not necessary bring success again.

Phase	Document	Key dimension		
Introduction	Introductory document	Strategic motif, art management, cultural mission, strategic team.		
Preparation	Project plan and budget	Strategic motif, interactive project work included.		
Development	Project programming, research results	Beginning of evaluation phase, research of environment, opportunities, SW analysis of the quality of artistic and creative processes.		
Production	Project results	Strategic plan. Realization plan.		
Function	Realization plan	Strategic plan/Realization plan		
Conclusion	Evaluation report	Realization plan		

Table 6 Phases of strategic projects

Source: Hagoort (2009)

4.2 Organization structure

If cooperation and delegation do not occur, the mission cannot be reached, structure should follow the strategy. Creative artistic teams have longer time duration than defined goals. Strategic management finds difficult to cut off previous approaches. Structure is based on principles of - division of labor – no odd activities, coordination of activities – giving responsibility. The life cycle of "business", its size and ethics must be team into consideration as well.

4.3 Leadership

While managers control, leaders inspire, leaders stimulate teams for higher performance but also for their own satisfaction. Like the orchestra conductors the leaders can control people working on the common task (Finn, Jedlicka, 1998).

The arts leader exhibits four managerial roles - Leader, Manager, Entrepreneur, Employer. The extend the manager fulfils the roles depends on each organization, each situation, each personality. Mintzber refers management as a complex job. The arts manager interrelates ten roles defined by Mintzberg:

- Representative for the ceremonies.
- Manager responsible for staff and work done.
- Intermediary for getting contacts (outside the hierarchy).
- Controller monitoring the environment.
- Person for sharing and spreading information.
- Intermediary joining workplace with the outer world.
- Entrepreneur balancing the business with environment.
- Protector suppressing the outer influences.

Distributor dealing with resources of labor, time, and finance. Negotiator for conflict solving and daily routine (Finn, Jedlicka, 1998).

5 Conclusions

Dynamic trends can be observed in arts and culture within the European Union. These areas are key areas for developing creative society, which can have positive impact as the added value on economy. The authors analyzed information available from the documents publicly open, and realized that organizations operating in arts and culture are not sufficiently supported by the government; their impact on the society is permanently underestimated. Most relevant findings concern especially the economic control of theatres:

- Insufficient support of local, and regional theatres.
- Governmental grants preferred for theatres in Prague.
- Support by regions is minimal and unbalanced.
- Obsolete system of financing prevails.

Solutions suggested:

- To update the system of financial support.
- Set up legislative framework for theatres and organization operating in arts and culture.
- Set up multi resourcing parameters.
- Set up responsibilities for different levels of public administration.

- Establish balance between regions in government grants.
- Set up legislation framework for institution operating in arts and culture as a public legal form (veřejno právní instituce v kultuře (VPI).

VPI is a modern form supported by contributions of public administration and is typical for principles of:

- Multi resources financial support, cooperative and long term
- Multi founding by more subjects of public administration,
- No political concern,
- Independence in labor law relations,
- Setting up a business,
- Tax deduction system change (VAT).

References

- ARTSLEXIKON.CZ. *Fundraising*. [online]. [cit. 2015-08-06]. Available online: http://artslexikon.cz/index.php/Fundraising>.
- ASOCIACEDIVADEL.CZ. 2015. [online]. [cit. 2015-08-01]. Available online: .

BOUKAL, P. 2013. Fundraising pro neziskové organizace. Praha: Grada publishing.

- BOUKAL, P. and VÁVROVÁ, H. 2007. *Ekonomika a financování neziskových organizací*. Praha: Oeconomica.
- BURIAN, J. 2015. *Transformace správy a financování živého umění v České republice*. [online]. [cit. 2015-08-06]. Available online: http://www.divadelni-noviny.cz/transformace-spravy-a-financovani-ziveho-umeni-v-ceske-republice>.
- DONELLY, J. H., GIBSON, J. L. and IVANCEVICH, J. M. 1997. *Management*. Praha: Grada Publishing.
- FINN, D. and JEDLICKA, J.A. 1998. On the Art of Leadership, Building Business-Art Alliances, Abevile Publication Group, New York.
- HAGOORT, G. 2009. Umělecký management v podnikatelském stylu. Praha: KANT.
- MKCR.CZ. 2015. *Státní fond kultury ČR*. [online]. [cit. 2015-08-06]. Available online: http://www.mkcr.cz/cz/statni-fondy/statni-fond-kultury-cr/legislativni-aj--predpisy-198/.
- MORGAN, G. 1993. Imaginization: the art of creative management. San Francisco.
- NEZISKOVKY.CZ. *O neziskových organizacích*. [online].[cit. 2015-07-16]. Available online: .
- NIPOS. 2015. *Kultura České republiky v číslech. Vybrané údaje ze statistických šetření*. [online]. [cit. 2015-08-01]. Available online: http://www.nipos-mk.cz/wp-content/uploads/2013/05/1_Kultura-v-%C4%8D%C3%ADslech_2015_web.pdf>.
- NOVOTNÝ, J. 2006. Ekonomika a řízení neziskových organizací: (zejména nevládních organizací). Praha: Oeconomica.
- VEBER, J. 2009. Management. Praha: Management Press.
- VOJÍK, V. 2008. *Podnikání v kultuře a umění Arts management*. 1.vyd. Praha: ASPI-Wolters Kluwer.

Zákon č. 121/2000 Sb. *Autorský zákon*. Zákon č. 239/1992 Sb. *O Státním fondu kultury České republiky*

Assessment of Living Standards and Deprivation in the Context of Quality of Life in the EU Countries

BIBIÁNA NOVÁKOVÁ¹ Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

The aim of the paper is assessment of living standards and deprivation in the context of quality of life (QOL) in the EU countries by the means of indicators made of subjective evaluations of the EU citizens which replied to the questionnaires in European Quality of Life Survey 2012 (EQoLS). These indicators complement traditional indicators of economic growth and living standard (e.g. GDP or income) and permit a multidimensional perspective on QOL, and are more inclusive of social aspects of progress. First goal of the paper is to calculate the integrated indices of living standards and deprivation for the EU countries in 2012, and based on that to create the clusters of the EU countries with similar characteristics. Second research goal explores relationship between subjective perception of living standards and deprivation and overall life satisfaction. Main contribution of the paper is assessment of living standards and deprivation in the EU countries and emphasis on the fact that overall life satisfaction is shaped by various dimensions of life.

Key words: Living Standards and Deprivation, Quality of Life, Integrated Index

JEL Classification: I30, I31, I32

1 Introduction

QOL has been recently the subject to extensive research and discussion. There does not exist one definition or unified methodology for its measurement. Its assessment contains objective conditions of life and also subjective perception of life conditions of individuals. This paper is focusing on subjective evaluation of living standards and deprivation of the EU citizens as the one of many dimensions of QOL. Theoretical framework contains brief overview of QOL and related literature. The next part contains description of used data and methodology. Analytical part deals with calculation of integrated indices of living standards and deprivation for the EU countries in 2012, and based on that, it further deals with the creation of the EU countries clusters with similar characteristics. In the next part, the effects of self-perceived standard of living and deprivation on overall life satisfaction are explored. Final part contains conclusion and evaluation of research results.

2 Theoretical Framework

2.1 Quality of Life

QOL represents complex, multi-dimensional concept, for which there is no uniform, universally accepted definition (Apparicio et al., 2008; Das, 2008; Ira and Andráško, 2007; Ulengin et al., 2001). According to Fayers and Machin (2000) QOL shows the difference between hopes and expectations of individuals and their present experience. Various disciplines, e.g. economics,

¹ Ing. Bibiána Nováková, Němcovej 32, 040 01 Košice, Slovak Republic, bibiana.novakova@tuke.sk

theology, psychology, medicine or geography deal with QOL and its measurement. In the field of QOL assessment there is no standard method for selection of indicators (Diener, 1995; Šoltés and Gavurová, 2014b). Murgaš (2009) points to the importance of precise definition of explored area of QOL for better understanding and assessment of QOL.

QOL is described as a broader concept than economic production and living conditions (Stiglitz et al., 2009; Gavurová et al., 2014). It can include various factors which affect individual evaluation of life above its material page. Related research papers investigate QOL from different aspects which imply its multidimensional character (Eby et al., 2012; Li and Weng, 2007; Mulvey, 2002; Turksever and Atalik, 2001). Report about Multidimensional measurement of the QOL (Eurostat, 2011), based on recommendations of Stiglitz et al. (2009), encourages a creation of multidimensional indicators of QOL. Eurostat distinguishes 8+1 dimensions of QOL, namely: Material living conditions, Productive or main activity, Health, Education, Leisure and social interactions, Economic and physical safety, Governance and basic rights, Natural and living environment and Overall experience of life.

Ďzuka (2004) distinguishes between the objective QOL which evaluates objective conditions of the life of people who are not the subject of psychological research; the subjective QOL based on the judgment and evaluation of the conditions of life; and the subjective well-being which includes expressed emotional system and assessment of the conditions of our lives.

QOL indicators can be used as inputs for calculation of the overall aggregate indices. Aggregate index is a dimensionless number that has many advantages, e.g. transparency, possibility of simple comparisons, and aggregation of various values. However, frequent disadvantages of indices are distortion of results and exclusion of relevant variables. Moreover, issue of relevance and individual choice of weights in the index is often influenced by the subjective opinion of the researcher (Heřmanová, 2012; Šoltés and Gavurová, 2014a). Calculation of various QOL indices has been the subject of various research papers (e.g. Weziak-Bialowolska, 2014; Chan et al., 2005; etc.)

2.2 QOL and Living Standards and Deprivation

According to Deaton (2008), income and health are the most influential determinants in most evaluations of human well-being. Findings from several research studies confirm that the impact of wealth on reported satisfaction of citizens in countries with higher level of economic development is weaker (e.g. Frey and Stutzer, 2002; Veenhoven, 2005, etc.).

On the other hand, it is important to take into consideration the Inglehart's theory based on diminishing impact of material living conditions on life satisfaction at higher levels of human and social development. This theory is related to changes of value system in post-modern societies, where the needs of a higher order (self-realization and self-expression) became more important. In other words, satisfaction with basic material needs is less important for affluent people compared to poorer people (Inglehart, 1997; Inglehart and Welzel, 2007).

Eurofound (European Foundation for the Improvement of Living and Working Conditions, 1975) is a tripartite European Union Agency, providing information, advice and expertise in the field of living and working conditions, industrial relations and managing change in Europe. One of the activities of Eurofound is The European Quality of Life Survey (EQLS) designed to document and

analyse QOL in the EU. It began in 2003 and was repeated in 2007 and 2011 (Eurofound, 2015). Nevertheless, Europe belongs to the wealthiest areas in the world, many households have difficulties in making ends meet and experience decrease in their standard of living. Also, there are significant differences between regions in term of threat to economic exclusion (Eurofound, 2005). The living standard of citizens can be measured in relative conditions compared to other people or in absolute conditions (e.g. satisfactions with different life areas). It reflects the fact whether people live in poverty (Weziak-Bialowolska, 2014).

Eurostat recommends using both subjective and objective indicators to make assessment of the selected domain of QOL more integral. Many authors confirm importance of usage both subjective and objective measures of QOL (Aallardt, 1986; Diener, 2005; Stiglitz et al., 2009).

Material deprivation is defined as a limited access to recourses, in case of people cannot afford to consume goods and services which are standard for society where they live (Townsend, 1987). People who are materially deprived are excluded from accepted way of life of society, because of inadequate recourses (Layte et al., 2001). According to Eurofound (2012), material deprivation is inability to afford items that are considered essential. Measure of material deprivation contains ability of households to afford six basic requirements. This measure better represents financial strain than income. Further, an important determinant in shaping QOL is insecurity about future. People with relatively high standards of living and suffering little or no material deprivation can be influenced by the fear of losing such standard. Many Europeans suffer the insecurity about future (Eurofound, 2012).

3 Data and Methodology

3.1 Data

For our analysis and calculations of indices we used data from Eurofound, European Quality of Life Survey (EQoLS) 2012, in aggregate form for each country from interactive database on the website of Eurofound. Specifically, we worked with data obtained from EQoLS 2012 questionnaire about dimension - Standard of living and deprivation in the EU-28. EQoLS questionnaire contains 15 questions in this dimension about: ability of households making ends meet, ability of households to afford six basic requirements (level of material deprivation), and arrears to pay loans, mortgage payments, bills etc., expected financial situation and financial situation compared to most people in the country.

To calculate the integrated index of standard of living and deprivation we used next subjective indicators made from answers to the questions from EQoLS 2012:

- **Y11_Deprindex**: Deprivation index: Number of items household cannot afford, (in mean value),
- **Y11_Q57**: Financial situation of the household compared to most people in the country (people who tagged option much worse), (in %),
- **Y11_Q58**: Is your household able to make ends meet? (% of people who tagged option with great difficulty),
- **Y11_Q59a**: Can you afford to keep your home adequately warm? (% of people who tagged option no),
- **Y11_Q59b**: Can you afford to pay for a week's annual holiday away from home? (% of people who tagged option no),

- **Y11_Q59c**: Can you afford to replace any worn-out furniture? (% of people who tagged option no),
- **Y11_Q59d**: Can your household afford a meal with meat, chicken or fish every second day (if you wanted it)? (% of people who tagged option no),
- **Y11_Q59e**: Can members of your household afford to buy new, rather than second-hand clothes? (% of people who tagged option no),
- **Y11_Q59f**: Can your household afford to have friends or family for a drink or meal at least once a month? (% of people who tagged option no),
- **Y11_Q60a**: Has your household been in arrears for rent or mortgage payments in the last 12 months? (% of people who tagged option yes),
- **Y11_Q60b**: Has your household been in arrears for utility bills in the last 12 months? (% of people who tagged option yes),
- **Y11_Q60c**: Has your household been in arrears for payments related to consumer loans in the last 12 months? (% of people who tagged option yes),
- **Y11_Q60d**: Has your household been in arrears for payments related to informal loans in the last 12 months? (% of people who tagged option yes),
- **Y11_Q65**: Financial situation of the household compared with 12 months ago, (% of people who tagged option better),
- **Y11_Q66**: Expected financial situation for the next 12 months, (% of people who tagged option better).

We used ISO codes of the EU-28 countries, namely: AT-Austria; BE-Belgium, BG-Bulgaria, CY-Cyprus, CZ-Czech Republic, DE-Germany, DK-Denmark, EE-Estonia, EL-Greece, ES-Spain, FI-Finland, FR-France, HR-Croatia, HU-Hungary, IE-Ireland, IT-Italy, LT-Lithuania, LU-Luxemburg, LV-Latvia, MT-Malta, NL-Netherlands, PL-Poland, PT-Portugal, RO-Romania, SE-Sweden, SI-Slovenia, SK-Slovakia, UK-United Kingdom.

3.2 Calculation of Integrated Indices

For the last decades, economic situation and development of countries has been often confronted with the social development and QOL of people. Increase in QOL of citizens is considered as desirable trend. Assessment of QOL should be performed on international, national and regional level. To evaluate and analyse domain of living standards and deprivation we calculate the integrated indices for every EU country. Individual indicators (variables) are transformed to a consistent scale (0, 1) according to the next formula (1) and (2) based on (Huba et al., 2000):

$$I_{xi} = (\max x_i - x_i) / (\max x_i - \min x_i),$$
(1)

if desirable development is increasing with max x_i ,

$$I_{xi} = (x_i - \min x_i) / (\max x_i - \min x_i),$$
(2)

if desirable development is increasing with $\min x_i$,

where x_i is value representing the performance value of the certain indicator and I_{xi} is calculated partial index of certain indicator for *i*-th country.

Integrated index of living standards and deprivation is further calculated according to the next formula (3):

$$I = (I_1 + I_2 + I_3 + I_4 + \dots + I_n)/n,$$
(3)

where I_n is partial index of certain variable and n is number of partial indices.

4 Findings

4.1 Partial and Integrated Indices of Living Standards and Deprivation in the EU-28

Partial and integral indices of living standards and deprivation in the EU-28 were computed using data from Eurofound as was described in previous chapter. Partial indices for every indicator in *i*-th country were calculated by the means of formula 1 in cases where increase is desirable trend or formula 2 in cases where increase is undesirable trend to ensure that growth of indices represents the higher living standards and deprivation quality. Integrated indices in *i*-th country were calculated by applying formula (3).

Calculated integrated indices (according to formula (3)) in the EU-28 in 2012 are presented in Figure 1.



Figure 1 Integrated living standards and deprivation indices in the EU-28 in 2012 Source: Own calculations based on data from Eurofound database

In the Figure 1 we can see that the highest integrated index of living standards and deprivation in 2012 was calculated in Sweden. We can divide the EU-28 according to the values of integrated indices into 5 groups from the best performing countries with the highest values of indices to the worst. The best performing group of countries is formed by Austria, Denmark, Finland, Luxemburg and Sweden with values of index from the interval (0.8; 1.0). The second group consists of Belgium, Germany, Estonia, France, Ireland, Malta, Netherlands, Slovenia and United Kingdom (0.6; 0.8). The third group consists of Czech Republic, Estonia, Croatia, Italy, Lithuania, Portugal and Slovakia (0.4; 0.6). The fourth group is formed by Bulgaria, Cyprus, Hungary, Latvia, Poland and Romania (0.2; 0.4). The lowest value of index (0.17) was calculated in Greece.

4.2 Living Standards and Deprivation Clusters of the EU-28

To form group of countries with similar characteristics focusing on subjective perception of the EU-28 citizens about their living standards and deprivation, we decided to make cluster analysis, specifically, hierarchical (tree) clustering. The results for all living standards and deprivation, indicators are displayed as a tree diagram called a dendrogram in Figure 2. Cluster analysis requires the specification of the optimal number of clusters to extract. We used a plot of the within groups sum of squares by number of clusters extracted. Further, we ran cluster analysis with 5 clusters. Data were normalized in the scale from 0 to 1. These calculations were made in the statistical software R.

Cluster Dendrogram



dmatica hclust (*, "ward.D") Figure 2 Hierarchical clustering for living standards and deprivation indicators in the EU-28 in 2012 Source: Own calculations in R based on data from Eurofound database

Cluster analysis formed 5 clusters of countries which were similar to those in the previous part. For deeper analysis we calculated average values of selected objective indicators of living standards for every cluster (GDP per inhabitant and median equivalised net income) and compared them to our integrated indices.

	Countries	GDP per Inhabitant, (in PPP)	Median equivalised net income, (in PPS)	Integrated index of living standards and deprivation
1. Cluster	AT, DK, FI, LU, SE	38 780	20 813	0.90
2. Cluster	BE, FR,DE, IE, IT, NL, SI, ES, UK	26 650	16 901	0.69
3. Cluster	CZ, HR, MT, PT, SK	19 440	10312	0.53
4. Cluster	BG, EE, LT, LV, HU, RO, PL	16 114	6 624	0.38
5. Cluster	CY, EL	21 450	14 569	0.26

Table 1 Characteristics of clusters based on the values of integrated indices of living standards and deprivation

Source: Own calculations in MS Excel based on data from Eurofound and Eurostat database

As we can see from the table, the first cluster includes countries with the highest values of all selected indicators. This cluster is formed by high developed economics which is reflected also in subjective perception of citizens about standard of living. The second cluster has on average lower values of objective indicators but accordingly lower values of integrated indices. The third cluster contains Slovakia and Czech Republic which are, in accordance with this analysis, in better position when compared to remaining countries from the Visegrad group (Hungary and Poland) in the fourth cluster. The fifth cluster contains Cyprus and Greece which are characterised by high differences between objective indicators (income and GDP) and subjective perception of living standards and deprivation of their citizens. This can be a consequence of economic turmoil and crisis in Greece where citizens can perceive worsening of their living standards, which can be higher than in other countries with similar objective indicators (e.g. Czech Republic).

4.3 Standard of Living and Deprivation and Overall Life Satisfaction in the EU-28

Despite changes in the value system of people in wealthier areas in the world, subjective perception of living standards and deprivation has an influence on overall satisfaction with life. According to Zagórsky (2010), the post-modern period is characterised by process of decreasing importance of income and material living conditions on overall life satisfaction. This fact does not mean irrelevance of material conditions but their diminishing impact on happiness. Figure 2 reflects on relationship between integrated index of standard of living and deprivation and subjective overall life satisfaction.



Figure 3 Relationship between the values of integrated index of living standards and deprivation and satisfaction with life as a whole in the EU-28 in 2012 Source: Own calculations based on data from Eurofound database

Correlation coefficient was 0.874, which means that there was a strong positive relationship between living standards and deprivation and overall life satisfaction in the EU-28 in 2012.

5 Conclusion

The paper dealt with assessment of one dimension of QOL in the EU-28, living standards and deprivation by the calculation of integrated indices from relevant indicators by Eurofound.

Calculation of indices was followed by formation of five clusters from Member States based on cluster analysis, from the best performing countries to the worst and comparison with other important indicators (GDP and income). The best performing countries, according to this analysis, were those with the highest values of GDP and income which was also reflected in better subjective perception of living standards and higher levels of overall life satisfaction confirmed by correlation analysis at the end of the analysis.

We have to take into consideration that living standards and deprivation are complex issues in which a larger amount of relevant indicators is needed to avoid misleading information leading to the ineffective policy recommendations. On the other hand, aggregate information could be misleading due to large differences (e.g. income or cultural) between various groups and households. There can be still significant proportion of people who suffer material deprivation, have problems with making ends meet and state low satisfaction with their standard of living, inside countries where the value of integrated index is relatively high (Eurofound, 2012). Furthermore, important aspect which can affects QOL is insecurity of future and fear of losing required standard of living level. Some social groups (e.g. retired) can be vulnerable more than others. Therefore, deeper analysis of different social groups which was beyond the scope of this article could be useful. We did not take into consideration time aspect and analysis of longer time period which could recognize interesting trends and development of satisfaction trends and perception of living standards and deprivation among Member States due to scope limitations.

References

- AALLARDT, E. 1986. Having, loving, being: An alternative to the Swedish model of welfare research. The Swedish approach to welfare research. In M. Nussbaum & A. Sen (Eds.), *The quality of life* (pp. 88–95). Oxford: Clarendon Press.
- APPARICIO, P., SEGUIN, A.-M. and NAUD, D. 2008. The quality of the urban environment around public housing buildings in Montréal: An objective approach based on GIS and multivariate statistical analysis. In: *Social Indicators Research*. Vol. 86, No. 3, pp. 355–380.
- CHAN, Y.K., KVAN, Ch. and SHEK, T. 2005. Quality of Life in Hong Kong: The Cuhk Hong Kong Quality of Life Index. In: *Social Indicators Research*. Vol. 71, pp. 259–289.
- DAS, D. 2008. Urban quality of life: A case study of Guwahati. In: *Social Indicators Research*. Vol. 88, No. 2, pp. 297–310.
- DEATON, A. 2008. Income, Health, and Well-Being around the World: Evidence from the Gallup World Poll. In: *Journal of Economic Perspectives*. Vol. 22, No. 2, pp. 53–72.
- DIENER, E. 1995. A value based index for measuring national quality of life. In: *Social Indicators Research*. Vol. 36, pp. 107–127.
- DIENER, E. 2005. *Guidelines for National Indicators of Subjective Well-Being and Ill-Being. Guidelines for National Indicators.* University of Illinois. Available online: http://internal.psychology.illinois.edu/~ediener/.
- DŽUKA, J. 2004. Psychologické dimenzie kvality života. Kvalita života a subjektívna pohoda teórie a modely, podobnosť a rozdiely. Prešov: Prešovská univerzita v Prešove.
- EBY, J., KITCHEN, P. and WILLIAMS, A. 2012. Perceptions of quality life in Hamilton's neighbourhood hubs: A qualitative analysis. In: *Social Indicators Research*. Vol. 108, No. 2, pp. 299–315.

- EUROFOUND. 2012. Third European Quality of Life Survey Quality of life in Europe: Impacts of the crisis. Luxembourg: Publications Office of the European Union.
- EUROFOUND. 2015. European Quality of Life Surveys. Available online: http://www.eurofound.europa.eu/european-quality-of-life-surveys-eqls. Accessed 15 March 2015>.
- EUROSTAT. INSEE. 2011. Report of the Task Force: Multidimensional measurement of the quality of life. Available online: http://ec.europa.eu/eurostat/documents/42577/43503/TF3-Final-report-Quality-of-Life. Accessed 15 May 2015.
- EUROSTAT. 2015. Database. Available online: http://ec.europa.eu/eurostat/data/database>. Accessed 15 March 2015.
- FAYERS, P.M. and MACHIN, D. 2000. *Quality of life. Assessment, analysis and interpretation*. Chichester: Wiley.
- FREY, B. S. and STUTZER, A. 2002. *Happiness & economics*. Princeton: Princeton University Press.
- GAVUROVÁ, B., ŠOLTÉS, M. and BALLONI, A.J. 2014. The Economic Importance of Using of ICT in the Health System. In: *Ekonomický časopis*. Vol. 62, No. 1, pp. 83-104.
- HUBA, M., IRA, V., HANUŠIN, J., LEHOTSKÝ, M. and SZÖLLÖS, J. 2003. Regional aspects of development towards sustainable Slovakia. In: Ekológia. Vol. 22, No. 2, pp. 66-78.
- HEŘMANOVÁ, E. 2012. Koncepty, teorie a měření kvality života. Praha: Sociologické nakladatelství (SLON).
- INGLEHART, R. 1997. *Modernization and postmodernization*. Princeton: Princeton University Press.
- INGLEHART, R. and WELZEL, C. 2007. *Modernization, cultural change, and democracy—the human development sequence.* Cambridge: Cambridge University Press.
- IRA, V. and ANDRÁŠKO, I. 2007. Kvalita života z pohľadu humánnej geografie. In: *Geografický časopis*. Vol. 59, pp. 159-179.
- LAYTE, R., MAITRE, B., NOLAN, B. and WHELAN, C.T. 2001. Persistent and Consistent Poverty in the 1994 and 1995 Waves of the European Community Household Panel Survey. In: *Review of Income and Wealth*. Vol. 47, No. 4, pp. 427-449.
- LI, G. and WENG, Q. 2007. Measuring the quality of life in city of Indianapolis by integration of remote sensing and census data. In: *International Journal of Remote Sensing*. Vol. 28, No. 1– 2), pp. 249–267.
- MULVEY, A. 2002. Gender, economic context, perceptions of safety, and quality of life: A case study of Lowell, Massachusetts (U.S.A.), 1982–96. In: *American Journal of Community Psychology*. Vol. 30, No. 5, pp. 655–679.
- MURGAŠ, F. 2009. Kvalita života a jej priestorová diferenciácia v okresoch Slovenska. In: *Geografický časopis*. Vol. 61, pp. 121-138.
- STIGLITZ, J. E., et al. 2009. *Report of the commission on the measurement of economic performance at social progress.* http://www.stiglitz-senfitoussi.fr/documents/rapport_anglais.pdf. Accessed 25 May 2015.
- ŠOLTÉS, M. and GAVUROVÁ, B. 2014a. Identification of the Functionality Level of Day Surgery in Slovakia. In: *Ekonomický časopis*. Vol. 62, No. 10, pp. 1031-1051.

- ŠOLTÉS, V. and GAVUROVÁ, B. 2014b. The Functionality Comparison of the Health Care Systems by the Analytical Hierarchy Process Method. In: *E+M Ekonomie a Management*. Vol. 17, No. 3, pp. 100-118.
- TOWNSEND, P. 1987. Deprivation. In: Journal of Social Policy. Vol. 16, No. 2, pp. 125-146.
- TURKSEVER, A. N. E. and ATALIK, G. 2001. Possibilities and limitations for the measurement of the quality of life in urban areas. In: *Social Indicators Research*. Vol. 53, No. 2, pp. 163–187.
- ULENGIN, B., ULENGIN, F. and GUVENC, U. 2001. A multidimensional approach to urban quality of life: The case of Istanbul. In: *European Journal of Operational Research*. Vol. 130, No. 2, pp. 361–374.
- VEENHOVEN, R. 2005. Apparent quality-of-life in nations: How long and happy people live. In: *Social Indicators Research*. Vol. 71, No. 1–3, pp. 61–86.
- WEZIAK-BIALOWOLSKA, D. 2014. Spatial Variation in EU Poverty with Respect to Health, Education and Living Standards. In: *Social Indicators Research*.
- ZAGÓRSKY, K. 2010. Income and Happiness in Time of Post-Communist Modernization. In: *Social Indicators Research*. Vol. 104, pp. 331–349.

Barriers for BIM (Building Information Modeling) Adoption

VLADIMÍR NÝVLT¹ – TEREZIE VONDRÁČKOVÁ² – VĚRA VOŠTOVÁ³ ^{1,2}The Institute of Technology and Business in České Budějovice Czech Republic ³Czech Technical University in Prague, Faculty of Transportation Sciences Czech Republic

Abstract

BIM has a big potential to support all areas in building industry with both information and data in time, and tools needed to handle with data. Contribution in particular activities, spread from design through various building activities to maintenance of completed facilities varies significantly. This variety in approach and adoption of BIM tools creates "barriers" in BIM implementation processes. The chapter tries not to focus on one aspect, but trying to identify and evaluate more aspects contributing to general low acceptance of BIM adoption, and identify where to look for solutions, and where to focus further research.

Key words: Building Information Modelling, BIM Adoption, Culture Changes, Barriers to Implementation, Civil Engineering

JEL Classification: M11, O14, O32

1 Introduction

Building Information Modeling (BIM) has been originally defined as a part of CAD systems, or "CAD paradigm". This led to creation of "a set of interacting policies, processes and technologies generating a methodology to manage the essential building design and project data in digital format throughout the building's life-cycle" (Succar, 2009). Building Information Modelling is rapidly gaining acceptance of building industries internationally, and is likely to become the primary industry standard for AEC information exchange in near future. The built-in intelligence of BIM offers the highest potentials for adopting lean approaches for project delivery, and minimizing of risks and uncertainties enabling highly sustainable procurement sytems for the building industry.

2 BIM – New Paradigm Shift

While literature present identification of barriers for BIM adoption inside organisations, we lack identification of mutual dependencies and importance of mutual relations among barriers identified. Try then to deduce these relations. It may help adopters to consider worst barriers during the implementation process and adopt a strategy to overcome these. BIM as it is commonly referred to, is digital representation of physical and functional characteristics of a

 ¹ Ing. Vladimír Nývlt, MBA, Okružní 10, 370 01 České Budějovice, Czech Republic, nyvlt@mail.vstecb.cz
 ² Ing. Terezie Vondráčková, Ph.D., Okružní 10, 370 01 České Budějovice, Czech Republic,

vondrackova@mail.vstecb.cz

³ Prof. Ing. Věra Voštová, CSc., Konviktská 20, 110 00 Praha 1, Czech Republic, vostover@fd.cvut.cz

building creating a shared knowledge resource for information about it forming a reliable basis for decisions during its life cycle, from earliest conception to demolition.

With targets to impement BIM by new adopters in Building Industry, these adopters need to be aware of what must be overcome during the process. The importance of each barrier is therefore vital to adopters as a tool to determine where to focus their energy as thay seek to implement BIM. Furter findings allow adopters to consider the worst berrier during the implementation process and adopt a strategy to ovecome these.

Lack of Senior Management Support

Ruikar et al (2005) suggest a number of reasons why senior managers are reluctant to introduce new technologies and processes into their organisations. However, management support for the introduction of new technologies and processes is essential if the benefits are to be realised. Arayici et al (2011) suggest a bottom-up approach with *"learning by doing"* is a more efficient means of BIM implementation and dealing with resistance to change rather than top-down approach. However, they suggest that successful implementation is as much about people and processes as it is about the software and hardware used. They acknowledge that a Knowledge Transfer Partnership (KTP) was put into place to start the process. This shows "buy-in" from senior management.

Jung and Joo (2011) further confirm this by showing that the strategy and policy for specific levels of adoption is necessary to accelerate practical BIM implementation. Coates et al. (2010) suggest Key Performance Indicators (KPI's) which can be used by management to measure the success of the implementation. Without this there is a lack of the vision of the success that implementation can bring and documentation of the benefits from a senior manager standpoint. It can also be difficult for senior management personnel with financial expertise, to identify the monetary value of BIM implementation (Giel et al., 2010). It is common to carry out Return On Investment (ROI) calculations when considering a purchase that has clearly identifiable costs and benefits (Azhar, 2011; Giel et al., 2010).

Cost of Implementation (Software and Training)

Implementing BIM necessitates organisation to purchase the pertinent software and hardware and train their staff in the use of that software. The impact of that cost may vary according to the financial standing of the organisation. The high front-end cost of implementing BIM has been seen to act as a significant barrier to uptake within the construction industry (Azhar, 2011; Giel et al., 2010). However, Aranda-Mena et al. (2008) disagree indicating using case study research to indicate "consistent disagreement" with a position of high implementation costs associated with resources and expenses. In this context the evidence of the potential of BIM to reduce re-work, delays and ultimately cost, has not gone unnoticed by professionals in industry (Ahmad et al, 2010; BIMhub, 2012). However, construction is as much about business as it is about building (Lowe and Leiringer, 2006). Therefore it is essential for those with commercial responsibilities within a contracting organisation to investigate the business case for implementing BIM (Giel et al., 2010). BIM however, is not just a software package, but also a process (Arayici et al., 2011). While a process results in a beneficial outcome, Thompson and Miner (2010) show that the cost of its implementation must be paid for as well. Software packages need updates and therefore it is also necessary to consider the fact that BIM software packages will periodically need updated. which is an added cost (Lee et al., 2012).

Scale of Culture Change Required

Introducing new processes into an organisation involves the shifting of the culture of the organisation, which carries with it, risks and challenges that are not limited to financial considerations, but also include the flexibility or versatility of the organisation's people and systems (Ahmad et al, 2010). These factors impact on the strategic decisions taken by management, who must constantly refer to and augment their business plan, in an on-going effort to ensure business success (Langford and Male, 2001). Part of this process involves assessing the organisation's strengths and weaknesses with regard to, amongst other things: people, finances, systems and physical resources. The implementation of BIM necessitates dramatic changes in business practices (Jordani, 2008; Mihindu and Arayici, 2008). This requires a large culture change within the organisation as in a SWOT analysis, senior management feel that by implementing BIM, they would simply be aligning their weaknesses with the threats in their external operating environment (Langford and Male, 2001). This has contributed to the relatively gradual adoption of BIM within the construction industry (Watson, 2010).

Other Competing Initiatives

Another factor which acts as a barrier to BIM up-take is the number of on-going initiatives that organisations are already engaged in. There are movements to reform industry practice (in both the financial and construction elements), reduce waste and drive better value for money from procurement of construction. Construction clients are increasingly setting quality, health and safety, and environmental performance targets as contractual obligations (Harris and McCaffer, 2006). In order to maintain or attain their status as competent in these areas, contractors are regularly involved in training and assessment activities, in order to become accredited by the relevant bodies (Harris and McCaffer, 2006). This represents a significant resource commitment to organisations in terms of finance and time, and to add the introduction of a new technology which requires such a culture change may just not make business sense to senior management.

Social Aspects

Barriers from point of social realtionships has been described by Szabo and Sidor (2014) for systems. Together with their findings we argue that adoption of BIM systems can induce changes in the strategy. It is therefore necessary to focus on the critical social aspects such as organizational culture leadership style, and communiacation within the organization or within a project team.

Lack of Supply Chain Buy-in

BIM is seen as a driver for collaboration (Efficiency and Reform Group, 2011). The opportunity exists for front-end designers to collaborate with clients, main contractors, sub-contractors and fabricators, and other members of the supply chain for the purpose of integrated project delivery (Eastman et al, 2011). It follows then, that contractors aiming to provide collaborative BIM services to their clients will require their sub-contractors and fabricators to be "BIM literate". As main contracting organisations who are considering implementing BIM could arguably be described as the "early majority", it may be difficult for them to secure the competencies further down the supply chain, to fully exploit BIM's potential (Ruikar et al, 2005; Jung and Joo, 2011). It is essential, if the benefits associated with improved collaboration are to be achieved, that the BIM software packages in use by different project participants are "interoperable" (Pniewski, 2011). Interoperability has been defined as " … the ability of two or more systems or components

to exchange information and to use the information that has been exchanged" (IEEE Standards Board, 1990). Truly interoperable applications should be able to seamlessly exchange data, without introducing the possibility of introducing human error by requiring data duplication at interface (Moon et al, 2011).

Without this, the concept of collaboration is a farce, and BIM, instead of streamlining communication in the supply chain, will act as a barrier (Azhar et al, 2011). The more organisations involved the greater the difficulty as the variety of software programmes increases the further down the supply chain collaboration is required. Further, if the investment in BIM software represents a financial burden to large main contractors, it could potentially be financially out of reach for their sub-contractors. The technological maturity of companies in the supply chain is vital as *"many do not posses the technology or know-how to take advantage of such innovations without significant financial and human-resource investment*" (Aouad et al, 2006). This can be a significant barrier to implementation of BIM from a project standpoint.

Staff Resistence and ICT Literacy

A study by Mitchell and Demian (2006), on the implementation of construction project extranets CPEs, commented that it is common to encounter a resistance to change from staff. Distinct staff resistance to the adoption of new technologies and processes can also be witnessed (Ruikar et al., 2005). This is the case especially when staff consider that they have been given insufficient training and/or that the technology may threaten their employment (Ruikar et al., 2005). Arayici et al (2009) conclude that the construction industry has been slow to tackle this resistance to change. Aouad et al. (2006) further indicate a lack of skilled BIM operatives in the industry as a significant barrier to BIM adoption. Arayici et al. (2009) suggest that a skill gap has arisen due to BIM implementation.

Legal Uncertainties

Oluwole (2011) identifies the following legal issues with BIM: duty of care including ownership and intelctual property and contractual arrangements including jurisdiction, virtual enterprising, recognition, taxation laws and government policies. Christensen et al. (2007) indentify authenticity as a major legal barrier for BIM while Race (2012) identifies product liability risks. Each of these will be examined in detail.

Ownership and Intellectual Property

The first legal issue raised by Oluwole (2011) relates to ownership. If the owner of the BIM application for the project was the client, they may claim ownership of the data and documents therein, as they are paying for the design. Conversely, designers will claim that their designs remain their own intellectual property. If a designer considers that they have lost competitive advantage through the client passing on information they may wish to pursue this in court. Determining who that party may be is not necessarily a simple process, especially as the industry moves towards fully-integrated Level 3 BIM (Udom, 2012). BIM Industry Working Group (2011) recognised this as a problem and suggested that the ownership of copyright should generally reside with the author, not the individual who commisions it. Christensen et al (2007) disagrees arguing that the model is com bined work, and therefore, the intellectual property right (IPR) or ownership should be treated as being similar to the output of conventional teamwork. However there is no case law to support this position and this will remain a difficulty until a court makes a decision on a case and precedent is set. BIM Industry Working Group (2011) further

state that this should not be a long term barrier to BIM adoption and simple solutions should be sought. Furneaux and Kivvits (2008) suggest that governments should be addressing these issues.

3 Conclusion

While implementation of BIM would probably pose numerous challenges, an early BIM industry also benefits from option for wider number of potential alternative BIM adoptin strategies. Thus a coherent assessment of current context is crucial to chose most suitable strategies. Barriers identified show major weak points of implementation, if trying to implement BIM in its complexity alone. However, three successive stages, suggested by Succar (2009) may be the way of piecemeal elimination of identified barriers.

The review of current knowledge showed that Bew-Richards BIM maturity model and Succar's BIM Maturity Stages Model alone could be less useful to asses BIM industry in early stages. To cover this gradual BIM implementation evaluation, a framework of assessment had to feature in depth assessment of a narrow scope of earliest BIM maturity or immediate potential maturity at zero maturity.

Such framework would comprise of four components:

- 1. Collaborative processes: assessment of immediate potential for collaborative processes.
- 2. Enhanced skill: assessment of current status and immediate potential multitasking.
- 3. Integrated information and automated systems: assessment of existing automated systems (nonBIM) and compatibility of ICT infrastructure for ultimate BIM integration (iBIM).
- 4. Knowledge management: assessment of compatibility of current KM systems with the expected BIM enabled systems as the iBIM basestone.

The framework can embrace both Bew-Richards BIM Maturity Model and Succar's BIM Maturity Stages Model for assessment at higher level of maturity.

References

- AHMAD, I., SEIN MAING, K. and PANTHI, K. 2010. Challenges of Integration and ICT's Potential in the Globalised Construction Industry. In *Proceedings of PICMET'10: Technology Management for Global Economic Growth*. Phuket, Thailand: PICMET, pp. 1– 7.
- AOUAD, G., WU, S. and LEE, A. 2006. Dimensional Modelling Technology: Past, Present, and Future. In: *Journal of Computing in Civil Engineering*. Vol. 20, No. 3, pp.151–153.
- ARANDA-MENA, G. et al. 2009. Building information modelling demystified: does it make business sense to adopt BIM? In: *International Journal of Managing Projects in Business*. Vol. 2, No. 3, pp.419–434.
- ARAYICI, Y. et al. 2009. Towards Implementation of Building Information Modelling in the Construction Industry. In: *Collaboration and Integration in Engineering Management and Technology*. Instanbul: Fifth International Conference on Construction in the 21st Century.
- ARAYICI, Y. et al. 2011. Technology adoption in the BIM implementation for lean architectural practice. In: *Automation in Construction*. Vol. 20, No. 2, pp.189–195.

- AZHAR, S. 2011. Building Information Modelling (BIM): Trends, Benefits, Risks and Challenges for the AEC Industry. In: *Leadership and Management in Engineering*. Vol. 11, No. 3, pp.241–252.
- BIMhub. 2012. Benefits of BIM. Available online: http://www.bimhub.com/level-up-bim/pass/>.
- BIM Industry working Group. 2011. A report for the Government Construction Client Group Builiding Information Modelling (BIM). *Working Party Strategy Paper*.
- COATES, P. et al. 2010. The changing perception in the artefacts used in the design practice through BIM adoption. In: *CIB 2010*. Salford, UK: University of Salford.
- DORČÁK, P., POLLÁK, F. and SZABO, S. 2014. Analysis of the possibilities of improving an online reputation of public institutions. *IDIMT-2014*, Sept. 10–12. Poděbrady: IDIMT Networking Societies-Cooperation and Conflict 22ndInterdisciplinary Information and Management Talks, pp. 275-281.
- EASTMAN, C.M. et al. 2011. BIM Handbook. Hoboken, NJ: Wiley.
- EFFICIENCY AND REFORM GROUP. 2011. Government Construction Strategy. London: UK, Construction Research, 120, pp. 101.
- FURNEAUX, C. and KIVVITS, R. 2008. BIM implications for government. CRC for Construction Innovation, Brisbane: Australia.
- GIEL, B., ISSA, R.R.A. and OLBINA, S. 2010. Return on investment Analysis of Building Information Modelling in Construction. Nottingham University Press.
- HARRIS, F. and McCAFFER, R. 2006. *Modern Construction Management*. 6th ed., Oxford, UK: Blackwell.
- CHRISTENSEN, S., MCNAMARA, J. and O'SHEA, K. 2007. Legal and contracting issues in electronic administration in the construction industry. In: *Structural Survey*. Vol. 25, No. 3/4, pp.191 203.
- IEEE Standards Board. 1990. IEEE Standard Glossary of Software Engineering Technology. New York, USA.
- JORDANI, D. 2008. A Healthy Disruption to a Fragmented and Broken process. In: *Journal of Building Information Modelling*. Vol. 1, pp.24–26.
- JUNG, Y. and JOO, M. 2011. Building information modelling (BIM) framework for practical implementation. In: *Automation in Construction*. Vol. 20, No. 2, pp.126–133.
- LANGFORD, D. and MALE, S. 2001. *Strategic Management in Construction*. 2nd ed., Oxford, UK: Blackwell Science.
- LEE, G., HARRISON, K. and WON, J. 2012. Economic Impact of BIM-Assissted Design Validation. In: *Automation in Construction*. Vol. 22, No. 1, pp.577–586.
- LOWE, D. and LEIRINGER, R. 2006. *Commercial Management of Projects*. 1st ed., London, UK: Blackwell Publishing.
- MIHINDU, S. and ARAYICI, Y. 2008. Digital Construction through BIM Systems will Drive the Re-engineering of Construction Business Practices. 2008 International Conference Visualisation, pp.29–34.
- MITCHELL, A. and DEMIAN, P. 2006. Barriers that Influence the Implementation of UK construction Project Ectranets.

- MOON, H. et al. 2011. Case Studies for Evaluation of Interoperability Between a BIM Based Architectural Model and Buildeing Performance Analysis Programs. Sydney.
- OLUWOLE, A. 2011. A preliminary review on the legal implications of BIM and model ownership. In: *Journal of Information technology in Construction (ITcon)*. Vol. 16, pp.687–696.
- RACE, S. 2012. BIM Demystified. 1st ed., London: RIBA Publishing.
- RUIKAR, K., ANUMBA, C. and CARRILO, P. 2005. End-user perspectives on use of project Extranets in construction organisations. In: *Engineering, Construction and Architectural Management*. Vol. 12, No. 3, pp.222–235.
- SUCCAR, B. 2009. Building Information Modelling Framework: A research and delivery foundation for industry stakehodlers. In: *Automation in Construction*. Vol. 18, No. 3, pp. 357-375.
- SZABO, S. and SIDOR, J., 2014. The Performance Measurement System Potentials and Barriers for its Implementation in Healthcare Facilities. In: *Journal of Applied Economic Sciences.* Vol. IX, No. 4(30).
- SZABO, S., DORČÁK, P. and FERENCZ, V. 2013. The Significance of Global Market Data for Smart e-Procurement Processes. *IDIMT-2013*, Sept. 11–13. Prague: IDIMT -Interdisciplinary Information and Management Talks, 2013, s. 217-224.
- THOMPSON, D. and MINER, R. G. 2010. Building Information Modelling BIM: Contractual Risks are Changing with Technology. Available online: < http://www.aepronet.org/ge/no35.html>.
- UDOM, K. 2012. Building Information Modelling. Available online: ">http://www.thenbs.com/topics/bim/articles>.
- WATSON, A. 2010. A driver for change. In: W. Tizani, ed. 2010. Proceedings of the International Conference on Computing in Civil and Building Engineering. Nottingham: Unoversity of Nottingham.

Entrepreneurial Characteristics of the Owner and their Impact on Current Activity Management in Small Business – Literature Review

MAŁGORZATA OKRĘGLICKA¹ Czestochowa University of Technology Poland

Abstract

Small business plays a key role in all economies, therefore the development of this sector should be a priority of the economic policy of the country. One of the main problems for small business is to manage the current activity in order to maintain liquidity and strengthen the competitive position. This is determined by a number of factors, many of which are characteristic for the small business owner. As a firm's creator and decision maker, he is responsible for sooth operation of the company. His entrepreneurial features and social interactions determine his managerial style and influence, both positively and negatively, on success of the small business. The aim of this article is to identify how comprehensive is the range of studies in the area of critical approach to the role of entrepreneurial orientation and entrepreneurial characteristics of the owner in running the business, with a particular focus on the daily operation of the company.

Key words: Small Business, Entrepreneurship, Entrepreneurial Orientation, Determinants, Current Management

JEL Classification: M10, M13

1 Introduction

Current economic activity is characterized by globalization, technology, deregulation and democratization collectively creating an extremely complex operating environment for companies, especially from SME sector (Gorzeń-Mitka and Okręglicka, 2014). The increasing pressure on today's companies coming from these forces makes it hard to develop enduring competitive advantages and improve business performance (Mynarzová and Kaňa, 2014). Turbulent markets with rapidly changing and uncertain environmental variables exacerbate the challenge to make the proper decisions and lead the organization in the right direction.

Small businesses are generally regarded as the driving force of economic growth, improvement of the competitiveness of markets, workplaces creation, and poverty reduction in developing countries (Haviernikova, 2013; Skibiński, 2009). On the other hand, small enterprises differ significantly from larger organization in nearly every aspect of their functioning. According to Iacono and Nagano (2009), there are many types of specificities of small enterprises: environmental, behavioural, decisional, technological, structural or strategic. Generally, a small business is an entity which is financed by one individual or small group and is directly managed by its owner(s), in a personalized manner instead of the medium of a formalized management structure (Silineviča, 2011).

¹ Małgorzata Okręglicka Ph.D., Dąbrowskiego 69, 42-201 Częstochowa, Poland, mokreglicka@wp.pl

The dominant person for such an entity is the owner. He is at the same time a creator, manager and often a working person for the company. There is no company without the entrepreneur and for that reason the concept of entrepreneurship and entrepreneurial orientation have mostly positive connotations. The same characteristics that enable entrepreneurs create companies, can constitute an obstacle of its development. In addition, it is difficult to separate the characteristics of a person as an entrepreneur from those as a member of society or family. Therefore, it should be indicated that some elements relating to the entrepreneurial orientation or characteristic of the owner may constitute a barrier to the successful firm operation.

2 Literature review method

Literature review can be defined as a qualitative synthesis and a fundamental step within the overall research process, which should be conducted systematically and transparently. Badger et al. (2000) describe the review of the literature as a systematic, explicit and reproducible approach for identifying, evaluating and interpreting the existing body of publications.

The review process in this article was performed in several consistent stages:

- 1. defining research objective,
- 2. conducting a search on the databases;
- 3. evaluations of the relevance of records retrieved;
- 4. detailed analyse of all relevant peer-reviewed articles, important for the objective of the research.

In library database search the combination of two methods was applied. The first was the building blocks method, which involves breaking the topic into different "building blocks". Therefore, the method involves interrogating databases using a combination of key words, connectors, and search delimiters to identify relevant records on a topic of interest (Goodman, Gary and Wood, 2014). Then, the snowball method was applied by starting with articles retrieved in the first step and searching backward for references cited in those articles.

Research papers considered for inclusion in this literature review are: written mostly in English, from peer-reviewed journals or monographs, accessible through electronic management databases. Only a few position were added as a complement to the research process.

The main objective of the study is to identify how comprehensive is the range of studies in the area of critical approach to role of the entrepreneurial orientation and entrepreneurial characteristics of the owner in running the business, with a particular focus on the daily operation of the company. Taking into account the main objective of this paper, the research will verify the main hypothesis: H1: There are many findings in literature which emphasize not only positive, but also negative influence of characteristic features of the business owner, connected with entrepreneurship and entrepreneurial orientation on every day activity of the company.

3 Characteristics of an entrepreneur as determinant of current management in small business

3.1 Entrepreneurship and entrepreneurial orientation

The entrepreneurship, as a concept, has received rising attention in terms of scholarly research in the recent years (Wiklund et al., 2011). There is no universally accepted definition of this term, but

it could be described as a process of creating something different with value by using the necessary time, effort and financial resources, taking the psychic and social risks, and receiving the resulting rewards of monetary and personal satisfaction (Hisrich and Peters, 1989). The entrepreneurship refers to individual activities which create value by the exploration, recognition and exploitation of market opportunities. These kind of actions are accompanied by risk affinity, and are strongly linked to innovative outcomes (Pearce et al, 2010; Covin and Wales, 2012).

Entrepreneurship is inseparable from the concept of entrepreneurial orientation (EO), which is the basis and determinant for creating a new company. Entrepreneurial orientation is indicated as "a propensity to act autonomously, a willingness to innovate and take risks, and a tendency to be aggressive towards competitors and proactive relative to opportunities" (Lumpkin and Dess, 1996). Entrepreneurial orientation was introduced by Miller (1983; 1982) in the early 1980s. and he defined EO as "a multidimensional concept encompassing the firm's actions relating to product-market and technological innovation, risk taking and proactiveness". He also emphasizes that a company degree of entrepreneurship is the extent to which it acts proactively, innovates, and takes the risks. In turn, Robinson and Stubberud (2014) add competitive aggressiveness and autonomy as the characteristics commonly associated with a personal EO. Since the appearance of the EO idea, it has been observed from many different perspectives, especially how it can vary among individual, organizational, and environmental determinants (Brettel and Rottenberger, 2013; Lumpkin and Dess, 1996).

For business entities, EO involves creating a strategy that provides the basis for business decisions and actions (Rauch et al., 2009). As the firm's resource, entrepreneurial orientation develops profitable new products and this new product development is the innovation behaviour of EO (Chun-Lan Chang, 2015).

In small business, the EO is mostly concentrated in the person of the owner who is at the same time a creator, manager and often performer of many business activities. Entrepreneurial activities focused on the person of entrepreneur are usually informal and very dynamic (Zahra and Filatotchev, 2004).

The entrepreneur fulfils many functions in economic environment (McMullen and Shepherd, 2006):

- the entrepreneur as an organizational or economic function someone who specializes in taking responsibility for and making judgmental decisions that affect the location, the form, and the use of goods, resources or institutions; someone who engages in exchanges for profit),
- the entrepreneur as a personality (i.e., innovative, risk seeking person, etc.),
- the entrepreneur as a position (i.e., small business manager, owner, etc.).

All this functions, being concentrated on one person, create unique opportunities for development, but give also a rise to dilemmas and contradictions. On the one hand, the entrepreneurial activities are often nurtured by owners' positive characteristics like their knowledge, skills, creativity, imagination, and alertness to opportunities, on the other hand, his actions could be driven by imperfect information, over optimism, excessive trust of intuition, the lack of use of professional management methods, making wrong decisions under stress or conflict of entrepreneur' interests with the interests of his/her family etc.
3.2 Maintenance of liquidity as a key principle for successful current management in small business

Small businesses are different from large corporations in many aspects. Visible differences are not only the scope of activity, different levels of financial and material resources, but above all a different style of management. Small enterprises often adopt management practices, techniques and principles that are not adequate to their reality. To ensure the survival and market success, a different approach to many areas of functioning is required (Lemańska-Majdzik and Tomski, 2013), particularly in the current management of a small company.

Maintaining liquidity results from effective management, not only in financial area, but the whole current management of enterprise. The experience of highly developed countries has shown that the main cause of bankruptcy of small and medium-sized enterprise, is loss of financial liquidity rather than lack of sales profitability (Opler et al., 1999; Sierpińska and Wędzki, 1997). Although Mcmenamin (2005) defines the main financial aims of a company, such as being profitable, pursuing liquidity and sustaining a proper capital structure, but for SMEs the financial liquidity is a priority. Drever and Hutchinson (2007) emphasise that the relative lack of research on liquidity is striking in that the liquidity management is usually a more urgent day to day problem than decisions about capital structure, because the consequences of becoming illiquid can be severe to the point of bankruptcy or insolvency which can be due to a single event or the whole activity and they appear more rapidly.

The short-term financial characteristics of small entities can be described by a higher proportion of current assets relative to large enterprises, lower level of liquidity, exposition to high volatility of cash flows, and a higher reliance on short-term debt (Peel et al., 2000; Dečman and Sever, 2012). This is why small businesses are especially prone to running into financial difficulties as they often lack the resources to adapt to rapidly-changing market conditions (Vasilescu and Popa, 2010). Compared to large companies, SMEs usually operate under the conditions of less capital reserves. Accordingly, it is more likely that they do not have the capacity to compensate for occurring incidents or buffer themselves against supply chain risks (Thun, Druke and Hoenig, 2011).

The liquidity of an economic organization is an important aspect of its financial soundness for creditors, suppliers, equity holders, employees and other stakeholders (Mramor and Valentincic, 2003). Considering that liquidity become a fundamental assumption of going concern, information on cash flows will be significantly interesting to SME owners (Dečman and Sever, 2012). In contrast to strategic management, current management must therefore focus on ensuring the smooth day to day running and the key here is to ensure the liquidity.

3.3 The selected aspects of impact the entrepreneurial orientation and characteristics of the owner on current business management – is it always positive?

Smooth operating activities of the enterprise require an appropriate level of liquidity. Financial liquidity depends in turn on many factors, like: owned equity, access to external sources of financing and determining their structure, efficient management of receivables, inventory or cash. In small business all decisions are made by the owner.

The entrepreneurial orientation and its influence on the company's performance are well established, and its positive relationship to the performance is widely accepted in the literature (Wiklund 1999; Zahra and Covin 1995; Zahra, Hayton, and Salvato 2004; De Clercq, Dimov and

Thongpapanl, 2010). Although entrepreneurial orientation is generally desirable phenomenon, there are certain characteristics of small business owner which may have limiting impact on the results and grow of the firm. It is important to establish whether entrepreneurs respond to economic motives, or if their behavior is dominated by such an entrepreneurial characteristics as overconfidence, pleasure in risk or optimism (Simons and Åstebro, 2010).

Each organization has its own specificity. In every one of them, there is an unrepeatable, unique and special culture, described as a permanent system of values, beliefs and assumptions characterizing this organization (Sipa and Lemańska-Majdzik, 2015). From this perspective, small and medium sized-enterprises are very specific business entities, dominated by the person of owner (Aldrich and Auster 1986) what results from his dominant position (Shane and Stuart 2002), which leads to dependence on his personal specific features, capabilities, knowledge and expectations (Stone and Brush 1996). The entrepreneurial tasks are highly varied in nature and change significantly with enterprise development (Baron, 2006), while the environment, in which entrepreneur operates nowadays, are highly unpredictable and characterized by rapid changes (Lichtenstein, Dooley and Lumpkin, 2006). When performing variable tasks in very complex and unpredictable environments, an entrepreneur's affect may play an important role in judgment and decision making (Baron, 2008), both positive and negative.

It's obvious that an entrepreneur does not always act fully rationally, which allows him to take risks (sometimes excessively). De Meza (2002) assume that entrepreneurs are wishful thinkers. There would be no reason to encourage entry (to any project or task) if there is widespread over optimism. But in practice, this is the driving force for actions, giving the chance of success, but which is a common cause of failure.

Entrepreneur, in particular, is a person who is likely to experience mixed rather than single basic emotions in decision making, including his/her evaluation of opportunities and assessment of risks (Podoynitsyna, Van Der Bij and Song, 2012). For example, during economic crisis, when the economic environment have a negative impact on a business, entrepreneurs are forced to make changes in their strategies, cut costs and employment, reduce assets, looking for alternative revenue sources (Latham, 2009), which is connected with the personal stress. It is not surprising, therefore, that entrepreneurs often report such negative feelings as concern, isolation or overburdance (Brennan and McHugh, 1993). This situation can inhibit their ability to pursue their goals, actively engage in entrepreneurial activities, and compete in the marketplace (Pollack and Jeffrey, 2012). In daily operations, acting under the influence of emotions can have negative effects, consisting of a reduction liquidity as a result of inadequate assessment of the activities of business partners.

If the firm's management is concentrated in the person of the owner, it should be stressed that the way of management will change over time. It was found that parenthood reduces risk taking and older people show a lower risk propensity (Abotsi et al., 2014). Changing risk response causes the same entrepreneur is already another manager, which will have certain connotations for the company.

Certain simplification lies in the public understanding of the entrepreneur as an individual. Drakopoulou and Anderson (2007) argue that in literature a myth of the heroic individual is created, while considering the dynamics of social conditioning or social interaction seems to be too complex for discussion about entrepreneurship. This is why Aldrich and Cliff (2003) recommend including a family embeddedness perspective in entrepreneurship research. The authors maintain that the social institutions of family and business are "unnaturally" separated and their unification would allow for more holistic and more realistic insights into entrepreneurship.

The entrepreneurs owning small firms often treat them as a basic source of profits for living. Veblen effect, described in theory of economy, leads them to make decisions through the prism of profit maximization, as a determinant for luxury, while other elements of the business become of secondary importance. An insistence on maximizing profits may lead to a situation of low liquidity, sometimes resulting in insolvency (Samiloglo and Dermirgunes, 2008). There should be thus a trade-off between profitability and liquidity.

Entrepreneurial orientation is not synonymous with self-efficacy. Self-efficacy refers to the extent to which a person not only wants but believes that he/she can complete tasks and actions to produce expected outcomes. People with the same skills may perform on the different efficiency level, depending on whether their self-beliefs of efficacy improve or degrade their motivation and problem solving efforts. Those with high self-efficacy for a specific task are more likely to pursue and then persist in a specific task (Ahlin et.al., 2014). This feature is changed by external conditions, e.g., the economic crisis lowers confidence and verifies approach to risk.

Small business owners take authoritarian decisions based on the fact that they created a company, so they have the appropriate skills to manage the the company. With the development of the entity it could be not enough. Formal education often enhances one's analytical abilities, communication skills, and provides specific skills useful in business operation (Casson, 1995). Lack of knowledge in management area limits the use of modern methods of analysis, reducing effectiveness of management, e.g. it is difficult to talk about an appropriate level of liquidity and working capital management without the constant professional analysis of these items. So, the owner's self-overconfidence could become a barrier rather the opportunity for functioning.

Economic activity is inextricably linked with the risk. Risk management is nowadays one of the topic commonly undertaken in literature as fundament of smooth functioning and development of enterprise. There are studies presenting that daily sales/income influence risk management decision. Generally the larger the income/sales, the larger the positive influence on risk management decision (Valendia et al., 2009). Therefore, small businesses with a relatively small turnover rarely apply methods of risk management and this is why they are exposed to the possibility of insolvency or bankruptcy, to a greater extent.

The presented aspects represent only a tiny fraction of a very broad topic that seems to be located on the border of economic sciences and social sciences.

4 Conclusion

Entrepreneurship is a phenomenon that allows for the creation and development of economic structures. Entrepreneurial orientation is a set of features that will encourage and facilitate the creation of new companies, which is particularly desirable from the point of view of economic development of the region and the country.

Review of economic literature shows clearly that many features of entrepreneur which help in creating business entity, can also be the cause of leaving the industry or even bankruptcy. The impact of the human factor is unpredictable and when the power is focused in the hands of one person, the risk of wrong decisions can even grow.

Looking through the prism of the main objective of this article, it can be said that literature is full of examples of the negative impact of the characteristics of entrepreneurs on conducting a business. It confirms the research hypothesis. These examples, however, can be usually found with the presentation of other issues, and not as a separate subject of research. Additionally, the dominance of the positive features of entrepreneurs and entrepreneurial orientation over the negative ones is clearly noticeable. This indicates a need for a wider analysis of this topic.

The next step of research process within this thematic area should be the systematic classification of the negative characteristics connected with the person of the small business owner.

References

- ABOTSI, A.K., DAKE, G.Y. and AGYEPONG, R.A. 2014. Factors Influencing Risk Management Decision of Small and Medium Scale Enterprises in Ghana. In: *Contemporary Economics*. Vol. 8, Issue 4, pp. 397-413.
- AHLIN, B., DRNOVŠEK, M. and HISRICH, R. 2014. Entrepreneurs' creativity and firm innovation: the moderating role of entrepreneurial self-efficacy. In: *Small Business Economics*. Vol. 43, Issue 1, pp. 101-117.
- ALDRICH, H. and AUSTER, E.R. 1986. Even Dwarfs Started Small—Liabilities of Age and Size and Their Strategic Implications. In: *Research in Organizational Behavior*. Eds. Staw, B.M., Cummings, L.L. Greenwich: Elsevier, pp. 165–198.
- BARON, R.A. 2006. Entrepreneurship: A process perspective. In: R. Baum, M. Frese, R.A. BARON (Eds.). *The psychology of entrepreneurship: Frontiers of industrial/organizational psychology series*, pp. 19–40. Mahwah, NJ: Lawrence Erlbaum Associates.
- BARON, R.A. 2008. The role of affect in the entrepreneurial process. In: *Academy of Management Review*. Vol. 33, No. 2, pp. 328–340.
- BRENNAN, S. and McHUGH, M. 1993. Research note-Coping with recession: The impact upon the entrepreneur. In: *International Small Business Journal*. Vol. 12, pp. 70–75.
- BRETTEL, M. and ROTTENBERGER, J.D. 2013. Examining the Link between Entrepreneurial Orientation and Learning Processes in Small and Medium-Sized Enterprises. In: *Journal of Small Business Management*. Vol. 51, No. 4, pp. 471-490.
- CASSON, M., 1995. Entrepreneurship and Business Culture. Edward Elgar, Aldershot.
- CHUN-LAN CHANG. 2015. Entrepreneurial orientation, communication strategies, and new product success: a theoretic model, In: *Academy of Strategic Management Journal*. Vol. 14, Issue 1, pp. 1-19.
- COVIN, J.G. and WALES, W.J. 2012. The measurement of entrepreneurial orientation. In: *Entrepreneurship Theory and Practice*. Vol. 36, No. 4, pp. 677-702.
- DE CLERCQ, D., DIMOV, D. and THONGPAPANL, N. 2010. The Moderating Impact of Internal Social Exchange Processes on the Entrepreneurial Orientation-Performance Relationship, In: *Journal of Business Venturing*. Vol. 25, Issue 1, pp. 87–103.

DE MEZA, D. 2002. Overlending?. In: The Economic Journal. Vol. 112, No. 477, pp. F17–F31.

- DEČMAN, N. and SEVER, I., 2012. Liquidity management in small and medium-sized entities, In: Conference Proceedings: International Conference of the Faculty of Economics Sarajevo (ICES). pp. 685-693.
- DRAKOPOULOU, D.S. and ANDERSON A.R. 2007. Mumpsimus and the mything of the individualistic entrepreneur. In: *International Small Business Journal*. Vol. 25, Issue 4, pp. 341-360.
- DREVER, M. and HUTCHINSON, P. 2007. Industry differences in the determinants of the liquidity of Australian small and medium sized enterprises. In: *Small Enterprise Research*. Vol. 15, Issue 1, pp. 60-76.
- GOODMAN, J.S., GARY, M.S. and WOOD, R.E. 2014. Bibliographic Search Training for Evidence-Based Management Education: A Review of Relevant Literatures. In: Academy of Management Learning & Education. Vol. 13, Issue 3, pp. 322-353.
- GORZEŃ-MITKA, I. and OKRĘGLICKA, M. 2014. Improving Decision Making in Complexity Environment. In: *Procedia Economics and Finance*. Vol. 16, pp. 402-409.
- HAVIERNIKOVA, K. 2013. Podnikanie v podmienkach globalizácie. In: HAVIERNIKOVA et al. *Teoreticko-metodologické aspekty merania ekonomickej výkonnosti klastrov v Slovenskej republike*. Trenčín: TnUAD.
- HEINZE, I. 2013. Entrepreneur sense-making of business failure. In: *Small Enterprise Research*. Vol. 20, Issue 1, pp. 21-39.
- HISRICH, R. and PETERS, M. 1989. Entrepreneurship: Starting, Developing and Managing a New Enterprise. Irwin: Homewood, IL.
- IACONO, A. and NAGANO, M.S. 2009. Interactions and cooperation in local production systems: an analysis of inhibiting factors related to specificities of small enterprises. In: *Journal of Technology Management & Innovation*. Vol. 4, Issue 2, pp. 143-153.
- LATHAM, S. 2009. Contrasting strategic response to economic recession in start-up versus established software firms. In: *Journal of Small Business Management*. Vol. 47, pp. 180–201.
- LEMAŃSKA-MAJDZIK A. and TOMSKI P., 2013. O sukcesie przedsiębiorstwa, Zeszyty Naukowe Uniwersytetu Przyrodniczo-Humanistycznego w Siedlcach No 98 Series: Administracja i Zarządzanie (25), pp. 203-214.
- LICHTENSTEIN, B., DOOLEY, K.J. and LUMPKIN, G.T. 2006. Measuring emergence in the dynamics of new venture creation. In: *Journal of Business Venturing*. Vol. 21, No. 2, pp. 153–175.
- LUMPKIN, G.T. and DESS, G.G. 1996. Clarifying the entrepreneurial orientation construct and linking it to performance. In: *Academy of Management Review*. Vol. 21, No. 1, pp. 135–172.
- MCMENAMIN, J., 2005. Financial Management. London: Routledge.
- MCMULLEN, J.S. and SHEPHERD, D.A. 2006. Entrepreneurial action and the role of uncertainty in the theory of the entrepreneur. In: *Academy of Management Review*. Vol. 31, Issue 1, pp. 132-152.
- MILLER, D. and FRIESEN, P.H. 1982. Innovation in conservative and entrepreneurial firms: two models of strategic momentum. In: *Strategic Management Journal*, Vol. 3, No. 1, pp. 1–25.
- MILLER, D. 1983. The correlates of entrepreneurship in three types of firms. In: *Manage Science*. Vol. 29, No. 7, pp. 770–792.

- MRAMOR, D. and VALENTINCIC, A. 2003. Forecasting the liquidity of very small private companies. In: *Journal of Business Venturing*. Vol. 18, Issue 6, pp. 745-771.
- MYNARZOVÁ, M. and KAŇA, R. 2014. Theory and Practice of Industrial Policy of the EU in the Context of Globalization Challenges. In: HONOVÁ, I. et al. (eds.). *Proceedings of the 2nd International Conference on European Integration 2014*. Ostrava: VŠB Technical University of Ostrava, pp. 499-507.
- OPLER, T., PINKOWITZ, L., STULZ, R. and WLLIAMSON, R. 1999. The determinants of implications of corporate cash holdings. In: *Journal of Financial Economics*. Vol. 52, No. 1, pp. 3–46.
- PEARCE, J.A., FRITZ, P. and DAVIS, P.S. 2010. Entrepreneurial orientation and the performance of religious congregations as predicted by rational choice theory. In: *Entrepreneurship Theory and Practice*. Vol. 34, No. 1, pp. 219-248.
- PEEL, M.J., WILSON, N. and HOWORTH, C.A., 2000. Late payment and credit management in the small firm sector: some empirical evidence. In: *International Small Business Journal*. Vol. 18, No 2, pp. 17–37.
- PODOYNITSYNA, K., VAN DER BIJ, H. and SONG, M. 2012. The Role of Mixed Emotions in the Risk Perception of Novice and Serial Entrepreneurs. In: *Entrepreneurship: Theory & Practice*. Vol. 36, Issue 1, pp. 115-140.
- POLLACK, J.M., VANEPPS, E.M. and HAYES, A.F. 2012. The moderating role of social ties on entrepreneurs' depressed affect and withdrawal intentions in response to economic stress. In: *Journal of Organizational Behavior*. Vol. 33, Issue 6, pp. 789-810.
- RAUCH, A., WIKLUNG, J., LUMPKIN, G.T. and FRESE, M. 2009. Entrepreneurial orientation and business performance: An assessment of past research and suggestions for the future. In: *Entrepreneurship Theory and Practice*. Vol. 33, No. 3, pp. 76-87.
- ROBINSON, S. and STUBBERUD, H.A. 2014. Elements of entrepreneurial orientation and their relationship to entrepreneurial intent. In: *Journal of Entrepreneurship Education*. Vol. 17, pp. 1-11.
- SAMILOGLO F. and DERMIRGUNES K. 2008. The effect of working capital management on firm profitability: evidence from Turkey. In: *International Journal Applied Economics Finance*. Vol 2, No 1, pp. 44–50.
- SHANE, S. and STUART, T. 2002. Organizational Endowments and the Performance of University Start-Ups. In: *Management Science*. Vol. 48, No.1, pp. 154–170.
- SIERPIŃSKA, M. and WĘDZKI, D. 1997. Zarządzanie płynnością finansową w przedsiębiorstwie, Warsaw: PWN.
- SILINEVIČA, I. 2011. Survival opportunities for small business under economic crisis condition in the case of Latgale region. In: *Management Theory & Studies for Rural Business & Infrastructure Development*. Vol. 26, Issue 2, pp. 212-219.
- SIMONS, K.L. and ÅSTEBRO, T. 2010. Entrepreneurs seeking gains: profit motives and risk aversion in inventors' commercialization decisions. In: *Journal of Economics & Management Strategy*. Vol. 19, Issue 4, pp. 863-888.
- SIPA, M. and LEMAŃSKA-MAJDZIK, A. 2015. MSME employees' pereception of organizational culture chosen aspects. In: LISNIK, A., GREŇOVÁ, K. and AMBROZY M. (Ed.). Socialne Posolstvo Jana Pavla II. Pre Dnesny Svet. "1989 a 25 rokov po...". Ruzomberok: VERBUM vydavateľstvo Katolickej univerzity v Ruzomberoku. pp. 851-860.

- Skibiński, A. 2009. Demograficzne uwarunkowania rynku pracy w Polsce na tle wybranych krajów Unii Europejskiej In: KARTECZEK, A., LOREK, A. and RACZASZEK, A. (Ed.). Polityka gospodarcza w Polsce i Unii Europejskiej na początku XXI. Katowice: Wydawnictwo Akademii Ekonomicznej w Katowicach.
- STONE, M. and BRUSH, C. 1996. Planning in ambiguous contexts: the dilemma of meeting needs for commitment and Demands for Legitimacy, In: *Strategic Management Journal*. Vol. 17, No.8, pp. 633–652.
- THUN, J.H., DRUKE, M. and HOENIG, D. 2011. Managing uncertainty an empirical analysis of supply chain risk management in small and medium-sized enterprises. In: *International Journal of Production Research*. Vol. 49, Issue 18, pp. 5511-5525.
- VASILESCU, L.G. and POPA, A. 2010. Bankruptcy a possible new start for the small business?. In: Annals of the University of Petrosani Economics. Vol. 10 Issue 1, pp. 111-118.
- VELANDIA, M., REJESUS, R.M., KNIGHT, T.O. and SHERRICK, B.J. 2009. Factors Affecting Farmers' Utilization of Agricultural Risk Management Tools. In: *Journal of Agricultural and Applied Economics*. Vol. 41, No 1, pp. 107–123.
- WIKLUND, J. 1999. The Sustainability of the Entrepreneurial Orientation-Performance Relationship. In: *Entrepreneurship: Theory & Practice*. Vol. 24, Issue 1, pp. 37–48.
- WIKLUND, J., DAVIDSSON, P., AUDRETSCH, D.B. and KARLSSON, C. 2011. The future of entrepreneurship research. In: *Entrepreneurship Theory and Practice*. Vol. 35, No. 1, pp. 1-9.
- ZAHRA, S.A. and COVIN, J.G. 1995. Contextual Influence on the Corporate Entrepreneurship– Performance Relationship: A Longitudinal Analysis. In: *Journal of Business Venturing*, Vol. 10, pp. 43–58.
- ZAHRA, S.A. and FILATOTCHEV, I. 2004. Governance of the entrepreneurial threshold firm: A knowledge-based perspective. In: *Journal of Management Studies*. Vol. 41, pp. 885–897.
- ZAHRA, S.A., HAYTON, J.C. and SALVATO, C. 2004. Entrepreneurship in Family vs. Non-Family Firms: A Resource-Based Analysis of the Effect of Organizational Culture. In: *Entrepreneurship: Theory & Practice*. Vol. 28, Issue 4, pp. 363–381.

Examination of Patents, R&D Expenditures and R&D Personnel Relationship in USA using ARDL Approach

JANKA PÁLFYOVÁ¹ Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

This paper deals with innovation, especially patents as output in the process of measuring the innovation, research and development expenditures and research and development personnel as inputs in the process of measuring the innovation, in USA. The paper examines the long-run and short-run impact of research and development expenditures and research and development personnel on patents in the United States. Kwiatkowski–Phillips–Schmidt–Shin (KPSS) statistics is applied for unit root test to determine whether the variables in the model are I(0), I(1) or mutually cointegrated. The requirement for applying ARDL model is that none of variables are stationary. Using Autoregressive Distributed Lag (ARDL), developed by Pesaran et al. (2001), the results point to long-run causality from research and development expenditures and research and development personnel to patents. The investigation confirmed strong casual effect on dependent variable. The error correction term that embodies the speed at which dependent variable returns back to long-run equilibrium after a change in independent variables following a shock in short-run indicates that approximately 93% of disequilibria from previous years converge to long-run equilibrium the current year.

Key words: Patents, Research and Development, ARDL Approach, Unit Root Tests, Cointegration

JEL Classification: C11, C12, C51, O32

1 Introduction

The theoretical and empirical link between research and development expenditures, research and development personnel and patents as fundamentals measuring innovation has been investigated for a long time. Although there have been a number of studies into innovation, especially measuring innovation using research and development expenditures and research and development (R&D) personnel as inputs, and patents as output, there have not been attempts to determine the causality among these variables.

Autoregressive Distributed Lag – ARDL approach is used by economists to demonstrate, for example, the casual relationship between innovation and market characteristics (De Freitas et al., 2012), to demonstrate the casual relationship between R&D expenditures and economic growth (Tuna et al., 2015), casual relationship between patent and GDP (Josheski and Koteski, 2011), to demonstrate effects of technological innovation (Sohag et al., 2015; Fei and Rasiah, 2014) and much more.

The relationship between R&D expenditures and patents, both as an output indicator of research and development was a field of research of economists since the past (Bound et al., 1984; Griliches, 1990). Some literature focuses on a lag structure of the relationship between patents and R&D. For instance, some researchers refer to the lag structure between patenting

¹Ing. Janka Pálfyová, Němcovej 32, 040 01 Košice, Slovak Republic, janka.palfyova@tuke.sk

and internal R&D (Pakes and Griliches, 1984, Wang et al. 2014), to the lag structure between patenting and R&D expenditures (Hall et al., 1984; Hausman et al., 1984).

The main contribution of this paper is outlining the problem of testing the existence of longrun relationship among a dependent variable – patents and variables – research and development expenditures and research and development personnel.

The aim of this paper is to investigate the casual relationship among patents, research and development expenditures and research and development personnel using Autoregressive Distributed Lag approach. The purpose is to determine whether there is any proof of causality among variables in the short-run and long-run.

2 Data descriptions and methodology

The data used in this paper are resident patent applications (direct and patent cooperation treaty national phase entries) in logarithm – lnPAT, total research and development expenditures (all types: basic research, applied research, experimental development and other type of research and development in) – RDE, and total research and development personnel (total intramural researchers in full time equivalent) – RDP, for the period 1998-2013. The annual series data for RDP and RDE are sourced from OECD statistics and annual series data for PAT is sourced from World Intellectual Property Organization (WIPO).

The ARDL approach to cointegration is valuable method for testing for the occurrence of long-run relationship between variables. ARDL model involves estimating error correction model, estimating short-run and long-run dynamics.

Following Pesaran et al. (2001), ARDL approach to cointegration contains estimating the conditional error correction model (1) for patents (lnPAT), research and development expenditures (RDE), and research and development personnel (RDP):

$$\Delta lnPAT_t = \lambda_0 + \sum_{i=1}^p \lambda_{1i} \Delta lnPAT_{t-i} + \sum_{i=0}^p \lambda_{2i} \Delta RDE_{t-i} + \sum_{i=0}^p \lambda_{3i} \Delta RDP_{t-i} + \delta_1 lnPAT_{t-i} + \delta_2 RDE_{t-i} + \delta_3 RDP_{t-i} + \varepsilon_t$$

$$(1)$$

The variables in equation (1): δ_i are long-run multipliers, λ_i are short-run multipliers, ε_t represents white noise error.

The first step in ARDL approach is to estimate equation (1) by ordinary least square in order to test for existence of long-run relationship among the variables. The second step, after confirming long-run relationship, the ARDL method of cointegration analysis is applied. The final step consists of obtaining short-run dynamic parameters by estimating error correction model.

2.1 Unit Root Tests

Before proceeding with ARDL model, the stationarity of all variables is necessary to be tested. We apply Kwiatkowski–Phillips–Schmidt–Shin (KPSS) statistics for unit root test in order to determine whether the variables in the model are I(0), I(1) or I(2). There is a necessity that none of variables are I(2) integrated.

The ARDL model was introduced by Pesaran et al. (2001) in order to put I(0) and I(1) variable into the same estimation. If the variables are stationary I(0), the usage of ordinary least square is appropriate. If the variables are non-stationary I(1), the application of Vector

Error Correction Model (Johanson Approach) is appropriate. Table 1 reports results of KPSS statistics. KPSS test is used for testing null hypothesis, that variables (lnPAT, RDE, RDP) are stationary.

Variable	lag	KPSS statistic	
vanable	lag	Level	Differences
lnPAT	3	0.5336(**)	0.1957
RDE	0	1.5984(***)	0.0906
RDP	4	0.4557(*)	0.3571(*)
Notes: *, **, *** signify critical values at 10%, 5%, and 1% significance level.			

Table 1 KPSS Unit Root Test

Table 1 indicates that we cannot reject null hypothesis of a unit root in the case of lnPAT at 5% significance level. In the case of the variable RDE, we cannot reject null hypothesis of a unit root at 1% significance level and in the case of RDP we cannot reject null hypothesis at 10% significance level. According to the results, we can estimate ordinary least square (OLS) on the variables, because all variables are stationary I(0) that is requirement for OLS to variables behave like constants.

Applying the unit root tests to the first differences of each variable, points out to a clear rejection of the hypothesis that data are I(2). The rejection of hypothesis that data are I(2) is important to apply bounds testing in the next step of the research.

2.2 Cointegration

In order to test for the existence of long-run equilibrium relationship among the variables, the bound testing approach is examined. ARDL bound test is performed by error-correction model (ECM). The variable lnPAT represents dependent variable, and the null hypothesis of no cointegration is:

$$H_0: \delta_1 = \delta_2 = \delta_3 = 0 \tag{2}$$

The alternative hypothesis is:

$$H_1: \delta_1 \neq \delta_2 \neq \delta_3 \neq 0 \tag{3}$$

If the estimated F-statistic is above the upper critical value, the null hypothesis (2) can be rejected. If the test statistic is between the lower and upper critical values, we reject the null hypothesis. If F-statistic is lower than the lower bound, all of the variables are not appropriate for further modeling, because the variables are not cointegrated. If the variables are not cointegrated, there is possibility to change the model for instance by adding more variables, modifying the specifications of variables.

We used Schwarz Bayesian Criterion (SIC) to determine optimal number of lags in error correction model (ECM). The maximum number of lags is set to 4. We tested for existence of long-run relationship and calculated test F-statistic.

F-statistic:	7.731271		
Significance	I(0) Bound	I(1) Bound	
10%	3.17	4.14	
5%	3.79	4.85	
2.5%	4.41	5.52	
1%	5.15	6.36	

Table 2 F-test for cointegration

Table 2 highlights ARDL bound tests. The results indicate that value of F-statistic is 7.731271. F-statistic is higher than the upper – bound critical value 6.36 at 1% level significance. The null hypothesis is rejected, indicating the long-run cointegration relationship among variables.

2.3 Autoregressive distributed lag estimates

The existence of long-run cointegration relationship was established in previous step using estimated conditional ARDL long-run model for patents. The next step is estimating long-run coefficients. The specifications of model are the follow: the number of maximum lags is 4 for dependent variable (lnPAT) and also for dynamic regressors (RDE, RDP), the fixed regressor (C) is set, model selection method is Schwarz Bayesian Criterion and number of evaluated models is 100.

Figure 1 indicates top twenty models based on Schwarz Bayesian Criterion. From total number of ARDL model specifications that were considered, ARDL (3,0,4) represents the best model and model we have chosen for the research.



Schwarz Criteria (top 20 models)

The results of estimating long-run coefficients are presented in Table 3. The estimated coefficients of long-run relationship in Table 3 point out that research and development

expenditures has positive impact on patents. Considering the impact of research and development personnel RDP(-4), it has positive and significant impact on patents. A 1% increase / decrease in patents leads to 0.000367% increase / decrease in RDP(-4). In the case of the variable RDP, there is negative and not significant impact on patents.

Variable	Coefficient	Standard Error	t-Statistic	Probability
lnPAT(-1)	0.173289	0.154750	1.119803	0.3056
lnPAT(-2)	0.076324	0.145495	0.524584	0.6187
lnPAT(-3)	-0.184074	0.074808	-2.460599	0.0491
RDE	7.37E-07	1.43E-07	5.150234	0.0021
RDP	-5.29E-05	6.02E-05	-0.879148	0.4131
RDP(-1)	2.55E-05	5.83E-05	0.438328	0.6765
RDP(-2)	0.000196	4.86E-05	4.027307	0.0069
RDP(-3)	8.67E-05	4.18E-05	2.076480	0.0831
RDP(-4)	0.000367	5.43E-05	6.756975	0.0005
С	8.995748	1.127887	7.975755	0.0002

Table 3 Autoregressive distributed lag estimates for ARDL (3, 0, 4), based on SIC

2.4 Error correction representation for ARDL(3,0,4) based on Schwarz Bayesian Criterion

The error correction model provides estimated short-run coefficients. The error correction model involves error correction term that embodies the speed at which dependent variable (lnPAT) returns back to long-run equilibrium after a change in independent variables (RDE, RDP) following a shock in short-run. Error correction term simply provides feedback or the speed of adjustment whereby short-run dynamics converge to the long-run equilibrium in the model.

Variable	Coefficient	Standard Error	t-Statistic	Probability
$\Delta \ln PAT(-1)$	0.107749	0.137797	0.781944	0.4640
$\Delta \ln PAT(-2)$	0.184074	0.074808	2.460599	0.0491
ΔRDE	0.000001	0.000000	5.150234	0.0021
ΔRDP	-0.000053	0.000060	-0.879148	0.4131
$\Delta RDP(-1)$	-0.000196	0.000049	-4.027307	0.0069
$\Delta RDP(-2)$	-0.000087	0.000042	-2.076480	0.0831
$\Delta RDP(-3)$	-0.000367	0.000054	-6.756975	0.0005
ecm(-1)	-0.934460	0.129625	-7.208941	0.0004

Table 4 Error Correction Model for ARDL (3, 0, 4), based on SIC

The variable ecm(-1) is most important to point out. The value of ecm(-1) should at least be negative and significant. Table 4 indicates that the value of ecm(-1) equal -0.934460 lies between 0 and -1 what ensures the existence of convergence in the model with a significant long-run relation. The more is the value near -1, stronger equilibrium is. Error correction model in our case is (4):

$$ecm = lnPAT - (0.0000 * RDE + 0.0007 * RDP + 9.6267)$$
(4)

The value of the coefficient ecm(-1) demonstrate that approximately 93% of disequilibria from previous years converge to long-run equilibrium the current year. The error correction suggests that approximately 93% of the adjustment back to long-run equilibrium is corrected

after one year. Table 4 indicates that variables have short-run but definitely long-run effect on dependent variable, so there is strong casual effect on dependent variable. It is reported as (5):

 $lnPAT = 0.107749\Delta lnPAT(-1) + 0.184074\Delta lnPAT(-2) + 0.000001\Delta RDE - 0.000053\Delta RDP - 0.000196\Delta RDP(-1) - 0.000087\Delta RDP(-2) - 0.000367\Delta RDP(-3) - 0.934460ecm(-1)$ (5)

3 Conclusion

This paper has investigated the casual relationship among patents, research and development expenditures and research and development personnel using ARDL approach. Before proceeding with ARDL model, we applied Kwiatkowski–Phillips–Schmidt–Shin statistics for unit root test in order to determine whether the variables in the model are I(0), I(1) or I(2). The results of KPSS test demonstrated the stationarity for all variables.

After confirming the stationarity, we moved to the first step in ARDL approach. In order to test for the existence of long-run relationship among the variables, we applied the bound testing approach. Bound testing indicated the long-run cointegration relationship among variables.

Then we applied ARDL method of cointegration analysis and obtained short-run dynamic parameters by estimating error correction model. The equilibrium correction was significant and confirmed the existence of long-run relationship among patent, research and development expenditures and research and development personnel. The error correction suggested that approximately 93% of the adjustment back to long-run equilibrium is corrected after one year. The findings show that there is strong casual effect, both short-run and long-run, on patents as dependent variable from independent variables research and development expenditures and research and development.

References

- BOUND, J., CUMMINS, C., GRILICHES, Z., HALL, B. H., and JAFFE, A. B. 1982. Who does R&D and who patents? In: Griliches, Z. ed. 1982. *R & D, Patents, and Productivity*. University of Chicago Press. pp. 21 54.
- De FREITAS, L. C. and KANEKO, S. 2012. Is there a causal relation between ethanol innovation and the market characteristics of fuels in Brazil? In: *Ecological Economics*. Vol. 74, pp. 161-168.
- FEI, Q. and RASIAH, R. 2014. Electricity Consumption, Technological Innovation, Economic Growth and Energy Prices: Does Energy Export Dependency and Development Levels Matter? In: *Energy Procedia*. Vol. 61, pp. 1142-1145.
- GAVUROVÁ, B., ŠOLTÉS, M. and BALLONI, A. J. 2014. The Economic Importance of Using of ICT in the Health System. In: *Journal of Economics*. Vol. 62, No. 1, pp. 83-104.
- GRILICHES, Z. 1990. Patent statistics as economic indicators: a survey. In: Griliches, Z. ed. 1982. R & D, Patents, and Productivity. University of Chicago Press. pp. 287-343.
- HALL, B. H., GRILICHES, Z. and HAUSMAN, J. A. 1984. Patents and R&D: Is there a lag? In: *International Economic Review*, Vol. 27, No. 2, pp. 265-284.
- HAUSMAN, J. A., Hall, B. H. and Griliches, Z. 1984. Econometric models for count data with an application to the patents-R&D relationship. In: *Econometrica*, Vol. 52, No. 4, pp. 909-938.

- JOSHESKI, D. and KOTESKI, C. 2011. The causal relationship between patent growth and growth of GDP with quarterly data in the G7 countries: cointegration, *ARDL and error correction models*. *ARDL and Error Correction Models* (September 3, 2011).
- MURA, L., BULECA, J., HORVÁTH, P., MACHYNIAK, J. and ŠEBÍK, K. 2014. Identification of Funding of Regional Governments Using Correlation Analysis. In: *Procedia Economics and Finance*, Vol. 15, pp. 154-161.
- PAKES, A. and GRILICHES, Z. 1984. Patents and R&D at the firm level: a first look. In: Griliches, Z. ed. 1982. *R & D, Patents, and Productivity*. University of Chicago Press. pp. 55 72.
- PESARAN, M. H., SHIN, Y. and SMITH, R. J. 2001. Bounds testing approaches to the analysis of level relationships. In: *Journal of applied econometrics*, Vol. 16, No. 3, pp. 289-326.
- RAISOVÁ, M., BULECA, J. and MICHALSKI, G. 2014. Food processing firms inventory levels in hard times. 2004–2012 Slovak, Czech and Polish enterprises case. In: *Procedia Economics and Finance*. Vol. 12, pp. 557-564.
- RAISOVÁ, M. and ĎURČOVÁ, J. 2014. Economic Growth-supply and Demand Perspective. In: *Procedia Economics and Finance*. Vol. 15, pp. 184-191.
- SOHAG, K., BEGUM, R. A., ABDULLAH, S. M. S. and JAAFAR, M. 2015. Dynamics of energy use, technological innovation, economic growth and trade openness in Malaysia. In: *Energy*. Vol. 90, Part 2, pp. 1497 – 1507.
- SZABO, Z. K., ŠOLTÉS, M. and HERMAN, E. 2013. Innovative Capacity & Performance of Transition Economies: Comparative Study at the Level of Enterprises. In. *E&M Economics and Management*. Vol. 16, No. 1, pp. 52 - 68.
- ŠOLTÉS, V. and GAVUROVÁ, B. 2014. Innovation policy as the main accelerator of increasing the competitiveness of small and medium-sized enterprises in Slovakia. In: *Procedia Economics and Finance*. Vol. 15, pp. 1478-1485.
- TUNA, K., KAYACAN, E. and BEKTAS, H. 2015. The Relationship Between Research & Development Expenditures and Economic Growth: The Case of Turkey. In: *Procedia-Social and Behavioral Sciences*, Vol. 195, pp. 501-507.
- WANG, N. and HAGEDOORN, J. 2014. The lag structure of the relationship between patenting and internal R&D revisited. In: *Research Policy*. Vol. 43, No. 8, pp. 1275-1285.

Development of Deposits in Slovak Republic after Euro Adoption

DAMIÁN PASTOR¹ – PAVEL KISELA² – VILIAM KOVÁČ³ Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

This paper deals with a development of a volume of the deposits received by the financial institutions in the Slovak Republic. The main focus is concentrated on the period from 2009 to 2014. Such a period represents an era of the euro currency as a legal tender used on the territory of the Slovak Republic. After a short introduction to the topic, this paper offers an overview on the individual types of the deposits recognised by the National Bank of Slovakia. Development of volumes of the deposit types follows. A view on this topic is offered by not only the separate types of deposits, but also by the origin of these deposits. There is an analysis of real deposits in the core of the paper too. Finally, a conclusion summarises the outcomes of the executed analysis.

Key words: Deposit, Overnight Deposits, Deposits with Agreed Maturity, Deposits Redeemable at Notice, Deposits Repayable on Demand, Euro, Slovak Republic

JEL Classification: E58, G21

1 Introduction

On the 1st January 2009 the Slovak Republic joined the euro area and that is why the National Bank of Slovakia became part of the Eurosystem. This brought change in reporting of statistical data providing by the National Bank of Slovakia. Main alternation was new currency, which the data are quantified in. In the paper we would like to demonstrate development of deposits after the Slovak Republic joined the euro area. Evolution of the Slovak deposit market is explained on the basis of newly received deposits – new transactions. Deposits represent a significant source of funding for financial institutions and are considered to be more stable than other types of bank liabilities. Regarding the stability of deposits, there are differences between various types of deposits of non-financial corporations. The European Central Bank observed stability of the market deposits through the variation coefficient (Ahlswede and Schildbach, 2012). In order to determine whether the deposits received by the Slovak bank institutions represent a stable source of funding for them, we also analysed stability of the deposits by the same way and then compared the outcomes with the results from the study by the European Central Bank.

2 Types of Deposits Recognised by the National Bank of Slovakia

Our analysis of development of deposits in the Slovak Republic is based on aggregated data from all the banking institutions. Data was obtained from the National Bank of Slovakia. The applied

¹ Ing. Damián Pastor, Němcovej 32, 040 01 Košice, Slovak Republic, damian.pastor@tuke.sk

² Ing. Pavel Kisela, Němcovej 32, 040 01 Košice, Slovak Republic, pavel.kisela@tuke.sk

³ Ing. Viliam Kováč, PhD., Němcovej 32, 040 01 Košice, Slovak Republic, viliam.kovac@tuke.sk

dataset involves the Slovak banking market date coming from 1st January 2009 to 31st December 2014. The National Bank of Slovakia divides the deposits into three main groups:

- overnight deposits,
- deposits with agreed maturity,
- deposits redeemable at notice.

2.1 Overnight Deposits

Overnight deposits could be converted into currency and transferred on demand by check, banker's order, debit entry or similar means without significant delay or penalty.

This item includes:

- balances interest-bearing or not which are immediately convertible into currency on demand or by close of business on the day following that on which the demand was made, without any significant penalty or restriction, but which are not transferable,
- balances interest-bearing or not representing prepaid amounts in the context of electronic money, for instance prepaid cards, which are based on hardware or software;
- loans that can be repaid by close of business on the day following that on which the loan was granted.

The National Bank of Slovakia distinguishes between demand and daily overnight deposits.

The categories marked as demand and daily are part of a national methodology for statistical reporting (Brziaková, 2006). The remuneration of overnight deposits, which are inherently forward, is different – higher than the interest on demand deposits, which are available on request.

2.2 Deposits with Agreed Maturity

Transferable deposits which cannot be converted into currency before an agreed fixed term or that can only be converted into currency before that agreed term provided that the holder is charged some kind of penalty are called deposits with agreed maturity. This item also includes administratively regulated savings deposits where the maturity related criterion is not relevant. They should be classified in the maturity band over two years.

These deposits are broken down into the following categories (Governing Council of the European Central Bank, 2013):

- up to 7 days including,
- up to 1 year including,
- up to 2 years including,
- up to 5 years including,
- over 5 years.

2.3 Deposits Redeemable at Notice

Deposits redeemable at notice are non-transferable deposits without any agreed maturity which cannot be converted into currency without a period of prior notice, before the term of which the conversion into cash is not possible or possible only with a penalty. They include deposits that can be legally withdrawable on demand, but are subject to penalties and restrictions according to national practice – classified in the maturity band up to and including three months, and investment

accounts without period of notice or agreed maturity, but which contain restrictive drawing provisions – classified in the maturity band over three months.

These deposits are divided by the National Bank of Slovakia into the two categories (Komínková, 2001):

- repayable up to 3 months including,
- repayable over 3 months.

3 Development of Total Deposits after Euro Adoption

At first, we present development of total deposits in the Slovak banking market and then we focus on development of the deposits of non-financial entities.



Figure 1 Variation Coefficient of Deposit according its Type Source: Own elaboration

Figure 1 visualises stability of deposits as measured by the variation coefficient. According to this approach, we can state deposits of the household investing in the Slovak Republic are more reliable then deposits of the non-financial institutions on the Slovak banking market. Mean value of the variation coefficient of the households reaches a value of 25.28 %, whilst the non-financial institutions touch a value of 42.74 %.

Let us have a more detailed look at the individual types of deposits. Lower value of the variation coefficient than the non-financial institutions is provided only by the deposits of the households redeemable at notice at level of 21.74 % and then by the deposits repayable on demand at level of 11.99 %. Deposits with agreed maturity are more stable by the non-financial institutions, where the variation coefficient is 38.44 %, while by the households the variation coefficient raises to 42.10 %.

Compared to the average values of the variation coefficient in the euro area, the deposits redeemable at notice and the deposits with agreed maturity are received by the financial institutions in higher volumes. On the other hand, under the average volumes are found by the deposits repayable on demand, whose the variation coefficient reaches a level of 11.99 %, and by the non-

financial institutions at level of 12.35 %. The average variation coefficient of all the deposits equals to 19 %.



Figure 2 Development of Total Deposits in the Slovak Republic Source: Own elaboration

The displayed Figure 2 shows the development of the total deposits in the Slovak Republic since 2010. It can be seen a volume of the total bank deposits was gradually increasing during the observed period. While at the beginning of the first quarter of 2010 it reached a value of about 65 billion EUR, at the end of the fourth quarter of 2014 it was more than 80 billion EUR. During the first half of 2010 a volume of the total deposits decreased on year-on-year basis. It is just a continuation of the reduction in deposits, especially from households, which started at the beginning of 2009. The reason for this withdrawal of deposits from banking institutions was primarily a financial crisis, and transition of the former Slovak currency the Slovak Crown – International Organization for Standardization code SKK – to the new currency also played a role. The annual decrease in these deposits was gradually softened and in the second half of 2010 a volume of total deposits increased on year-on-year basis.

Annual growth of the deposits peaked in the first quarter of 2011, which amounted to 7.11 %. Since then, the growth rate of the deposits started to gradually decline and in the fourth quarter of 2011 total deposits recorded an annual decrease again. The annual decline continued until the third quarter of 2012, when it reached the top. During this period, we can observe a significant decline in economic activity, when there was a gradual decrease in gross domestic product growth in the Slovak Republic. Thus, we see a volume of the deposits reflects to some extent of the development of the real economy. This confirms the correlation coefficient between the total deposits and gross domestic product, which reached a level of 60 %, reflecting a positive relationship between these variables. At the end of 2012 there is seen some recovery in the real economy, which was reflected in a slight increase in gross domestic product growth rate. It responded to the deposits, which recorded a sharp annual increase, peaking in the third quarter of 2014, when a volume of the total deposits grew by 10.68 %.



Figure 3: Shares of Various Types of Deposits in Total Deposits Source: Own elaboration

As already indicated in the previous chapter, the National Bank of Slovakia distinguishes three types of deposits. The displayed Figure 3 shows the share of the individual types of the deposits in the total deposits in the Slovak Republic.

During the examined period the overnight deposits clearly dominated. These deposits accounted for 78.06 % of the total deposits in the Slovak market during the explored period. The significance of these deposits was increasing gradually. While in January 2009 accounted for 67 % of the total deposits, at the end of 2014 their share increased to 85.72 %. The second most sought-after type of deposit product between economic entities became the deposits with agreed maturity, which accounted for 15.45 % of the total deposits on average. Their share has been gradually declining, suggesting that businesses give priority to their short-term commitment of funds before longer-term fixed term. The share of the deposits with agreed maturity in the total deposits dropped significantly from 27.97 % in January 2009 to 5.81 % in December 2014. On the other hand, the share of the deposits redeemable at notice over the horizon gradually increased from 4.29 % in January 2009 to 8.46 % in December 2014. Even a volume of these deposits in 2014 was in March, June, July, September, October and December for the first time during the whole period greater than a volume of the deposits with agreed maturity.



The development of the real total deposits according to their type in the Slovak Republic shows Figure 4. From an analysis of the real deposits, we can conclude that there is a significant growth in the overnight deposits and the deposits redeemable at notice in the Slovak republic during the monitored period. On the other hand, one can observe a downward trend in the deposits with an agreed maturity. This suggests that businesses started to prefer deposits without commitment (Národná banka Slovenska, 2010; Národná banka Slovenska, 2011; Národná banka Slovenska, 2012; Národná banka Slovenska, 2013; Národná banka Slovenska, 2014; Národná banka Slovenska, 2015). One of the main reasons for this transfer of the deposits was the fact that during that period there was a reduction in the difference between the interest rate for long-term and the interest rate for short-term commitment. While at the beginning of 2009 the difference between the average interest rate on the overnight deposits and average interest rate on the deposits with agreed maturity of 1.2 percentage points, at the beginning of 2014 it was only 0.4 percentage points. That is why the long-term deposits became less attractive for investors. The second partial explanation may be a preference for collective investment, which may be considered as alternative investments with long-term fixed term deposits. The third fractional explanation can be a reduction in competition and therefore lowering the banking institutions' efforts in acquiring new and maintaining existing clients.

4 Conclusion

In the paper a development of a volume of the deposits received by the financial institutions in the Slovak Republic is analysed. After the 1st January 2009 when the Slovak Republic joined the euro area, reporting of statistical data providing by the National Bank of Slovakia was changed and deposits became divided into the three main categories, which are overnight deposits, deposits with agreed maturity and deposits redeemable at notice till now.

At first, stability of deposits measured by the variation coefficient was analysed. We can conclude that the deposits of households are more stable than the deposits of non-financial institutions.

From 2010 to 2014 a volume of the total deposits in the Slovak Republic increased from 65 billion EUR to more than 80 billion EUR. Last decrease was recorded in the third quarter of 2012 as a continuation of the reduction of the deposits, especially by households, which started at the beginning of 2009 because of the financial crisis. The largest part of the total deposits is created by the overnight deposits. Their share in the total deposits increased from 67 % in January 2009 to 85.72 % in December 2014.

At last, we looked at development of the real deposits in the Slovak Republic. Volumes of the real overnight deposits and the real deposits redeemable at notice were enlarged during the monitored period. On the other hand, the real deposits with agreed maturity recorded loss in their volume. An increasing preference of the deposits without commitment over the deposits of long-term commitment is based on the fact that during the followed period there was a reduction in the difference between the interest rate for long-term commitment and the interest rate for short-term commitment.

References

- AHLSWEDE, S. and SCHILDBACH, J. 2012. Poised for a comeback: Bank deposits. [online]. In: *Deutsche Bank Research*. Frankfurt am Main, Germany: Deutsche Bank; 2nd May 2012. Available online: http://www.dbresearch.com/PROD/DBR_INTERNET_EN-PROD/PROD0000000287475/Poised+for+a+comeback%3A+Bank+deposits.PDF>.
- BRZIAKOVÁ, I. 2006. Harmonizovaná menová a banková štatistika Národnej banky Slovenska. [online]. In: *Biatec*; volume 14; issue 9; pages 18 – 21. Bratislava, Slovakia: Národná banka Slovenska; 18st September 2006. Available online: <http://www.nbs.sk/_img/Documents/PUBLIK/MU/06_09.pdf>.
- GOVERNING COUNCIL OF THE EUROPEAN CENTRAL BANK. 2013. Regulation (EU) No 1071/2013 of the European Central Bank of 24 September 2013 concerning the balance sheet of the monetary financial institutions sector (recast) (ECB/2013/33). [online]. Frankfurt am Main, Germany: European Central Bank; 27st November 2013. Available online: https://www.ecb.europa.eu/ecb/legal/pdf/02013r1071-20131127-en.pdf>.
- KOMÍNKOVÁ, Z. 2001. Monetizácia slovenskej ekonomiky a problém finančných štruktúr. [online]. Bratislava, Slovakia: Národná banka Slovenska; July 2001. Available online: <http://www.nbs.sk/_img/Documents/PUBLIK/kom43.pdf>.
- NÁRODNÁ BANKA SLOVENSKA. 2010. Analýza slovenského finančného sektora za rok 2009. [online]. Bratislava, Slovakia: Národná banka Slovenska. Available online: <http://www.nbs.sk/_img/Documents/_Dohlad/ORM/Analyzy/2009-2.pdf>.
- NÁRODNÁ BANKA SLOVENSKA. 2011. Analýza slovenského finančného sektora za rok 2010. [online]. Bratislava, Slovakia: Národná banka Slovenska. Available online: <http://www.nbs.sk/_img/Documents/_Dohlad/ORM/Analyzy/AnalyzaSFS2010.pdf>.
- NÁRODNÁ BANKA SLOVENSKA. 2012. Analýza slovenského finančného sektora za rok 2011. [online]. Bratislava, Slovakia: Národná banka Slovenska. Available online: <http://www.nbs.sk/_img/Documents/_Dohlad/ORM/Analyzy/protected/AnalyzaSFS2011.p df>.

- NÁRODNÁ BANKA SLOVENSKA. 2013. Analýza slovenského finančného sektora za rok 2012. [online]. Bratislava, Slovakia: Národná banka Slovenska. Available online: <http://www.nbs.sk/_img/Documents/_Dohlad/ORM/Analyzy/protected/AnalyzaSFS2012.p df>.
- NÁRODNÁ BANKA SLOVENSKA. 2014. Analýza slovenského finančného sektora za rok 2013. [online]. Bratislava, Slovakia: Národná banka Slovenska. Available online: <http://www.nbs.sk/_img/Documents/_Dohlad/ORM/Analyzy/protected/AnalyzaSFS2013.p df>.
- NÁRODNÁ BANKA SLOVENSKA. 2015. Analýza slovenského finančného sektora za rok 2014. [online]. Bratislava, Slovakia: Národná banka Slovenska. Available online: <http://www.nbs.sk/_img/Documents/_Dohlad/ORM/Analyzy/protected/AnalyzaSFS2014.p df>.

Analysis of Selected Aspects of Social Responsibility in Slovak Enterprises

IVANA PERŽEĽOVÁ¹ Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

Corporate social responsibility is an important feature of the new economy, combining economic interests with responsibility for employees and the environment. Maximizing company value and corporate social responsibility should be the most important objectives of the company. This article focuses on one level of the concept corporate social responsibility - ethical responsibility. The aim of the analysis is to show the ability to define an ethical responsibility towards employees and specify its levels in selected Slovak enterprises with respect to their characteristics and activity on the market. Analysis is based on a predictive data mining technique - decision trees. Output is a set of decision rules, which highlight the factors that mostly affect the level of ethical responsibility towards employees. It seems that the attributes "profit or loss of company" and a "number of employees" are the most significant determinants influencing the level of ethical responsibility.

Key words: Corporate social responsibility, Ethical responsibility, Labour cost, Decision tree, Decision rules

JEL Classification: M14, M19

1 Introduction

Each company defines the objectives, of which meeting expresses a success of the company. The traditional approach to management is meeting the objectives, particularly in the economic field and implements such strategies and visions that are beneficial only for the company itself. Important feature of new approach to management is a movement from the level "profit only" to level "responsible approach to business". The implementation of concept of social responsibility in the company's activities means to voluntarily apply such strategies that are beyond legislative obligations and beneficial for all stakeholders as well. According to this view, the company focuses not only on economic growth, but also social and environmental impact of its activities according to indicators (Turáková and Plchová, 2011). Corporate social responsibility can be defined as a multi-level concept, which consists of four levels, where one of them is the ethical responsibility (Carroll, 1979). Enterprises with ethical responsibility should be doing what is right, fair and honest without being forced by legal system to do so. Enterprises should voluntarily take care of their employees, follow their interests and should provide adequate wages with respect to the value created by these employees.

The concept of corporate social responsibility should be a part of the strategic planning of each enterprise, which wants to be successful in the long term (Gavurová, 2011, 2012). In both, the

¹ Ing. Ivana Peržel'ová, Němcovej 32, 040 01 Košice, Slovak Republic, ivana.perzelova@tuke.sk

theoretical approaches and practice is missing link between ethical rules and procedures and function of management. They do not get into management methods and analysis; and are not a criterion in the decision-making algorithms (Jasovská and Gavurová, 2008). The actuality of this issue led us to examine the feasibility of implementation and use of analysis of ethical responsibility in Slovak enterprises.

2 Corporate Social Responsibility

Concept of corporate social responsibility (CSR) can be described using conceptual model "A Three - Dimensional Model of Corporate Performance" created by A. Carrol (1979). CSR is defined as multi-level concept which include economic, legal, ethical and philanthropic expectations that are addressed to enterprises at that moment. CSR can be categorized into four interrelated aspects - economic, legal, ethical and philanthropic that are stacked in a pyramid (Carroll, 1979). CSR have been developing for decades and up to now there is a number of theoretical lines developed, which are characterized by different approaches to this issue (Remišová et al., 2013). One of the first theoretician in this area is Howard R. Bowen with his publication "Social Responsibilities of the Businessman" (1953). In the publication CSR has been interpreted in the way emphasizing the commitment and exemplary approach to the entrepreneur (Kunz, 2012).

In 1970 was opened a beneficial discussion about basic objective of business and CSR by M. Friedman. In his famous essay entitled "The Social Responsibility of Business Is to Increase Its Profits", Milton Friedman states that the only CSR of company is to create a profit in a legal way. Perceiving of CSR in the context of a "wider good" is for companies devastating. M. Friedman rejects any social or environmental objectives and condemns the whole concept of claiming that it is essentially averted idea (Friedman, 1970).

His approach to the CSR found many proponents and opponents, which are developing this area. So in the spotlight is the relationship between CSR and profitability of enterprises, establishment of business ethics as a separate academic discipline, formation counterpart to the US understanding of the CSR - European approach. Business ethics as a separate scientific discipline developed in the USA in the 70's and in Europe in the 80's of the 20th century (Remišová et al., 2013). Kunz (2012) says that business ethics is a form of applied ethics, which focuses on the application of ethical principles in economic practice. Business ethics is one of the determinants of gaining competitive advantage. Obeying to ethical principles is positive for company culture. Creating an ethical environment also influence implementation of changes and achieving strategic goals of the company (Šoltés and Gavurová, 2015).

3 Methodology

Data sample consisted of 9 070 records (enterprises). Main information source are financial data of enterprises from standard annual financial statements provided by company or from the company's website, data from commercial bulletins and collections of documents. Available dataset of Slovak enterprises takes mainly the numeric form, which results from the nature of main sources of the database. It contains also discrete values that provide general information about the enterprise (place of business, area of operation, type and legal form of the company, number of employees, economic results, etc.).

Analysis is based on a predictive data mining technique – classification, specifically is used C5.0 algorithm that can generate decision trees and set of decision rules. The selected algorithm only allows symbolic output fields. The analysis is conducted using data mining software SPSS Clementine based just on CRISP – DM methodology.

Our target attribute (Output) is given by level of ethical responsibility towards employees, resp. their numerical description. For purpose of this analysis, ethical responsibility towards employees (ER) is perceived as the level of distribution of operating income. In the other words it is a distribution of income produced by employees in the form of added value to lower level – the ones who is income generating – to the employees. Therefore, based on the available financial data of enterprises ratio indicator expressing the share of added value and labour costs (AV/LC) can be considered as the suitable one:

$$ER = \frac{AV}{LC} \tag{1}$$

Selected variables represent a significant part of operating profit and substantial influence its level. Variable added value consists of three parts such as margin, production and production consumption. Labour costs represent the consumption of human labour and part of the employees' compensation analysis.

Further, we selected inputs of model, which can be considered as the company characteristics which can influence in some way target attribute (output). These variables have numerical and symbolic form and are splitting to the groups. Importance of its inclusion in the analysis has been using regression analysis. The regression analysis confirmed that selected sample is statistically significant, except for the variable "number of employees". On this basis, we can say that the variable "number of employees" does not affect to level ER towards employees. Despite this fact, we included it in the model in order to verify its statistical significance. The structure of the model is shown Table 1:

Target (output)	Inputs
 Very high level ER High level ER Neutral level ER Low level ER Very low level ER 	 Income (Profit/Loss) Type of enterprise Number of employees Fixed Assets / Total assets Intangible asset / total assets Length of business Region Size of town NACE

Table	1	Structure	of	C5.0	model
Lanc		ou ucui c	UI.	C.J.0	mouci

Source: Author

4 Results

Level of ethical responsibility towards employees was determined by applying selected ratio indicator (AV / LC) to sample of Slovak enterprises. As the results of analysis we got five groups – levels of ER towards employees using the Binning node and Likert scale. The following table shows the fives levels of ER. (Table 2)

Level ER	AV / LC	
Very high level ER	>= 0.00160128	< 0.99982867
High level ER	>= 0.99982867	< 1.99805606
Neutral level ER	>= 1.99805606	< 2.99628345
Low level ER	>= 2.99628345	< 3.99451083
Very low ER	>= 3.99451083	<= 4.99273822

Table 2 Level of ethical responsibility towards employed
--

Source: Author

Records, which are classified in the group with very high level ER, have a much higher labour costs than added value. On the other hand, in case of fifth group, which represented very low level ER, records have a high level of added value, but labour costs are very low. This relationship, lower value of indicator AV / LC, means higher level ER towards employees. In the analysed samples, the most records (5,745; 63.34%) have a high level ER towards employees (i.e. second group). Only 204 records, representing 2.25% of all sample, have a very low level ER towards employees. It shows the following Figure 1:



Figure 1 Frequency of records according level ER Source: Author

Output of analysis is also in the form of a decision tree and a set of decision rules, which were generated by selected C5.0 algorithm. The decision tree visualizes how predictor fields split the data into subsets, as we can see in the text display of the tree (Figure 2).

The root of the tree shows the overall graphic view of counts for five levels of ER. The first split is on "Profit or Loss", where records were divided into two groups – profitable enterprises, loss - making enterprises. Branch "Loss - making enterprises" contains more records with very high level of ER than profitable enterprises. This branch was further expanded by "Length of business", where records were split into two groups – records with length of business less than 18 years and more than 18 years. It seems that the enterprises operating on the market longer have higher level of ER. The third split is on "Number of employees", which expanded the node "Profitable enterprises". There are two subsets, which present enterprises with number of employees less than 38 and more than 38. The first subset contains more than 3 000 records, which is further expanding by attribute "Type of company". According to this splitting, the

trading enterprises show low level of ER, but on the other side, manufacturing enterprises and enterprises providing mainly service are indicated high and neutral level of ER towards employees. It is noteworthy that the node representing records with number of employees more than 38 is extended again by attribute "Number of employees". The decision tree shows this attribute as significant; therefore the tree did not confirm the results of regression analysis.



Figure 2 Decision tree of C5.0 model Source: Author

The C5.0 model also generated a rule set presentation which breaks the tree into collections of "IF - THEN" rules, organized by outcome. The rule set presentation of this model presented in Table 3.

 Table 3 Set rules of C5.0 model

Factor	Rule
IF "Profit or Loss" = Loss	THEN level ER higher
IF "Profit or Loss" = Profit & $38 <$ "Number of employees" ≤ 3500 & NACE = B, D, F, G, H, K, N (Mining and quarrying; Electricity, gas, steam and air condition supply; Construction; Wholesale and retail trade; Transporting; Financial and insurance activities; Administrative and support services activities)	THEN high level of ER –> 3718 records (41% of all sample), confidence of rule 75%
IF "Profit or Loss" = Profit & "Number of employees" ≤ 38 & "Type of enterprise" = mainly manufacturing & NACE = B, D, G, K, N, O (Mining and quarrying; Electricity, gas, steam and air condition supply; Whole sale and retail trade; Financial and insurance activities; Administrative and support services activities; Public administration and defence)	THEN high level of ER -> 537 records (6% of all sample), confidence of rule 74,2%

Source: Author

5 Conclusion

The result of this study is the classification of ethical responsibility into five groups - very high; high; neutral; low; very low level of ethical responsibility towards employees.

In the analysed sample dominates a high level of ethical responsibility and only a small percentage of records shows a very low level of ethical responsibility towards employees. According analysis, it seems that the situation in Slovak enterprises is favourable in this area.

The decision tree shows the attribute "Loss or profit "is the most significant factor that mostly affects the level of ethical responsibility towards employees. Enterprises making loss have a higher level of ethical responsibility toward employees as compared with profitable enterprises. It is likely result of bad situation enterprises, when they not able to create such a high added value and so almost all amount of added value is used to cover the labour costs. The second most important factor is attribute "Number of employees". The decision tree did not confirm the results of the regression analysis on this attribute, but on the contrary, this attribute is present in many decision rules. The attributes such as type of enterprise, length of business also have a relatively high impact on the level of ethical responsibility towards employees in Slovak enterprises.

References

CARROLL, A. B. 1979. A Three - dimensional Conceptual Model of Corporate Performance. In: *Academy of Management Review*. Vol. 4, No. 4, pp. 497-505.

- FRIEDMAN, M. 1970. The Social Responsibility of Business is to Increase Its Profits. In: *The New York Times Magazine*. September 13, 1970.
- GAVUROVÁ, B. 2012. Source Identification of Potential Malfunction of Balanced Scorecard

System and Its Influence on System Function. In: E+M Ekonomie a management, Vol. 15, No. 3 (2012), pp. 76-90.

- GAVUROVÁ, B. 2011. Systém Balanced Scorecard v podnikovom riadení (The Balanced Scorecard System in Enterprise Management). In: *Ekonomický časopis*, Vol. 59, No. 2, pp. 163-177.
- JASOVSKÁ, J. and GAVUROVÁ, B. 2008. Podnikateľská etika v podmienkach systému Balanced Scorecard. In: *Mezinárodní vědecká konference doktorandů a mladých vědeckých pracovníků*: Karviná, Obchodně podnikatelská fakulta, 2008, pp. 166 – 181.
- KUNZ, V. 2012. Společenská odpovědnost firem. 1.vyd., Praha: Grada,2012. 208 s. ISBN 978-80-247-3983-0.
- REMIŠOVÁ, A., BÚCIOVÁ, Z. and FRATIČOVÁ, J. 2013. Spoločenská zodpovednosť podnikov a vedenie ľudí. Výskumný projekt VEGA 1/0333/13. Univerzita Komenského v Bratislave, 2013.
- ŠOLTÉS, V. and GAVUROVÁ, B. 2015. Modification of Performance Measurement System in the Intentions of Globalization Trends. In: *Polish Journal of Management Studies*. Vol. 11, No. 2, pp. 160 – 170.
- TURÁKOVÁ, A. and PLCHOVÁ, J. 2011. Spoločenská zodpovednosť podnikov ako súčasť podnikovej kultúry. In *Journal of Management and Economics*, MANEKO, 2011.

Economic and Psychological View of Spa Tourism in Perspective of Wellbeing

DANIELA PETRÍKOVÁ¹ - TATIANA SOROKOVÁ² Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

The aim of the article is based on descriptive statistics for the period 2005 to 2014; provide a view of the position of spa tourism in Slovakia. This paper focuses on the capacity and performance of the spa and spa tourism in the perspective of wellbeing. In this article we describe the development of the number of visitors in the Slovak ian spas in the distribution of domestic and foreign clients. We present the development of the total amount of sales for accommodation and other indicators to describe the spas in the context of its position in the travel industry as a whole. We highlight the growing importance of spa tourism in the perspective of wellbeing.

Key words: Spa Tourism, Wellbeing, Domestic and Foreign Clients

JEL Classification: I15, I31

1 Introduction

Spa tourism represents one of the basic types of tourism which requires an existence of spa facilities with certain amount of utilization of natural healing sources, such as healing waters, thermal springs and gas emanation, peloids and climate conditions. Spa tourism is one of the most important and concurrently favourite forms of tourism in Slovakia. In Slovakia, there are located "uncountable" numbers of natural streams and there are plenty of high quality spas. The large number of healing streams enables spa tourism to develop and it has fuelled the initial establishment and consequent development of various spa cities. (Matlovičová, Kolesarová, and Židová, 2013) In addition to traditional healing spa visits there are number of new types of consumers' visits which are in form of short-term recondition or regeneration visits which do inspired individuals to lead healthier life style and wellbeing as an expression of rationale prevention and health protection. Currently, we can consider the spa care as a synonymous of prevention and type of investment into own health.

2 Spa sector in Slovakia - capacity and performance of spas in years 2005-2014

Upon the entry of Slovakia into the European Union, the emphasis on quality and scale of offered spa services have been improving continuously. There are many changes in spa tourism in 20th century based on political, economical and social impact in this service sector. (Eliášová, 2009) Over last years, the increase significance of wellness spa services has emerged and those services are mostly focused on rest, relax, beauty, physical and mental health. Spa tourism is connected with health-preventive and healing activities with specialized doctor's support and rehabilitation supervisions. Amongst the basic spa-healing functions of spa tourism are health, regeneration and

¹ Ing. Daniela Petríková, PhD., Němcovej 32, 040 01 Košice, Slovak Republic, daniela.petrikova@tuke.sk

² PhDr. Tatiana Soroková, PhD., Němcovej 32, 040 01 Košice, Slovak Republic, tatiana.sorokova@tuke.sk

recreational functions. The main tasks are strengthening of health and voidance of negative influences sourced from daily lives environment with main goal to eliminate negative impact of civilisation diseases affecting human organism. (Gúčik, 2010; Orieška, 2010; Orieška, 2011) On the Map 1 are marked Spa centers in Slovakia.



Number of visitors in Slovakian spas (see Figure 1) had from 2005 until 2008 increasing trend. In 2008, there was recorded a decrease in number of foreign visitors. Subsequently, a year later the similar trend was seen with domestic visitors, as well. In 2009, there was the lowest rate of visits from foreign visitors over observed period. The main source of this development was mainly due to the global economic recession and related social depression. In 2010, the number of visits had grown, although the growth was only in slight numbers and this trend remained mostly unchanged until 2012. In years of 2013 and 2014, the significant increase in domestic visitors had been recorded, whereas foreign visits remain mostly at the same level.



Figure 1 Number of visitors in Slovakian spas in years 2005-2014 Source: Bfased on SACR

Number of overnight stays in spas tourism in individual years (Figure 2 and Figure 3) had copied development of the number of visitors. Clearly visible decline in overnight stays of foreign visitors was in 2009. However, the significant view of average number of overnight stays in spa tourism is between domestic and foreign visitors, where we can see that from 2008 it had declining tendency

of visits of foreign visitors in comparison to domestic visitors and also the average overnight stay had declined more in foreign visitors pool.



The following Figures 4 and Figure 5 show overall development of sales for accommodation in spa tourism. Sales from year 2005 until 2008 are presented in millions of Slovak crown (mil. SKK) and sales from year 2009 until 2014 are presented in thousands of Euro (ths. EUR). The sales had been growing evenly until 2008, where in 2009 decline of the sales was recorded, although this event can be attributed to economical recession. Since year 2011, the story has changed and overall sales are recording continuous growth. Until the year 2007, the sales from accommodation of foreign visitors exceeded sales from domestic visitors' accommodation. After this year, the sales from domestic visitors exhibited growing tendency and domestic visitors' sales have influenced the overall sales growth since 2009. On the contrary, rapid decline in sales from accommodation of foreign spa visitors commence in 2009. The main outflow of foreign clients was from Czech Republic and Poland which was due to foreign currency constrains and exchange rate developments.



Sale growth is associated with increase in average prices for accommodation services. Similarly to above figures, prices between years 2005 and 2008 in Figure 6 are presented in Slovak crowns (SKK) and prices between years 2009 and 2014 in Figure 7 are presented in Euros (EUR). In 2009, the average price for one night was at level of 18 Euros, and price level between year 2010 and 2011 had risen to 21 Euros per night. Subsequently, in 2012 the price level growth even more to 23 Euros for one night, followed by the price level decrease in 2013 and 2014 to level of 22 Euros for one night.



Source: Based on SACR



A share of spa tourism on total visits of all visitors throughout whole tourism sector in Slovakia is presented by Figure 8 by percentage scale. The spa tourism share on whole tourism sector had been developing evenly with slight decline in year 2012. Since year 2012, the share of spa tourism has growing tendency which is mostly due to the increase of domestic visitors in spas. In 2007, the trend of declining share of foreign visitors on total visits had begun, although this trend started to be reversed in 2012 and since then it had growing trend (over observed period of time).



Figure 8 Share of spa tourism on total visits of all visitors throughout whole tourism sector in % in Slovakia between years 2005 - 2014 Source: Based on SACR

Following Figure 9 shows the share of foreign and domestic visitors on overall spa sales. Share of domestic spa visitors had mostly growing tendency with exception in years 2008, 2011 and 2013

when a minor decreases were recorded. The biggest share on total sales for foreign visitors was achieved in 2005, when this share reached 15.6% rate. Domestic spa visitors on the other hand reached the highest level in 2012 in share of 28.8%. On the contrary, in year 2012, foreign spa visitors' rate was the lowest from the whole observed period at the level of 11.4%. Additionally, in 2013 situation was more or less similar to year 2011, when domestic spa visitors had contributed to overall sales level by 27.5% and foreign by 11.7%.



Source: Based on SACR

At the Figure 10 we can see structure of foreign visitors in Slovakian spas between years 2011 and 2014. Number of visitors from listed countries represents a selection of countries with the highest number of visitors. In observed years the most represented countries amongst foreign visitors were Czech Republic and Germany.



Source: Based on SACR

Number of overnight stays presented on Figure 11 corresponds with number of visitors from two most frequently represented countries by its spa visitors, such as Czech Republic and Germany, although important levels of visitors are as well from Israel, Poland and Russia.





Figure 11 Number of overnight stays in spa accommodation facilities in Slovakia between years 2005 – 2014 Source: Based on SACR

The following Figure 12 shows an average number of overnight stays by foreign visitors in Slovakian spas with significant dominance of clients from Germany, Israel, Russia and Netherland.



Figure 12 Average number of overnight stays in spa accommodation facilities in Slovakia between years 2005 - 2014

Source: Based on SACR

3 Spa tourism in perspective of wellbeing

Spa tourism is defined by the level of supply and its main precondition is developed spa sector and services focused on satisfaction of clients' needs. Modern spar services in European perception are basically healing services based on utilisation of local natural healing resources which are used systematically and under the supervision of doctors in high quality environment in order to change working life stereotypes. (Spanring, 2009) The difference between spas and spa tourism can be seen as a non-invasive form of treatment focused on client to improve his/hers health status. Spa activities are not leisure time activities but it is a form of therapy. Spa tourism represents a leisure time activity and it's a healing process during leisure time. Therefore, we can concluded that this term - "spa tourism" - is defined by spa healing procedures and by some aspects of wellness which represents healthy life style, regeneration and relaxation. Over the last couple of years, there has been steep development of wellness services in spa locations. Wellness can be perceived in number of dimension and the term itself consists of two words, such as wellbeing and fitness. The term wellness should represent a combination of health and good feelings. (Global Spa Summit, 2011) Wellness products are very often presented as addition to spa tourism and nowadays those services are widely offered by spa facilities and spa cities. The wellness services have a visible distinction from spa services and the main differences are presented in Table 1.

Parameters	Spa services	Wellness
Length of stay	Recommended 3-6 weeks	3 – 7 days
Target	Improvement of health state	Regeneration
Necessity	With certain diseases	No
Natural healing sources	Necessity - expected	Not necessary
Provider of care	Medical staff	Without medical staff
Selection of procedures	Timeframe and selection of procedures determined by doctor	Decision and planning done by client
Role of doctor	Important	Not important
Procedures	May use doctor's supervision	Without doctor's supervision

Table 1 Differences between spa services and wellness

Source: Own processing

Main difference between spa and wellness is in a length of stay, whereas the spa length of stay is 3 to 6 weeks, wellness length of stay is just 3 to 7 days. Spa therapy is necessary step in healing process in some diseases or in some health states. The goal is to improve patient's health state which is directly linked to the effects of natural healing resources. The goal of visitors of wellness is to regenerate and this regeneration is not associated with any healing natural resources. Overall care is provided without doctor's supervision and selection and planning of procedures is solely based on client's decision. However, during spa visits the doctor's supervision is necessity and all procedures are administered with trained medical staff supervision. Trend of development of wellness services as its justifications although the latest information shows that expansion of those services is creating additional financial constraints on wellness owners. Range of services offered by wellness centres had in initial days from its commence a specific competitive advantage but since then the portfolio of services have grown within the pool of spa cities and facilities and uniqueness of sole wellness has begun to fade. Therefore, it is necessary for wellness owners to continue development and research for further ways to attract clients and to compete with spa resorts.

The spa tourism has in comparison to wellness unique advantage mainly due to its natural healing sources. Spa resorts are currently focusing mainly on patients who pay for their procedures individually and not just relying on health insurance customers. This means that there is a certain shift from initial spa healing trend to more spa tourism and this trend represents to some degree a deviation from healing purpose of spa resorts. At the end, the health is the most important precondition for happy life of every human being. Person who needs to improve his/hers health state will pay full price for spa services and will not wait for partial compensation from health insurance. Based on this the frequency and length spa therapy will be influence and will change over time. Therefore, wellness and spa trends represent modern form of diseases prevention and deep thought about our health and revaluation of priorities will drive us towards healthier life style and wellbeing which are currently very often missing due to our over-occupied lives. (SACR, 2013)

4 Conclusion

In year 2009, over observed period there was recorded decline in foreign visitors in Slovakian spas. Factors which cause this development and subsequent decline in sales were economic recession, uncertainty connected to introduction of Euro currency, adverse development of currency exchange rates which mainly affected visitors from Czech Republic and Poland. Structure of visitors of Slovak spas is predominantly based on domestic visitors rather than foreign visitors. The most
frequently represented countries were Czech Republic, Germany, Israel, Russia and other countries (aggregation indicator). Despite the fact that spa tourist from Poland visit Slovakia spas regularly their length of stay is comparably lower. Nowadays, significant portion of Slovak spa resorts are including many wellness services, weekend getaways, regeneration treatments and many other services. The wellness - as one of the activities of tourism - highlights the healthy life style, responsible approach to own health, improvement of quality of live and maximization of psychological and physical balance. It uses traditional and modern medicine, relaxation procedures, psychology, treatments, dietary and healthy meal plans, active care-taking of own bodies and offers ways to successfully manage demanding situations. In regard to wellness, nowadays we can see an emergence of a term know as "wellness and spa tourism" which represents people travelling to different locations in order to actively conduct activities which are focused on maintaining or improving their personal health or contentment and as well at the same time for people who are searching for unique and authentic experience away from their homes. The most significant factor which drives the active development of spa tourism can be defined as an "increase interest" in healthy life style.

References

- ELIÁŠOVÁ, D. 2009. Slovenské kúpeľníctvo v kontexte zmien. In: Kontexty kultúry a turizmu [online]. 02/2009. [cit. 2014-03-01]. Available online: http://kmkt.sk/files/files/b8573-Kontexty_2_2009.pdf>.
- GLOBAL SPA SUMMIT. 2011. Wellness Tourism and Medical Tourism: Where Do Spas Fit? [online]. [cit. 2014-03-02]. Available online: <http://www.globalspaandwellnesssummit.org/images/stories/pdf/spas_wellness_medical_to urism_report_final.pdf>.
- GÚČIK, M. 2010. Cestovný ruch: Úvod do štúdia. Banská Bystrica : DALI-BB, s.r.o. 307 s.
- MATLOVIČOVÁ. K., KOLESAROVÁ, J. and ŽIDOVÁ, A. 2013. Slovak spas in the context of change – current conditions, issues and challenges, in Dej M., Huculak M., Jarczewski W. (Eds) (2013): Recreational use of geothermal water in Visegrad Group countries. Institute of Urban Development, Kraków 2013, pp. 161 – 173
- ORIEŠKA, J. 2010. *Služby cestového ruchu*. Bratislava : Slovenské pedagogické nakladateľstvo Mladé letá, s.r.o. 150 s.
- ORIEŠKA, J. 2011. Služby v cestovnom ruchu: 2.časť. Banská Bystrica : DALI-BB, s.r.o. 150 s.
- SACR. 2013. Marketingová stratégia SACR na roky 2014 2020. [online]. [cit. 2014-03-04]. Available <a href="http://www.sacr.sk/fileadmin/user_upload/Statistiky/strategiaSACR/Marketingova_strategiasacrategi
- SACR. 2014a. Ubytovacia štatistika CR na Slovensku. TOP 15 krajín AZCR. [online]. [cit. 2015-06-04]. Available online: ">http://www.sacr.sk/odborna-verejnost/analyzy-a-statistiky/?no_cache=1&cid=1163&did=9148&sechash=549d6572>">http://www.sacr.sk/odborna-verejnost/analyzy-a-statistiky/?no_cache=1&cid=1163&did=9148&sechash=549d6572>">http://www.sacr.sk/odborna-verejnost/analyzy-a-statistiky/?no_cache=1&cid=1163&did=9148&sechash=549d6572>">http://www.sacr.sk/odborna-verejnost/analyzy-a-statistiky/?no_cache=1&cid=1163&did=9148&sechash=549d6572>">http://www.sacr.sk/odborna-verejnost/analyzy-a-statistiky/?no_cache=1&cid=1163&did=9148&sechash=549d6572>">http://www.sacr.sk/odborna-verejnost/analyzy-a-statistiky/?no_cache=1&cid=1163&did=9148&sechash=549d6572>">http://www.sacr.sk/odborna-verejnost/analyzy-a-statistiky/?no_cache=1&cid=1163&did=9148&sechash=549d6572>">http://www.sacr.sk/odborna-verejnost/analyzy-a-statistiky/?no_cache=1&cid=1163&did=9148&sechash=549d6572>">http://www.sacr.sk/odborna-verejnost/analyzy-a-statistiky/?no_cache=1&cid=1163&did=9148&sechash=549d6572>">http://www.sacr.sk/odborna-verejnost/analyzy-a-statistiky/?no_cache=1&cid=1163&did=9148&sechash=549d6572>">http://www.sacr.sk/odborna-verejnost/analyzy-a-statistiky/?no_cache=1&cid=1163&did=9148&sechash=549d6572>">http://www.sacr.sk/odborna-verejnost/analyzy-a-statistiky/?no_cache=1&cid=1163&did=9148&sechash=549d6572>">http://www.sacr.sk/odborna-verejnost/analyzy-a-statistiky/">http://www.sacr.sk/odborna-verejnost/analyzy-a-statistiky/
- SACR. 2014b. Ubytovacia štatistika CR na Slovensku. Kúpeľný CR 2014/2013. [online]. [cit. 2015-06-04]. Available online: ">http://www.sacr.sk/odborna-verejnost/analyzy-a-statistiky/?no_cache=1&cid=1163&did=9159&sechash=e2684228>.
- SPANRING, J. 2009. Kúpeľný cestovný ruch. In: *INPROFORUM 2009*, České Budějovice, pp. 298-302.

Introduction to Theoretical Aspects of Financial and Medical Care Benchmark Indicators

LUKAS PINKA¹ Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

The health sector in general and specifically focusing on financial performance of the healthcare facilities is a highly topical issue. Examining the financial statements of the health facilities helps in understanding and interpreting the financial performance of health and health care system. The main objective of this work is to show, commonly used indicators of financial performance and health care. This work serves as introduction to theoretical knowledge about reporting of the healthcare facilities. Understand of the background, theoretical framework of the reported benchmark indicators, basic units, concepts, terms, relations and combinations of possible indicators. Major contribution of the work consists in development of the new indicators for assessing the financial performance, namely Medical Care Output Cost of I. level and Effectiveness of bed distribution.

Key words: Health Care System, Financial Performance, Financial Indicators, Medical Care Indicators, Healthcare Facilities, Benchmark Indicators

JEL Classification: 111

1 Introduction

The issue of healthcare in its broader concept is the part of public sector. The public sector is often the main area of interest in terms of efficient use of public resources. In Slovakia, but also in other countries, many studies designed to assess the effectiveness of public organizations, which include hospitals, have been conducted (Martini and co., 2014; Gholami, Higón and Emroznejad, 2015; Rosenkrantz and Doshi, 2015). This study belongs to the wide field of publications investigating a performance in the health sector.

The presented study is concerned with identifying the key indicators of the hospital facilities effectiveness as well as with defining the new indicators. We identify indicators of health and healthcare, which have a direct or indirect impact on financial performance. Slovak hospitals report mainly indicators such as bed occupancy, bed turnover rate, number of beds, which we meet in publications of Perera, Dowell and Crampton (2012) or the Dy et al. (2015).

The aim of this study is the construction of new indicators. The first one called Medical Care Output Cost of I. level, which consists of two newly indicators - the price (in the means of salary) and utilisation rate of medical doctor. The second indicator we developed is the Effectiveness of bed distribution.

¹ Ing.Lukáš Pinka, Němcovej 32, 040 01 Košice, Slovak Republic, lukas.pinka@tuke.sk

2 Theoretical framework

The main objective of allocating the public resources is to manage them efficiently. For this reason, public bodies are required to publish the so-called Annual reports, resp. Management reports. These reports have two mandatory parts: the balance sheet and profit and loss accounts, which reflect the management of organizations within a given period. Especially in the field of health, which is in SR associated with many publicized cases of inefficient management, is making a profit or loss even further monitored by whole public (Gavurová and Šoltés, 2013).

This study is based on selected key publication in the field of performance of healthcare. One of them is document called "National Reform Programme of Slovak Republic" published by Ministry of Finance in 2013. With more detailed issues including the plans for the future direction of Slovak healthcare in the period 2013-2030 deals document "Draft of Strategic Framework for Health for the years 2013 - 2030" published by Ministry of Health in 2013. Besides the mentioned publications, the key source of information for this study is also the data published by OECD (OECD Health Data) and WHO.

In this article we identify various factors that have an impact on the profit/loss of hospital facilities. In order to identify and define the determinants of profit or loss we are working with data that is publicly available and reported in annual reports. Annual reports are mainly available on the official websites of hospitals and are freely downloadable. In addition to the sites we use also The Register of Financial Statements and the official website of Ministry of Finance of the Slovak Republic. With the study of the hospital annual reports deal authors Gavurová (2013), Šoltés and Gavurová (2013), Gavurová and Hyránek (2013).

Currently in Slovakia there is no regulation or standard reporting, to which all hospitals or health organizations have to hold. Many hospitals use in its annual reports only data from the balance sheet and income statement. Other indicators of healthcare and financial indicators are not reported. Therefore is the data collection very time consuming. The unification of reporting, the use of standardized forms, same indicators would clearly contribute to an increased transparency and clarity for and internal and external users of reports. In Slovakia there is total number of 126 hospitals, within which we managed to get annual reports from 43. From these 43 monitored annual reports we have managed to assemble an observed sample consisting of seven indicators repetitive in 21 cases (INEKO, 2013). The comparison of hospitals on the basis of selected indicators can be conducted in terms of the different legal status. The choice of legal form of organization affects the way it's governing, funding and management. From this point of view, we can include the legal form to one of the determinants of efficiency in organizations within both private and public sector. Currently, the public hospitals in Slovakia may exist in the following legal form: Stock Company, Limited Company (Ltd), Contributory organizations, Non- profit organizations, Budget organizations.

Due to briefly mentioned differences in the various forms of establishment of hospitals in Slovakia, we can assume that the legal form will be one of the factors affecting the efficiency, both financial and health, but this difference is not highly significant, as confirmed by Meričková (2009), Pirozek, Komarova, Lešetický and Hajdíková (2015).

3 Indicator research

Theoretical aspects of selected financial and medical care benchmark indicators are shown in the next text.

Number of beds

The number of beds is indicator that reflects mainly the size of hospital. From this indicator is clear that any addition to the hospital beds means extra costs for the procurement and running. With the service of bed added are related marginal labour costs required for staff that must provide care for each patient on a new bed, as well as other costs associated with complementary products (e.g. Bedding, etc.). On the other side, new bed means the possibility of providing basic services and so brings to the hospital the margin profit either directly from patients or from health insurance companies, which have to reimburse by the hospital performed acts, drugs, consumed material and other medical material except the drugs itself.

Bed Occupancy Rate

Indicator of bed occupancy rate generally expresses the percentage usage of the total number of hospital beds for a given period (Belciug and Gorunescu, 2015). This indicator directly reflects the utilization of resources which are available in the hospital. It expresses whether hospital is managed efficiently in terms of utilization of their capacity, whether it has enough available beds, and whether is able to meet demand of patients on time and sufficiently.

On the other hand, the indicator expresses whether hospital has not too much capacity, which probably will not be fulfilled and thus is wasting its resources. Too low number of this indicator is a warning sign for the inefficient use of financial and capacity resources of hospital. This warning sign so should lead to a reduction in the number of beds at an unchanged patient satisfaction but at reducing the costs of service and maintenance of beds.

With the number of beds are related various expenses such as: procurement, running, deterioration and repairs. The amount of beds is directly related to the ownership of real property. The direct correlation is generally accepted: the more hospital beds provide the more rooms necessary for their smooth and continuous operation are needed. To find the correct bed occupancy rate is for efficient management of hospitals crucial. Due to the smooth running, the hospital should reach such numbers of this indicator that would ensure meeting the demand of patients while having possible reserve for short-term increase in demand. However, this reserve of unused bed fund must not be too large, as this may lead to a waste of resources that could be used more efficiently. Mathematical expression of Bed Occupancy Rate is as follows (1):

$$BOR = \frac{ID^i * 100}{AB^T * d^i} \tag{1}$$

where: BOR – occupancy rate ID^{i} – total number of inpatient days for a given period i AB^{T} – available beds in total d^{i} – number of days for a given period, typically one year (365 days)

Inpatient days

Inpatient days are the total number of days, which all hospitalized patients stayed in the hospital for a given period of time.

This indicator allows monitoring a hospital utilization, manpower and resources. Every day spent by the patient in the hospital means for the hospital the costs, but on the other hand a yield. Situation is so similar to the above stated number of beds and bed occupancy rate. This indicator at the nominal value is not generally applicable for comparisons between hospitals. The reason is the different size of hospitals and thus the volume of patients in absolute terms as well, which influence the indicators such as the number of hospitalized days. Mathematical expression of Inpatient days is as follows (2):

 $ID^i = ALOS * I$

(2)

where: ALOS – average length of the stay in the hospital I – number of hospitalized patients

Number of hospitalized patients

Number of hospitalized patients gives us information about the total number of hospitalized patients during the reporting period and thus again depends on the size of the hospital and the use of its resources. Similar to the inpatient days, this indicator itself has not high expressing power when comparing the hospitals because of the effect of the size. This indicator itself so does not say much about the performance of the hospital and its impact on the profit or efficiency of financing.

Number of employees

Total number of employees is the basic indicators needed when pursuing the profit of hospital. It expresses the hospital size and potential, which hospital can offer to its patients (Maestre, Oliveira and Barbosa-Póvoa, 2015). The number of employees itself is not explanatory. Of course by the number of employees are influenced the expenses in the term of increased wage costs with every other employee in an employment relationship (Baray and Cliquet, 2013).

However, interesting indicators of effectiveness of hospital are calculated from the number of employee. We can compare the number of employee to the base of potential patients or beds, etc. Interesting is also the categorization of employee by their specialisation, education or gender. The main idea is that employees who bring profit to the hospital and positively affect the profit are doctors and nurses. So it is for discussion in what intense are different categories of employees more important than others, and what number of employee is optimal.

Bed Turnover interval

Turnover interval show us the average length of time elapses between one patient discharge and another entre the same bed over specific period of time especially one year.

It can be expected that for the hospital is preferred to maximize the turnover of beds. This would mean that the time when the bed is not used is reduced and thus increases usability of beds. Such thinking is economically and reflects the effective use of beds. From a medical point of view after leaving a patient (death, moving between departments, moving between hospitals) it is important to prepare bed for the next patient. There is evidence that too little time for bed turnover leads to the increase of bacteria on the bed, which has a negative impact on the patient (Kaier, Mutters and Frank, 2012). Mathematical expression of Bed Turnover interval is as follows (3):

$$BTO = \frac{ABD^{i} - ID^{i}}{Di^{i}}$$
(3)

BTO – Bed Turnover interval ABD^{i} – available bed days in total for a given period of time i ID^{i} – total number of inpatient days for a given period i D^{i} – total number of inpatient discharges (deaths, transfer in or out of the hospital) for a given period i

4 Proposed indicators

In this section are described our proposed financial and medical care indicators suitable for evaluating the financial performance of healthcare facilities. First is Medical Care Output Cost of I. level and second is Effectiveness of bed distribution.

Medical Care Output Cost of I. level

In order to compare financial performance we propose to monitor the price of one performance, what means how much pays hospital to a doctor for one performance. We assume that performances are conducted only by doctors and no other employees.

$$C_{MCO} \text{ of } I. level = \frac{c_D}{DO_r}$$
(4)

$$C_D = \frac{LCoD}{D} \tag{5}$$

$$DO_r = \frac{MCO}{D} \tag{6}$$

where:

 C_{MCO} – Medical Care Output Cost C_D – Doctor Cost DOr – Doctor Occupancy Rate LCoD – Labour Cost of Doctors D –Number of Doctors MCO – Number of Medical Care Outputs

Medical care output cost of I. level (further only "medical care output cost") is a ratio of doctor cost to doctor occupancy rate, equation (4). Costs per doctor are calculated by partitioning the total salary costs for all doctors by the number of employed doctors in the hospital, equation (5). Occupancy doctor rate we get by dividing the sum of all medical care outputs by the number of doctors, equation (6). Indicator of medical care output cost shows the relationship between wages

of doctor and his occupancy given by ratio number of medical care outputs and number of doctors. This indicator tells about costs of labour required for one doctor's medical performance.

Indicator is very easy to use for comparisons between hospitals. Based on this indicator, we can see whether the hospital pays for the medical output more or less as the other hospitals. Thus, for the same output hospitals can pay its doctors different. When we compare hospitals using this indicator, hospital with higher medical care output cost pay more for one output what means less effective financing then the other hospital with lower output cost.

When interpreting the results in specific data is necessary to monitor other factors as well. The price of labour is generally dependent on several factors, such as geographical location. Into the calculation of the total cost of performances can enter other factors besides these by us proposed, that will affect the outcome in a greater or lesser extent. Therefore, we assume the possibility of extending the proposed indicator to the further levels by adding new variables.

Effectiveness of bed distribution

Effectiveness of bed distribution is an indicator that expresses the appropriateness of the amount of beds. It is calculated as the ratio of beds to the total number of employed doctors. We assume that the number of beds and the number of employed doctors are growing proportionally and that for each additional bed it is necessary to increase the quantity of doctors. The amount of doctors in nominal terms testifies the size of the hospital. Thus, the individual indicators are used to compare the sizes of hospitals. Mathematical expression of Effectiveness of bed distribution is as follows (7):

$$Effectiveness of bed distribution = \frac{number of beds}{number of doctors}$$
(7)

The proposed indicator abstracts the size of the hospital and provides a picture of whether the amount of beds is adequate to amount of employed doctors. In other words, it expresses the suitability of the size of the hospital. Based on an indicator we can say how many beds will increase if the hospital employs one doctor extra. If in the various hospitals are notable differences, it is expected that the hospital does not employ the right number of doctors or bed fund is pre-dimensioned or under-dimensioned.

When interpreting, it is necessary to take into account the fact that doctors are necessary for the providing the services for the non-hospitalized patients as well.

5 Conclusions

This paper provides insight on indicators of health and healthcare, which directly or indirectly serve to evaluate the financial performance of hospitals. The essential is the study of used indicators. Understanding hospitals reporting system, clarification of the importance of used indicators is a necessity. The paper is a kind of gateway to the world of annual report analysis.

Construction of new indicators provides a suitable proposal for reflection and deeper analysis. The indicators are designed so that the information content they provide is not distorted and can serve for comparison between hospitals without any further adjustments and calculations.

In the area of data reporting in the form of annual reports there is a lot of deficiencies. Heterogeneity of data has resulted in the complexity of data collection as well as subsequent analysis. Unification and standardization of data reporting would help to better understanding of annual reports and facilitating the comparison of different institutions.

One of the limitations is the orientation on the official website of hospitals. It is difficult to find whether the hospital published annual reports or not. Not all hospitals have their own website. Other limitation consists in the irregular publication of report resp. annual reports from previous years are missing. On the other hand, many hospitals did not have to the date of our study (August 2015) annual report for the previous period 2014.

Register of financial statements available on the internet publishes annual reports of the minimum number of hospitals and health facilities. Besides that, financial statements of most hospitals are absent in several years.

This paper is a basic study for further studies in the area of effectiveness of hospitals. The next studies can extend our paper by application of proposed indicators on a data followed by their analysis and examination of the relationships and possible impact on financial performance.

References

- BARAY, J. and CLIQUET G. 2013. Optimizing locations through a maximum covering/p-median hierarchical model: Maternity hospitals in France. In: *Journal of Business Research*. Vol. 66. No. 1. Pages 127-132.
- BELCIUG, S. and GORUNESCU, F. 2015. Improving hospital bed occupancy and resource utilization through queuing modeling and evolutionary computation. In: *Journal of Biomedical Informatics*. Vol. 53, pp. 261-269.
- DY, M. S., KILEY, K. B., AST, K. LUPU, D., NORTON, S. A., McMILLAN, S. C., HERR, K., ROTELLA, J. D. and CASARETT, D. J. 2015. Measuring What Matters: Top-Ranked Quality Indicators for Hospice and Palliative Care From the American Academy of Hospice and Palliative Medicine and Hospice and Palliative Nurses Association. In: *Journal of Pain and Symptom Management*. Vol. 49, No. 4, pp. 773-781.
- GAVUROVA, B. and HYRANEK, E. 2013. Determinants of day health care development in Slovakia. In: *Ekonomicky časopis*. Vol. 61, No. 2, pp. 134-154.
- GAVUROVÁ, B., et al. 2013. Vybrané aspekty efektívnosti slovenského zdravotníctva. Jednodňová zdravotná starostlivosť a jej rozvoj v podmienkach Slovenskej republiky.
- GAVUROVÁ, B. and ŠOLTÉS, V. 2013. Slovak Healthcare Effectiveness-Analysis of Comparative Aspects and Identification of Development Opportunities.
- GHOMALI R, H, D. A. and EMROUZNEJAD, A. 2015. Hospital performance: Efficiency or quality? Can we have both with IT?. In: *Expert Systems with Applications*. Vol. 42, No. 12, pp. 5390-5400.
- KAIER, K., MUTTERS, N. T. and FRANK, U. 2012. Bed occupancy rates and hospital-acquired infections—should beds be kept empty?. In: *Clinical Microbiology and Infection*. Vol. 18, No. 10, pp. 941-945.

- MAESTRE A.M., OLIVEIRA, M. D. and BARBOSA-PÓVOA, A.P. 2014. Location-allocation approaches for hospital network planning under uncertainty. In: *European Journal of Operational Research*. Vol. 240, No. 3, pp 791-806.
- MARTINI, G., BERTA, P., MULLAHY, J. and VITTADINI, G. 2014. The effectivnessefficiency trade-off in health care: The case of hospitals in Lombardy, Italy. In: *Regional Science and Urban Economics*. Vol. 49, pp. 217-231.
- MERIČKOVÁ, B. FANTOVÁ ŠUMPÍKOVÁ, M. ROUSEK, P. 2009. Benchmarking na úrovni miestnej samosprávy vybrané problémy. In: *Teoretické a praktické aspekty veřejných financí*. Praha: Vysoká škola ekonomická v Praze. 15 s.
- NÁRODNÝ PROGRAM REFORIEM SLOVENSKEJ REPUBLIKY. Ministerstvo financií SR 2013. [online]. Available online: www: <http://www.mfsr.sk/Components/CategoryDocuments/s_LoadDocument.aspx?categoryId= 8046&documentId=9957>. [Accessed 2015-08-10].
- MZ SR, 2013. NÁVRH STRATEGICKÉHO RÁMCA V ZDRAVOTNÍCTVE PRE ROKY 2013 – 2030. [online]. Available online: www: <http://www.health.gov.sk/Zdroje?/Sources/Sekcie/IZP/navrh-strategickeho-ramca-vzdravotnictve-pre-roky-2013-2030.pdf>. [Accessed 2015-08-10].
- OECD HEALTH DATA, OECD Publishing, 2015. [online]. Available at www: http://www.oecd.org/els/health-systems/oecdhealthdata.htm> [Accessed 2015-08-13].
- PERERA, R., DOWELL A. and CRAMPTON, P. 2012. Painting by numbers: A guide for systematically developing indicators of performance at any level of health care. In: *Health Policy*. Vol. 108, No 1, pp. 49-59
- PIROZEK, P., KOMARKOVA, L., LESETICKY, O. and HAJDIKOVA, T. 2015. Corporate governance in Czech hospitals after the transformation. In: Helth Policy. Vol. 119, No. 8, pp 1086-1095
- ROSENKRATZ, A. B. DOSHI, A. 2015. Characterizing the Performance of the Nation's Hospitals in the Hospital Outpatient Quality Reporting Program's Imaging Efficiency Measures. In: *Journal of the American College of Radiology*. Vol. 12, No. 2, pp. 166-173

Supply Perspective of the Slovak Economic Growth

MANUELA RAISOVÁ¹ – JÚLIA ĎURČOVÁ² – ĽUDMILA BARTÓKOVÁ³ Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

The theories of economic growth agree that it is necessary to use the tools of economic policy in a manner which would lead to the attainment of sustainable economic growth in the long term. It would be an ideal situation if economic growth would reflect a permanent, long-termpredictable constant. However, the reality is not theory. In these turbulent times the rate of economic growth was far from constant. This trend concerns the global economy. As Romer (2012, p.6) said "growth has been rising over most of modern history and average growth rate in the industrialized co untries were higher in the twentieth century than in the nineteenth". An exception to this scheme of increasing growth is slowdown in productivity growth. The main aim presented in this article was the analysis of the economic growth of the Slovak Republic. We used a method called growth accounting. The first step of the analysis was to spread the overall rate of economic growth on the contribution of each production inputs - capital, labour and technological progress (total factor productivity). The second step was the calculation of TFP by dual approach using the price and the amount of the factors. Our calculation was based on the neoclassical Cobb-Douglas production function. Calculation of primal and dual TFP can by useful for comparison of development of economic growth in the countries. Our result should confirm or refute the hypothesis that although countries have achieved economic growth the productivity growth gradually slowed.

Key words: Total Factor Production, Dual TFP, Primal TFP, Solow Residual, Growth Accounting, Economic Growth

JEL Classification: JEL 040

1 Introduction

The economic crisis of recent years has opened a space for debate about whether the economy is still capable of economic growth at all, or whether we have reached our ceiling. While Shapiro (2013), in his commentary on the US economy said that economic growth can be achieved through the involvement of more innovations in the production process, reform of immigration policies and the creation of suitable conditions for the creation of new start-ups, on the other hand, de Neufville (2014) combines ecological and economic processes and problems and points out the need to change the current way of functioning of the globalized world. Innovation and investment as a factor of economic growth also described Szabo, Šoltés and Herman (2013), Buleca (2013).

To determine the potential of the country to achieve future economic growth is necessary to monitor how the economic growth is currently set. For this analysis we have chosen growth accounting approach, which consists in the distribution of economic growth on individual shares of individual economic inputs. The pioneers of this method were Abrahamovitz (1956) and Solow (1957). Solow just came up with the idea to analyze the impact of individual factors on economic

¹ Ing. Manuela Raisová, PhD., Němcovej 32, 040 01 Košice, Slovak Republic, manuela.raisova@tuke.sk

² Ing. Júlia Ďurčová, PhD., Němcovej 32, 040 01 Košice, Slovak Republic, julia.durcova@tuke.sk

³ Ing. Ľudmila Bartóková, PhD., Němcovej 32, 040 01 Košice, Slovak Republic, ludmila.bartokova@tuke.sk

growth in the form of a dual approach to growth accounting. The essence of this approach is to adjust production function so that we were able to express so called "*Solow residuals*". The Solow residual is sometimes interpreted as a measure of the contribution of technological progress (Romer, 2012, p.31; Mankiw, Romer and Weil, 1992).

We focused on economic growth of the Slovak Republic in period from 2000 - 2013. It is a small country with the potential to achieve economic growth even during the crisis years. According to the information from national account the average economic growth of the country was 4.2% in our period. According to the Peter - Lalinsky (2013), the fastest growing sector was manufacturing (9.4% annual growth rate) and the economic growth was based also on faster productivity growth in comparison with other EU countries. As mentioned in Peter and Lalinsky (2013) and Buleca and Andrejovska (2015), real labour productivity growth was supported by considerable amount of investments (including FDI) leading to technological renewal and greater efficiency of production factors. Nevertheless, the change has not been any significant. The result was that the capital – output ratio has increased at an average rate of 0.65 percent (period from 2000 to 2007 - before crisis in the Slovak Republic) and decreased at an average rate of 1.2 percent a year in period 2000 – 2013. The main aim of this paper is to find out if factor accumulation or total factor productivity (TFP) was responsible for economic growth.

2 Methodology and Data

2.1 Methodology

We used approach presented by Hsieh (2002). As a start point was used the basic national accounting identity - national output - presented as:

$$Y = rK + wL \tag{1}$$

where "Y" represents aggregate output, or aggregate income, "K" represents capital, "L" is labour, "r" is the real rental price of capital, and "w" is the real wage. After the differentiation of (1) with respect to time and dividing by Y we get:

$$Y' = r'K + rK' + w'L + wL'$$
(2a)

$$\frac{Y'}{Y} = r'\frac{K}{Y} + \frac{r}{Y}K' + w'\frac{L}{Y} + \frac{w}{Y}L'$$
(2b)

$$\frac{Y'}{Y} = r\frac{K}{Y}\left(\frac{r'}{r} + \frac{K'}{K}\right) + w\frac{L}{Y}\left(\frac{w'}{w} + \frac{L'}{L}\right)$$
(2c)

We used substitution in (2c):

$$Y' = s_K \left(\hat{r} + \hat{K} \right) + s_L \left(\hat{w} + \hat{L} \right)$$
(3)

where the identities " s_k " and " s_L " are the factor-income shares. (Hlousek, 2007) In the next step we placed the terms of the growth rates of factor quantities on left-hand side of the equation and the rest we left on the ride-hand side. Finally we obtained:

$$Y' - s_K \hat{K} - s_L \hat{L} = s_K \hat{r} + s_L \hat{w}$$
⁽⁴⁾

The left-hand side of the equation (4) is called the Solow residual primal (SR_p) or TFP growth. Decomposition of output growth gives us information about contributions of physical capital, labour and productivity to economic growth. After the removal of the contribution of these essential resources, the remaining part of economic growth, which was not explained by a combination of the growth rates of all production inputs, will be considered as the real value of TFP growth. (Wang – Yao, 2003)

$$SR_p = Y' - s_K \hat{K} - s_L \hat{L}$$
⁽⁵⁾

The right-hand side of the equation (4) is called the Solow residual dual (SR_d) expressed as share-weighted growth in factor prices.

$$SR_d = s_K \hat{r} + s_L \hat{w} \tag{6}$$

Under the condition that output equals factor incomes we can talk about the result that the primal and dual measures of the Solow residual are equal. No other assumption about the production function, bias of technological change or relation between factor prices and their marginal products is needed for this result. We do not even need to assume that the data is correct. (Hsieh, 1999)

2.2 Data

We worked with the aggregate measures of factor inputs and their prices in this paper. Data were collected from database of Slovak Statistical Office (SSO1,2,3,4,, 2015), National Bank of Slovakia (NBS, 2015), Eurostat and Ameco. The frequency of used data was annual in period 2000 – 2013. To calculate the SR_p were used gross domestic product in constant price of 2010, total hours worked and stock of gross fixed capital in constant price of 2010. (Figure 1)



The real interest rate was defined by 3 month nominal BRIBOR/EURIBOR deflated by inflation. The real wage was calculated as a nominal wage-consumer price index ratio (Figure 2).



To obtain factor-income shares we used annual data of gross value added, nominal costs of labour per person (Figure 3) and number of employed persons. Our average share of labour (s_L) was 48 % (for comparison for the Czech Republic it was 43.2% in the same period).



Source: SSO 2015b; SSO 2015d

As shown in Figures 2 and Figure 3, the value of gross value added, nominal labour costs and real wages were growing during the period. Short-term decrease was seen only in the gross added value during the height of the crisis. That was caused by the decrease in total production in the economy. Development of interest rates (Figure 2) reflected the economic development. The initial decrease in interest rates represented the government's efforts to promote steps towards investment in the economy and the subsequent rate cuts represented a policy of the European Central Bank in an effort to end the economic slump of economies of the euro area. (Schmieding, 2013)

3 Conclusions

We used equation (6) to calculate the final results. (*The results are in Table.1 and graphical results are presented in Figure 4 and Figure 5.*)

	Rental Price of Capital	Real Wage	Dual TFP
Annual	-2,868	0,062	-1,359
Annual weighted	-1,389	0,030	-1,359

Table 1 Results of dual Solow residual (TFPd), (growth rates in %)

Source: Own calculations

The results showed that the rental price of capital declined on average during the period. Its development reflects the diminishing marginal product of capital associated with the growth in the volume of capital. Changes in real wage were not negligible but the nature of the changes was not as much dynamic as in the case of the capital prices.



Source: Own calculations

The costs of capital were changed most significantly in 2002 (positive), 2007 and 2011 (negative). While changes in 2002 we see as a result of positive economic and political changes in the country, negative changes in 2006-2007 are associated with easing of fiscal and monetary policy in the country as well as with onset of the crisis. We admit the possibility that the market might react to the imbalances on the markets already at that time. A strong decline in prices of capital in 2011 was clearly associated with a second wave of the crisis. It is the same with real wage developments. According to our opinion, while striking imbalances in the years 2002- 2005 were associated with significant economic changes in the Slovak Republic, considerable decline in wages in 2011 represented a direct result of changes induced by the crisis. Our results are somewhat consistent with the conclusions reached by Haluska, (2012).

However, the calculation of TFP has brought significant differences in results. In the pre-crisis period we can speak about approximately the same trend observed for both variables. It should be noted that the rate of change is significantly greater in the case of dual TFP as in the primal TFP. It means that there was a change (the positive and negative) of factors market price and it could affect the overall economic growth in the country. On the other hand, the accumulation of labour and capital had no a significant impact on economic growth.



In term of numbers, the calculation of primal and dual Solow residual revealed that the perception of prices on the market factors and the estimates in the national accounts established by the Statistical Office differ significantly. While the value calculated according to equation (6) is equal to -1.359, the value calculated according to equation (5) is at the 0.023. The difference is thus 1.382 percentage points.

By controlling for the quality and usage of the factors of production, we found that TFP grew at an annual rate of 2.4%, where TFP has made a large contribution to economic growth (55.8%), followed by capital (39,5%) and to a lesser extent labour (4.7%).

	Capital	Labour	Primal TFP	Output
Annual	0.031	0.004	0.024	0.0422186
Annual weighted	0.017	0.002	0.024	0.0422186
Contribution	0.395	0.047	0.558	1.00

 Table 2 Results of primal Solow residual (growth rates in %)

Source: Own calculations

Conclusions that we have reached by the calculation of primal TFP are consistent with the findings made by Hlousek (2007), Haluska (2012). Based on its findings, the effect of total factor productivity to economic growth was much more important than the accumulation of capital or labour. Our findings confirmed this fact.

Despite the different results we believe that dual approach is a useful alternative for TFP measuring. Our further research in this area will focus on the more detailed elaboration of the impact of the various forms of capital on economic growth.

Acknowledgement

This paper was written in connection with scientific project VEGA no. 1/0892/13. Financial support from this Ministry of Education's scheme is also gratefully acknowledged.

References

- ANDREJOVSKÁ, A. and BULECA, J. 2015. Regresná analýza faktorov vplývajúcich na objem investícií v krajinách V4. In: *Acta Oeconomica Universitatis Selye*. Vol. 4, No. 1, pp. 23-33.
- BULECA, J. 2013. Podpora Inovácií a Podnikania v Košickom Samosprávnom Kraji. In: Acta Oeconomica Universitatis Selye, pp.47-54.
- HALUŠKA, J. 2012. Slovenská ekonomika v roku 2011. Makropohľad na vývoj v jej reálnom sektore. In: *"Biatec"*, Vol. 20, No. 5, pp. 7 10.
- HLOUŠEK, M., 2007. Dual approach to growth accounting -application for the Czech Republic, In: "*Mathematical Methods in Economics 2007*". Ostrava: Faculty of Economics, VŠB-Technical University of Ostrava, 2007. p. 185-190.
- HSIEH, C. T., 2002. What Explains the Industrial Revolution in East Asia? Evidence From the Factor Markets. In "*The American Economic Review*", Vol. 92, No.3, pp. 502-526.

- HSIEH, C. T., 1999. Productivity Growth and Factor Prices in East Asia. In: "American Economic Review", Vol. 89, No. 2, pp. 133-138.
- MANKIW, N.G., ROMER, D., WEIL, D.N., 1992. A contribution to the empirics of economic growth, In: *The Quarterly Journal of Economics*.
- NBS, 2015. Interest Rates of the ECB.
- de NEUFVILLE, R. 2014. Have We Reached the Limits to Growth? In. Anthropocene. Jan 14, 2014.
- ROMER, D., 2012. The Solow Growth Model. In: Advanced Macroeconomics, pp. 6-37.

SHAPIRO, G. 2013. Six Ways to Create Economic Growth. In: "Forbes".

- SCHMIEDINGE, H. 2013. CB, 2013. The ECB is not breaching the law. In: "The Economist",
- SSO. 2015a. Gross Domestic Product by branches of NACE Rev. 2 in Mill. EUR at constant prices, indices (1995 2014).
- SSO. 2015b. Gross Domestic Product formation and its components in Mill. EUR at constant prices, indices (1995 2013).
- SSO. 2015c. Average nominal monthly wage at EUR, SKK, indices (1991 2014). September 15th, 2015.
- SSO. 2015d. Total labour costs (yearly) at EUR, SKK, structure (2000 2013). September 15th, 2015.
- SZABO, Z., ŠOLTÉS M. and HERMAN, E. 2013. Innovative Capacity & Performance of Transition Economies: Comparative Study at the Level of Enterprises. In: *E & M Ekonomie a Management*. Vol. 16, No. 1, pp. 52-68.

Quality and Availability of Cost Data in Czech HTA Research

VLADIMÍR ROGALEWICZ¹ – MIROSLAV BARTÁK² – IVANA KUBÁTOVÁ³ ^{1,3}Czech Technical University in Prague, Faculty of Biomedical Engineering Czech Republic ²Jan Evangelista Purkyně University in Ústí nad Labem, Faculty of Social and Economic Studies Czech Republic

Abstract

Health technology assessment (HTA) studies can provide healthcare decision makers with valuable data concerning effectiveness of medical interventions. The main purpose of an economic evaluation within HTA may be seen in measuring, valuing and comparing the costs and consequences of alternatives to support economic judgments about an intervention or a program. Technological innovations are associated with a significant public budget impact; hence, a high attention is paid to their cost-effectiveness. Cost analyses, the core of these studies, require detailed, exact and true inputs. In order to calculate the production function, physical inputs (amounts of the production factors) are necessary; these are subsequently valued by their prices. In the Czech Republic, such data are, as a rule, considered quasi confidential from the part of healthcare providers, and also (public) health insurance companies are not very open to share their records. Two main reasons may be that (1) in many cases, reimbursement of health care does not correspond to real costs of the respective intervention, and (2) such analytical data are often not monitored nor recorded, so that the institutions do not know them. This paper discusses possible sources of cost data, their availability, reliability, and how to substitute the missing data by information from open sources. The rather critical situation in the Czech Republic is illustrated by examples of real recent studies.

Key words: HTA, Cost Analysis, Healthcare, Health Economics, Health Policy

JEL Classification: I19

1 Introduction

Economic resources dedicated to healthcare are scarce and do not cover all costs of technological development, demographical changes, changes in healthcare prices, the growing expectation of citizens and patients, nor the inner ineffectiveness of the healthcare system. Particularly as concerns healthcare there is an ongoing conflict between economic efficiency and equity.

The tension between costs and available resources is present in all health systems in OECD member countries including the Czech Republic. Another tension arises from the different research approaches of various scientific disciplines applied in healthcare systems. While the approaches of biomedicine and economics are based on a rational tradition represented e.g. by multiple-criteria decision analysis or generally by the assumption that the society is manageable by common sense, on the contrary, the approaches of social and political sciences are based more on incremental models of policy making.

¹ doc. Vladimír Rogalewicz, CSc., Nám. Sítná 3105, 27 201 Kladno, Czech Republic, rogalewicz@fbmi.cvut.cz

² PhDr. Miroslav Barták, Ph.D., Pasteurova, 400 96 Ústí nad Labem, Czech Republic, miroslav.bartak@ujep.cz

³ Ing. Ivana Kubátová, Nám. Sítná 3105, 27201 Kladno, Czech Republic, ivana.jurickova@fbmi.cvut.cz

Health Technology Assessment (HTA) was suggested in the 1970s to cope with the problem of a conflict between sources and demands in healthcare. It comprises a number of methods for assessing safety, efficiency, appropriateness and costs of healthcare technologies, i.e. drugs, bio-pharmaceuticals, devices, equipment and supplies, medical and surgical procedures, support systems and organizational and managerial systems. HTA can inform us which care is efficient from the point of view of the society as a whole. Hence, HTA can be seen as a rational approach that can serve to evidence based health policy making, and is often used as an argument justifying the proposed policy. In order to reach this goal, HTA aims to gather sufficient clinical and economic evidence to allow us to reach a decision whether the technology is worth being utilized in clinics and/or paid from the public (healthcare) budget (Goodman, 2014; Schöffski and Schulenburg, 2012).

Typically, HTA is used in a comparative study to decide whether a new drug should replace the currently used one (the comparator). In most cases, the new option has better clinical outcomes while being more expensive. HTA should suggest whether the higher price is worth being paid. While HTA is routinely used in drugs, it is less used in clinical interventions or preventive measures, and rather rarely used in medical devices where there are many methodological problems left (Facey, 2015; Markiewicz, van Til and IJzerman, 2014; Moharra et al., 2009; Rosina et al., 2014).

Next to national healthcare system regulator's level, HTA methods have been increasingly applied also on a hospital level in the last years (Ehlers et al., 2006). This approach, called hospital-based HTA (HB-HTA), has different objectives and employs different methods than the traditional HTA approach. Hospital-based HTA programs inform clinical decisions at the local level. Hence, HTA methods are usually applied to strategic decisions, device procurement and management, and general organizational issues in hospitals (Mitchell, Williams, Brennan and Umscheid, 2010).

Most core methods of HTA are based on calculation of the ratio of costs of a medical intervention (technology) to a measure of its effect (outcome), the cost-effectiveness analysis (CEA). The measure of effects depends on the intervention considered. Next to simple natural measures (number of newly born babies, number of deaths, disease incidence), more sophisticated measures can be used. The most frequent outcome measure is "quality-adjusted life years" (QALYs) combining the length of life and its quality. In this case, the outcome is called utility, and we speak about the cost-utility analysis (CUA) (Goodman, 2014; Schöffski and Schulenburg, 2012). Recently, utilization of multiple-criteria decision methods was suggested (Baltussen, 2015; Thokala and Duenas, 2012). The choice of the measure of outcomes plays a crucial role in the result of CEA (Busse et al., 2002; Fitzpatrick et al., 2010; Grosse, Wordsworth and Payne, 2008).

However, this paper deals with the other part of the cost-effect (C/E) ratio, i.e. the cost part. Although the cost part may seem simpler to determine, its practical calculation appears to be quite challenging. When we overcome the first obstacle and decide on the perspective of the study (healthcare payer's, healthcare provider's, patient's, society's etc.), which determines which particular costs should be included, the economic methods for their evaluation must be chosen. And then the researcher is confronted with the fact that the necessary data are labelled as confidential or are not recorded at all. The Czech Republic with a short democratic history shows a special feature of concealing all types of information. Moreover, while clinical outcomes are mostly transferable between healthcare systems, cost data are national system sensitive and must be collected independently for each economic environment (Barbieri et al., 2014; Drummond et al., 2009).

HTA tries to find answers to difficult questions that a lot of people consider ethically incorrect: "How to measure the clinical effect of a particular technology?", "What is the willingness for paying for medical care among the country population?" or "Which technology is (or is not) behind the society's material potentials?" Due to the communist education in the recent past, the majority of Czech people have problems with even raising such questions. They were taught that everybody is entitled to the best medical care free of charge. An excellent account of these questions is given in an American textbook with a comprehensive but provocative question in the title: "Who Shall Live?" (Fuchs, 2011). The book first appeared 40 years ago, which shows the delay the Czech society is experiencing in this field.

While HTA methods are routinely used in many developed as well as developing countries, they are still disbelieved or even called into question in the Czech Republic. Many actors simply prefer avoiding scientific evidence, others consider utilization of economic methods in healthcare for indecent. In this situation, refusal to provide data seems to be a safer way for many healthcare facility employees or government authority officers. This paper discusses which economic data should be collected for cost-effectiveness analyses, who can provide them, and how to replace missing data (with estimates) from open sources.

2 Research perspectives and relative data

What particular pieces of economic data will the analysis require depends on the study perspective and the research methods. The perspective refers to the standpoint, at which the expenses are outlaid. Typical perspectives taken are those of healthcare payer (typically health insurance company), healthcare provider (physician, clinic, hospital), patient (and his family), social security system, patient's employer, society as a whole. The perspective of the entire society is a typical textbook case, since the minimization of the sum of expenses borne by all parties involved should be the ultimate goal of HTA (Drummond, 2005; Goodman, 2014). Nonetheless, this idea does not work in practice due to separate budgets of individual ministries. Typical perspectives applied are the first three.

Furthermore, the selection of information needed is influenced by the research method. Two general methods are "top-down" and "bottom-up". The former starts from cumulative data and divides them according to the incidence or precedence figures. The latter (often called micro-costing) is based on recording all amounts and costs alongside the treatment process, and adds them all together (Schöffski and Schulenburg, 2012).

Economic data are usually divided into direct medical costs, direct non-medical costs, indirect medical costs, and indirect non-medical costs. All these categories will be discussed hereunder with some accent to direct medical costs.

Clinical outcomes are often measured in a randomized controlled trial (RCT). However, costs seem to be better determined in everyday practice, as RCTs may include more diagnostic tests or

other patient monitoring, which can lead to higher costs. Moreover, RCTs often take place in better equipped facilities (university or research hospitals), where the expenses are naturally above average (Goodman, 2014).

2.1 Perspective: Healthcare payer

In the Czech conditions, the third-party payer is a health insurance company. The vast majority of healthcare payments go through the obligatory public health insurance In 2014 the total health expenditure was (almost exactly) CZK 300 billion, while the public health insurance part counts for CZK 239 billion, i.e. 79.7% (Popovic, 2015). Although there are currently seven health insurance companies, one of them (VZP – General Health Insurance Company) dominates with almost 60% of population insured (Popovic, 2014). However, all health insurance companies have nearly identical reimbursement schemes. The costs spent by an insurance company are quite simple to determine, as it is possible to use a set of legal regulations and other public sources. These costs are a mixture of DRG, reimbursements according to the annually updated "Reimbursement Decree" (Decree No. 134/1998 Coll., which issues the list of medical procedures with their point values), reimbursement of drugs, and reimbursement of materials.

Since 2014, the General Health Insurance Company (VZP) publishes all newly signed contracts with healthcare providers on their web pages (http://www.vzp.cz). In August 2015, they have published contracts with 1100 healthcare providers including all hospitals. Together with methodological materials of the Czech DRG system, this enables cost calculations. However, some pieces of information concerning DRG have been labelled as classified. Since January 2015, the DRG Restart project has been realized by the Institute of Health Information and Statistics of the Czech Republic planned for 2015-2017 (http://www.drg-cz.cz). It is difficult to predict the result of this project.

In case of facilities or healthcare reimbursed according to the "Reimbursement Decree", the payment of health insurance companies can be calculated directly from this decree and its annual amendments. Similarly the costs of extra calculated materials (denoted "ZUM") and extra calculated medicinal products (denoted "ZULP") can be calculated directly from their reimbursement lists.

In some special cases, health insurance companies and healthcare providers agree on a "package price", i.e. a lump sum reimbursement of a particular treatment. These agreements serve usually also as a regulation tool, determining the maximum number of such interventions. This option is used in a very limited number of interventions (e.g. hip replacement), more by small health insurance companies than by VZP. Such agreements are as a rule considered confidential. Although the calculation of costs from the payer's perspective seems to be rather simple, it is necessary to stress that the resulting figures are usually quite artificial and unrealistic. The reason is that the frequency of updating the reimbursement lists (all three variants: DRG, "Reimbursement Decree", ZUM/ZULP) is not very high. While market prices are changing rapidly, reimbursements are the same for a long time, which (next to obvious mistakes) creates scope for unrealistic reimbursement schemes (that may be higher as well as lower than actual costs) (Popesko, Papadaki and Novak, 2015; Simrova, Bartak, Vojtisek and Rogalewicz, 2014). Healthcare providers learnt to compensate underreimbursed care with overpaid interventions and are afraid of any changes.

2.2 Perspective: Healthcare provider

Data on costs generated by a hospital (or another healthcare facility) usually form the core of any HTA analysis. The result of such a study is the real costs of illness/diagnosis in the particular healthcare system. Such information is required at the national regulatory level (the Ministry, health insurance companies, the State Institute of Drug Control, etc.) on one hand, and within the particular hospital for their internal decisions (HB-HTA) on the other hand. In the case of the Czech Republic, such data are mostly unknown; only rare papers have been published yet (Bartakova et al., 2013; Blahova Dusankova, Kalincik, Dolezal, Kobelt, and Havrdova, 2012; Ondrackova, Demlova and Kominek, 2010; Simrova et al., 2014).

The main source of data for analyses from the healthcare provider's perspective are the providers themselves. However, hospitals are usually not very helpful in collecting these data. First, analytical data are often not collected, especially in the detailed structure required for HTA analyses; second, economic departments usually do not want to disclose these data: partly because real costs and reimbursements differ greatly and disclosing real costs could harm the hospital, partly due to a concern about personal data protection.

Another reason may be insufficient analytical staff in hospitals. Some hospitals outsource the analytical work that they afterwards use for their own purposes. There are many sources of such information in shadow literature, e.g. master or doctoral theses, annual reports, or newspaper articles.

Data required for HTA studies include e.g. salaries of medical and non-medical staff, drugs administered, purchase, maintenance and operational costs of medical devices, consumables, laboratory, imaging and other diagnostics, "hotel services" in hospitals, transport of patients, energy, waste management, facility management, overhead costs (incl. hospital management). Costs of complications (in the same structure) must be added, often exceeding the basic treatment.

2.3 Perspective: Patient (patient's family)

Patients are more interested in quite different costs (however each citizen is legally entitled to get an outline of the cost of care provided to him/her from the general health insurance during the previous period). Patients worry about the out-of-pocket payments (above all drug surcharges), transport to/from hospital and lost opportunity costs (above all lost salary of theirs and their unofficial carers). However, patient's payments and losses may be much wider, including special diet costs, payments for arranging an official carer, or for replacing the unofficial carer's duties (see also the next paragraph), adaptation of the apartment, various materials necessary for life, etc. Some of the cost may be compensated by allowances and subsidy from the system of social security. According to some researchers there are population groups (e.g. some seniors or people endangered by social exclusion) that are probably facing catastrophic costs of healthcare. To some extent, this is a surprise for many health policy actors (Krutilova and Yaya, 2012).

2.4 Perspective: Society

The societal perspective should comprise all costs regardless of who bears them. Next to those discussed above, a large part are opportunity costs, i.e. mainly absenteeism (economic loss due to absence of the patient and the carer at work) and presenteeism (lower performance of the patient at work), both reflected in a decrease in GNP and country competitivness. A problem may be

also if the patient is not able to do his/her duties at home (such as care of children or senior persons, cooking, cleaning, gardening, care of farm animals) and someone is temporarily hired for that.

Other costs borne by the society are various social benefits and allowances. In some cases the societal costs may be much higher than healthcare costs, e.g. in mental healthcare (Dlouhy and Bartak, 2013). Some parts of the societal costs are hard to estimate; there are also many methodological concerns.

3 Sources and substitute sources of data

It would be nice if everything went smoothly. However, this is usually not the case. The first thing any HTA researcher finds out in the Czech Republic is that some cost data are not recorded and/or interpreted, and if they are, they cannot be communicated. Hence, it is necessary to search for substitute sources of data, estimations, expert opinion etc. The money datum can be always obtained as a product of the quantity and the unit price. Quantities are much more available than costs themselves, and even if price lists are not accurate, this procedure provide quite usable cost estimates. In this chapter, we will discuss sources of individual data categories.

3.1 Public health insurance system data

In Czech conditions, the payer's perspective is the perspective of health insurance companies in most cases. (A small exception are the interventions that are not covered, e.g. cosmetic surgery, some methods of assisted reproduction, part of dental care, drug surcharges etc.) Hence, the best source of data are records of the health insurance companies. What would be expected are listings of all care rendered to a particular patient (his/her identity is not necessary), i.e. a record of all provided care related to a particular personal identity number. Surprisingly, this is nearly impossible task for Czech insurance companies, although it is a matter-of-course elsewhere (Dietl and Korczak, 2013; Neyt, Devriese, Thiry and Van den Bruel, 2010).

Hence, hospitals seem to be a better source of data, even if the analysis is calculated from the healthcare payer's perspective. Availability of hospital data is discussed in the next chapter. However, we do not have to go much into detail for the payer's perspective. A process flowchart completed with prevalence data is to be evaluated according to the point values and multiplied by the price of a point (at present having several values according to medical specialties), both published in the annually updated "Reimbursement Decree". It is just a technical issue to do these calculations.

However, reimbursement of care in most hospitals is based on a DRG basis, where the reimbursement determined according to the group diagnosis is multiplied by a special constant individually agreed with each hospital (according to historical economic results). Next to that, there are agreements between individual hospitals and individual insurers fixing both the reimbursement and quantity limitations. Both the "hospital constant" in the DRG system and the content of the special agreements are generally not disclosed. Hence, most HTA analyses are calculated according to the "Reimbursement Decree" (i.e. point values for each medical procedure) (Dolezal, Pisarikova, Zemanova and Bartaskova, 2009; Kruntoradova and Dolezal, 2013; Simrova et al., 2014). As a result, the costs calculated from the payer's perspective are as a rule just estimates, whose preciseness changes dependent on the particular illness and medical specialty. Nevertheless, these estimates are still the most precise values we are able to figure out and can provide a basis for comparison studies.

3.2 Hospital's/clinic's data

Typically, younger physicians are more willing to collaborate than financial managers, since they are quite often interested how much do their clinical interventions cost and how they compare with the competing options. Hence, even if hospitals are not prepared to disclose economic data, they are usually quite co-operative if they are asked for quantitative data concerning the care rendered. Hence, it is possible to get information about all care provided either retrospectively (from patients' files) or - better - prospectively (recorded simultaneously with the treatment). Average unit prices (over the whole national system), as precise as possible, will be used to transfer the quantity data to cost data.

Salary data are those very sensitive. If the study scope is nationwide, average salaries collected by the Institute of Health Information and Statistics (www.uzis.cz) can be pretty well used, however, cleared of overtime and stand-by duty. Nonetheless, in case of HB-HTA, actual data of the particular hospital should be used; the researcher should discuss the situation with the hospital management and find a reasonable compromise, so that the result was really informative for that particular hospital.

Some data can be taken from annual reports; next to overhead costs and energies (that are, in fact, non-medical costs – see further), average cost of a one-day stay in the ward (different for normal ward, ICU, sometime an "intermediate care" level). Hospitals usually have special negotiated prices of drugs and consumables, protected by a confidentiality clause. There is probably no other option than using published price lists; again, this is more legitimate in nationwide studies than in HB-HTA. As concerns medical devices, their costs have to be divided into all uses (legal tax depreciations can be used, or the purchase price can be divided to all years of expected lifetime). Next to that, regular maintenance, service costs and price of consumables must be also included (in a proportional way).

Finally, all non-medical costs shall be calculated and included. These are non-medical services for patients (e.g. food, accommodation) on one hand, and overhead costs in a very broad sense on the other. Part of them may be listed individually, however, a part is always hidden in a relatively high lump sum expressed as percentage of total expenses. Moreover, Czech hospitals have quite a high portion of outpatient care that must be deducted from the overhead costs.

3.3 Patient and his family

The costs borne by the patient and his family are manifold. The best source of these data are patients themselves. They are quite willing to collaborate and collect data in a good faith that they will help in lowering the financial burden for future patients. On the other hand, this is why they are not unbiased, and all their inputs must be checked carefully.

The simplest situation is in direct medical costs that can be proved by patients' receipts. Patients' out-of-pocket payments were 14.7% of all healthcare costs in the Czech Republic in 2013 and in a long run they fluctuate between 14 and 16% (OECD, 2015), which is not little. This figure

includes drug and medical device participation (surcharges and items fully paid by patients), as well as payments for interventions that are not covered by the health insurance plan (Kruntoradova, Kruntoradova, Rogalewicz and Bartak, 2014).

There is a certain level of "black market" payments, which is very difficult to estimate. Stories told are probably a part of urban legends, especially concerning different ways of prioritizing for a reward. On the other hand, the situation when the patient is not allowed to pay the difference between reimbursement and the price of a better quality treatment (especially as concerns materials used) provides fertile ground for unofficial solutions. Except some clearly limited cases (Kruntoradova et al., 2014), it is difficult to take these unofficial payments into account, so they are usually omitted.

The costs of patient (and the accompanying person's) transport are simple to estimate, although they do not create a substantial part of patient's expenses. The same holds for accommodation. Also dietary needs may constitute significant financial demand, as can be seen on the example of phenylketonuria (Hodik, 2014).

The loss due to patient's (and his carer's) impossibility to work can be relatively easily estimated. Either the patient provides documents (e.g. pay slips) or the table of average salary in the Czech Republic (according to regions) can be used (national or regional Statistical Yearbooks published regularly by the Czech Statistical Office, see www.czso.cz). What is quite difficult to estimate is the loss due to patient's or his/her carer's impossibility to do his/her unofficial duties. Patients usually show a tendency to exaggerate these costs. Average salaries in similar jobs can be considered, although it is often more appropriate if the estimate is based on the legal minimum salary.

3.4 Society as a whole

In the Czech Republic, sickness benefits, disability pensions as well as other allowances are strictly separated from the healthcare budget. Hence, they are usually not considered in a healthcare related analysis. They should be deducted (as a compensation) in the patient's perspective. On the other hand, the whole system of (various) allowances play quite a significant role from the perspective of the society as a whole. There have been several attempts to incorporate social payments into a HTA study. They seemed to cause no special problem, as the social benefits are paid strictly according to well defined rules.

More problems are in capturing absenteeism and (especially) presenteeism. First, the salaries are usually not communicated. As a result, the estimates are based on average salaries (national or regional) as published by the Czech Statistical Office (www.czso.cz). Next to that two basic calculation methods are available to be chosen. The human capital approach incorporates the whole period the worker is not at work due to illness (i.e. the labour market is considered to be inflexible and not compensating for the workers missing). The friction cost approach is based on the idea that the labour market is able to compensate for the lost productivity after a definite time period. Both approaches are used with very different results, while theoretically, no one of them is given priority. In case of presenteeism, studies describing the decrease in productivity due to particular health states would be needed. They are still missing.

Several studies have been published trying to calculate cost of illness from the perspective of the society as a whole (Blahova, Dusankova et al., 2012; Dolezal et al., 2009; Petrikova et al., 2013).

In most of them, only productivity loss due to absenteeism and the cost of a preliminary retirement are included.

4 Discussion

In HTA studies, most analyses are based on a comparison of (clinical) outcomes and costs. Although it is mostly clear what to do, the costs of healthcare programs are difficult to figure out, as the respective data are often not disclosed. Most of them might be available in hospital information systems, in data bases of health insurance companies, or from state authorities (Ministry of Health, State Institute of Drug Control). The unwillingness to disclose them is particularly strange if we realize that we speak about public finances – 79.7% of healthcare is payed from the public health insurance and other 5.2% from the state or regional budgets (Popovic, 2015).

Data are not missing for those HTA studies that are presented to the state regulator (the State Institute for Drug Control) as a part of the marketing authorization application dossier. It is the responsibility of the applying pharmaceutical company to draft and deliver it. The companies provide researchers with their own data collected during drug testing. However, these cost-effectiveness and budget impact studies are classified and their publishing is the sole right of the applicant (pharmaceutical company). In the case of independent (e.g. academic) research, the situation with cost data in drugs is the same as in all other technologies.

A problem going beyond the scope of this paper is the uncertainty on the border between the health and social systems in the Czech Republic. While there is a sharp line between these systems as concerns budgeting, accountancy, allowances or disability assessment, in realty there is no boundary and the landscape is quite dissolved into a continuous image (Cevela, Celedova, Ptacek and Kuzelova, 2013). Quite often it is difficult to decide which system should finance some treatments, and sometimes neither of them accepts the responsibility. This may be e.g. the case of assistive technologies or health services in social facilities (Bartak and Gavurova, 2014; Rapcanova, 2013). The situation may mirror in an uncertainty which data should (or should not) be included in a particular study and which sources they should be collected from.

In many countries there is a unified effort to set rules for data acquisition coordinated or even guided by the particular national agency. Despite of some efforts above all from the part of interested individuals connected with academic institutions (Dlouhý, Barták, Hlavácek, Kokavec, and Malina, 2008; Kolasa, Kalo, Zah and Dolezal, 2012; Rogalewicz, Jagerova and Kotajna, 2014; Rogalewicz and Jurickova, 2011), establishment of any institution that would coordinate HTA efforts nationwide cannot be expected in near future.

5 Conclusions

In the Czech Republic, the availability, quality and accessibility of data for HTA analyses bring a lot of concern. As can be seen from the published papers, a "case study" is the most frequent approach in HTA studies in the Czech Republic, and almost all papers complain about the limited availability of data as well as their limited generalization.

So far there is no institution or recognized network that would concentrate, elaborate and coordinate HTA activities that can serve to evidence-based health policy making. According to

our findings there is a research capacity to establish such an institution; on the other hand, this does not seem to be of a high priority of Czech health policy these days. A national HTA agency that would set standards is extremely missing. The bodies active in the field should negotiate national standards and work together towards cultivation of the national health economic landscape

The situation is generally strongly connected with the level of recognition of HTA findings in the policy making process. In the Czech environment, the recognition still remains a challenge. In certain cases the use of HTA seems to face the lack of political will to be used as a base for decision and sometimes less rational arguments may predominate.

Acknowledgement

Development of HTA methods within the Czech healthcare system has been supported by the Ministry of Education, Youth and Sports of the Czech Republic within the scheme of research organizations development institutional support.

References

- BALTUSSEN, R. 2015. Question is not whether but how to use MCDA. In: *Value & Outcomes Spotlight*. pp. 14-16.
- BARBIERI, M., WEATHERLY, H. L. A., ARA, R., BASARIR, H., SCULPHER, M., ADAMS, R. and Powell, M. 2014. What is the quality of economic evaluations of non-drug therapies? A systematic review and critical appraisal of economic evaluations of radiotherapy for cancer. In: *Applied health economics and health policy*. Vol. 12, No. 5, pp. 97-510.
- BARTAK, M. and GAVUROVA, B. 2014. Economics and social aspects of long-term care in the context of the Czech Republic and the Slovak Republic EU membership Conference Proceedings, 12th International Scientific Conference "Economic Policy in the European Union Member Countries". Pp. 52-61. Karvina: Silesian University in Opava, School of Business Administration.
- BARTAKOVA, J., POTLUKOVA, E., ROGALEWICZ, V., FAIT, T., SCHONDORFOVA, D., TELICKA, Z. and JISKRA, J. 2013. Screening for autoimmune thyroid disorders after spontaneous abortion is cost-saving and it improves the subsequent pregnancy rate. In: *BMC Pregnancy and Childbirth.* Vol. 13, No. 517.
- BLAHOVA DUSANKOVA, J., KALINCIK, T., DOLEZAL, T., KOBELT, G.and HAVRDOVA, E. 2012. Cost of multiple sclerosis in the Czech Republic: the COMS study. In: *Multiple sclerosis (Houndmills, Basingstoke, England),* Vol. 18, No. 5, pp. 662-668.
- BUSSE, R., ORVAIN, J., VELASCO, M., PERLETH, M., DRUMMOND, M., GURTNER, F., and WILD, C. 2002. Best practice in undertaking and reporting health technology assessments - Working group 4 report. In: *International Journal of Technology Assessment in Health Care*. Vol. 18, No. 2, pp. 361-422.
- CEVELA, R., CELEDOVA, L., PTACEK, R. and KUZELOVA, H. 2013. Assessment of health and working capacity of people with dementia for purposes of the social security system (Abstract No. 1054 of 21th European Congress of Psychiatry). In: *European Psychiatry*. Vol. 28, No 1.

- DIETL, M. and KORCZAK, D. 2013. Specialized pain care in Germany. *Schmerz. Vol.* 27, No. 2, pp. 123-128.
- DLOUHY, M. and BARTAK, M. (2013). Mental health financing in six Eastern European countries. In: *E & M Ekonomie a Management*. Vol. 16, No. 4, pp. 4-13.
- DLOUHÝ, M., BARTÁK, M., HLAVÁCEK, A., KOKAVEC, P. and MALINA, A. 2008. Zdravotnické technologie v ČR [A need for health technology assessment in the Czech Republic]. In: Zdravotnictví v České republice. Vol. 11, No. 4, pp. 136-138.
- DOLEZAL, T., PISARIKOVA, Z., ZEMANOVA, P. and BARTASKOVA, D. 2009. Costs of type II diabetes in the conditions of the Czech Republic's medical care system. [Naklady na diabetes 2. typu v podminkach zdravotniho systemu Ceske republiky.]. In: *Vnitrni lekarstvi*. Vol. 55, No. 4, pp. 342-344.
- DRUMMOND, M. 2005. In: *Methods for the economic evaluation of health care programmes* (3rd ed.). Oxford ; New York: Oxford University Press.
- DRUMMOND, M., BARBIERI, M., COOK, J., GLICK, H. A., LIS, J., MALIK, F. and SEVERENS, J. 2009. Transferability of Economic Evaluations Across Jurisdictions: ISPOR Good Research Practices Task Force Report. In: *Value in Health*. Vol. 12, No. 4, pp. 409-418.
- EHLERS, L., VESTERGAARD, M., KIDHOLM, K., BONNEVIE, B., PEDERSEN, P., JORGENSEN, T. andKjolby, M. 2006. Doing mini-health technology assessments in hospitals: A new concept of decision support in health care? In: *International Journal of Technology Assessment in Health Care*. Vol. 22, No. 3, pp. 295-301.
- FACEY, K. 2015. HTAi Policy Forum 2015 Background Paper: Improving the effectiveness and efficiency of evidence production for HTA, in the light of current trends in drug and device development, health system funding, regulation and HTA. Edmonton, Canada: Health Technology Assessment International.
- FITZPATRICK, R., CHAMBERS, J., BURNS, T., DOLL, H., FAZEL, S., JENKINSON, C. and Yiend, J. (2010). A systematic review of outcome measures used in forensic mental health research with consensus panel opinion. In: *Health Technology Assessment*. Vol. 14, No. 18.
- FUCHS, V. R. 2011. Who shall live? : health, economics, and social choice (2nd expanded ed.). New Jersey: World Scientific.
- GOODMAN, C. S. 2014. HTA101. Introduction to Health Technology Assessment. Bethesda, MD, USA National Library of Medicine.
- GROSSE, S., WORDSWORTH, S. and PAYNE, K. 2008. Economic methods for valuing the outcomes of genetic testing: beyond cost-effectiveness analysis. In: *Genetics in Medicine*. Vol. 10, No. 9, pp648-654.
- HODIK, J. 2014. Phenylketonuria from a HTA perspective [Fenylketonurie pohledem HTA]. (Master Thesis), Czech Technical University in Prague, Kladno.
- KOLASA, K., KALO, Z., ZAH, V. and DOLEZAL, T. 2012. Role of health technology assessment in the process of implementation of the EU Transparency Directive: relevant experience from Central Eastern European countries. In: *Expert Review of Pharmacoeconomics & Outcomes Research*. Vol. 12, No. 3, pp. 283-287.
- KRUNTORADOVA, I., KRUNTORADOVA, K., ROGALEWICZ, V. and BARTAK, M. 2014. Cost-of-illness study of senile cataract in the Czech Republic. In: *Value in Health*. Vol: 17, No. 7, pp. 607-607.

- KRUNTORADOVA, K. and DOLEZAL, T. 2013. Protonová terapie v léčbě nádorových onemocnění [Proton therapy in tumorous disease treatment]. HTA Report. Available online: http://www.iheta.org/p42-protonova-teorie-hta-report>
- KRUTILOVA, V. and YAYA, S. 2012. Unexpected impact of changes in out-of-pocket payments for health care on Czech household budgets. In: *Health Policy*. Vol. 107, No. 2--3, pp. 276-288.
- MARKIEWICZ, K., van TIL, J., & IJZERMAN, M. 2014. Medical devices early assessment methods: systematic literature review. In: *International Journal of Technology Assessment in Health Care*. Vol. 30, No. 2, pp. 137-146.
- MITCHELL, M. D., WILLIAMS, K., BRENNAN, P. J. and UMSCHEID, C. A. 2010. Integrating local data into hospital-based healthcare technology assessment: Two case studies. *International Journal of Technology Assessment in Health Care*. Vol. 26, No. 3, pp 294-300.
- MOHARRA, M., ESPALLARGUES, M., KUBESCH, N., ESTRADA, M. D., PARADA, A., VONDELING, H and EUROPEAN NETWORK HLTH TECHNOL, A. 2009. Systems to support health technology assessment (HTA) in Member States of the European Union with limited institutionalization of HTA. In: *International Journal of Technology Assessment in Health Care*. Vol. 25, pp. 75-83.
- NEYT, M., DEVRIESE, S., THIRY, N. and Van den BRUEL, A. 2010. Tiotropium's costeffectiveness for the treatment of COPD: a cost-utility analysis under real-world conditions. In: *BMC Pulmonary Medicine*. Vol. 10.
- OECD. 2015. OECD Health Statistics 2015. Available online: http://www.oecd.org/health/health-data.htm
- ONDRACKOVA, B., DEMLOVA, R. and KOMINEK, J. 2010. Economic evaluation of targeted biologic therapy in metastatic renal cell carcinoma. [Analyza nakladu na cilenou biologickou lecbu pacientu s metastatickym karcinomem ledviny.]. In: *Klinicka onkologie*. Vol. 23, No. 6, pp. 439-445.
- PETRIKOVA, A., DOLEZAL, T., KLIMES, J., VOCELKA, M., A, L. and KOLAR, J. 2013. The economic burden of the ankylosing spondylitis in the Czech Republic: comparison between 2005 and 2008. In: *Rheumatology International*. Vol. 33, No. 7, pp. 1813-1819.
- POPESKO, B., PAPADAKI, S. and NOVAK, P. 2015. Cost and reimbursement analysis of selected hospital diagnoses via Activity-Based Costing. In: *E & M Ekonomie a Management*. Vol. 18, No. 3, in print.
- POPOVIC, I. 2014. Health Insurance Corporations Costs spent on Health Care by Types of Health Care. Available online: http://www.uzis.cz/en/fast-information/health-insurance-corporations-costs-spent-health-care-types-health-care-3
- POPOVIC, I. 2015. Total Health Expenditure in 2010–2014. Available online: http://www.uzis.cz/en/node/7139>
- RAPCANOVA, I. 2013. Comparison of costs and benefits in providing various forms of longterm care for seniors [Porovnání přínosů a nákladů poskytování různých forem dlouhodobé péče seniorům]. (Master Thesis), Czech Technical University in Prague, Kladno.
- ROGALEWICZ, V., JAGEROVA, J. and KOTAJNA, K. 2014. Health Technology Assessment in the Czech Republic. In: T. Michalek, L. Hebakova, L. Hennen, C. Scherz, L. Nierling, &

J. Hahn (Eds.), Technology Assessment and Policy Areas of Great Transitions, 1st PACITA project conference, pp. 301-306.

- ROGALEWICZ, V. and JURICKOVA, I. 2011. Health Technology Assessment as evidence for decision [Hodnocení zdravotnických technologií jako zdroj informací pro rozhodování]. In: Zdravotnictví v České Republice. Vol. 14, No. 2-3, pp. 32-35.
- ROSINA, J., ROGALEWICZ, V., IVLEV, I., JUŘIČKOVÁ, I., DONIN, G., JANTOSOVÁ, N. and Kneppo, P. 2014. Health Technology Assessment for Medical Devices. In: *Lekar a technika Clinician and Technology*. Vol. 44, No. 3, pp. 23-36.
- SCHÖFFSKI, O. and SCHULENBURG, J.-M. 2012. In: *Gesundheitsökonomische Evaluationen* (4th ed.). Berlin: Springer.
- SIMROVA, J., BARTAK, M., Vojtisek, R. and Rogalewicz, V. 2014. The costs and reimbursements for lung cancer treatment among selected health care providers in the Czech Republic. In: *E & M Ekonomie a Management*. Vol. 17, No. 3, pp. 74-85.
- THOKALA, P. and DUENAS, A. 2012. Multiple Criteria Decision Analysis for Health Technology Assessment. In: *Value in Health. Vol. 15*, No. 8, pp. 1172-1181.

The European Sovereign Debt Crisis: The Result of the Systemic Failure of the Political Project of EMU and of the Euro

ANNA RUŠČÁKOVÁ¹ Technical University of Kosice, Faculty of Economics Slovak Republic

Abstract

For the continued success of the primary goal of the European integration, which is the preservation of peace in the Europe, it is necessary to deal with the real causes of the current Eurozone crisis and to identify the facts which must be taken into account when forming its adequate and effective solutions. Our paper therefore identifies major systemic causes of that crisis, based on the analysis of the objectives of the European integration, the optimality of design of the EMU, the consequences of the "Euro Illusion" and economic myths about the EMU and the euro related political, respectively economic and political factors. It is noted, that the current European sovereign debt crisis is a balance of payment crisis and has the nature of a self-fulfilling crisis. It stresses the need to create a system of fiscal transfers in the EMU and the need to find a suitable compromise between centralization, interventionism, freedom and laissez faire approach of the government to the economy.

Key words: European Sovereign Debt Crisis, Systemic Causes, European Integration, Euro Area

JEL Classification: E4, E5, F6

1 Introduction

The financial crisis is the financial market condition which occurs when asset prices collapse due to the loss of investor confidence in domestic assets and therefore, investors are seeking to invest in foreign financial assets. One specific type of such financial system distortions is the debt crisis, which arises from the economic subjects' inability to repay its private or public debt. In the case of sovereign debt crisis it is also valid that the "… probability of transmitting the crisis to other economies is higher the more systemic failures are in the structure of national economies and the more identical problems these economies have." (Sucha, 2013)

A recent example of such a crisis is the European sovereign debt crisis, which is de facto a continuance of the recent US mortgage crisis (2007) and the global financial and economic crisis (2008), and which, according to Aizenman et al. (2013) results from different economic levels and performances of the eurozone members, from unsustainable public debt of the peripheral eurozone countries and from the incompleteness of the project of euro. (Lothian, 2014) It is thus not a crisis caused only by the inability of the South European countries to control their government expenditures, but it is mainly the product of imbalances in the EMU and in the global political economy. The main causes of this crisis are systemic and consist of the universal system failures in the global economic and political order and in serious design failures of the EMU and euro projects.

¹ Ing. Anna Ruščáková, Němcovej 32, 040 01 Kosice, Slovak Republic, anna.ruscakova@tuke.sk

With that in mind, for the continued success of the primary goal of the European integration, which is the preservation of peace in the Europe, it is necessary to deal with the real causes of the current Eurozone crisis and to identify the facts which must be taken into account when forming its adequate and effective solutions. Our paper therefore identifies major systemic causes of that crisis, based on the analysis of the objectives of the European integration, the optimality of design of the EMU, the consequences of the "Euro-Illusion" and economic myths about the EMU and the euro related political, respectively economic and political factors. It is noted, that the current European sovereign debt crisis is a balance of payment crisis and has the nature of a self-fulfilling crisis. It stresses the need to create a system of fiscal transfers in the EMU and the need to find a suitable compromise between centralization, interventionism, freedom and laissez faire approach of the government to the economy.

The rest of the paper is organized as follows: Section 2 deals with the goals of the European integration. Section 3 is devoted to the issue of the optimality of the EMU design. Section 4 defines the consequences of the "Euro-illusion" and economic myths about the EMU. Section 5 is dedicated to the euro-political, respectively economic and political determinants of the actual European debt crisis. Finally, Section 6 concludes the article and adds some recommendations and possible alternative approaches to solve the European sovereign debt crisis.

2 Questionable goals of the European integration

Winston Churchill, a former army officer, war correspondent and British Prime Minister, was after the experiences of the Second World War convinced that only a united Europe could guarantee peace. According to his expression at the University of Zurich, in 1946 there is only one way of making all of Europe free and happy in the short span of a few years. The plan was to re-create the European family and to provide a structure under which it can dwell in peace, safety and freedom. He was sure that it is necessary to build something akin to United States of Europe. (European commission, 2015)

With a goal "... to prevent any country or any group of countries to gain a strategic dominance in the arms manufacture …" (Kuhn, 2014) and the aim to create a common market for arms trade, a first step towards a desired free and prosperous Europe was taken. A Treaty was signed in 1951 establishing the European Coal and Steel Community. With the ambition to ensure control over the use of nuclear energy in Europe, European Atomic Energy Community was founded in 1957, and in order to strengthen economic cooperation between the signatory countries, another Treaty was signed, that same year, establishing the European Economic Community. This was supposed "… to ensure economic and social progress of joined countries, … the constant improvement of living and working conditions of their denizens, … to maintain and strengthen peace and liberty – all of this achieved by a way of common action, by eliminating the barriers which are dividing Europe." (Kuhn, 2014)

The primary motivation of European integration was mainly to prevent wars and conflicts and ensure freedom and prosperity in Europe. As a result, it was largely based on economic arguments. Its subsequent progress, however, was determined mainly by geo-political reasons. While, for example. Treaty establishing the European Economic Community should establish a common European market, the result of the Single European Act, which was signed in 1986, should have been the actual unified, single European market. The upside of the ongoing

integration was the enforcement of the principle of four freedoms - free movement of goods, services, capital and labour; however a huge downside of this integration was the strengthening of aggressive European political integration, which was leading towards the establishment of a European economic and political union or even to a "European superstate". An important milestone and confirmation of the political unification of the European countries was the signing the Treaty of the European Union in 1992. This treaty included an agreement of signatory countries on single currency, known as Euro. Although this step justified as a necessity for the proper functioning of the single European market, in fact, it was more of a political rather than economic decision. The proof may be found in the fact that while politicians and political scientists claimed its economic advantage and the necessity of such treaty, a set of diverse opinions were found amongst economists on the possible positive impact of a unified currency on such socially, economically, structurally and institutionally heterogeneous countries. They also had important reservations on the conditions and terms regarding the introduction of euro. On the surface, a very strict integration and harmonization was being promoted, however, there were several times during its implementation when multiple "opt-out"-s and other exemptions for some of the EMU countries were agreed to. The rules in the EMU and the ways they were applied were constantly changed, depending on the situation and on the individual interests and whims of some participating countries. (Carlin, 2011; Gonda, 2012; Kuhn, 2014)

An important demonstration of dominance from the politicians and political objectives of the European integration was the ignorance of opinions from denizens of the countries concerned with creating the proposed monetary union or the willingness to join such monetary union with a cast of very heterogeneous members. This is evidenced by the example of repeated referendum in Ireland or by the fact that in many countries such referendums, e.g.; Maastricht Treaty referendum, were not even realized and the government has adopted it without taking the opinion of voters into account, and without any further expression of interest in their opinions.

In an effort to identify the real goals of the integration process in Europe, one is a witness to severe systemic failures of both the EMU and the euro project. The cause of these failures are vague intentions for creating the project, its obvious political background, ignorance of rational economic obstacles standing in the way of the project, ignorance of the public opinion, and the constant risky changed made to the terms and conditions it defines.

3 The issue of the EMU design

Krugman (1979) defines a balance of payments crisis as the government's inability to defend fixed parities due to the limitation of its power. According to the authors of the Optimum Currency Area Theory (OCA: Fleming, 1971; Kenen, 1969, McKinnon, 1963, Mundell, 1961) who have examined this issue in terms of the unified currency, money is an economic instrument which has, in the case of an independent state with its own currency, a key role in the absorption of economic imbalances (such as loss of competitiveness, or unemployment). Thus, when a country decides to abandon its currency to create a monetary union, they deprive themselves of an important instrument used to smoothen out the internal and external imbalances emerging in this union of theirs, simply because they limit their ability to instill their own monetary policies. (Guerreiro, 2014)

As such, the proponents of OCA theory are talking about the existence of certain "trade-off" between the homogeneity of countries belonging to a monetary union and the existence of real adjustment mechanisms they would operate in. A very close similarity of the union members should in fact prevent the occurrence of asymmetric shocks caused by imbalances in the union, and the presence of functional adjustment mechanisms should secure that the union and its members will recover from these asymmetric shocks, in the case their homogeneity is not sufficient. As a result, a monetary union in which none of the above mentioned conditions are present, is by the creators of the OCA theory, considered to be a suboptimal monetary area and course of a fixed exchange rate, meaning the appliance of "one-size-fits-all" monetary policy is by no means an adequate regime for securing its current internal and external balance. In an environment of such a monetary union, a non-compliance of PPP can happen amongst its members, which in turn leads to an external imbalance, which, in case it becomes too persistent, can start a crisis of payment balance and, finally, even a sovereign debt crisis. (Guerreiro, 2014) In terms of the eurozone, the scenario of an inception of a sovereign debt crisis is demonstrated by Figure 1 and Figure 2. Figure 1 proves that there is a great imbalance of the current account balance of payments and that within it, a trend to develop ties between its members akin to the relationship between the USA and China.

Comparison with Figure 2 shows that Figure 1 highlights the increased and rapidly growing indebtedness of Eurozone countries with deficits in the current account balance of payments compared with countries showing surplus. The conclusion reached by examining the pictures is therefore indisputable - primarily peripheral eurozone countries with large current account deficits were hit by the sovereign debt crisis.



Source: Eurostat (2015)



Source: Eurostat (2015)

Non-optimality of the EMU is also confirmed by Monolopoulos (2011), saying that the design of the EMU differs significantly from the design of optimum currency area, which was based on criteria of Mundell and McKinnon. Grahl (2011) also recommends the EMU to create an adjustment mechanism to smooth out the imbalances arising between the surplus and deficit members. The introduction of a single currency bundled with the absence of other mechanisms de facto changes and automatically fixes in the competitiveness of the economic sectors in the countries that decided to use the currency.

Due to low labour force mobility, lack of fiscal transfers, artificial suppression of the German unit labour costs, politics, inflation policy that serves mainly the countries with surpluses, and low level of diversification of the economies of its members, we must regard the adoption of a single currency in the Maastricht Treaty in 1992 relatively irrational decision. (Detlef, 2012)

However, in this context, Sklias (2014), regards the absence of European mechanism for fiscal transfers, which was supposed to alleviate the huge trade imbalances and significant differences in the economic growth, which arise between the central and peripheral countries, as the most significant weakness.

Eichangreen (1991) is of the same opinion regarding this subject, and proposes a system of budgetary transfers in the form of injections of liquidity between the individual countries of the EMU, a creation of suitable system of redistributing policies and central fiscal authority.

In this context, Varoufakis (2012) ponders that this necessary type of "recycling" of budget surpluses can have either the form of standard money transfers between countries or the form of transnational investments in production in countries and regions with a deficit. (Sklias, 2014)

The European sovereign debt crisis is therefore a balance of payments crisis, which arose and became persistent due to the presence of large external imbalances of members of the eurozone in relation to their main partners in the eurozone. In the context of the analysis of the design of the EMU it is necessary to emphasize two systemic causes of the crisis of Eurozone: the diversity of its members and the absence of any effective adjustment mechanism of external and internal imbalances that arise within it. It is necessary to also draw attention to the special position of Germany in the Eurozone as a leading export nation and therefore not only state the requirement of an effective system of fiscal transfers in the Eurozone, but also the need to set certain limits on

its internal trade, which would prevent the emergence and development of a "fatal addiction" among its members, similar to that between China and the USA.

4 The Euro-illusion and economic myths of EMU

"The euro has been promoted on the basis of spreading of myths and illusions which fail to respect economic principles, which say a prerequisite for a common market, competition and economic integration in Europe are the one and only (the administratively established - fiat) currency and harmonized conditions." (Gonda, 2012)

The basic preconditions for a trouble-free and efficient functioning of the market, however, are unrestricted competition supported by diversity and the absence of core barriers to the free exchange. The introduction and launch of the euro are therefore " ... the result of a political decision made without sufficient economic aid ... and without taking the conditions, problems and risks of Eurozone, and the level of countries readiness ..." (Gonda, 2014), which it was created to function in, into account.

At the same time, the argument that strict compliance with the Maastricht criteria and the fiscal rules in their current form, without a working and automatically acting sanctioning mechanism, will ensure trouble-free functioning of the monetary union with diverse members, which the EMU undoubtedly is, is very optimistic. The formerly listed rules are in fact mainly administrative measures. For many of the economies, compliance can prove to be inappropriate and even harmful. A single currency also means one central bank for all eurozone countries, with one interest rate regardless of the economic level and national competitiveness of the country. A system of unspoken guarantee was formed, promising the weaker members to be rescued by the stronger, and a dangerous illusion of prosperity in Eurozone was created.

While before joining the Eurozone, countries paid a premium corresponding to the state of their economies for the money borrowed on the financial markets, the introduction of euro has reconciled the development and the level of interest rates on government loans. Thus, as shown in Figure 3, once it the idea of a common currency was adopted, interest rates of the peripheral economies have stabilized and moved to the level of interest rates that Germany and other economically stronger countries have.



Source: Eurostat, 2015

The amount of newly created euros and for some euro area countries the interest rates which were determined too low by the ECB, have radically reduced the cost of loans for private sector entities in the peripheral Eurozone countries. In these peripheral countries a formation of bubbles started appearing, whether it were the real estate markets in Spain and Ireland or the public sector in Greece. Thanks to the support from the government, the euro-illusion of homogeneous Europe, despite its negative consequences, was still growing. There has been a deepening economic recession and moral hazard on the part of ECB and Eurozone governments, which under the temptation of the low cost borrowing and the newly established guarantee of rescue in case of difficulties, decided to "gamble for redemption" from the problems in which they, whether due to external influences or their irresponsible deficit management, found themselves.

Based on the Figures 2, 3, 4 and 5, it is possible to argue that the introduction of the euro and the relating new conditions in the Eurozone were only the motivation for many Eurozone countries, which were in economic stagnation or in economic recession, to "gamble for redemption" from the bad economic situation in which they found themselves. "Euro Illusion" supported irresponsible behaviour of that countries and the growth of their sovereign debt.

A significant disadvantage of the euro and the EMU is the transfer of additional costs, obligations and liability for the debts and losses of others (the perpetrators, to all holders of the euro and taxpayers in the Eurozone. Such inexcusable systemic support of moral hazard, despite its consequences, continues. Its driving forces are the measures taken to solve the European debt crisis. Euro and the membership in the EMU are generally increasing the risk of endogenously caused, self-fulfilling crisis, both when talking about crises caused by self-fulfilling panic in the financial markets (due to self-fulfilling expectations of investors in those markets), as well as in those of the crisis which are caused by reckless behaviour of "Panglossian" borrowers (motivated only by their own benefit and rational disregard of the possibility of their failure to honour their commitments, respectively, relying on a rescue from the outside, e.g. from the ECB and from other eurozone countries). (Cohen and Villemot, 2014) Therefore, considering that the basic determinant of the self-fulfilling crisis is the starting level of debt of an individual country, it is necessary to reassess the adequacy of existing rules of fiscal discipline in the EMU.



Figure 4 Government deficit/surplus in the Eurozone Source: Eurostat (2015)


Source: Eurostat (2015)

Based on the analysis of the impact of the euro-illusion and economic myths about the EMU on the indebtedness of its members, it is possible to argue that the introduction of the euro and the single monetary policy in the Eurozone were only false signals emitted by market operators, handling the market sentiment, the drop in the cost of loans for the governments, their irresponsible behaviour motivated by a gamble for redemption of their problems should things go awry, and raising the countries debt.

5 Euro-political, i. e. economic and political factors

"The European sovereign debt crisis has highlighted the fact that a unified currency and "onesize-fits-all" monetary policy, at least for the cast of countries of the EMU, extends and deepens the economic cycle." (Gonda, 2014) Signs of this are the negative effects of low nominal interest with higher inflation and also negative real interest rates, in the peripheral countries after they joined the Eurozone. These interest rates in fact supported the credit booms in these countries, both in the private and in the public sector. "One-size-fits-all" monetary policy by the ECB in the euro area before and during the debt crisis was not adequate and just for all its members. This monetary policy was seemingly appropriate for the core countries of Eurozone, but it was too lenient for the peripheral countries. (Lothian, 2014)

Huge capital inflows had an identically negative impact on the debt in the Eurozone, as reported by all stressed countries during the period leading to the crisis. These capital inflows reflected the belief of the investors that the sovereign risk of a country becomes minimal after its adoption of the Euro. These large capital inflows were accompanied by a substantial reduction in long-term bonds, a large increase in the growth rate of money and credit supply, the relatively fast pace of price growth and a deterioration of competitiveness, all these demotivated euro area governments to implement reforms to comply with the budgetary constraints to which they are committed. (Dellas and Tavlas, 2012)

The unstable, relatively fast growth of monetary base in the Eurozone poses a serious threat for the future. The current setting of the monetary policy ECB has continually supports the growth of bubbles in Eurozone countries.

The single monetary policy of ECB, which, for many countries, was too expansionary when it should have been restrictive instead, was and still is a serious systemic cause of long-term debt problems in the Eurozone.

6 Conclusion

Current attempts at solving the European sovereign debt crisis are ineffective. They do not solve the problem at its core, but rather make it worse by delaying the issue. The various forms of assistance to stressed countries and austerity measures, which are conditions of such aid, are in fact substantially dictated by the financial market sentiment and they don't have a sufficient economical basis. (De Grauwe and Yuemei, 2013; Sklias, 2014) Therefore it is necessary to establish procedures which would solve the causes of the Eurozone crisis, i.e. to eliminate the effects of system failures of the EMU project and euro.

Relying on the OCA theory, according to which the euro area is clearly a sub-optimal currency area, and on views of Keynes, one can consider a workable mechanism of fiscal transfers as an appropriate adjustment tool for smoothening out the imbalances between surplus and deficit Eurozone member countries. (Sklias, 2014) However, implementation of such mechanism in the EMU requires creating a fiscal union and, despite the fact that centralization and regulation are one of the main problems of the EMU, a further strengthening of the political integration.

The first possible way of solving the current European debt crisis is to create some sort of the United States of Europe, i. e. a European (federal) state; similar to what Winston Churchill declares in his discourse in 1946. However, the basis for correct functioning of this state should be a suitable compromise between government interventionism and leases faire approach of government to the economy of the country. Keynes insists on the unavoidability of the government affecting the economy, because of the uncertainty that is formed when relying on the free hand of market, but experience shows that excessive centralization and excessive government intervention in the economy only lead to the growth of costs and inefficiency. When handling this compromise, it is necessary to realize that next to the government, the market is another factor capable of manipulating economic agents and influencing their decisions.

When creating an adequate system of fiscal transfers in the EMU, again according to views of Keynes, it is necessary to ensure an expansionary effect of this mechanism in the years of economic recession and crisis. This would however be based on the rationalization of government expenditures. The fiscal transfers in the EMU of the supranational level would be able to mitigate the investment volatility of the Eurozone in the turbulent years.

To add to the subject of fiscal centralization, it's appropriate to propose a common European tax system, which would be complementary to national tax systems. Major European investment projects should be founded. They would be realised in the peripheral Eurozone countries and would lead to more efficient use of resources in the EMU and would be an essential mechanism for ensuring an equal development of the EMU countries. It is also important to implement sanctions for trade within the EMU, especially for countries with large surpluses on their current account, such as Germany. The funds that would flow from them could be part of a system of fiscal transfers in the EMU and could be invested in the development of deficient regions.

Creation of a European super-state is obviously a last resort and not a very realistic solution. It is politically impassable and would cause massive waves of nationalism and resistance against the idea that the disciplined countries would have to pay for the mistakes and irresponsibility of the less disciplined countries. Likewise, British Prime Minister David Cameron commented on the idea of closer political integration: "For us, the European Union is a means to an end – prosperity, stability, the anchor of freedom and democracy both within Europe and beyond her shores – not an end in itself." (Kuhn, 2014)

Of course there are several other alternatives how to solve the Eurozone crisis, such as the managed or unmanaged breakdown of the EMU. Controlled collapse of the Eurozone, however, is unlikely because this way, the European leaders would have to admit their failure and the failure of the euro project. However, this solution would be possible and real if the politically prominent members of the EMU, United Kingdom for example, would make a decision to leave the EMU. Voluntary withdrawal of individual countries from the EMU would create a precedent and a wave of mass exodus from the Eurozone countries. (Gonda, 2014)

At the same time I must to point out that the European politicians probably won't accede to the real solution of the current European sovereign debt crisis. However, the turning point could be the moment when the consequences become grave enough that the politicians and the governments become vulnerable to the risk of not being elected. With that being said, it is also necessary to quote the Federal Chancellor Angela Merkel, which in the context of the European's debt problems, said: "Nobody should believe that another half century of peace in Europe is a given — it's not," Mrs Merkel said. "So I say again: if the euro collapses, Europe collapses. That can't happen." (Bundesregierung, 2011) A United Europe has a markedly better chance to compete in global markets against its competitors such as China and the US. However, it is questionable how the optimal union of European nations should look like.

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.

References

- AIZENMAN, J., HUTCHISON, M., JINJARAK, Y., 2013. What is the risk of European sovereign debt defaults? Fiscal space, CDS spreads and market pricing of risk. In: *Journal of International Money and Finance*. Vol. 34, pp. 37 – 59.
- CARLIN, W. 2011. Heterogeneity in the Euro-zone and why it matters for the future of the currency union. In: *Beblavy, M., Cobham, D., Odor, L. (Eds.), The Euro Area and the Financial Crisis.* Cambridge: Cambridge University Press. Pp. 320–328.
- DIE BUNDESREGIERUNG. 2011. Regierungserklärung von Kanzlerin Merkel zum Europäischen Rat und zum Eurogipfel.
- COHEN, D. and VILLEMOT, S. 2014. Endogenous debt crises. In: Journal of International Money and Finance. Vol. 51, pp. 337 369.
- DE GRAUWE, P. and YUEIMEI, J. 2013. More Evidence that Financial Markets Imposed Excessive Austerity in the Eurozone, CEPS Commentary, February.

- DELLAS, H. and TAVLAS, G. S. 2012. The Road to Ithaca: the Gold Standard, the Euro and the Origins of the Greek Sovereign Debt Crisis. Bank of Greece working paper 149.
- DETLEF, A. 2012. Causes of the Sovereign Debt Crisis. [online]. Available online: http://www.e-ir.info/2012/04/16/causes-of-the-sovereign-debt-crisis/

EUROPEAN COMMISSION. 2015. Winston Churchill: calling for a United States of Europe.

- EUROSTAT. 2015. Search Database, As accessed online 28 September 2015. Available online:
- GONDA, P. 2012. Eurozóna a alternatívy európskej ekonomickej integrácie. Bratislava: Konzervatívny inštitút M. R. Štefánika.
- GONDA, P. 2014. Euro nástroj alebo brzda prosperity?. In: 10 rokov v EÚ. A čo ďalej?. pp. 12–23.
- GOREA, D. and DAREV, D. 2013. The euro area sovereign debt crisis: Can contagion spread from the periphery to the core?. In: *International Review of Economics and Finance*. Vol. 30, pp. 78 100.
- GRAHL, J. 2011. Crisis in the Eurozone. Soundings, Vol.47, No. 47, pp. 143-158.
- GUERREIRO, D. 2014. Is the European debt crisis a mere balance of payments crisis? In: *Economic Modelling*. Vol. 44, pp. 50 56.
- KUHN, I. 2014. Stále tesnejšia integrácia. Až dokedy?. In: 10 rokov v EÚ. A čo ďalej?. pp. 5-11.
- LOTHIAN, J. R. 2014. Monetary policy and the twin crises. In: *Journal of international Money* and Finance. Vol. 49, pp. 197 210.
- MANOLOPOULOS, J. 2011. Greece's' Odious' Debt: The Looting of the Hellenic Republic by the Euro, the Political Elite and the Investment Community. Anthem Press.
- NECHIO, F. 2011. Monetary Policy When one Size Does not fit all, 2011–18. FRBSF Economic Letter, pp. 1–5.
- SKLIAS, P., ROUKANAS, S., MARIS, G. 2014. Keynes and the Eur ozone's Crisis: Towar ds a Fiscal Union?. In: *Procedia Economics and Finance. Vol.* 9, pp. 66 73
- SUCHÁ, Ž. 2013. Európska banková únia v podmienkach finančnej globalizácie. In: Současná Evropa 02/2013. pp. 167 185.
- URECHE-RANGAU, L. and BURIETZ, A. 2013. One crisis, two crises...the subprime crisis and the European sovereign debt problems. In: *Economic Modelling*. Vol. 3, pp. 25 44.

Livelihood of Poor Roma Families (a Qualitative Study)

JURINA RUSNÁKOVÁ¹

Constantine the Philosopher University in Nitra, Institute of Roma Studies Slovak Republic

Abstract

Poverty is a serious problem both on the individual level and the level of society. It takes away one man's freedom and choices, influences his present situation, his future, goals and achievements (National strategy for human rights protection and support in Slovakia, Attachment no. 9, 2014). Poverty is a complex and multidimensional phenomenon and therefore it is not easy to understand it in its full complexity. Understanding, though, is essential for good solutions and help. There has been a lot of research carried out, proving that if we analyze the household strategies of families and their members, we can understand their situation and how they take decisions. The aim of this paper is to give the reader the results of a qualitative research (VEGA1/0596/1 and 1/0206/13) focused on observing and studying the household strategies and perceived social support of poor Roma households. The description of strategies, that the representatives of the families involved in our research utilize to make a living, is aimed to show the variability and their decision-making limits, resulting from their enviroment and situation.

Key words: Roma, Roma Communities, Poverty, Social Exclusion, Life Strategies, Household Strategies

JEL Classification: D12, D19

1 Introduction

The term Household strategy represents an array of activities that lead towards securing the basic needs for life (Bridger and Pine, 1998 In Rochovská, 2011). The above-mentioned authors define the strategies as ways or means by which households cope with economical insufficiency and various forms of poverty and social exclusion. Radičová (1998) suggests that the strategies result from the reaction of people to social change. Household strategies are not just means of "survival", but they may be used as methods to improve the condition of a household, social progress (Rochovská, 2011). The aim of the household strategies is survival or accumulation of items (Pickup – White, 2003). Adaptation to living conditions is an essential prerequisite for choosing the best household strategy to secure survival from the social point of view as well as securing the basic needs. The decision making is in fact dependent on the situation of a subject and how he perceives and understands the situation.

"However, the household strategies of the Roma families significant for their low level of integration and even lower economical status are very distant to us and we don't understand them and we have doubts about them. They are very specific survival-oriented household strategies we are talking about." (Kompaniková and Šebesta, 2002)

Our "incomprehensibility" of the decision-making process of Roma families is very often a source of prejudice and stereotypes ("they are living for the day") and an obstacle in providing effective help. Poverty has become extreme mainly in the so-called "segregated" communities whereas it is not so in communities located in marginalized areas (Radičová, 2001). There has been a lot of research done and many papers published that give us some insights and evidence on the poverty and social handicap of people in Roma communities (e.g. Gavurová et al. 2014a, 2014b; Šoltés et al. 2014; Rosinský, 2006; Klein and

¹ Mgr. Jurina Rusnáková, PhD., Kraskova 1, 949 74 Nitra, Slovak Republic, jrusnakova@ukf.sk

Matulayová, 2007; Filadelfiová and Gerbery, 2012; Filadelfiová, Gerbery and Škobla, 2006; Džambazovič and Jurásková, 2002; etc,...).

According to Rusnáková (2009), social exclusion supported by a remote location of the community forms such internal and external obstacles that they are very hard to overcome. There are *"two worlds"* being formed that are isolated by space and other factors. Poeple living in a remote location have very limited opportunities to enter the *"other"* environment. Extremely poor living conditions of communities reduce the possibilities and goals of its residents to solve the "breadline" problem. Filčák (2013) offers a similar point of view. According to him, the *"two worlds"* are the consequences of segregation and insufficiency of opportunities. In absence of external opportunities, the communities are kept in locations that have adopted almost all the signs of a ghetto.

And usury, to give an example for the illustration, is one of the consequences of poverty and economic exclusion (including financial exclusion). There are many forms of usury, usurers normally adjust to conditions and offer services and merchandise (money, food, transport, telephone, etc.) that their clients normally can't access from other sources. The residents of such communities may accept these services (we do not approve it, though) if the conditions are bearable (if the debtor is not dependent on the lender, nor is he threatened by him, if the rate on interest is not too high). If usurers cross the line and their conditions become unbearable, for example by offering extremely overpriced goods, they become an enemy, utilizing criminal means to ensure the conditions are met.

To understand how households manage their matters, many researchers use the analysis of household strategies published by Smith and Rochovská (2007) that is best fitting the Slovak environment. The authors used the Burawoy's system of theories called "assets" in order to study economical strategies of particular households. The system is based on a research done in Russia (Burawoy, Krotov and Lytikina, 2000) that identifies four main categories of assets – material assets (cars, apartments, houses...), skills (education, rank, physical skills, etc.), social relations (relations with family members and friends), civil resources (provided by state).

Limited amount of research publications studying the household strategies in Roma communities concerning the Slovak environment have been released so far, (Radičová, 1998; Rusnáková et al., 2011). If there was as a study on Roma communities, it was only on the periphery of the matter and/or just as part of a wider-scope social research, analysing the level of poverty in Roma communities or other ethnologic research focused on interethnic relations (f.e. Jakoubek and Hirt et al., 2008).

Our paper has been written as a result of studying the above mentioned matters with intentions to share the results of our qualitative research focused on finding and studying the household strategies of poor Roma homes.

2. Livelihood securing household strategies – results of a qualitative study

Researches from the Faculty of Social Studies at the University of Constantine, the Philosopher in Nitra have worked on the study of household strategies as part of the projects VEGA/ 1/0596/10 and VEGA 1/0206/13. The first of the projects was done in the years 2010 and 2011 with the aim of analysing the household strategies of poor Roma families living in Roma communities. The second project consists of two parts – qualitative and quantitative and has been worked on since 2013 with the set deadline for December 2015. Its main focus is on studying the qualitative and quantitavive characteristics of the perceived social support of poor Roms concerning the assets and types.

The results of our study are based on more than 40 half-structured interviews with representatives of Roma households from all types of housing (using the typology based on the relation of a Roma community to a particular urban site near which they are located) and approximately 20 interviews with representatives of professional on-site workers (on-site social workers, community workers) and activists working at Roma communities. These interviews have been done as part of the study of household strategies.

In-depth case-studies that have not been published yet, were done as part of the research of perceived social support and social networks of poor Roms between the years 2014-2015, where the researchers visited both of the selected families repeatedly in the period of six months, between the years 2014 - 2015. The case-studies were included in the research after an analysis had been done focusing on the actual findings from the part of the project dealing with the qualitative study, with the aim to understand the household strategies better, as well as their loan-taking process (including the consequences). The studied families perceived themselves as not the poorest ones in the community (based on the amount of money they had been receiving monthly, that being compared with other families from the community involved in the research).

2.1 Strategies of two selected households – case studies

The studied homes are multi-generation types, living in a rural area in a village of the population of 1000 residents, approximately 20 km away from the nearest county seat (regions occupying the first positions in the unemployment charts of the country), in ethnically rich neighbourhood.

The first family (represented by a Rom named Milada, 35) has got four members: a mother called Maria (64), two daughters Agnesa (44) and Milada (35) and Milada's daughter Livia (11). Maria is a widow, Agnesa is single and Milada has a partner who is constantly away from home due to the lack of job opportunities (each time too far from home, not able to commute on daily basis, most of the time in Czech Republic). "He comes home only at public holidays and in summers. Twice a year." The house is simple, one room, equipped with basic appliances and furnished with new furniture, television and a computer connected to the Internet. According to the respondents, they had to lease the appliances, part of them was being paid back even during the period of our study. Milada was the only one possessing a mobile phone.

The other family in our research is represented by a divorced Dorota (33), who lives with her unemployed parents (55, 57) and a daughter (11). "I have nowhere to go. Without my parents I would not survive". They live in a two-bedroomed house that is furnished with oldish furniture, appliances, TV and a notebook with access to the Internet. Dorota took a loan, too, for the newer appliances.

Economy, income and expenses

Both homes deal with money collectively. Milada's family puts all the money into one jar and the mother holds the accounts. All the family members keep the accounts transparent. Everybody knows how much they spend on expenses, such as food, loans, rent, Internet, phone bills and education for the daughter. The trips and excursions are not paid for the daughter and she usually does not attend them with the rest of her class. The family buys clothes only in a case of emergency, mostly for the child. Just to mention, Milada's older sister responded that she had not bought clothes in years. If there are bigger expenses (such as burning wood) or something unexpected happens (normally connected to family events, illnesses), the family usually borrows some money from relatives, acquaintances, or even take a loan from a non-banking financial company. Every month they take use of an "I.O.U." (or "I owe you") agreement when shopping at a local grocer's (buying on the store credit).

Do you shop for food on the store credit, too?

"...yes we do, because we have loans. But if go, we mostly don't take goods for more than 40 euro, mostly for meat and so on..."

Dorota works for the nearby county seat and she keeps the pay (approx. 500 euro), but she does not have the privilege to decide what to do with it, because the loans of the family and food expenses consume almost all of it so she often has to borrow some money for her travel costs or for medication... . "So I have to pay the repayments, phone and internet, the cooker. More than a half of my salary is spent on loans." Both of her parents are unemployed with a minimum income. The father is an alcoholic, day-by-day he gets deeper into debt. When he borrows some money for alcohol, he never pays it back. Numerous executors have filed an appeal for execution against him. This home doesn't have a clear and transparent economy. They are not very organized when shopping, they do it mostly impulsively and often soon after the day of the social security benefits payment. They don't possess cash on the most of the time of our research they had some unpaid bills for water, taxes and waste management. Neither this family buys clothes for its adult members. "I can't afford to buy shoes for myself and neither can I buy the things my daughter would like to have."

2.2 Livelihood security concepts

Social security benefits and income from employment

As we mentioned above, big part of the income of both families consists of social security benefits. Milada's family is "dependent" almost entirely on the state, her partner works, but he sends home only the child-allowance money. He has moved many times across Slovakia in the last years for job-seeking reasons, every time he moved, it was too far to commute to work on a daily basis. The reasons he left were mainly execution appeals and overextension of the family. Due to the execution appeals he was unable to get employed for two years as he feared his assets might get frozen by his bank. So he stayed in the Czech Republic, where he worked part-time illegally. During this period of time he managed to get rid of the most of his lenders that had filed an execution appeal against him. He managed to find a job in Slovakia later on. His income is not very big, though, approx, 500 euro a month. This is sometimes insufficient to cover all his expenses, such as loans, living costs, child allowance for his daughter. At the time of our research he asked his relatives for a small loan three times, and once he took a loan from a non-banking company. Milada used to work, too, before her daughter was born, however, she had to work illegally and that was for two reasons: the employer had not offered her a legal contract and the combination of a small income and social security benefits turned out to be more efficient for her, money-wise. She left the job after she had delivered the baby and since then, for about 11 years by now, she has been unemployed. Her mother and the older sister have not worked in the past 20 years either.

Dorota is the only person in the family that has a job. Her parents are unemployed, her mother has never worked in her life. Her father used to be a quite well-known foreman, so he would have some money from his job and some extra money from occasional part-time jobs (the family would owe money even at this period of time). Due to the health condition and addiction he has not been able to work at all in the past two years. The respondents mentioned that their hopes and desires depend on a job, but they have doubts, too. Job security is the only solution they see to resolve their financial problems (e.g. getting rid of the loans, increasing the income) and it is the only way to achieve their goals, including the need for social life and self-actualisation.

"We would not probably survive if I did not work. Even now, when I am sick or it doesn't go well at work, I have to borrow some money to cover the loans." (Dorota)

"If we had a better-paid job, me and my partner, we would be able to get out of the debt and think of becoming independent. There is no point of thinking of better days in the present situation." (Milada)

On the other hand, frustration and negativism were noticeable at our discussions. "If I could find at least four jobs and the day had 48 hours, then only I would be able to earn enough to cover all the bills. Otherwise there is no chance to make things better, I think." (Dorota) In Milada's opinion, getting a proper job is impossible, for her it is an unrealistic dream and she doesn't have the strength to pursue it, either. She argues her health condition is not good, but she admits she is not ready to enter the job market. "I can't even say if I would manage it. I am not fit, I have had an injury on my leg and I am unable to stand on it for a longer period of time, leave out working. And to tell you the truth, I can't imagine that I would be able to work every day..." Milada claims that after experiencing some unsuccessful attempts to get employed, she has given up for good. The insecurity about the present and the future, the lack of self-confidence and trust in her own abilities, inner dissatisfaction and disappointment has accompanied her for many years. "I want a better life for my daughter, not the life I have, but I am not capable of changing it, I don't know how to put it, I just don't know what to do. I am angry at everything..."

The family networks

United families and collective budget. Neither of the families claim it is a voluntary decision, but it is a necessity to survive, as stated by the respondents. Neither of the women is happy with the fact that they don't have their own apartment. "I am an unsuccessful person, I have not achieved anything, I don't have anything, I am surviving. I have to live with parents, my daughter does not get the stuff she needs." (Dorota) "I pray that my mother keeps her good health, not just because she is my mother, but also for the fact that without her pension we would be finished."(Milada)

Mutual help of the extended family is another example of a household strategy that the family of Milada utilizes. Two of her sisters have their own houses and are ready to give her cash in the case of need (happened three times a month during the time of our research). They pay it back the following month, but borrow again. The sisters sometimes donate her some money (mainly for food, clothes and school items needed by her daughter). Milada sometimes gets a donation even from her extended family, too.

Compared to Milada, Dorota has fewer opportunities to get financial help from her family, therefore she depends more on the non-banking companies. Her sister that lives with her children 100 km away sometimes offers her to go shopping with her for things her daughter needs for school and for food. She visited them twice during the time of our research. When there is an emergency, her extended family donates some money, approximately 10 euro to bypass the unfavourable situations. "When it is very urgent, when I don't even have the change for a bus to get to work, or my daughter gets sick and I need to take her to the doctor, I go to my cousins. Otherwise I rather go to a non-banking company and get a loan."

Buying on the store credit

This way of shopping is well-known by both of the families and according to them, most of the poorer people in the village depend on it. They shop for food mostly, occasionally toiletries and the father of Dorota often buys alcohol on this agreement. They pay it back each month, that is the condition to get this service again in the future. This services are provided by a local undertaker, who knows his clients well, he knows how much they earn, he himself regulates how much they can buy, so they only buy the amount of goods they can pay back when they get some money. Both of the families consider this service as an advantage, that protects them from getting deeper in debt. On the other hand, the variability of goods is not sufficient, is limited to overpriced goods of a low quality, f.e. the meet is of a questionable origin and the owner requires them to use his services even at times when they have cash on hand. "We have had times when we had to shop on the store credit all month long. And then, when my sister came by, or my mother went to the town, we shopped secretly so we would not lose the access to this service. He (the undertaker) wants us to shop at his place even when we have enough money." (Dorota)

Strategy of frugality

All of the respondents emphasized the strategy of frugality as one of the very few strategies that work and result in a debt-free situation. Years and years of practising modesty was evident at discussions with Milada and with her mother.

"It is not so, no...,I have something to eat, but financially...I would rather have a job so we would not have financial problems and worries, how to best spend our money and where to shop, what to buy...I cannot afford a lot of things, I don't buy clothes for me, only for my daughter, even that only in case my partner sends some money or we have a little money left..." (Milada)

"...sometimes I don't have enough money for the basic necessities...Sometimes we can't afford to buy food, my daughter likes milk or yoghurt, but we don't have it. We have to be modest all the time, otherwise we wouldn't manage. We buy only the most important things, and cheapest food. If I buy some clothes for my daughter, I always buy them at a Chinese shop, because it is the cheapest option." (Dorota)

Farming and growing crops

Only the family of Dorota owns a piece of land. They grow annual vegetables for immediate consumption and potatoes to store for winter. They get fruit from shops. Milada's family does not own a piece of land. They buy vegetables and fruit at shops.

Loans from non-banking companies

Borrowing smaller amounts of money is very usual for both of the families. Milada and her partner are repaying three smaller loans (a few hundred euro) from non-banking companies and a bigger one (approx. 3.000 euro) from a bank. Her mother has two loans, too, one from a non-banking company and she bought some effects on a leasing basis (furniture, plastic-framed windows, electrical appliances). Dorota and her family have a few loans. Neither Dorota, nor her mother know how many loans does the father have. She herself has several smaller loans from non-banking companies (a few hundred euro) and one from a bank (about 7.000 euro) and she is paying the repayments alone. During the time of the research, she was repaying two loans from a non-banking company and she signed two new loan agreements. Dorota occasionally (approx. once a month) visits a local "businessman" who provides informal loans. They say they wouldn't manage without the loans, not even the basic

necessities (food, energy bills), on the other hand, paying the repayments has a huge impact on the economy of the family and have many times resulted in even deeper debt. "Once I had a situation when I got sick and that resulted in a 300 euro salary. It was unthinkable to pay the repayments, so I could not pay the banks for two months and I was really under pressure, as it was no joke. So I had no other choice than to take another loan to cover the existing loans, thus, having to pay back the new one and the older ones as well. " (Dorota)

2.3 Defined household strategies according to the interviews

We would like to give a brief insight into the household strategies that we have learned in our resarch that was carried out in form of qualitative studies (more detailed information can be found in the publication of a collective of authors Rusnáková et al., 2011).

The biggest part of the income of the families that took part in the research (regardless the location, type of housing, or type of Roma community) consisted of social security benefits, f.e. employment and support allowance etc...Very few respondents had the privilege to have an income from a job (we do not mention the figures and ratio, we do not consider it important as it was a qualitative study, a non-representative research). In context of the job market, we can say there are job-seeking strategies (f.e. Gaga is looking for a job on the Internet, teletext, gets job openings recommended by her relatives and job agencies) and work mobility, unofficial recruiting (part time jobs preferred by men, activation works, mostly in construction, but also women take advantage of fruit-picking opportunities or pick fruit or mushrooms in forests and sell it) and we must say, there is a good deal of deceit related to them. For illustrative purposes, we would like to draw a case, where Paul, who, according to him, got befooled by an agency, went to the Czech Repulic, worked for two months and did not get paid. He had to return back home on his expense. Education ambitions have been expressed by the younger generations and respondents, who need to advance their education for a certain job opening.

"So, we must try not to spend in excess, save instead, even if we might have enough for the whole month, but what if we don't have enough the following month, where will we go?" (Aneta) As the respondent suggests by her thoughts, frugality is the most commonly used household strategy practiced by all of the respondents. They spend money only on necessities, expenses related to energy bills, medication, clothes for children.

Big part of the interviewed Roma prefer buying in bulk and accumulate stocks, just in case. The goods mostly include potatoes, pasta, sugar, flour, meat. "Meat, potatoes, that we need to secure for the whole month."(Ema) Matej does not consider buying in bulk and accumulating stocks as very wise, because a lot of money is usually spent for unnecessary things. Dalila does not have the resources to accumulate stocks, she never has enough money.

Most of the multi-generation families manage their finances collectively, they put all the income into one sum and the mother takes charge of it. They discuss all the major expenses. A few women stated, that the man has the last word when deciding about major expenses.

Household strategies of mutual help of families and relatives showed a great importance, too. Those often serve as a back-up in case of emergency (manisfested as a little amount of money provided for food for a shorter period of time).

In situations where a bigger sum of money is needed, services of banks or even more frequently, of non-banking companies are utilized, and they are available even to the families with lower income. Gita says, that there are many families that owe to local usurers in her village. Quite a few respondents complained about the high rates on the interest and that does not let them get out of the constant debt. *"The banks take decisions about our money."* (Milada) Due to the relatively low amount of money granted by the companies (usually tens or hundreds of euros), the effort and costs that the respondents have to put forth are too high.

3. Conclusion

The Burawoy's theory of assets identifies 4 groups of resources: material, skills, social relations and civil resources.

- Social relations and property: "Roma are generally poorer than the Non-Roma. It is mainly for the fact that they do the jobs that are not paid very well, even at times when their education is competing, or they have not inherited any property from their ancestors or there was nobody to help them. They had to manage on their own. But the main reason lies in connections. Our parents come from an isolated community, or they had their ancestors from there. Their friends are from there. (Jaro) Many respondents consider good relations with Non-Roma as an important source providing them with access to the job market, however, most of the respondents don't really keep up the connections alive.
- Skills: they are important in the context of the job market. Man has to possess adequate education, qualification, has to have a good sense of orientation on the job market. For example Pavol considers his ability to find his grounds quickly in terms of relations, or naming his requirements, securing his position at work or achieving advantage before his competitors, as the best skill he has.
- Civil resources: civic amenities in urban areas, infrastructure, availability of services those are usually unavailable in segregated communities. The segregation/isolation itself is a disadvantage. For many respondents is living amongst the Non-Roma or interacting with them an important asset, providing them with experience, know-how, they learn various skills, the language. According to them, employment is the answer to their financial problems. Their experience is with the low-paid jobs and mostly only on a parttime basis. These jobs don't have the desired effect. Many men have worked with no pay in return, as victims of very deceitful practices of so-called "job agencies".
- Many interviewed respondents touched on the ethnicity discrimination issues, too. Their appearance is a disadvantage according to them. For them, it is better to have a white skin, they find it easier to be successful on the job market, and in their day-to-day life situations, for example when obtaining needed papers at public offices. "...but according to his appearance, what he is wearning, if he is dark-skinned or white. If he is handsome, because there are jobs where you have to look nice. No matter if you are smart, but if you don't have the desired manners, or you don't have the looks...if you are black, they will send you home sooner or later." (Milada, 35)

We need to raise a question if we should speak about household strategies in the first place, if the inhabitants of the segregated Roma communities have very limited life conditions which limit their choices to zero and are simply forced to adjust to the environment. We think it is far more accurate to speak about concepts of adaptation to an environment and about adaptation strategies. Some respondents said that a bad financial situation had forced them to take wrong decisions, such as to borrow from a non-banking company and to go even deeper in debt. "If somebody was born in such community and grew up in there, sharing a small room with 10 other people, with no hygiene, no education, no skills, we can not say he is paying for his own mistakes." (Jaro, a social worker)

Acknowledgements

This publication has come into existence thanks to the support of the *Ministry of Education*, Science, Research and Sport of the *Slovak Republic* as part of the research projects VEGA 1/0596/1 and VEGA 1/0206/13). We would like to give thanks to all of the respondents that took part in the interviews related to our research.

References

- BRIDGER, S. and PINE, F. 1998. In: ROCHOVSKÁ, A. 2011. Životné stratégie teoretické východiská. In: Životné stratégie obyvateľov rómskych osídlení. Nitra: FSVaZ UKF v Nitre.
- BURAWOY, M., KROTOV, P., LYTKINA, T. 2000. Involution and destitution in capitalist Russia. In: *Etnography*. Vol. 1/1, pp. 43-65.
- *Celoštátna stratégia ochrany a podpory ľudských práv v SR Príloha 9, 2014.* [online] http://www.radavladylp.gov.sk/celostatna-strategia-ochrany-a-podpory-ludskych-prav-v-sr/ [cit. 2015-10.09]
- DŽAMBAZOVIČ, R. and JURÁSKOVÁ, M. 2002. Sociálne vylúčenie Rómov na Slovensku. In: *Čačipen pal o Roma. Súhrnná správa o Rómoch na Slovensku*. IVO, pp. 527 – 564.
- FILADELFIOVÁ, J. and GERBERY, D. 2012. Správa o životných podmienkach rómskych domácností na Slovensku 2010. Bratislava: UNDP.
- FILADELFIOVÁ, J., GERBERY, D. and ŠKOBLA, D. 2006. Správa o životných podmienkach rómskych domácností na Slovensku. Bratislava: UNDP.
- FILČÁK, R. 2013. Another Brick in the Wall: ghettos, spatial segregation and Roma ethnic minority in the central and Eastern Europe. In: *Rethinking Urban Inclusion: spaces, mobilizations, interventions.* Coimbra: Centro de Estudos Sociais, Universidade de Coimbra, pp. 413-428.
- GAVUROVÁ, B., ŠOLTÉS, V. and ŠOLTÉS, M. 2014a. Meranie zdravia a zdravotných rizík vo vybraných rómskych osadách na Slovensku – fakty a reflexie. In: *Nerovnosť a chudoba v Európskej únii a na Slovensku 2:* Zborník statí z 2. medzinárodnej vedeckej konferencie: Košice, 22.-24. októbra 2014. Košice: Technická univerzita, pp. 188-201.
- GAVUROVÁ, B., ŠTEFKO, R. and BAČÍK, R. 2014b. The Analysis of Social Services' Structure in a Specific Region and its Significance for Health and Social Policy in Slovakia. In: *Polish Journal of Management Studies*. Vol. 10, No. 2, pp. 43-53.
- JAKOUBEK, M. and HIRT, T. 2008. Rómske osady na východnom Slovensku z hľadiska terénneho antropologického výskumu 1999-2005. Bratislava: OSF NOS.
- KLEIN, V. and MATULAYOVÁ, T. 2007. Aktuálne problémy v multikultúrnej výchove rómskych žiakov. In: Technológia vzdelávania: Vedecko-pedagogický časopis s informačnou prílohou, Príloha Slovenský učiteľ. Vol. 7/2007, pp. 2 – 8.
- KOMPANÍKOVÁ, S. and ŠEBESTA, M. 2002. Životné stratégie Rómov. In: Čačipen pal o Roma. Súhrnná správa o Rómoch na Slovensku. Bratislava: IVO, pp. 589 618.
- PICKUP F. AND WHITE A. 2003. Livelihoods in Postcommunist Russia: Urban/Rural Comparisons. In: *Work Employment Society*. Vol. 17, No. 3, pp. 419-434.
- RADIČOVÁ, I. et al. 1998. Vieme čo odmietame a vieme čo chceme? Zborník záverečných štúdií SOCO projektov. Bratislava: S.P.A.C.E.
- RADIČOVÁ, I. 2001. Hic Sunt Romales, Bratislava: S.P.A.C.E.
- ROCHOVSKÁ, A. 2011. Životné stratégie teoretické východiská. In: Životné stratégie obyvateľov rómskych osídlení. Nitra: FSVaZ UKF v Nitre.

- ROSINSKÝ, R. 2006. Chavale Romale alebo motivácia rómskych žiakov k učeniu. Nitra: FSVaZ UKF v Nitre.
- RUSNÁKOVÁ J., 2009. Objektívne a subjektívne charakteristiky chudoby v rómskych komunitách. Nitra, [dizertačná práca].
- RUSNÁKOVÁ, J. et al. 2001. Životné stratégie obyvateľov rómskych osídlení. Nitra: FSVaZ.
- SMITH, A. and ROCHOVSKÁ, A. 2007. Domesticating neo-liberalism: Everyday lives and the geographies of post-socialist transformations. In: *Geoforum*. Vol. 38, pp. 1163-1178.
- ŠOLTÉS, V., ŠOLTÉS, M. and GAVUROVÁ, B. 2014. Vývoj mortality v regiónoch s vysokou koncentráciou rómskeho obyvateľstva. In: *Nerovnosť a chudoba v Európskej únii a na Slovensku 2*: Zborník statí z 2. medzinárodnej vedeckej konferencie: Košice, 22.-24. októbra 2014. Košice: Technická univerzita, pp. 202-214.

Analyses of Factors Affecting the Withdrawal of Life Insurance Policyholders

KATARÍNA SAKÁLOVÁ¹ – FRANTIŠEK PELLER² Economic University in Bratislava, Faculty of Business Informatics Slovak Republic

Abstract

The aim of the note is to analyze life insurance policyholder withdrawal activity to determine whether policy withdrawal (lapse) is a function of certain factors or variables. Generally, a life policy is a long term insurance contract. It is the first reason why policyholder may want to voluntary terminates their contract before the date of expiration. These policyholders are said to withdraw or lapse from insurance contract. There are several reasons for doing this. The main aim of our paper is to determinate and then to write the results of analyses of significant factors affecting the termination of life insurance contracts. Analyses was realised with the use of the analytical software from SAS Company – SAS Visual Analytics and SAS Visual Statistics.

Key words: Withdrawal, Surrender, Lapse, Factors Affecting Lapse Rate, Analytical Software SAS

JEL Classification: G2, C4

1 Introduction

Withdrawal refers to the option of policyholder to stop paying premiums and by some contracts take a surrender value. The rate of withdrawal can be generally viewed as a measure of policyholder satisfaction. A policy which is withdrawn results in a profit or loss to the company if the surrender value – which can be also zero – is less or more, respectively, than the earned asset share.

In our paper we deal with two types of withdrawals.

- Under majority of savings contracts (endowment, whole life assurance, annuity) the insurance company pays policyholder a cash payment called **surrender value**;
- Some types of temporary insurance (term assurance) contracts, where the reserve values of the contract at the moment of termination are very small, are not usually granted surrender values. When a policyholder withdraws from a contract which does not have a surrender value, then it is said a contract is **lapsed**.

A most important aspect of surrenders is whether or not the surrender value is guaranteed. Because withdrawal rates are generally high so to grant surrender values is for life insurance company risky.

¹ prof. RNDr. Katarína Sakálová, CSc. Dolnozemská 1, 85 235 Bratislava, Slovak Republic, sakalova@dec.euba.sk

² prof. RNDr. Ing. František Peller, CSc. Dolnozemská 1, 85 235 Bratislava, Slovak Republic, peller@dec.euba.sk

2 Reasons why policyholders withdraw (lapse) from assurance

There exist some reasons for terminating the life insurance contract before the date of expiration. Sometimes policyholders after buying a life insurance policy, decide that they do not need that. This may be because they have been sold a policy which does not suit them or because they discover some feature of the policy which they do not like. Withdrawal may be a sign of dissatisfied customer.

Policyholders can have again sometimes several other reasons why they are not satisfied with the contract and solve this situation with stopping existing policy and take out a new policy. Example is an insurance product covering mortgage arrangements when after moving house is policyholder taking new mortgage arrangements.

There are also very often financial reasons. When policyholder is for example in financial difficulties and has to cut expenditure insurance premiums may be among the first axed. This can be in many cases conclusion of economic climate. But another cause of financial problems can be also illness or unemployment.

Policyholders do not always tell the life insurance company that they are going to stop the premiums. Reasons can be various – changing address, account etc. These lapses without surrender values and also more without explanations are called **forfeitures** and most companies have procedures for keeping the contract in force for as long as possible, usually only if the policy has a surrender value.

Withdrawal is sometimes not only one option how to solve the situation. Depending on company and the circumstances policyholder may be able to:

- Make a policy paid-up, that means stop paying premiums but keep the contract in force by changing the conditions, in majority cases by reduced benefit;
- Reduce the premium;
- Surrender the bonuses by with profit contracts and keep the sum assured in force;
- Otherwise change the terms of the contract (Sakalova, 2001).

3 General features and financial effects of withdrawals

Excessive withdrawals can have in many areas a negative financial impact on life insurance company. Generally the profit arising from the block of contracts will be a mixture of profits which become lapse sooner or later and on those which run their full term. In more details (Black and Skipper, 1994).

Expenses. The company will be unable to recover initial expenses. Thus they must be passed on to persisting policyholders.

Investments. The life company may lose planned investment cash flows and it is possible, that it may result in forced sales of investments or assets at a loss in order to meet surrender demands.

Mortality antiselection. In general, higher risks tend not to lapse, causing that if the lapse rate is high, than the company experience a greater proportion of claims than expected. A special case of such life cover losses is for example in the case under decreasing term assurance, where the life

cover is highest at the outset, the first years premiums may not be enough to pay for the life cover. Thus the withdrawal would leave the company with the loss. Then one prevention for this is to charge single premium.

Thus, lapses can negatively affect each of these major factors affecting life insurance cost. Granting of any form guarantee on withdrawal or lapse reduces the protection of life insurance office against loss. Even if a contract does not guarantee any surrender terms, it is also a serious matter for company.

4 Withdrawal (lapse) rates and factors affecting them

Withdrawal (lapse) rates measures the proportion of policyholders who voluntary terminate their insurance. Lapse rates are generally higher in the first policy year than they are in the subsequent years. Lapse rates vary by the socioeconomic and demographic characteristics of a policyholders. High lapse rates are expected for some target markets and product types.

We begin with defining the withdrawal rate. We have two possibilities. First possibility is to use in definition number of all contracts in the portfolio of contracts and number of lapsed contracts. Then:

$$lapse \ rate = \frac{number \ of \ lapsed \ contracts}{number \ of \ all \ contracts}$$
(1)

Second possibility is to use in definition value of premiums of all contracts in the portfolio of contracts and value of premiums for lapsed contracts. Then:

$$lapse \ rate = \frac{value \ of \ premiums \ for \ lapsed \ contracts}{value \ of \ all \ premiums}$$
(2)

Interesting is also fact, that withdrawal rates are much higher than mortality rates especially at the beginning of the contract. Surrenders are then for life company more important than maturities. Withdrawal rates are influenced by the way the life insurance office markets and underwrites its new production. This is reason for considerable differences between companies and types of products. Rates are also influenced by the economic climate.

There exist some studies in empirical literature about withdrawal rates especially about factors affecting withdrawal rates:

- Renshaw and Haberman (1986), Scotland,
- Kagraoka (2005), Japan,
- Milhaud et al. (2010), Spain,
- Eling a Kiesenbauer (2011), Germany.

In these studies were used various family of factors or variables (continuous, discrete) and various models and methods of analysing them. The list of most variables used in these studies is in Table 1.

Table 1			
Macroeconomic variables	Contract characteristics	Policyholder characteristics	Company characteristics
Gross domestic product Inflation Economic growth	Type of insurance product Duration in force Original term of contract	Age at the moment of analysis (moment of beginning)	Type of insurance company Distribution channel
Unemployment measure Volatility of stock markets Volatility of interest rates	Frequency of premium Size of premium Size of sum assured	Sex Family status Habitation, domicile,	Negative publicity
		country	

Source: Own processing based on Renshaw and Haberman (1986), Kagraoka (2005), Milhaud et al. (2010), Eling a Kiesenbauer (2011)

Generally the actual rate will depend on the following factors – in rough order of importance(Life Insurance, 2000): duration in force, sales method used and target market, frequency of premium, premium payment method, original term of contract, sex and age.

5 Determination of significant factors affecting the withdrawal rates in life insurance

Now we introduce first some important factors affecting withdrawal rates. Then we introduce results about importance of these factors with the use of analytical software from SAS Company. SAS is statistical software from SAS Company that can mine, alter, manage and retrieve data from a variety of sources and perform statistical analysis on it.

Because investigating portfolio of contracts was very large (about one million of contracts) with twenty years history, analyses of factors affecting lapse rates from this huge data was performed with SAS Visual Analytics and SAS Visual Statistics (Tomeková, 2015). By analysing these factors were used following predictive models and methods of visualisation – linear and logistic regression, correlation matrices, generalized linear models (GLM) and decision trees.

In this unit we will look at factors which influence withdrawal rates, and also what is the typical pattern of withdrawal rates.

From **macroeconomic factors** withdrawal rates vary considerably with respect to the **change of interest rate** – with increasing interest rates withdrawal rates were decreased. Results from the analysis indicate that life insurance policy lapse activity is significantly related to interest rates (positively) and generally that the findings provide very small support for the Emergency Fund Hypothesis (EFH). Also relationship to unemployment measure was very week.

In another empirical study (Russell, D. T., Fier, S. G., Carson, J. M., and Dumm, R. E., 2013) findings suggest that policyholders tend to surrender policies when market interest rates increase, when real per capita income decreases, and when policy replacement activity increases. These results show that surrender activity appears to be correlated with several macroeconomic variables that could produce cash flow problems for life insurers in certain economic environments.

Next was testing two factors which were often tested also in many empirical studies. First was **type of life insurance product**. It is well known, that withdrawal rates vary significantly between different types of life insurance business (and also different companies). In investigating

portfolio were four types of life insurance products: endowment, term assurance, unit linked contracts and annuities. Lapse rates were greatest for endowment, on the other side smallest for term assurance.

The main feature in the withdrawal rates is their dependence on **duration in force of the contract**. They are highest in the first few years and decline thereafter. In our analysis it was highest in the first year and then the measure of lapses was decreasing but in each year the majority of lapses were at the end of the year (it was the date of expiration at which the policyholder can lapse their contract).

Duration in force matters much more than the next factor - the age of policyholder. In our analysis the majority of lapses were in the age of 29 and then it was decreasing.

The **premium frequency** can affect the withdrawal rates, since opportunities to withdraw arise when a premium is due. In our country the most often frequency of paying premium by life insurance products is monthly and most rare is single premium at the beginning of the contract. The measure of lapses was then highest for monthly premium (67%) and lowest for simple premium (2%).

The next interesting factor is the **form of the premium payment (premium payment method).** If premiums are payable by direct debit, the policyholder is less likely to lapse (2%), because it is easier to overlook the premium payment. From our analysis we saw that the lapse rate was highest (54 %) by paying the premium with the use of postal money-order.

From what was said about it is clear that withdrawal rates should depend on the way in which a policy was sold, so the next factor is **selling method (selling channel)** or **target market**. Result of our analysis without specification of selling channels was that this factor is very important for withdrawal rates. So the same type of contract may have different withdrawal experience if sold for example by agents, banks or buildings societies.

The last factor with interesting result was factor - insured person and person paying premiums are not identical. We obtain from the analysis that if these persons are not identical then withdrawal rate was lower by 13 %.

6 Conclusion

Withdrawal refers to life insurance policyholders option to stop paying premiums and take a surrender value, if there is one. A policy which is withdrawn results in a profit or loss to the company. Withdrawal rates are much higher than mortality rates, so surrenders are often more important than maturities.

Duration in force is a major influence on withdrawal rates, which tend to be highest in the first few years of duration of policy. Withdrawal rates are affected also by the way in which the policy was sold and how strongly the policyholder believes in the need of the policy. Withdrawal rates are also affected by changing economic conditions and vary especially by type of contract, from company to company and from time to time.

Acknowledgements

Realization of the paper was supported by a grant agency of the Ministry of Education, Science, Research and Sport of the Slovak Republic VEGA. Project: VEGA no. 1/0542/13 Risk management and the actuarial function in life insurance.

References

DICKSON, D., C., M., HARDY, M., R. and WATERS, H.R. 2009. In: Actuarial Mathematics for Life Contingent Risk. Cambridge University Press, 2009, New York, pp. 493.

BLACK, K. and SKIPPER, H. D. 1994. Life insurance. Prentice Hall, New York.

LIFE INSURANCE. 2000. Modul F. Study material. Oxford: Institute of Actuaries.

- NEIL, A. 1997. Life Contingencies. Oxford: The Institute of Actuaries and Faculty of Actuaries.
- ONDREJKOVÁ KRČOVÁ, I. 2013. Use of profit testing method for product pricing and reserving in life insurance. In: Actuarial science in theory and in practice. Proceedings from the 9th international scientific conference Bratislava, Ekonóm Publishers.
- RUSSELL, D. T., FIER, S. G., CARSON, J. M. and DUMM, R. E., 2013, An empirical analysis of life insurance policy surrender activity. Journal of Insurance Issues. Vol. 36, No. 1: pp. 35–57.

SAKÁLOVÁ, K. 2001. Product pricing in life insurance. Ekonóm Publishers, Bratislava.

SAKÁLOVÁ, K. 2006. Actuarial analyses. Bratislava: Ekonóm Publishers, pp. 113.

- SEKEROVÁ, V. and BILÍKOVÁ, M. 2007. Insurance mathematics. Ekonóm Publishers, 180 pp.
- TOMEKOVÁ, K. 2015. Lapse rates in life insurance and factors affecting them. Engineer thesis. University of Economics. Bratislava.

Empirical Approaches to Clarify the Causes of the Sovereign Debt Crisis

JOZEFÍNA SEMANČÍKOVÁ¹ Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

This paper offers an empirical investigation of the causes of the EMU sovereign debt crisis through various empirical approaches. To do so, we present a different literature based on the evidence of the strong link between banking crises and debt crises and the existence of the contagion effect across Eurozone's sovereign spreads. We also present studies dealing with the investigation of the behaviour of the peripheral countries bond yield spreads, and CDS spreads in comparison to German bonds. Our paper offers findings if the debt crisis was due to the existence of only pure contagion or fundamentals-based contagion in the Eurozone countries or whether the debt crisis has the origin in the European Union itself.

Key words: Debt Crisis, Contagion, Eurozone, Spreads

JEL Classification: F34, G12, G15, H63

1 Introduction

The European economic leaders have currently decided to provide another financial support to Greece that is already the third rescue package in the last five years. The European institutional organs and IMF were shocked by the statement of the Greek Government to hold a referendum about further development of the Greek economy in the European Union. The referendum took place on July 5th and the Greek citizens clearly said "no" to conditions of international creditors for providing another financial support. Despite the clear statement of the Greek citizens against another adjustment, the Greek Government "ignored" opinions and the will of its nation. Eventually, they reached the mutual understanding with the European leaders on providing another financial support. The amount should be about 86 milliard euros and is provided by the European Stability Mechanism.

Even today various government leaders and academics around the world are motivated by the severity of the current Eurozone debt crisis to make a contribution to discover the causes and to identify possible warning signals in preventing its future start. Many empirical studies have been written since its origin in Greece in the autumn of 2009. On the one hand, these studies have been trying to explain possible causes of the Greek debt crisis itself. On the other hand, causes of the more common term of the Eurozone debt crisis with the using of different empirical methods. The European governments were getting into debt to protect their national banking systems and prevent their economies from the impacts of the economic crisis in the United States with the origin in 2007. This crisis took place in Europe in 2008, and the total level of government debt increased rapidly.

¹ Ing. Jozefína Semančíková, Němcovej 32, 04001 Košice, Slovak Republic, jozefina.semancikova@tuke.sk

Figure 1 shows the uptrend of general government debt to GDP ratio in most countries even before emerging the crisis. Specifically, countries like Greece and Ireland broke the threshold of 110 % before 2000. These values were increasing to the level of 179 % and 143 % in 2013, in order. However, according to Panico (2010) data before the crisis showed that Ireland, Greece and Spain had the highest economic growth rates in the Eurozone countries. They were even higher than in leading economies like Germany or France.



Source: OECD

Trade deficits of Greece, Spain and Portugal and the deficit to GDP ratio of Greece, Spain, Portugal, Italy and France had been increasing approaching the crisis. Comparing the year 1998 i.e. before the euro in non-cash transactions with 2007, it is striking that Spain, France, Italy and Portugal worsened their external positions considerably. Gibson, Hall and Tavlas (2012) argued that Greece experienced the significant decrease in its interest rates after entering the Eurozone in 2001. The change was made after emerging the economic crisis at the end of 2009 when interest rates increased rapidly, and 10-year government bond yields increased enormously to around 12 % at the end of 2010. The Greek economy suffered from increasing unsustainable fiscal and external imbalances accompanied by worsening its competitive position in comparison to other countries. Moreover, the procyclical character of the fiscal policy was led mostly by expenditures that represented more than 50 % of GDP. That acted as the main driver of shocks in the Greek economy. According to Katsimi and Moutos (2010), the Greek government relied predominantly on tax revenues with the growth by 8 % from 1993 to 2000 while leaving the level of government expenditures unchanged. Indirect taxes represented the high proportion of tax revenues that were less visible to the Greek citizens. Gibson, Hall and Tavlas (2012) argued that the global economic crisis had only a small impact on Greece at the first stage. The change was made, as mentioned above, in October 2009 when the newly elected government declared the level of fiscal deficit of about 12.7 % of GDP. That value represented more than double what the previous government

had forecasted. Moreover, the Dubai world demanded from creditors the 6-months debt moratorium. For that reason, these events initiated the debt crisis that deepened into large financial interventions taking place not only in Greece but also in Ireland, Portugal, etc. According to Panico (2010), the driver of the current Greece position was the lax policy of the European organs and the view of so-called "faulty management". That means that Greece respected the 3 % fiscal rule of The Stability and Growth Pact only in 2006. The Greek financial problems were so severe in May 2010 that the country needed to be rescued from "outside". Gómez-Puig and Sosvilla-Rivero (2012) justified the decision on providing financial assistance partly due to increased fear of the crisis contagion whereas most countries were largely exposed to Greece². However, it was largely due to the fact that investors were paying more attention to macroeconomic and fiscal imbalances in the European Monetary Union that were highly ignored until this time. Despite the enormous effort of the European organs to prevent the crisis from contagion, the crisis started to spread to other countries since the beginning of May 2010. The main pieces of evidence were increasing government CDS spreads of the Eurozone countries, and government bond spread yields comparing to German's. German bonds had been named as the safe haven since 2009, and we could be witnesses of the progressive euro depreciation to other currencies. According to De Grauwe and Ji (2012), the severity of the debt crisis is accompanied by the main characteristic of the monetary union. This aspect is reflected in issuing the currency over which their members have no control. These countries give up the autonomous right of monetary policy by entering the monetary union. Therefore, countries' governments can't provide guarantees to their creditors that their cash will always be available on asking on the financial instruments' maturity date. The authors argued literally that the liquidity is vanishing. In particular, that is the reason for the monetary union vulnerability. In the case that investors have some problems with their repayment, usually, they start selling their government bonds resulting in double effects. The first effect means increasing interest rates and the liquidity outflow whereas investors search for safer investments. The second effect represents the government's impossibility of financing their debts, only under the condition of excessive interest rates. These events can lead to the liquidity crisis that can be easily transformed into the solvency crisis and in the end into the recession. That results in decreasing of government revenues and increasing deficits and debt level. The combination of high-interest rates and increased debt level contribute to the government default. Pisani-Ferry (2013) has a similar opinion on the previous point of view. The financial integration within Europe that is supposed to be considered as the biggest success of the monetary union was one of the main drivers of the crisis contagion. Moreover, Calice, Chen and Williams (2013) pointed to the basic risk mechanism in every country i.e. giving up the right of inflation and therefore depreciation of its currency that belongs to the main drivers of the Eurozone debt crisis. Based on that, countries could totally default by repaying their government debts.

According to the previous theoretical clarification of this field of interest, as my contribution I am providing the overview of empirical studies in the second part of this article. The authors deal with this topic differently by using various methods. The third part concludes.

 $^{^2}$ Gatkowski and Kalbaska (2012) reported in their study based on the data from BIS that PIIGS countries held debts by each other in 2011. However, banking systems of EU leading economies such as France, Germany and UK were exposed the most. Based on the debts composition in European banks, the authors claimed that problems that originally started in Greece could be easily spread to other peripheral countries and to the core countries of EU too.

2 Empirical Approaches

Studies of many academics have been devoted to the topic of the European debt crisis that originated in the autumn of 2009. These empirical studies are not unified, and there are studies dealing with the causes of the debt crisis in the field of monetary policy, fiscal policy, banking sector, etc. Based on the different views of authors on the causes of the debt crisis, I provide the overview of empirical studies dealing with this issue in the next section.

The study of De Grauwe and Ji (2013) is based on the fragility hypothesis. According to the mentioned authors, the essential part of the increase in spreads of the Eurozone peripheral economies during the period between 2010 and 2011 was the negative self-fulfilling market sentiment mainly at the end of 2010. Investors started to worry about the worsening economic situation in Europe after years of ignoring the high level of government debts and its GDP ratio. Therefore, investors reacted by increasing spreads. Based on the fragility hypothesis mentioned before, authors found out that the government bond market in the Eurozone is more sensitive and susceptible to countries' liquidity problems. Authors applied the linear regression model with four variables namely variables of the government debt sustainability, the current account position, the real effective exchange rate and the economic growth rate. One of the conclusions was the positive relationship between spreads and government debt to GDP ratio that was magnified mostly after 2008. The previous one reflects the fact that the increasing value of this ratio results in increased values of government bond spreads. Moreover, authors added the explanatory power analysis into their empirical analysis with the conclusion that more than half of the total variability spreads are due to time dummies and the other part due to fundamentals. Increases in spreads in the case of Greece are explained mostly by worsened fundamentals i.e. 60 % while time dummies explain less than 40 %. The major difference between Spain and Greece is mainly that the differences in Spain are because of distrust and in case of Greece because of worsening fundamentals accompanied by distrust. These findings confirm the initial hypothesis of authors that financial markets in the Eurozone are less tolerant to high government debts to GDP ratios than in the case of stand-alone countries. The study of Attinasi, Checherita and Nickel (2009) partly agrees with the previous findings. The authors considered that the main reasons for increasing government debts development in the European financial markets were mostly the international risk aversion and worsening fiscal fundamentals since the second half of July 2007. A detailed view on the causes of widening spreads offers the study of Croci Angelini, Farina and Valentini (2015). The authors argue that these results in the case of the peripheral countries are explained by worsening fiscal fundamentals, worsening competitiveness, market sentiment and the Global variable that is the evidence of contagion emerging in the Eurozone. This variable is more significant and therefore considerably limited to the peripheral economies mostly after 2007.

Stein (2011) dealt with the underlying differences in the clarification of the debt crisis causes in each peripheral country in the Eurozone. He pointed out that the debt crises in Ireland and Spain were mostly produced by the private sector running up debt, especially in the reality market. However, the structural budget deficits were lower in these countries than in the rest of the Eurozone. On the contrary, main drivers in countries like Greece and Portugal were the cyclical adjusted structural deficits while their structural balances were in average two times higher than in other Eurozone countries. The study of Figueiredo, Figueiredo and Soares (2014) agrees with the previous findings. The study of Gómez-Puig and Sosvilla-Rivero (2014) is devoted to the

examination of the causes of the economic crisis contagion into a debt crisis in the Eurozone. The authors applied the dynamic approach with the analysis of the Granger causality level. They examined the EMU government bond spreads development and significant contagion determinants. The conclusions confirm that this contagion was caused mainly by shifts in the local and regional market sentiment. Moreover, they stressed that the absence of global market sentiment reflects the fact that the EMU acted like the united system. Contagion through Europe was also examined by the authors Arghyrou and Kontonikas (2012). They came to the conclusion that the vast majority of EMU countries experienced the contagion from Greece, especially countries like Portugal, Ireland and Spain. This study is based on the fundamental principle that is the disguise of currency crisis for the EMU debt crisis caused by a systemic risk. That is because of the absence of currency markets that is diverted into the government bond market³. The authors pointed to the existence of the trade convergence hypothesis in the pre-crisis period when investors bought the peripheral countries' bonds to gain the convergence with the German bonds. This fact reflects the already mentioned finding that the spreads before the crisis weren't associated with macro fundamental variables. Moreover, the study included an analysis that pointed to the positive relationship of Greek spreads and the growth rate slowdown. The main findings of repeated analysis using CDS spreads⁴ are that the primary drivers of the EMU debt crisis are mostly the international risk, macro fundamentals and contagion. Therefore, the study denied the argument that leading causes were current trade speculations on the CDS markets. Beirne and Fratzscher (2013) analysed determinants of increasing government yield spreads, CDS spreads and possible contagion applying the standard panel model with country fixed effects. Their findings pointed to the presence of fundamental contagion during the period between 2008 and 2011 while in the pre-crisis period had fundamental variables only a minor impact on the crisis contagion to other countries. The previous sensitivity increase was proved mostly in the peripheral countries in Europe. Fundamental variables such as public debt to GDP ratio and real GDP growth started to have a significant impact on the increase of government vield spreads and CDS in PIIGS countries since 2008. On the other hand, these variables were found to be insignificant before the crisis. Furthermore, they found that even the regional shifts weren't as significant as fundamentals since 2008; they handled approximately 100-200 basis points in government yield spreads increase in PIIGS countries. The similar study of Grammatikos and Vermeulen (2012) is devoted to the contagion from the financial crisis to the European debt crisis based on the stock market indices. They applied the GARCH model for the period between 2007 and 2010. The authors found out the existence of strong dependence of European financial subjects on the Greek CDS spreads' changes after the Lehman Brothers collapse. Additionally, they pointed out the weak relationship in the case of non-financial subjects too. The contagion of the financial crisis into the EMU financial sector in early stages was mainly affected by expectations of European organs' decisions to protect vulnerable institutions and to isolate other institutions internally from a mortgage crisis. These expectations of EMU decisive actions weren't fulfilled which resulted in the severe contagion of the Greek debt crisis, mostly into financial institutions in the vast numbers of EMU countries.

³ We can see a similarity with the study of De Grauwe and Ji (2013).

⁴ According to Aizenman, Hutchison and Jinjarak (2013), CDS represent instruments that are mainly transacted in the over-the-counter (OTC) derivative markets. Spreads are the quarterly payments that must be paid by the buyer of CDS to the seller for the contingent claim in the case of a credit event, in this case non-payment (or forced restructuring) of sovereign debt.

The significant contribution to the topic of the debt crisis is the study of Reinhart and Rogoff (2010) who pointed out that banking crises precede or often accompany debt crises. Authors applied the historical approach of time series with the sophisticated analysis of 70 world economies. Public indebtedness increased enormously before a debt crisis mainly because of the probability of country default or restructuralization. Moreover, authors showed the high likelihood of secret debts containing public debt and private debt⁵ that exceed the level of published statistics. Such an increase of debt level precedes an increase of the probability rate of the governments' default. The current debt crisis can present the confirmation of this study. The study of De Bruyckere, Gerhardt, Schepens and Vander Vennet (2013) agrees partly with the previous findings. The authors examined a possible contagion among banks, on the one hand, and another hand among national economies, foreign economies and PIIGS economies based on the regression specification of factor model using CDS spreads data. Moreover, authors added variables causing contagion into their analysis with the conclusion that the contagion canals are mostly guarantees, collaterals and held assets. The significant finding is considerably higher contagion among banks and PIIGS economies with the strongest results in 2009. Similar but slightly weaker results were seen in 2010. These results corresponded to the existence of contagion among banks and national economies.

A similar study as the previous one is the study of Burietz and Ureche-Rangau (2013) where the authors examined the existence of the connection between the subprime crisis⁶ and the European debt crisis. Authors analysed impacts of introduced European governments' rescue packages on the long-term government debt costs after the subprime crisis based on GMM panel data approach. Their findings confirm the positive relationship between capital injections provided by governments to bank's recapitalization and government spreads leading to an increase of costs of public debts. Moreover, they pointed out two significant variables i.e. guarantees and stock market behaviour that contributed considerably to the rise of European costs of public debt. The previous findings of government interventions in Europe are also confirmed by authors like Acharya, Drechsler and Schnabl (2011), Van Riet (2010), etc. These authors stress only short-term effects of government interventions in a reduction of the banking system risk and CDS spreads.

Government interventions have a negative impact on government interest rates totally. Furthermore, empirical studies of De Santis (2012), Di Cesare, Grande, Manna and Taboga (2012), etc. concluded that government interventions in the Eurozone led to a higher market volatility and increased contagion risk. To the group of authors that has been trying to clarify possible connections leading to the debt crisis belongs the study of Gajewski (2014). The author examined the issue of monetary policy stress in EMU countries regarding the imbalances accumulation process applying the forward-looking Taylor-type monetary policy reaction function. According to Gajewski (2014), the peripheral economies were exposed to increased risks resulting from too low-interest rates that were the most significant ones in countries such as Greece, Ireland and Spain before 2009. Greece experienced the highest monetary policy stress since 2009. The conclusion of this study was mostly the finding that the primary driver of the EMU debt crisis was predominantly a lax fiscal policy of some economies together with a different implementation of the monetary policy. Also, the author stressed the missed forecasts

⁵ becoming public in case of buying debts by banks

⁶ the crisis of financial institutions

regarding interest rates in EMU that can be considered as one of the main reasons for low-interest rates under the monetary policy rule level.

Many academics in their studies highlighted the fact since the EU creation that the conventional monetary policy is inapplicable to all EU countries because EU nations are characterized by its heterogeneity. Crowley and Lee (2009) confirmed the previous statement applying the same approach as mentioned before. They concluded that ECB monetary policy was mostly suitable for the German economy together with countries that have similar economic environments like France, Austria or Belgium. Additionally, the significant finding was that countries like Greece and Spain together with Benelux countries joined the group of mostly endangered countries suffering from the costly loss of independent monetary policy.

Table 1 provides the chronological overview of selected empirical studies.

Author(s)	Author(s) Variables		Countries sample	Conclusions	
Attinasi, Checherita and Nickel (2009)	 a variable of country's announcement of bank rescue packages government expected fiscal position international risk aversion government bond market liquidity in the Eurozone 	• the FGLS estimator	• Eurozone	• main drivers of the widening spreads are the international risk aversion and fundamentals	
Reinhart and Rogoff (2010)	 dummy variable of banking and debt crisis financial crisis dummy for the global financial sector government debt to GDP ratio 	• VAR • OLS	• 70 world economies	 banking crises precede or accompany debt crises 	
Stein (2011)	 net external debt to GDP ratio real exchange rate 	• NA TREX model	• Eurozone	 the private sector in Spain and Ireland was the main cause of the debt crisis public sector in Greece and Portugal was the main cause of the debt crisis 	
Arghyrou and Kontonikas (2012)	 REER current account balance GDP VIX index bond market liquidity industrial production growth expected fiscal position 	 theoretical model by Arghyrou and Tsoukalas (2010) OLS-HAC 	• Eurozone	 the positive relation between Greek spreads and the economic growth slowdown the confirmation of contagion from Greece to other Eurozone countries main drivers of the debt crisis are the international risk, macro fundamentals and contagion 	
De Grauwe and Ji (2013)	• government debt/GDP • fiscal space • current account • REER	• OLS	• Eurozone • stand- alone countries	 a significant positive relation between the spreads and the debt to GDP ratio; financial markets in the 	

 Table 1 Overview of empirical studies

	• economic growth			Eurozone are less tolerant of high debt to GDP ratios	
Burietz and Ureche- Rangau (2013)	 capital injections central bank interventions guarantees returns of the representative stock market index 		• EU countries	• the introduction of the rescue packages has the negative impact on the level of government debt	
Beirne and Fratzscher (2013)	 the economic fundamentals regional price of sovereign risk crisis dummy variable of the value one after Sept. 2008 country-specific fixed effects 	 standard panel model with country fixed-effects OLS 	• 31 advanced and emerging economies	• rising development in spreads in PIIGS economies was caused by the higher sensitivity of financial markets to fundamental variables and deterioration of these fundamentals	
Gómez-Puig and Sosvilla- Rivero (2014)	 variables of local, regional and global market sentiment local and regional macro fundamentals variables of financial linkages 	 time-varying approach ordered logit model core countries peripheral countries 		• contagion within Eurozone caused mainly by local and regional market sentiment	
Gajewski (2014)	 equilibrium real interest rate actual rate of inflation target inflation rate output gap 	• Taylor-rule framework	• Eurozone	• lax fiscal policy and different monetary policy application were main causes of the debt crisis	
Croci Angelini, Farina and Valentini (2015) • VIX index as the market sentiment • average of expected debt to GDP ratio for a 2-year ahe period • REER • global variable indicated time-varying interdependence among spreads in Eurozone		• GVAR	 core countries peripheral countries 	• main drivers of widening spreads in peripheral economies are fundamentals together with deteriorating competitiveness, market sentiment and the global variable	

Source: Author's processing

3 Conclusion

The fundamental variables had only a minor impact on the origin of the debt crisis before the economic crisis. Significant variables that considerably contributed to the debt crisis since the economic crisis were mainly the market sentiment, especially local and regional, worsening values of fundamental variables namely government debt to GDP ratio and contagion. Moreover, the peripheral countries held their debts to one another that made the contagion easier. The valuable contribution to the debt crisis also had the international high risk, the lax fiscal and monetary policy of PIIGS countries or the long-term negative effects of introduced rescue packages to the level of government debt. The meaningful finding is also the connection between banking and debt crisis have their root in the basis of the monetary union too. The result is that countries lost their sovereignty and the possibility of inflating their currency. Since economies within the monetary union are characterized by the heterogeneity, the ECB decisions for member states aren't positive for all country. One of the differences in the results of analysed studies is

already mentioned using of various methods and approaches. Some authors examined the causes of the debt crisis based on the historical or dynamic approach, etc. We could see that authors applied different methods, i.e. ordinary least squares, VAR model or some less known methods (see above). Authors examined in their models the impact of various variables while also the results on the causes of the debt crisis are affected by the choice of variables. The critic would be probably the choice of analysed periods whereas most authors considered only short time. Therefore, there exists the probability of losing significant facts or results. Considering the previous fact, I would suggest widening the analysed period to the origin of EMU, whereas this topic wasn't thoroughly considered. As was already mentioned in studies of Reinhart and Rogoff (2010) or Crowley and Lee (2009), the causes of the debt crisis can be already recognized in the period of EMU origin or when meeting the euro convergence criteria.

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.

References

- ACHARYA, V., DRECHSLER, I. and SCHNABL, P. 2011. A pyrhic victory? Bank bailouts and sovereign credit risk. Cambridge: National Bureau of Economic Research.
- AIZENMAN, J., HUTCHISON, M. and JINJARAK, Y. 2013. What is the risk of European sovereign debt defaults? Fiscal space, CDS spreads and market pricing of risk. In: *Journal of International Money and Finance*. Vol. 34, pp. 37-59.
- ARGHYROU, M. G. and KONTONIKAS, A. 2012. The EMU sovereign-debt crisis: Fundamentals, expectations and contagion. In: *Journal of International Financial Markets*. Institutions and Money. Vol. 22, No. 4, pp. 658-677.
- ATTINASI, M.-G., CHECHERITA, C. and NICKEL, CH. 2009. What explains the surge in euro area sovereign spreads during the financial crisis of 2007-09?. Frankfurt am Main: European Central Bank.
- BEIRNE, J. and FRATZSCHER, M. 2013. The pricing of sovereign risk and contagion during the European sovereign debt crisis. In: *Journal of International Money and Finance*. Vol. 34, pp. 60-82.
- BURIETZ, A. and URECHE-RANGAU, L. 2013. One crisis, two crises... the subprime crisis and the European sovereign debt problems. In: *Economic Modelling*. Vol. 35, pp. 35-44.
- CALICE, G., CHEN, J. and WILLIAMS, J. 2013. Liquidity spillovers in sovereign bond and CDS markets: An analysis of the Eurozone sovereign debt crisis. In: *Journal of Economic Behavior and Organization*. Vol. 85, pp. 122-143.
- CROCI ANGELINI, E., FARINA, F. and VALENTINI, E. 2015. Contagion across Eurozone's sovereign spreads and the Core-Periphery divide. Macerata: University of Macerata.
- CROWLEY, P. M. and LEE, J. 2009. Evaluating the stresses from ECB monetary policy in the euro area. Helsinki: Bank of Finland.
- DE BRUYCKERE, V., GERHARDT, M., SCHEPENS, G. and VANDER VENNET, R. 2013. Bank/sovereign risk spillovers in the European debt crisis. In: *Journal of Banking and Finance*. Vol. 37, No. 12, pp. 4793-4809.

- DE GRAUWE, P., JI, Y. 2013. Self-fulfilling crises in the Eurozone: An empirical test. In: *Journal of International Money and Finance*. Vol. 34, pp. 15-36.
- DE SANTIS, R.A. 2012. The Euro area sovereign debt crisis: safe haven, credit rating agencies and the spread of the fever. Frankfurt am Main: European Central Bank.
- DI CESARE, A., GRANDE, G., MANNA, M. and TABOGA, M. 2012. Recent estimates of sovereign risk premia for euro-area countries. Rome: Banca d'Italia.
- FIGUEIREDO, A., FIGUEIREDO, F. and SOARES, C. 2014. Analysis of Public, Private and Financial Sectors in European Countries Through the Statis Methodology. Porto: FEP Economics and Management.
- GAJEWSKI, P. 2014. Monetary policy stress in EMU during the moderation and the global crisis. Lodz: University of Lodz.
- GĄTKOWSKI, M., KALBASKA, A. 2012. Eurozone sovereign contagion: Evidence from the CDS market (2005–2010). In: *Journal of Economic Behavior and Organization*. Vol. 83, No. 3, pp. 657-673.
- GIBSON, H. D., HALL, S. G. and TAVLAS, G. S. 2012. The Greek financial crisis: growing imbalances and sovereign spreads. In: *Journal of International Money and Finance*. Vol. 31, No. 3, pp. 498-516.
- GÓMEZ-PUIG, M. and SOSVILLA-RIVERO, S. 2014. *EMU sovereign debt market crisis: Fundamentals-based or pure contagion?*. Barcelona: Research Institute of Applied Economics.
- GRAMMATIKOS, T. and VERMEULEN, R. 2012. Transmission of the financial and sovereign debt crises to the EMU: Stock prices, CDS spreads and exchange rates. In: *Journal of International Money and Finance*. Vol. 31, No. 3, pp. 517-533.
- KATSIMI, M. and MOUTOS, T. 2010. EMU and the Greek crisis: The political-economy perspective. In: *European Journal of Political Economy*. Vol. 26, No. 4, pp. 568-576.
- PANICO, C. 2010. *The causes of the debt crisis in Europe and the role of regional integration*. Amherst: Political Economy Research Institute University of Massachusetts.
- PISANI-FERRY, J. 2013. The known unknowns and unknown unknowns of European Monetary Union. In: *Journal of International Money and Finance*. Vol. 34, pp. 6-14.
- REINHART, C. and ROGOFF, K. 2010. From Financial Crash to Debt Crisis. Cambridge: The National Bureau of Economic Research.
- STEIN, J. L. 2011. The Diversity of Debt Crises in Europe. In: *Cato Journal*. Vol. 31, No. 2, pp. 199-215.
- VAN RIET, A. 2010. Euro area fiscal policies and the crisis. Frankfurt am Main: European Central Bank.

Foreign Exchange Reserves Accumulation and their Impact on Macroeconomic Situation of the OPEC Countries

MARIANNA SINIČÁKOVÁ¹ - BARBORA FARKAŠOVSKÁ² – ANDREA TKÁČOVÁ³ ^{1,3}Technical University of Košice, Faculty of Economics Slovak Republic ²Holcim Business Services Slovak Republic

Abstract

Accumulation of foreign exchange reserves has been a significant phenomenon in last decades in several countries. The OPEC countries have been experiencing the same situation due to their oil industry and favourable oil price evolution for themmainly in the past. According to some authors foreign reserves accumulation should have positive impact on country credibility, inflow of investment, output, trade, etc. However, inflow of investment can lead to redundant exchange rate appreciation as well and consequently reduce competiveness of a country. Finally, outcome and other indicators will not be positively affected. Therefore, the aim of the paper is to evaluate impact of foreign reserves accumulation in the OPEC countries on their macroeconomic situation. The evaluation is realised through Granger causality testing. Results confirm positive impact of reserve hoarding on investment of three OPEC countries (Saudi Arabia, Algeria, and Venezuela). However positive impact on economic output has not been detected. This may reveal inefficiency of investments in these countries.

Key words: Foreign Exchange Reserves, Accumulation, the OPEC Countries, Granger Causality.

JEL Classification: F31, F41, F43

1 Introduction

Since the late 1990s a significant accumulation of foreign exchange reserves has been detected in several countries, mainly developing and emerging ones. The main motivation for such hoarding stems from currency crises in 1990s in Asia and South America. During these crises developing and emerging economies were restrained in liquid foreign assets and therefore did not have possibilities to curb capital flows (Corsetti et al., 1999). Consequently, several countries have decided to increase their reserves as a prevention against possible future crises. In addition, reserves accumulation helped to policymakers to avoid currency appreciation and thus ensure competitiveness of their country. Piling of reserves leads to depreciation of real exchange rate and economy is oriented more towards tradable sector which is rising.

Some authors (Fukuda and Kon, 2010) stress that foreign exchange reserve accumulation influence and modify the behavior of private agents. These changes may have different long-run macroeconomic consequences. In this paper we focus on the OPEC (Organization of the Petroleum

¹ doc. Ing. Marianna Siničáková, PhD., Němcovej 32, 040 01 Košice, Slovak Republic,

marianna.sinicakova@tuke.sk

² Ing. Barbora Farkašovská, Holcim Business Services, Košice, Slovak Republic, barbora.farkasovska@gmail.com

³ Ing. Andrea Tkáčová, PhD., Němcovej 32, 040 01 Košice, Slovak Republic, andrea.tkacova@tuke.sk

Exporting Countries) group consisting of 12 countries, i.e. Algeria, Angola, Ecuador, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirate, and Venezuela.



Figure 1 Foreign exchange reserves minus gold in US dollars excluding Saudi Arabia, 1966 – 2014 Source: International Monetary Fund (2015)



Figure 2 Foreign exchange reserves minus gold in US dollars including Saudi Arabia, 1966 - 2014 Source: International Monetary Fund (2015)

These countries as well as several other Latin American and South Asian economies have experienced enormous rise in reserves since the end of 1990s. Rising oil prices helped them to

increase pace of accumulation even more after year 2000. However, recent sharp decline in oil prices caused the opposite. These turbulences may have fatal impacts on macroeconomic stability of the OPEC countries which are concentrated almost exclusively on oil industry with very low rate of diversification. Comparatively dramatic evolution in foreign exchange reserves is captured in Figure 1. Saudi Arabia as the world number one oil producer and exporter has increased its reserves by far more than other OPEC countries (see Figure 2).

Our paper is organized as it follows. After short introduction explaining motivation of our paper, Chapter 2 provides theoretical background and short overview of relevant literature. Chapter 3 explains data and methodology applied in our research. Results are summarized and discussed in Chapter 4. Chapter 5 concludes our findings.

2 Theoretical Background and Relevant Literature

In general, foreign reserves creation can be explained by three basic incentives: precautionary, mercantilist, and transactional. Foreign exchange reserves composition is implied by: i) exchange rate regime of a country, if a currency is linked to a currency basket or to a particular currency; ii) currencies significantly applied in a trade or financial flows in especially developing countries; iii) market principle of neutrality and optimum asset allocation as it is recommended by the International Monetary Fund and European Central Bank (2006).

Phenomenon of foreign exchange reserves accumulation has attracted attention of several authors. Polterovich and Popov (2003) have proved on the large sample of many countries during several decades that total reserves aggregation contributes to economic growth, increases investment to gross domestic product ratio and encourages capital productivity: i) accumulation of reserves leads to devaluation of real exchange rate, in short-run this causes expansionary monetary policy effect. However, this policy may have long-run impacts, too, if devaluation is regular and unexpected, ii) accumulation of reserves increases credibility of the country and consequently it attracts more foreign direct investments. A more responsible country attracts more investment comparing to others with low reserves. Polterovich and Popov assume rise of social welfare as consequence of reserves piling. They confirm that countries with higher reserves have higher macroeconomic stability than other countries. In addition they conclude that total reserves accumulation policy may have positive impact on economic growth only if it is not linked to higher inflation, i.e. hoarding of reserves should be accompanied rather by sterilization than expansionary policy. These observations are true especially in developing or emerging countries. In advanced economies piling of reserves can be counterproductive. Undervaluation of exchange rate helps mainly to developing and emerging countries to encourage their international trade. In the case of advanced economies, it is believed that optimum international trade level had been already achieved (Mirdala et al., 2015).

Aizenman and Lee (2005) researched this situation from a mercantilist perspective. At the same time they considered a prevention aspect of reserves. Their findings confirmed that precautionary motives prevailed over mercantilist ones. Levy Yeyati (2006) underlined positive effects of reserves stocks, on the other hand Rodrik (2006) pointed out that the cost of foreign reserves accumulation may be important. Fukuda and Kon (2010) focused on long-run impacts of foreign reserves accumulation on macroeconomic variables in developing countries. They analyzed a simple open economy model. They assumed, unlike Rodrik, that foreign exchange reserves reduce

the cost of liquidity risk. Their results manifest that an increase in reserves raises external debt and shortens debt maturity. Yet, their study also proves that reserves' hoarding may lead to a decline in consumption, but can also enhance investment and economic growth as concluded previously by Polterovich and Popov.

According to Abiola and Adebayo (2013) it is important to divide foreign reserves into four types of portfolio: i) liquid portfolio, ii) long-run or investment portfolio, iii) immunization portfolio, and iv) the petroleum fund buffer portfolio or sovereign wealth fund. The last type of portfolio can be crucial for the OPEC countries.

3 Data and Methodology

3.1 Data

Crucial variables were total reserves minus gold comprising special drawing rights, reserves of the International Monetary Fund (IMF) members held by the IMF, and holdings of foreign exchange under the control of monetary authorities. Data are in current U.S. dollars. We have applied annual data from 2000 to 2013 for the OPEC countries apart from Iran as Iran's data have been rather missing since 1983 especially in the case of foreign exchange reserves.

In line with above mentioned theory we will test bilateral nexus between foreign exchange reserves (FER) measured as a percent to gross domestic product and several other relevant variables, i.e. output measured as an annual rate of change of gross domestic product (GDP), exchange rate (ER) expressed in terms of purchasing power parity, import as a % to GDP, export as a % to GDP, international trade (TRADE) as a % of GDP, total investment (INV) as a % of GDP, net inflow of foreign direct investment (FDI) as a % of GDP. In line with recommendations of Polterovich and Popov (2013), all variables are expressed to GDP.

3.2 Methodology

Granger causality testing will enable us to determine direction of causality between observed variables. Granger causality testing helps us to determinate if a given variable predicts evolution of another variable or if it is vice versa or if the relation is bidirectional. Series of several t-tests and F-tests verify hypothesis that X Granger causes $Y(X \rightarrow Y)$ and vice versa. Lagged values are considered, too as some variables may have impact on other variables with a certain delay.

Granger causality is based on regression:

$$y_{t} = a_{0} + \sum_{j=1}^{m} a_{j} + \sum_{j=1}^{m} a_{j} y_{t-j} + \sum_{j=1}^{m} \beta_{j} X_{t-j} + u_{t1}$$
(1)

It is autoregressive distributed lag model.

In case of all variables we will set two hypotheses. For instance, null hypothesis will suppose that gross domestic product does not Granger cause foreign exchange reserves (H0: GDP does not \rightarrow FER). On the contrary, alternative hypothesis will be based on assumption that gross domestic product Granger causes foreign exchange reserves (H1: GDP \rightarrow FER). And we will test opposite

direction, too, considering foreign exchange reserves as dependent and product as independent variable H0: FER does not \rightarrow GDP, H1: FER \rightarrow GDP).

Granger causality testing typically deals with lagged values of variables to take into account delayed impact of independent variable on dependent one. Number of lags is usually chosen according to Schwarz or Akaike information criterion. All analysed time series should be stationary.

4 Results and Discussion

Schwarz and Akaike information criteria identified t-1 as an important lag for our analysis. Statistically significant Granger causality has been confirmed only in the case of three countries, i.e. Saudi Arabia, Algeria, and Venezuela (see Table 1). In Saudi Arabia three variables (GDP, export and foreign direct investment) Granger cause creation of foreign exchange reserves. In Algeria four variables (exchange rate, export, trade and total investment) Granger cause reserves. In Venezuela exchange rate and foreign direct investment are decisive determinants of reserves. In other OPEC countries statistically significant results have not been observed. Foreign exchange reserves Granger cause total investment or foreign direct investment in these three countries. Bicausality has been found out between reserves and foreign direct investment in Venezuela.

Assumptions of Polterovich and Popov (2003) or Levy Yeyati (2006) were confirmed in the case of investments for Saudi Arabia, Algeria, and Venezuela. Hoarding of reserves led to higher inflow of investments in these countries (see also Figure 3), nevertheless it was without positive impact on GDP, exports or trade in general. These can be explained by less efficient transformation of investment to GDP, low capital productivity, volatility in oil prices, low diversification of these economies, low innovation potential (see Šoltés and Gavurová, 2014). Consequently, it seems that the OPEC countries cannot fully benefit from accumulation of reserves as other developing and emerging economics. Inflow of investment is encouraged by reserves in these countries but seems to be rather purposeless. It seems that inflow of investment does not contribute much to GDP creation. Income from investment is mainly transferred abroad, etc. See more for instance in research by Buleca and Andrejovská (2015).

Variables	Saudi	Algeria	Venezuela	Variables	Saudi	Algeria	Venezuela
	Arabia				Arabia		
$GDP \rightarrow FER$	5.531*	0.463	1.245	$FER \rightarrow GDP$	0.549	0.964	1.256
$\text{ER} \rightarrow \text{FER}$	1.368	7.149**	5.123**	$FER \rightarrow ER$	0.487	0.246	0.329
$IMPORT \rightarrow FER$	2.441	1.568	0.986	$FER \rightarrow IMPORT$	1.236	0.015	2.983
$EXPORT \to FER$	8.223**	7.586**	0.758	$FER \rightarrow EXPORT$	2.478	0.096	0.369
$TRADE \to FER$	0.023	8.549**	0.004	$FER \rightarrow TRADE$	2.580	0.140	0.025
$INV \rightarrow FER$	0.159	2.145	1.236	$FER \rightarrow INV$	9.349***	8.123***	4.896
$FDI \rightarrow FER$	5.444*	0.458	5.467*	$FER \rightarrow FDI$	3.041	3.254	10.269***

Table 1 Granger causality results between foreign exchange reserves and other indicators, 2000 - 2013

Note: *, **, *** statistical significance at 1, 5, 10 % level; Null hypothesis: X does not cause Y; FER - foreign exchange reserves, GDP - gross domestic product, ER - exchange rate, INV - total investment, FDI – foreign direct investment

Source: Own calculations



Figure 3 Relation between foreign direct investment and total reserves in the OPEC countries, average covering the period 2000 - 2013

Source: Own calculations based on World Bank data (2015)

Table 2 displays nexus between gross domestic product and total investment or foreign direct investment. Gross domestic product Granger causes total investment only in Venezuela. According to Granger test it does not have any impact on foreign direct investment in these countries. Neither total investment nor foreign direct investment significantly influence output in these countries. Therefore positive effects of reserve accumulation are questionable in those countries. Another question is whether these countries will be able to profit from these reserves in the future. At the end of 2014 world reserves were denominated mainly in US dollars (over 62 %) and in euros (over 22%). Is it efficient to hold reserves mainly in US dollars in case of further depreciation of dollar?

			8				
Variables	Saudi	Algeria	Venezuela	Variables	Saudi	Algeria	Venezuela
	Arabia				Arabia		
$GDP \rightarrow INV$	0.938	1.278	5.215*	$INV \rightarrow GDP$	0.369	0.233	2.478
$GDP \rightarrow FDI$	0.547	1.775	3.041	$FDI \rightarrow GDP$	1.587	2.066	0.014

Table 2 Granger causality results between gross domestic product and investment, 2000 - 2013

Note: *, **, *** statistical significance at 1, 5, 10 % level; Null hypothesis: X does not cause Y; GDP - gross domestic product, INV - total investment, FDI – foreign direct investment Source: Own calculations

The OPEC's reserves mainly come from oil trade. It is estimated that the OPEC countries create 40% of world oil production and they possess 81% of known world oil stocks (OPEC, 2015). Nevertheless, according to Polterovich and Popov, accumulation of reserves contributes to economic growth mainly in long-run horizon therefore it is possible that the OPEC countries need just more time when this positive effect occurs.

In Saudi Arabia export has strong impact on reserves hoarding. 90% of export profits are created by oil industry. Inflow of foreign direct investment to Saudi Arabia was after 2000 implied also by changes in Saudi legislation encouraging foreign investors (guarantees against nationalisation,
lower income tax rates for foreign investors, etc.). Saudi Arabia is the world most important oil producer and exporter. Saudi Arabia has a crucial role in oil price stabilisation. However, this procedure is very expensive. Budget deficit in 2015 should be over 38 billion of USD which is Saudi highest deficit ever. However, Saudi reserves are over 750 billion USD and the country is ready to use them in oil battle to maintain its leader's position (Vardi, 2015).

Algerian reserves have risen abruptly after 2000 reflecting rising oil prices. While in 2000 foreign exchange reserves were at the level of 12 billion USD, in 2007 it was already 99.3 billion USD with rising tendency in the following years. Thus foreign debt was eliminated. Oil industry represents approximately 93% of export profits. Algerian reserves accumulation is implied also by Algerian exchange rate. Most of export prices are denominated in dollars, while most of import prices are determined in euros. Mutual exchange rates between dollar and euro influence significantly situation in the country. Since 2005, Algeria has applied legislative changes as well in favour of foreign investors. Consequently access of foreign investor in Algerian oil market has been much easier since then (OPEC, 2015).

Venezuelan export profits are by more than 90% generated via oil industry. Nondemocratic situation and only partial market economy in Venezuela mean obstacles for foreign investments in the country. On the other hand, Chinese investors have not been discouraged yet by this specific situation. In 2009, Venezuela became the most important Chinese target in Latin America. China has invested several milliards in Venezuela and Venezuela has significantly increased its oil exports to China. Consequently, Venezuela has risen its reserves. However, this one-side orientation of Venezuelan economy to China and to oil industry makes the country more vulnerable and fragile.

5 Conclusion

Accumulation of foreign exchange reserves implied rise in total as well as foreign direct investments in three OPEC countries, i.e. Saudi Arabia, Algeria, and Venezuela. In Venezuela bicausality has been observed. However, impact of reserves hoarding on gross domestic product has not been detected in these countries unlike assumption of several authors. This can be explained by fact that investment inflows are encouraged to these countries thanks to reserves piling and important changes in legislation but at the same time these investments do not seem to be very efficient. These investments do not contribute sufficiently to output creation, capital productivity is in these countries lower and eventual profits are rather transferred to other countries. Nevertheless, according to Polterovich and Popov, accumulation of reserves contributes to economic growth mainly in long-run horizon therefore it is possible that the OPEC countries need just more time when this positive effect occurs. However, rational management of foreign exchange reserves is needed in all countries which is even more crucial in the OPEC countries because of their one-side orientation to oil industry.

Acknowledgements

The paper was written within the project VEGA 1/0892/13 and 1/0994/15.

References

- ABIOLA, A. G. and ADEBAYO, F. O. 2013. Channeling The Nigeria's Foreign Exchange Reserves into Alternative Investment Outlets: A Critical Analysis. Abuja. In: *International Journal of Economics and Financial Issues*. Vol. 3, No. 4, pp.813-826.
- AIZENMAN, J. and LEE. J. 2008. Financial versus Monetary Mercantilism: Long-run View of Large International Reserves Hoarding. *The World Economy*. Vol. 31, No. 5, pp. 593–611.
- BULECA, J. and ANDREJOVSKÁ, A. 2015. Regresná analýza faktorov vplývajúcich na objem investícií v krajinách V4. Acta Oeconomica Universitatis Selye. Vol. 4, No. 1, pp. 23-33.
- CORSETTI, G., PESENTI, P. and ROUBINI, N. 1999. What Caused the Asian Currency and Financial Crisis? *Japan and the World Economy*. No. 11, pp. 305-373.
- ECB, European Central Bank. 2006. The accumulation of foreign reserves. In: *Occasional Paper*, No. 43 (February).
- FILARDO, A.J. and SIKLOS, P.L. 2015. Prolonged reserves accumulation, credit booms, asset prices and monetary policy in Asia. *Bank for International Settlement*, No. 500, pp. 1-30.
- FUKUDA, S. and KON, Y. 2010. Macroeconomic Impacts of Foreign Exchange Reserve Accumulation: Theory and International Evidence. In: *ADBI Working Paper 197. Tokyo: Asian Development Bank Institute*, pp. 1-23.
- IMF. 2015. Data Template on International Reserves and Foreign Currency Liquidity.
- LEVY YEYATI, E. 2006. *The Cost of Reserves, 2006.* World Bank Working Paper No. 585. Washington, DC: World Bank.
- MIRDALA, R., SVRČEKOVÁ, A. and SEMANČÍKOVÁ, J. 2015. On the Relationship between Financial Integration, Financial Liberalization and Macroeconomic Volatility. In: *Journal of Applied Economic Sciences*. Vol. 10, No. 4, pp. 552-570.
- OPEC. 2015. Annual Statistical Bulletin. Pp. 1-120.
- POLTEROVICH, V. and POPOV, V. 2003. Accumulation of Foreign Exchange Reserves and Long Term Growth. In: *Moscow: New Economic School. MPRA Paper*. No. 20069.
- RODRICK, D. 2006. The Social Cost of Foreign Exchange Reserves. In: International Economic Journal. Vol. 20, No. 3, pp. 253-266.
- ŠOLTÉS, V. and GAVUROVÁ, B. 2014. Innovation policy as the main accelerator of increasing the competitiveness of small and medium-sized enterprises in Slovakia. In: *Procedia Economics and Finance: Emerging Markets Queries in Finance and Business* : 24-27 October 2013, Tîrgu Mureş, Romania. - Netherland : Elsevier, pp. 1478-1485.
- VARDI, N. 2015. Saudi Arabia's \$750 Billion Bet Drives Brent Oil Below \$54. In: *Forbes*. No. 1/05.
- WORLD BANK DATA. 2015. World Bank Development Indicators.

Perception of the Process of Succession by Employees of Polish Family Businesses

MONIKA SIPA¹ - MAŁGORZATA SMOLAREK² ¹Czestochowa University of Technology, Faculty of Management, Poland ²Humanitas University, Faculty of Administration and Management, Poland

Abstract

Family businesses are regarded as the oldest form of conducting business activity and constitute the foundation for economic development. They are characterised with a relatively high mortality rate, and continuity of their functioning and development is connected with proper succession. The paper outlines the specific way family businesses function as well as problems that appear in connection with the necessity of generational changes. The issues addressed in the paper have been related to the territory of Poland, as in the next years these problems will concern most family businesses that were set up at the beginning of the transformation of the Polish economy, i.e. in the 1990s. The paper includes findings of a survey conducted in the second half of 2014. The aim of the paper is to present the perception of generational changes (succession) by employees of family businesses, in particular their concerns and hopes connected with these changes.

Key words: Family Businesses, Generational Changes, Succession, Successor

JEL Classification: L21, L26, M10, M21

1 Introduction

Family businesses are characterised with a number of specific features, which on the one hand help them to achieve market success, while on the other hand - may constitute a significant barrier to their development. Family businesses are a source of employment for family members, and their owner-manager is usually heavily involved in every-day operation of the company. They function in accordance with accepted rules and principles of both the ethical and moral attitude of family members involved in the business, and the functioning of the company on the market. For most of such entities, the value system they adopted is the source of their market success (Lemańska-Majdzik and Sipa). Family businesses are often the only place of work for the whole family, constituting thereby the only source of their income. Such a situation increases motivation of family members involved in the activity of a given entity for greater commitment to the development of the company.

Generational change is a natural process in entities of this type, but their founders often postpone it or it takes too long for them to notice it. The process of succession is a complex one, and the current owner and potential successors (children) do not always perceive it in the same way. However, it is necessary that both the successor and senior are prepared for it. Almost 60% of Polish family businesses consider handing over the business to the next generation, but only every

¹ Ph.D., Monika Sipa, ul. Dabrowskiego 69, 42-201 Czestochowa, Poland, monikasipa@gmail.com

² Ph.D., Małgorzata Smolarek, ul. Kilińskiego 43, 41-200 Sosnowiec, Poland, msmolarek@poczta.fm

third family business has a succession plan - this refers mainly to middle-sized entities, employing from 50 to 249 people. Around 13% of entrepreneurs-owners do not intend to initiate succession processes, as they regard themselves to be too young and plan to work well into old age. Their lack of interest in succession is mainly due to their young age, little knowledge of the organisational and legal aspects of the processes of succession, and psychological considerations (Kowalewska, 2009).

Family businesses include small, medium-sized and large entities that create jobs. Thus, problems arising from generational changes affect not only to the owner of a company and their family, but also to people employed in such an organisation. Succession conducted in an inappropriate way may lead to collapse of a family business, and consequently loss of jobs.

The paper outlines issues connected with generational changes in family businesses. The authors notice that in the coming years succession with refer to most companies that were set up in the period of economic changes in postcommunist countries, including Poland. The aim of the paper is to theoretically and empirically present the issues of generational changes in Polish family businesses, with particular reference to the perspective of employees. The paper includes a summary of the results of a study on how employees of family businesses perceive generational changes, in particular their concerns and hopes connected with this process. The study was conducted using the method of a diagnostic survey and a questionnaire technique. During the study, qualitative data was received.

2 Succession of family businesses - some theoretical remarks

Academic literature shows numerous attempts to define the concept of a family business. Unfortunately, a commonly accepted definition has not been provided to this day. Lack of a clear definition leads to various criteria used in literature to distinguish family businesses. They usually include: family structure of the ownership of the entity, strategic control exercised by a family, family members' participation in management or involvement of more than one generation of a family in the functioning of the company (Handler, 1989).

Generational change is one of the most important processes in family businesses, which determines the long-term perspective of functioning of an enterprise of this type (Mathews and Blumentritt, 2015). It should be implemented gradually to maintain continuity of the functioning of the company, as any interruptions may be harmful to relations, built for many years, between the environment of the company and its founder. Owners of family businesses are often unaware of the necessity to ensure continuity of their businesses. Due to their problems with every-day operations, they often cannot or do not want to start preparations early enough for the change of ownership and management of their enterprise. Due to the pressure of current problems and decisions connected with every-day functioning of the company, the issue of succession is usually overlooked and postponed. Often, the owners of family businesses are unaware of how important it is for the further functioning of the company to early solve the issue of succession (Duh, 2012).

The prospect of a business handed over from generation to generation is perceived as an advantage of family businesses over non-family ones. Given "the average age" of family businesses, a generational change takes place every 25 years (Cristiano, 2014). Each generation brings new business experience, both into the company and the family, with the level of experience gained in

the process of succession being the highest during the transition from the first to the second generation. This is, among other things, due to the fact that the first generation introduces a lot of new principles of functioning, whereas the second and successive generations of the owners bring proportionally less (Astrachan, Klein and Smyrnios, 2012).

The process of succession is however not a simple one, especially as far as the first generational change is concerned. Succession is a complex process and it requires that both the successor and the senior are prepared for it. Unsuccessful succession is usually the result of: weak bonds and conflicts in the family, inappropriate power and ownership structure and problems in organisational communication. Concerns about generational changes appear both among the owners, usually the founders of enterprises, and among potential successors, i.e. children of the owners. Enterprises show a very varied degree of readiness to hand over their powers and accept the visions of the successors. Thus, succession-related tensions are caused, among other things, by the owners' fear of relinquishing power, which may result from their concerns about losing control over the company and underestimating the skills of the successors. In the case of children of the owners, there is a noticeable pressure arising from the necessity to choose the way of life, which may involve taking over the company in the future. This conflict is particularly significant when the potential successor has different plans for life or hasn't got appropriate competences (Lis, 2011). This, a particularly important element in the processes of succession is effective communication. All family members have to know and understand the basic principles which will control the processes of management and succession of the ownership of the company. They also have to understand the expectations of other members of their families. They also need information to take informed decisions. Due to the fact that expectations change over time, it is also necessary for family members to constantly communicate, providing each other with current information about the evolution of their expectations. Ensuring appropriate communication to solve the issue of succession is the most important step in the process of family succession and depends directly on the skills and readiness of family members to communicate (Walsh, 2011).

As studies show, it is estimated that 5%-15% of family businesses in EU countries will survive until the third generation, and almost 1/3 will have new owners. Similar figures are provided by Family Firm Institute (www.ffi.org): only 30% of family businesses will survive until the second generation, and only 10% - until the third one (Walsh, 2011). In Italy, less than 1/3 of such entities will survive until the second generation, and only 15% will successfully complete the process of succession. A similar situation is observed in Greece and Ireland: only 30% of family businesses in these countries will survive until the second generation. Within the nearest years, the problem of succession may be one of the most important elements of risk to business continuity of many enterprises (Cristiano, 2014). In Poland, as A. Lewandowska stresses, the owners of family businesses are still at the stage of planning, but they often do not think about activities connected with the process of succession. A. Blikle stresses, however, that in the near future the problem of generational change will affect over 340 thousand Polish enterprises, and in the case of 70% of them, this process may fail, as a significant number of entrepreneurs are not aware of the complexity of this process and start to think about it too late, which may lead to the collapse of a family business.

In view of the above, the process of planning generational changes is regarded as the most important issue in conducting family businesses, and thereby securing their material and intangible heritage. Thus, one of the most important factors ensuring successful succession is early planning and preparation of this process. Planning and selecting the successor should be a long-term process, that starts much earlier than the owners of companies think. Experts stress that the process of succession should last from 3 to 5 years.

While preparing for generational changes, the first thing to do is to find out the answers to the following questions: who inherits? when? and how? It is especially difficult to find a successor who would be at the same time interested in joining the family business and able and capable of managing the enterprise, since it affects include the level of risk among others in decision-making processes in this area (Gorzeń-Mitka, 2013). The population of potential successors is usually quite small and familiar due to deep personal relations, which entails emotionality of judgement (Rose and Grand, 2013). The successor should be patient, understand organisational culture and notice the needs of the founder of the company (Zahrani, Nikmaram and Latifi, 2014). Succession requires that the successor is appropriately prepared - through work in the company or other enterprise. Thus, the key factor of an effective succession is knowledge, as succession involves transferring power, knowledge and ownership. In the case of generational changes, we have on the one hand long experience (relations with employees, customers, suppliers or managers; accepted principles of marketing and solving various working problems) of the leaving entrepreneur, while on the other hand there is the successor with innovative ideas, acquired education, and sometimes professional experience, gained e.g. in different companies. In this case, the system of knowledge management should develop in such a way to enable formalisation and transfer of this knowledge (Cristiano, 2014). This process is however more difficult when the founder of the company has a strong personality, exercises autocratic power and does not delegate powers (Wiecek-Janka, 2002).

Generational changes can be organised in different ways. E. Cristiano indicates several factors determining how succession proceeds. He pays attention, among other things, to: complexity of the business activity, whether it is one type of activity (mono-business) or more (multi-business); size of the company; and impact of environmental and organisational factors. In a mono-business enterprise, the owner-founder focuses on his vision and is not open to innovations, especially if the enterprise records positive financial flows (Okreglicka, 2015). Generational changes can thus constitute a sort of innovation, and the successor can contribute to the improvement or weakening of the company's activity, but it depends to a large extent on the attitude of the entrepreneur. In entities with a varied profile of activity, where different tasks are performed with regard to strategic areas of their activity, the process of generational changes is quite complicated. Another significant factor is the size of the company. If the number of available posts is the same as the number of candidates for successors, then it is easier to implement succession changes, maintaining continuity and appropriate relations between the members. The situation becomes complicated when the owner has more successors than posts. Of importance are also environmental and organisational factors. We should remember that entrepreneurs and their successor function in and cooperate with a certain environment. The effectiveness of the process of succession is also determined by the location of the business. An economically, culturally and socially developed environment facilitates the sense of participation and unity, which makes generational changes easier. With the development of enterprises, the organisational structure also evolves, changing from a simple to a more formal and complex one. Such changes make the situation of future successors easier, as contrary to their predecessors they can focus on tasks connected exclusively with managing the enterprise. We also should not forget about the organisational culture, which successors should "nurture", introducing small and frequent changes. Sipa M. (2015) stresses that employees of a family business assess the atmosphere at work more favourably and notice greater impact of the

organisational culture in their company on loyalty and commitment to the implementation of the objectives. Another important problem is the family/business relation in such entities. It involves very close relationships, and managing the development of the family and the relationships between the company and the family is a very sensitive issue (Cristiano, 2014).

As far as Polish family businesses are concerned, 55% of future successors are involved in the work in the companies whose owners they are supposed to become, but not always on an employment contract basis (Kowalewska, 2009). A question arises: is it sufficient to work for the enterprise without being acquainted with the tasks connected with the process of management to become prepared for taking over the responsibilities? Parents often declare that it is very important for them that their daughter/son works in their company, but then they don't listen to, ignore or disregard their children's opinions, ideas or initiatives. Young people, who often have high qualifications, the so-called fresh knowledge and good skills in computer technology, try to introduce changes, which are met with caution and resistance on the part of the older generation, often causing conflict. Both parties want the same (the good and development of the company), but they rarely have an effective dialogue (Klimek, 2014). When planning the process of succession, one should not forget about the Nestor, who should define their place in the company or outside it. The process of succession ends with transferring power to the successor (Cristiano, 2014).

Thus, a very important element of planning succession is critical assessment of the potential successor, their skills. It is the founder of the company who decides, based on the objectives and values of the company, whether the successor has to be somebody from the family. However, making the choice, they should take into account the costs connected with the loss of knowledge that has been gathered in the company for years. This knowledge is the larger, the longer the enterprise has been functioning on the market (Cristiano, 2014). Own children are the first choice of Polish entrepreneurs running family businesses when considering their successors, however "females have a smaller chance, whereas the first-born sons have the biggest one". When choosing the successor of the company, professional qualifications and competences are more important in the case of women than men. (sukcesja.org.pl; polskieradio.pl)

Lack of an appropriate successor after the owner's retirement means that the company will lose its character of a family business or will be wound up. Unfortunately, often the life cycle of a family business coincides with the life of the entrepreneur, which means that when he/she retires or dies, the continuity of the business is interrupted or the business fails. A solution to this problem can be handing over the control over the company to people outside the family who have appropriate managerial skills, but this is a rare case. An entrepreneur may also consider sale of the business, treating the money received from the sale as their financial security, or definitely break ties with the enterprise, after introducing the company to the next stage of its development. The family members would become members of the board of directors, and management of the company would be given to external managers (Lis, 2011).

We should also remember that generational changes don't have to be planned processes. Changes of this type may also be connected with unexpected events. In such situations, it is necessary to quickly take over the responsibilities. Few Polish family businesses are prepared for events of this type (Kowalewska, 2009).

3 Generational changes in Polish enterprises - findings of the authors' own research

3.1 Methodology

The findings presented below represent a fragment of a broader research aimed at obtaining information about the knowledge of procedures, the development and implementation of the company's strategy and assessment of potential generational changes within the managerial staff of companies.

The study was conducted in November 2014 using the method of a diagnostic survey and the technique of a questionnaire. The questionnaire survey included open, semi-open and closed dichotomic questions, as well as a cafeteria and imprint. Non-probability sampling was used. 114 correctly filled in questionnaires were returned, of which data from 72 questionnaires was accepted for further analysis. The condition that had to be fulfilled to qualify for further analysis was employment in a family business³. The research sample N=72 were students of part-time studies, I and II degree in the field of Management. An important premise for the sampling was the fact that the respondents were employed, belonged to different working age groups and had some professional experience and knowledge about the functioning of the enterprises in which they were employed. The survey was anonymous, and participation in it was voluntary.

The aim of the survey was to assess how generational changes (succession) are perceived by employees of family businesses, especially in the context of the effect of this process on human resources in the company. The respondents assessed the degree of significance of generational changes on a scale from -5 to +5, i.e. assigning points from -5 to -1 indicates employees' concerns, whereas giving points from 1 to 5 - their hopes connected with the process of succession. Employees could also chose "0", indicating lack of any feelings in a given area. The survey also took into account differences between answers showing employees' feelings (hopes/concerns) connected with the generational change in the company depending on whether the company in which they were employed had developed a strategy for managing human resources. The analysis was conducted using the Mann-Whitney U test. Test probability p<0.05 was accepted as significant, whereas test probability p<0.01 was accepted as highly significant. The analysis of the results was conducted by means of the statistical application PQStat ver. 1.6.

3.2 Results

Characterisation of the respondents shows that most of them work in family businesses from the SME sector (86.1%), while the rest are employees of large companies employing 250 or more people. Employees of micro-entities prevail in this group, accounting for 38.7%. 32.3% of respondents are employed in small companies (10-49 employees), whereas 29.0% - in medium-sized ones. 1/3 of respondents are employees of family businesses in which children of the owners are employed, 63.9% work with other family members of the owner, whereas 2.8% indicated both. As far as the period of employment is concerned, 55.6% of respondents had been working relatively short, no longer than 2 years, in the organisations that were employing them when the survey was conducted. Those working 6-7 years accounted for 8.3%, whereas respondents working longer than 8 years but shorter than 10 years constituted only 5.6%. Retail and services are the main areas of

³ It has been accepted that a family business is one in which a child of the owner, or at least one other member of the family works.

activity conducted by family businesses in which the respondents work (38.9%). 16.7% indicated trade, 13.9% - production, and 8.3% - production and services as the area of activity.

The analysis of data shows that in 55.56% of companies constituting the place of employment of respondents, there has not been any succession yet. 30.6% of respondents indicated that the participation of the successor in the operation of the company was visible. In the case of the entities in which a generational change has already taken place, 30.56% of respondents notice that decision are taken independently by the successor, whereas 13.89% stress that decisions are still taken together by the new and previous owner. Over 60% of those surveyed indicated that children and other family members employed in the companies actively participate in managing the company. However, this refers to over 83% of children and 52% of the other family members (Table 1).

	Children of the owner	The other family members
active participation in managing the company	83.3%	52.2%
no participation in managing the company	16.7%	47.8%
	100.0%	100.0%

 Table 1 Participation of family members in managing the enterprise

Source: Own study

Succession is a process that has an impact on numerous areas of functioning of companies, including human resources. The survey shows that 52.8% of those surveyed are interested in generational changes in the enterprises in which they are employed. The survey took into account such elements as: *previous employment, change of the employment terms, radical organisational changes, continuity of the policy, changes to the objectives being implemented, flow of information, communication with the new manager, lack of experience of new successors and lack of knowledge of the employees.* All results for the above-mentioned elements have been presented in Table 2.

	Standard deviation	Minimum	Lower quartile	Upper quartile	Maximum
previous employment	2.46	-5	-2.25	0.25	5
continuity of the policy	1.81	-4	0.00	1.00	4
change of the employment terms	2.11	-4	-1.00	1.25	5
changes to the objectives being implemented	2.08	-5	0.00	1.25	5
information flow	2.45	-5	0.00	1.25	5
lack of experience of the new successors	2.29	-4	-2.00	0.00	5
lack of knowledge of the employees	2.12	-5	-0.25	0.00	5
communication with the new manager	2.01	-5	-0.25	0.00	5
radical organisational changes	2.24	-5	0.00	0.50	5

 Table 2 Employees' feelings connected with the succession in the company

Source: Own study

Generational changes are regarded by employees rather as a process that can bring positive changes for them. Analysing the level of concern or hope regarding succession, it should be noted that 49.4% of all the answers indicate a neutral level with regard to the selected elements of the functioning of the company (they were assigned "0"). The most neutral responses (58.3) were

received by element "changes to the objectives being implemented", which can mean that employees do not see any changes in this area that could have a negative or positive impact on their work.

The highest average result was received by the element "changes to the objectives being implemented" - 0.67 with a standard deviation of 2.08 and with a quartile range from 0 to 1.25. The lowest average result was received by the element "lack of experience of new successors". It was -0.44 with a standard deviation of 2.29. The quartile range was from -2 to 0. With most of the elements, the full scale of scores was covered, from "-5" to "+5". Only in the case of: "continuity of the policy" - the full range of the distribution of scores was from -4 to 4; and "change of the employment terms" and "lack of experience of new successors" - the full range of the distribution of scores was from -4 to 5. The distribution median for each of them is 0. The weighted average scores concerning feelings for the selected elements are presented in Figure 1.



Source: Own study

The analysis also took into account the variation in the answers about employees' feelings regarding generational changes in the selected areas and the possession of a strategy for managing human resources by a company in which they are employed (see Table3).

	Strategy for managing human	Average	Standard deviation	Minimum	Lower quartile	Median	Upper auartile	Maximum	Mann- Whitney U test
previous employment	no	0.50	3.02	-4	-2	0.0	3	5	Z=1.44
previous employment	yes	-0.65	2.15	-5	-3	0.0	0	4	p=0.1485
continuity of the policy	no	0.50	1.73	-2	0	0.0	1	4	Z=0.37
continuity of the policy	yes	0.15	1.85	-4	0	0.0	1	4	p=0.7077
change of the employment terms	no	1.20	2.63	-3	-1	0.5	3	5	Z=1.52
	yes	0.00	1.79	-4	-1	0.0	1	3	p=0.1289
changes to the objectives being	no	1.90	2.13	0	0	1.0	4	5	Z=2.92 p=0.0035
implemented	yes	0.19	1.88	-5	0	0.0	0	4	
information flow	no	1.00	2.60	-2	0	0.0	4	5	Z=0.02
information now	yes	0.38	2.39	-5	0	0.0	1	5	p=0.9841
lask of amarian as of navy successory	no	-0.70	3.18	-4	-3	-2.0	0	5	Z=1.62
lack of experience of new successors	yes	-0.35	1.88	-4	-1	0.0	0	5	p=0.1053
lack of knowledge the employees	no	-0.50	1.54	-4	-1	0.0	0	2	Z=1.33
	yes	0.23	2.28	-5	0	0.0	1	5	p=0.1839
communication with the new manager	no	0.40	1.90	-2	-1	0.0	1	5	Z=0.32
	yes	0.08	2.06	-5	0	0.0	0	5	p=0.7486
notical argonizational charges	no	1.30	2.00	-1	0	0.0	3	5	Z=2.15
radical organisational changes	yes	0.00	2.24	-5	-1	0.0	0	5	p=0.0318

Table 3 Employees' assessment of changes in the context of generational changes and possession of a strategy for managing human resources (differences between answers)

Source: Own study

Significant differences were observed only in the areas: *changes to the objectives being implemented* and *radical organisational changes*. The scale results for *changes to the objectives being implemented* differ in a highly significant way (p=0.0035), and for *radical organisational changes* they do so significantly (p=0.0318) depending on whether there is a strategy for managing human resources in the respondents' place of employment. This means that higher results in the assessment of scale are characteristic of entities that do not possess such a strategy. In the case of the other scales, no significant differences were found out (p>0.05).

4 Conclusion

Succession in family businesses constitutes a critical point in their life cycle due to, among other things, the emotional character of this process. Various statistics indicate limited survival rates of family businesses due to difficulties connected with succession. Generational changes will be increasingly significant also in Poland due to expected retirement of a large number of the owners of family businesses.

The survey shows that employees do not have high concerns about the changes that may occur in their organisations as a result of the succession. In most areas, they see hope rather than negative consequences in these changes. Their greatest hopes are connected with changes to the objectives being implemented by the company and the *flow of information*. Positive assessments also prevail in the areas of potential occurrence of radical organisational changes, continuity of the policy, changes of the employment terms, communication with the new manager or the new manager's lack of knowledge of the company's employees. Concerns refer to changes in the current employment and the successors' lack of experience. We can also notice that employees of

companies that do not have a strategy for managing human resources perceive succession as possibility for changing the objectives implemented so far by the company and a chance for radical organisational changes in their company.

References

- ASTRACHAN J.H., KLEIN S.B. and SMYRNIOS K.X. 2002. The F-PEC Scale of Family Influence: A Proposal for Solving the Family Business Definition Problem, In: *Family Business Review*. Vol. XV, No. 1, Family Firm Institute, Inc, pp. 45-58.
- CRISTIANO E. 2014. Analysis of The Critical Aspects of The Generational Turnover in Family SMEs, In: *Global Conference on Business and Finance Proceedings*. Vol. 9, No. 2, pp. 237-246.
- DUH M. 2012. Family Businesses: The Extensiveness of Succession Problems and Possible Solutions, In: Entrepreneurship Gender, Geographies and Social Context, Prof. Thierry Burger-Helmchen (Ed.), InTech, Rijeka.
- GORZEŃ-MITKA I. 2013. Risk Management as Challenge to Today's Enterprises. In: *Problems* of Management in the 21st Century. Vol. 7, pp. 4-5.
- HANDLER W. 1989. Methodological issues and considerations in studying family businesses, In: *Family Business Review*. No 2, pp. 257–276.
- KLIMEK J. 2014. W rodzinnej firmie. Powstanie, rozwój, zagrożenia i szanse, Wydawnictwo Menedżerskie PTM, Warszawa.
- KOWALEWSKA A. (red.). 2009. Badanie firm rodzinnych. Raport końcowy, Sygnatura: p/789/8/2008, Projekt współfinansowany przez Unię Europejską w ramach Europejskiego Funduszu Społecznego, Warszawa, grudzień 2009r.
- LEMAŃSKA-MAJDZIK A. and SIPA M. 2014. Determinants of building competitive positions of Family Enterprises case study. In: *Journal of Intercultural Management*. Vol. 6, No. 3, pp. 111-121.
- LIS D. 2011. Rozwój firm rodzinnych w Polsce In: Firmy rodzinne determinanty funkcjonowania i rozwoju. Współczesne aspekty zarządzania, Przedsiębiorczość i zarządzanie. Tom XII, Zeszyt 6, Ł. Sułkowski (ed.), Wydawnictwo Społecznej Akademii Nauk, Łódź, pp. 56-57, ISSN 1733-2486.
- MATHEWS T., BLUMENTRITT T. 2015. A sequential choice model of family business succession, In: *Small Business Economics*. June 2015, Vol. 45, No. 1, pp 15-37.
- OKRĘGLICKA, M., 2015. Innowacyjność a zarządzanie finansami bieżącymi małych i średnich przedsiębiorstw w Polsce. *Przedsiębiorczość i Zarządzanie*. Vol. 16, No 2, pp. 267-283.
- POLSKIE RADIO. 2015. Available online: http://www.polskieradio.pl/7/968/Artykul/854132, Firmy-rodzinne-%E2%80%93-czas-na-zmiane-wlascicieli>.
- ROSE S. and GRANT P. 2013. Succession issues plague some real-estate empires: Experts say families that control businesses often have difficulty divvying up power and money, In: *Wall Street Journal (Eastern Edition)*. September 2, A20.
- SIPA M. 2015. Postrzeganie kultury organizacji przez pracowników przedsiębiorstw rodzinnych i nierodzinnych wybrane aspekty in: Firmy rodzinne doświadczenia i perspektywy

zarządzania. In: Przedsiębiorczość i Zarządzania. Vol. XVI, No. 7 cz.III, Ł.Sułkowski, A.Marjański (ed.), Wydawnictwo Społecznej Akademii Nauk, Łódź, pp.105-120.

- SUKCESJA. 2014. Firmy rodzinne czas na zmianę właścicieli, [online]. Available online: <http://sukcesja.org.pl/metodologia/>.
- WALSH G. 2011. Family Business Succession. Managing the All-Important Family Component, KPMG LLP, Canada.
- WIĘCEK-JANKA E. 2002. Specyfika cyklu życia przedsiębiorstwa rodzinnego, In: Skawińska E. (red.), Zarządzanie przedsiębiorstwem, Wyd. Instytutu Inżynierii Zarządzania Politechniki Poznańskiej, Poznań.
- ZAHRANI M.A., NIKMARAM S. and LATIFI M. 2014. Impact of Family Business Characteristics on Succession Planning: A Case Study in Tehran Industrial Towns, In: *Iranian Journal of Management Studies (IJMS)*. Vol. 7, No. 2, pp. 229-243.

The Role of Business Corporations in the Globalization Process of New Economy

HANNA SOMMEER¹ Rzeszow University of Technology, Faculty of Management Poland

Abstract

The article is an attempt to analyse the impact of changes in the world economy on competitive strategies of transnational corporations and to identify the essence of the transformations that are taking place in connection with the corporate organizational systems. An important issue will be to identify the most important mechanisms of functioning of the world economy in conditions of global competition. The company's position is characterized by its sources of supply, distribution channels, customers, participation in joint ventures, strategic alliances, mergers, acquisitions or franchising. With the advance of globalization and the development of a knowledge-based economy, the traditional model of competition associated with factors such as cost and technology skills is no longer sufficient. In a rapidly changing environment companies are forced to implement new strategies based on innovation, flexible structures and social responsibility.

Key words: Globalization, Transnational Corporations, World Economy

JEL Classification: E00

1 Introduction

Events that occur in remote locations around the world reach us very quickly and have a huge impact on our lives. Thanks to the development of modern technology, we have the ability to instantly receive current information and events from around the world. We meet international products and companies on our market. It makes us aware of the importance and strength of various connections in the international environment. Our decisions are dictated by the actions of people, companies and institutions that are operating in the world.

Globalization is a complex phenomenon that occurs in the economic and social spheres. Many researchers believe that it is the most fundamental process of changes taking place in current world. Constantly changing, competitive environment is a challenge for managers of companies. It's impossible to speak about stability in this area, because the expectations of customers are still rising and the only constant thing is change.

Observing global trends, it can be established that innovative companies will have a higher importance, because of their activities based on original and creative decisions. Entrepreneurial activities, imagination and willingness to take the risk will be essential characteristics of decision-makers. Knowledge will be a leading strength of the institution.

¹ Hanna Soomeer, ul. Poznańska 1, 35–084 Rzeszów, Poland, hansom@prz.edu.pl

A characteristic feature of the modern world economy development is the growing importance of economic connections between the countries, regions and enterprises. The essence of globalization is to use the law of free market to increase the productivity of the global economy, and not just in selected countries. The globalization reflects the growing integration of the world economy. On the one hand it is the result of rapid development of technology, especially information and communication technologies, on the other hand it's because of the cooperation between countries in the framework of various international organizations.

It can be assumed that increasing globalization will mark the new century. Under its influence events or activities undertaken in remote locations will be able to influence the activities of entities in other places.

The evolving global economy has forced changes in its environment. The result of these changes is the integration of involved entities - countries and companies. Those economic organisms are increasing their reach and impact strength, which allows them to influence the environment. Transnational corporations are changing the rules of competition in the global economy. They define a new paradigm of competitiveness in the newly created global business space.

2 The essence of transnational corporations and their development in globalization

An important feature of contemporary socio-economic systems is the insecurity that affects people living on each continent. The cause of this insecurity is seen in the processes of globalization. The main beneficiaries of globalization are transnational corporations -TNCs (Gwiazda, 2000).

Transnational corporations are an integral part of globalization. Their influence on the structure of the global economy and occurring changes is still increasing. These companies are very differential regarding to size, reach, content, forms and methods of activity; they are also differently defined in the economic literature: transnational corporations, international-, multinational- or global corporations. The growing importance of TNCs in the world economy and its leading role in the process of internationalization of economic activity is an important force that is moving forward the process of globalization. An evidence for that can be their number or their enormous potential and expansiveness in the global economy.

Among the features that determine the activities of transnational corporations in the modern economy there should be distinguished (Zaorska, 2007):

- Sovereignty it concerns taking of strategic decisions, actions;
- Complexity it covers the issues of ownership, organization, control, space;
- Dispersion refers to the geographic dispersal, the issue of innovation and production and trade;
- Specialization selection of a product segment that will be offered then on the global market;
- The ability to arbitrate undertaking and conducting business activities on various markets;
- The ability to integrate creating of cooperation connections;
- Organizational flexibility coordination of actions on various markets, in various countries;

• Global efficiency - expressed, among other things, by taking surveys in different parts of the world or implementation of various projects concerning the production or sale of products.

Global business activity crosses the national borders and isn't tied to one home country. In global enterprises the markets of many countries are treated essentially as homogeneous, and all company's operations carried out in different countries are managed as one integrated system.

The global enterprise standardizes all its functions and operations around the world. Griffin and Pustay (Griffin an Pustay, 1996) say that the global company is one that treats the world as one big market.

It's impossible not to mention the concept of international new ventures, i.e. Born global. The characteristic of this type of company is that it sees the global market as a basis for its operations , while the domestic market is only the complement (Mathews and Zanders, 2007). Transnational corporations are the leading group of business entities in the global economy and in the process of internationalization of business activities. In the broadest sense, TNCs can be defined as firms which undertake production or business activities in many countries. In the narrower sense we can talk about companies that - thanks to foreign direct investment (FDI) - control or manage their branches in many countries outside their own (Dach, 2004). So not the ownership of resources, but the ability to organize, coordinate and integrate the activities of various entities to implement the strategy is now considered as a specific attribute of transnational corporations.

Functional integration means connection and coordination of activities of various organizational units (headquarters, subsidiaries, joint ventures or other strategic alliances related businesses), placed in many different countries. This approach emphasizes the organization, coordination and dominance of transnational corporations in networks. Globalization is a special case of internationalization of the company (Gorynia, 2007).

The evolving world economy forces the involved entities to make changes that allow them to adapt to the new environment and thus improve their capacity to act on resulting from globalization and liberalization space. The effects of these changes are the processes of integration of the involved entities (including both states and companies). Resulting in this way new economic organisms increase their reach, but also their impact. The type of impact and the sphere that they cover depends on the engagement of the entity in the global business space.

The genesis of transnational corporations should be associated with long-term processes connected to the development of trade. Technical progress and improvement of production methods favoured the development of economic activities on a large scale, which led to the promotion of foreign direct investment as an effective way to improve the competitive position (appearance of such economic powers as Unilever, Royal Dutch, Shell and Ericsson).

The first major companies engaged in business activities outside the home countries came from Europe and those were among others: German Bayer (1863.), Swiss Nestle (1867.), Belgian Solvay (1881), French Michelin (1893), British Lever Brothers (1890 - Unilever today) (Rosińska-Bukowska, 2009).

Corporation name	Home country	Assets in USD billion		Sale bil	Sale in USD billion		Foreign employment in total		
		foreign	In total	foreign	In total	foreign	In total		
General Electric Co	USA	502,612	717,242	77,480	147,300	170,000	301,000		
Royal Dutch Shell plc	Netherlands	296,449	345,257	282,673	470,171	75,000	90,000		
BP plc	Great Britain	263,577	293,068	308,437	386,463	68,005	83,433		
Exxon Mobil Corporation	USA	214,231	331,052	316,686	433,526	49,496	82,100		
Toyota Motor Corporation	Japan	214,117	372,566	142,888	235,200	123,655	325,905		
Total SA	France	211,314	228,036	197,480	256,732	61,067	96,104		
GDF Suez	France	194,422	296,650	82,731	126,040	110,554	218,873		
Vodafone Group Plc	Great Britain	171,941	186,176	65,448	74,089	75,476	83,862		
Enel SpA	Italy	153,665	236,037	66,817	110,528	36,656	75,360		
Telefonica SA	Spain	147,903	180,186	63,014	87,346	231,066	286,145		
Chevron Corporation	USA	139,816	209,474	139,344	236,286	31,000	61,000		
E.ON.AG	Germany	133,006	212,499	90,958	157,011	43,756	78,889		
Eni SpA	Italy	122,081	198,700	106,240	153,631	45,516	78,686		
ArcelorMittal	Luxembourg	117,023	121,880	93,679	93,973	197,149	260,523		
Nestle SA	Switzerland	116,130	121,257	92,166	94,191	318,301	328,000		
Volkswagen Group	Germany	115,081	221,486	173,390	221,486	277,105	501,956		
Siemens AG	Germany	112,356	141,750	87,418	102,488	244,000	360,000		
Ancheuser-Busch InBev NV	Belgium	106,336	112,427	34,944	39,046	108,446	116,278		
Honda Motor CoLtd.	Japan	105,151	143,196	78,134	100,594	109,400	179,060		
Deutsche Telekom AG	Germany	102,047	170,339	44,887	81,530	113,568	235,132		

Table 1 The largest in terms of foreign assets non-financial transnational corporations 2011

Source: World Investment Report 2012, UNCTAD, Annex table no. 28

The position of transnational corporations (TNCs) in the global economy is well illustrated by statistical data testifying to their economic power. And so just during an incomplete decade (2004-2010) their sales increased by over 50 % (from 19.4 to 30.0 billion US dollars), profits doubled (from 0.76 to 1.41 trillion US dollars), similar assets (from 68.1 to 124.0 billion USD). Other parameters characterizing their potential and impact on the world economy increased as well. The most important transnational corporations show as their native areas 62 countries of the

world, whereas in 2004 it was 51 countries. They employ over 76 millions of workers, their combined market value exceeds 30 billion USD (in 2010 it was 31.4 billion, and before the crisis it was 38.6 billion USD 2008) (Rosińska-Bukowska, 2009).

3 Impact of transnational corporations on modern economy

Currently it is thought that besides states, institutions and international organizations, transnational corporations have become a major and extremely active subject of globalization processes impacting heavily on the changes on-going in the global economy, but also an inspirer of new relation types with states.

The most important functions of transnational corporations on the global economy are: stimulating the economical growth and efficiency, increasing the economical competitiveness, stimulating reorganization with takeovers and mergers, activating local resources and competitiveness on the market, transmitting new methods and patterns, knowledge and technology, generating of work places, equalizing development levels of countries and/or regions, integrating enterprise and economical activity and influencing processes that go on in the global economy (Rymarczyk, 2010). The priority goal of TNCs is to achieve economical efficiency that guarantees profit maximization both in short and long term as well as seeking new expansion and innovation dimensions.

Being an active participant of international economic relationships transnational corporations with considerable potential of capital, production and technology influence substantially the development of relations within the global economy and change substantially the terms of competitiveness. Figures illustrating the scale of TNC activity indicate a gradual increase of their impact on global economy and cultivation of parts of the economical space that until now has been the domain of national economies.

TNCs substantially change the terms of competitiveness in global economy. The definition of competitiveness origins in Latin, where competere means to compete. In economy it concerns the process in which each market participant pursue their interests. Engaging the hard try of judging the TNC role and consequences to global economy one could venture separating three evaluation categories:

Positive consequences of TNC activity may be:

- capital inflow,
- inflow of modern technology,
- reviving local markets,
- improvement of work organization.

Negative consequences of TNC activity may be:

- enlargement of economical discrepancies,
- avoiding of tax payment,
- transferring the profits to countries of origin,
- spreading the activity costs on the workers,
- buying out firms to wind them up.

Disputable consequences of TNC activity may be:

- creating a global economy,
- equalizing of activity terms on global scale,
- dependence of national economies on foreign capital.

The final judgment of TNC activity should consider specific social-economic conditions of each country, region or city welcoming a corporation. Eventually the clashing of TNC with social-economic conditions of each country, region or city determines positive or negative consequences.

4 Meaning of on-going changes for the evaluation of ethics

Negative examples frighten off customers. That is why corporations started to change. Profit no longer was the only category to evaluate their actions. Shell took part in a campaign towards communities in which they work. Exxon Mobil launched a pro- ecological initiative that fights for endangered species. And though non-government organizations such as Corporate Watch (monitors the activity of firms) state, that a part of these actions only aims for "greenwashing" the firm, there have been first steps taken to amalgamate corporations that use i.e. ethical production methods or environmental standards throughout the world.

The leverage on firms are most severe in countries that can afford to boycott those who do not go along with ethical or environmental rules. At the same time the consumers in these countries have a bigger income at their disposal, so they are by far abler to influence the actions of corporations then poor societies. Products made by the strict rules of worker laws like coffee, cacao, ecological and products not tested on animals are a big runner – UNCTAD experts say. In the world of corporations, where the only category of success is profit, companies themselves start to leverage on ethic actions and their promotion. Companies see ethics as a source of advantage in the competition and also slowly realize the role they play in communities they are involved in. Actions for local communities start to be a regularity – this could be noticed during the UN summit in Johannesburg, where the world of business presented solid initiatives for underdeveloped countries. Organizations amalgamating social aware companies were also promoted.

An inseparable element of the dispute on corporations' social awareness is the reasons for their interest in this concept. The theory the realization of social awareness guidelines by corporation's origins in their actual believes and concerns about these matters is highly disputed. Even within positive evaluation of their actions, in this matter it is being stressed out that the change of their attitude towards social awareness programs is an effect of mainly external leverage, not internal initiative (Jarczewska-Romaniuk, 2004).

Currently ethical actions are no longer a luxury, but a necessity. One has to play by the clean rules or loses the market. It can be observed, that the consumer range of "dirty" products is shrinking. Transnational corporations will continue to gain power – UNCTAD experts say. Will this make the rule the world as anti-globalists predict? Rather not, though political influence of big enterprises are not to be disregarded. Huge companies are a stable element of the global economical landscape and this will not change. What may change however is their action manner. Corporations have never had such expansion possibilities, but also never have the

standards of their actions been tuned so strictly as today - at least in developed countries. In developing countries these standards are just being created.

What is new is the engagement of big companies in initiatives concerning social, environmental and human rights issues – in the eyes of protesting organizations still not big enough, but definitely bigger then in the early nineties. Moreover, there is a class of "political consumers" developing, who use services and buy goods only from those companies, which go along the code, i.e. concerning sustainable development. Many economists say it is them who will shape the map of influence of big companies in the upcoming decades.

5 Conclusion

The development of enterprises in the 21st century is in fact primarily aimed at increasing of entrepreneurial, innovation and competitiveness. The opportunity to develop these enterprises that will react to changes in the business environment, is based on the progress of science growing up in a world economy based on knowledge, methods and techniques that enable knowledge management. The decisive factor for today's enterprises is intellectual capital, which includes highly educated employees with the knowledge and skills of its use for designing modern systems for organization of production and services, as well as methods and management techniques for meeting the ever-increasing customer expectations (Hejduk, 2006).

Transnational corporations are a special type of entities of the world economy. Their specific results among others from, the availability of huge economic potential and relative financial, technological and organizational independence. Foreign Direct Investment allowed TNCs to become the drivers of change in the modern global economy. Capital flow is a phenomenon inseparably connected with modern economy, it's a key factor of corporate development. The importance of transnational corporations in the modern economy cannot be overstated. The most important functions which TNCs have in the global economy are: to transmit new methods and practices, knowledge and technologies, generating jobs, stimulating growth and economic efficiency, activating local resources and market competition or raising development level of the host countries. However, there is some risk resulting from the changing structure of the modern world and the participation of corporations in this process. Without the introduction of a new management system, the danger of global conflict in the 21st century can become reality. States and international organizations should realize that the processes of market globalization bring not only measurable benefits, but also involve the threat of a global nature.

TNCs are organizations whose strength lies primarily in the ability to integrate and coordinate large enterprise systems, including their own, and related contractual units located in several countries. By their very nature they are embodiment of international economic relations, because the fact of their creation and existence is associated with international capital flows. There are unusual entities and their role in the world economy continues to grow. Transnational corporations use in their business activity the differences in the geographical distribution of production factors and differences in the economic policies of individual countries. An example of such use is to differentiate levels of taxes and subsidies. Originally, the main motives to engage corporations in a country or region were natural resources and the resources of cheap labour. Today, the primary motives become less relevant to qualifications, research and manufacturing capacity and technologies. Such arguments explain the concentration of corporate

activities in highly developed countries. The investment location is currently determined by such factors as: the complementary skills, infrastructure or supplier's efficient and flexible use of modern technologies. Transnational corporations are ones of the most important entities that operate on a global scale. Despite the fact that the business activity in its assumption is economic, it goes far beyond that zone. Companies have different functions, from obvious economic or business functions, through political, to social ones.

It could be said that corporations rule the world. Power, reach and results of their impact have gone beyond the framework of traditional definitions of business a long time ago. Thanks to globalization, they grew even exorbitantly. Today big companies are taking part in law making, creating standards and building societies. At the global level we have about a thousand corporations whose economic importance is far greater than indicated by their financial results or the added value generated by them. Corporations have a structuring effect on the global economy. This happens both because of their size and standards and requirements that apply to their business partners. Corporations are therefore far more than just textbook businesses. Corporate activity begins to go beyond the economic sphere. So it's time for greater care for the environment. It is not about "corporate social responsibility ", which is now part of the game market, only about system solutions.

References

DACH, Z. 2004. Podstawy makroekonomii. Krakow: PTE.

- GORYNIA, M. 2007. Strategie zagranicznej ekspansji przedsiębiorstw. Warsaw: PWE.
- GRIFFIN, R. W. and PUSTAY, M. W. 1996. *International Business: a Managerial Perspective*. MA: Addison-Wesley, Reading.
- GWIAZDA, A. 2000. Globalizacja i regionalizacja gospodarki światowej. Toruń.
- HEJDUK, I. K. 2006. Główne uwarunkowania rozwoju nauk zarządzania w Polsce. In: *Ekonomika i Organizacja Przedsiębiorstwa*. No. 3.
- JARCZEWSKA-ROMANIUK, A. 2004. *Przedsiębiorstwa międzynarodowe*. Warsaw: Oficyna Wydawnicza Branta.
- MATHEWS, J. A. and ZANDER, I. 2007. The International Entrepreneurship Dynamics of Accelerated Internationalization. In: *Journal of International Business Studies*. Vol. 38.
- ROSIŃSKA-BUKOWSKA, M. 2009. Rola korporacji transnarodowych w procesach globalizacji. Kreowanie globalnej przestrzeni biznesowej. Toruń: Duet.
- RYMARCZYK J. 2010. Międzynarodowe stosunki gospodarcze. Warsaw: PWE.
- UNCTAD 2012. World Investment Report 2012 (Annex table no. 28).
- World Investment Report 2012, UNCTAD, Annex table 28.
- ZAORSKA, A. 2007. Korporacje transnarodowe, przemiany, oddziaływania, wyzwania. Warsaw: PWE.

Axionormative Aspect of Corporate Social Responsibility – Towards Practical Ethics

JUSTYNA STECKO¹ Rzeszow University of Technology, Faculty of Management Poland

Abstract

This publication aims to present briefly a definition and a history of CSR, as well as analyse values and norms that arise from those values and relate to fundamental relations among people, taking an aspect of corporate social responsibility into careful consideration. Morality is the strongest manifestation of the man's social nature, thus its character is the least conventional – it demonstrates certain imperatives of the communal life, which are common to people. The axionormative aspect of social responsibility displays two inseparable planes which refer to values. It is a set of qualities, comprised of values, its rules and relations among them, all of which create a specific axionormative order.

Key words: Corporate Social Responsibility, Morality

JEL Classification: M14

1 Introduction

Corporate social responsibility (CSR) is a concept that is not only popular, but also particularly relevant on a social and economic plane. The popularity of this notion is reflected, among other things, in the number of search-results displayed by Google search engine when one looks for "social responsibility of business" -200 million hits. The CSR itself, as well as its extent, as well as attempts to define it, raise considerable doubts.

Throughout the past several decades, contemporary companies have developed new methods of reacting to the expectations of both the immediate environment and employees. Social responsibility means mainly clear procedures for conduct and building relationships with stakeholders, which are based on values and mutual trust (Stecko, 2012). The ethical aspect of social responsibility allows for setting minimum ethical levels which apply to all those who are involved in their work for a company. Firstly, a brief historical outline of CSR will be provided, and subsequently, the ethical aspect of the subject in question will be analysed.

2 A history of CSR concept

An attempt to enforce codes and imperatives governing business activity and setting out the rules of conduct was made for the first time in the second half of the 20th century, however, the issues related to responsibility and justice have been attracting the interest of people for several thousand years. It was as early as in Babylonian times when the Code of Hammurabi was established by legislators imposing obligations on farm owners and builders to make them care about other people's interest. In antiquity, the principle of charity captured the attention of many

¹ Justyna Stecko, Ph.D., ul. Poznańska 1, 35–084 Rzeszów, Poland, jstecko@prz.edu.pl

philosophers. Household management was mentioned by Xenophon in "Economic", yet the philosophers who took responsibility into careful consideration were Plato and Aristotle. The first of them assigned economic matters to the main concept of good – he was against taking individual actions in economy and possessing private fortunes which should be allocated to the state. The other thinker distinguished the "art of management" from the condemned "art of getting money (property)". Another philosopher who perceived charity as a duty was Seneca the Younger, but apart from that, he was also the first one to point out that people – including slaves – were equal, and the main principle which applied to gaining and possessing wealth was ethical conduct (Budzanowska, 2011). According to Seneca, one of the essential duties of wealthy people was also charity.

However, the issues connected with social responsibility were included not only in texts written by famous philosophers, but they also appeared in religious writings. Ancient texts produced in Vedic period prohibited usury, similar concepts can be also found in many religions. Followers of the Koran are obliged, among other things, to give alms, also known as Zakat, which means that every Muslim has to give handouts to the poor, and even to prisoners and travellers. Also Christian thinkers, such as Saint Augustine or Thomas Aquinas, tackled the issues related to social responsibility. Saint Augustine believed that the pursuit of wealth was reprehensible, whereas the other saint tackled the problem of responsible management and demanded that human beings take the responsibility for their own actions. He also referred to the concept of just price, according to which full costs of producing it had to be recovered and which assumed equivalence in economic exchange.

Religious concepts are strongly correlated with an idea included in Corporate Social Responsibility and Business Ethics, which stresses the importance of two aspects that create social responsibility. One of them is mercy, which can be manifested through a situation when the affluent part of society takes care of a group of the poor, and the other one is mastery, which draws inspiration from Christian ideas and according to which rich people and entrepreneurs are delegated to be the guardians of wealth possessed by the rest of society (Frederick, Davis and Post, 1988). Therefore, the philanthropic activity conducted by John D. Rockefeller in the 19th century can be perceived as the basis for the contemporary concept of social responsibility, and one of the most famous texts by Andrew Carnegie - The Gospel of Wealth - is one of the first descriptions of the social responsibility phenomenon. We cannot also forget about the works of such theorists of management as: Chester Barnard (The Functions of the Executive 1938), Theodor Kreps (Measurement of the social performance of business 1940). Despite all those actions, the turbulent development of the modern CSR concept commenced only in the 1950s, when debate over social matters started. What deserves attention is a book by Bowen, published in 1953 and given a significant title - Social Responsibilities of the Businessman. Only one year later, the aspect of responsibility was discussed by Peter Drucker in his book: The Practice of Management. In the 1950s, the above discussion continued with the participation of: Eels Corporate Giving in a Free Society (1956), Heald Management's Responsibility to Society: The Growth of an Idea (1957) and Selekman Moral Philosophy for Management (1959). However, it was as late as in the 1970s when first attempts to formulate and adopt international codes of business activity were made, which resulted not only from the interest in privatisation, but also from trade restrictions. Also in that time, the first widely accepted definition of CSR was proposed, which – although presented later on, i.e. only in 1991 in the form of a pyramid – became one of the most popular views of the issue under consideration. The author of the pyramid, in which social responsibility is illustrated, Archie Carroll, noticed that the following four CSR planes are the most crucial: economic responsibility, legal responsibility, ethical responsibility, philanthropic responsibility. Interestingly enough, only at the end of the 1970s and the beginning of the 1980s, a concept of stakeholders by R. Edward Freeman, which is very popular nowadays, appeared. According to its definition, the term means every person or group that can exert influence on a particular organisation or which is influenced by this organisation (Freeman, 1984). The 1990s saw significant and dynamic changes with respect to the view of corporate social responsibility and social regulations connected with it. Not only the number of codes increased, which, however, failed to serve their intended function, but also self-awareness of stakeholders, variously understood, was on the increase. It was in the 1990s when numerous guidelines for companies were updated, yet one of the greatest undertakings, initiated by the Secretary-General of the United Nations, Kofi Annan, began several years later, i.e. in 2000, and it was the Global Compact initiative. The ten principles included therein changed the perception and importance of social responsibility.

Nevertheless, the most dynamic development of CSR began only in the 21st century. What is a contemporary definition of corporate social responsibility? In my opinion, it is worth mentioning at least two views. First of them refers to the definition of corporate social responsibility according to ISO 26000. It is the result of five years' work and negotiations among various entities worldwide, which were concluded in 2010 (ISO, 2015). Interestingly enough, ISO 26000 contains guidelines, and not requirements, and what is more, it is not a standard of management system, thus it cannot be a regulatory system, nor the basis for certification. According to ISO 26000, CSR is construed as "the responsibility of an organisation for the impacts of its decision and activities (products, services, processes) on society and the environment" (ISO, 2015). Yet the latest view on social responsibility is included in a communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, made on the 25th of October 2011, which implies "the responsibility of companies for their influence on society" (EC, 2011).

3 An axionormative aspect

The axionormative system is a functionally connected set of rules, norms and values which relate to all manifestations of social life, and which are typical of a particular culture (Sztompka, 2012). An axionormative aspect of social responsibility indicates two categories which are of key importance for the issue in question – these are values and norms. In the contemporary world, axionormative order is achieved mainly through defining ethical standards. They aim both to regulate the business behaviour of individuals and groups, and also to develop desired predispositions or ethical sensitivity. At the analytical level, it is difficult to determine precisely to which extent the institutionalisation of the social responsibility of a company is an activity that corresponds with the development of the ethical predisposition of company's management, or it is just a pragmatic action which is based on the approach according to which the category of social responsibility is regarded as an instrument or tool. Business ethics is the first step towards the implementation of CSR, and consequently, it seems that it is one of its foundations (Walkowiak and Krukowski, 2009).

Throughout the past two decades, contemporary companies have devised completely new methods of meeting the expectations of both their environment and employees. This is costly

and laborious reinterpretation of a company's situation in its environment. In the case when companies treat their responsible, sustainable and ethical programmes, which are built on a foundation of the concept of social behaviour and reputation, in terms of difficulties, considerable costs or dedication to community, powerful arguments of a social nature arise, which make it possible to consider such activity to be a socially rational process, even though it is based also on an approach according to which ethical values are treated as instruments.

The ethical aspect of social responsibility allows for setting minimum ethical levels which apply to all those who are involved in their work for a company. With respect to business activity, there are three completely different approaches to ethics-related issues. These approaches involve: unethical, aethical and ethical attitudes (Rybak, 2007). Unethical management represents the most radical approach referring to values and decisions that are taken in organisations and contrast with everything which is considered ethical. The main objectives of unethical management are completely unrelated to ethical norms of economic life, whereas legal norms are in this case a barrier which must be overcome in order to attain a defined objective very quickly. The characteristic feature of the aethical approach is profitability. This is the only value which is considered by business entities, and decisions are not judged ethically. As for this approach, attention is directed to those legal regulations which constitute an ethical guide to acting within the boundaries of legal practices. The ethical approach is one of the most desired methods of management. It entails complying with legal regulations and is perceived as the basis for ethical behaviour. Profitability is not a high priority, because what remains of the utmost importance is activity that aims to improve economic conditions while adhering to ethical rules and norms (Caroll, 1987).

4 Procedures that boost ethical actions in companies

More and more frequently, companies lay down codes of ethics, which are drawn up to meet the needs of a particular company. It is often a systematised set of moral norms and rules, which creates order of values, used to specify the rules of employee's behaviour towards himor herself and towards other people, groups or the whole society. It constitutes an ethical declaration of management, a company, which imposes an obligation on people related to a company to respect specific rules concerning accepted values and principles (Poganowska, 2004). Apart from ethical codes, there are also codes of conduct. Their aim is to collect procedures of conduct, which specify how employees should carry out their assignments. Less popular form involves legal compliance codes or codes of good practice. Nowadays, it is more and more common to combine documents which standardise ethical issues and rules of behaviour to form a whole that covers the conduct of employees towards each other, customers, suppliers, as well as other stakeholders which are crucial for an organisation. Those documents encompass issues connected with standards of work, confidentiality of work, environmental protection, rules of fair trade, corruption and consumer protection. When it is clearly specified, what is approved by an organisation and what is not, an employee and people connected with a company are able to take decisions on their own. They have a strong feeling that a lot depends on them and consequently, they feel responsible for their own actions. However, a code of ethics itself does not guarantee that employees will observe rules contained in it. Such document will form a relevant source of rules and values and will be observed by every staff member to whom it is addressed only when it is created in cooperation with employees and with their approval. A common mistake is that international

companies establish one ethical code and enforce it in all branch offices, failing to consider all cultural and social differences. The value which most business entities point to is fairness. Apart from it, importance is also attached to respect, diligence, trust and responsibility. Researches reveal that in the process of setting out ethical rules values which are important for both an individual and the whole organisation are considered. Therefore, such characteristics as safety of information, quality, reputation, customer satisfaction and competitiveness are of crucial importance (Rudnicka, 2012).

An ethical audit is a unique form of an audit, which allows for analysing issues connected with an ethical dimension of the business operation of organisations. Carrying out such audits enables the top management to obtain information about employees' values, conduct and behaviour at every single organisational level. An ethical audit makes it possible to verify whether a devised ethical programme of an organisation reflects real needs of staff, and to verify that it has been conducted according to arrangements made before (Gasparski, 2012).

Ethical procedures, as well as other types of procedures, make it possible to indicate a method of conducting an activity or a process, yet the difference is that the greatest emphasis is laid on an ethical sphere. Their role is important for processes related to human resources management, such as recruitment, adjustment to work in a new environment, planning of promotion or development and assessment of employees. We cannot forget about procedures that prevent discrimination and counteract nepotism or harassment. Such procedures should provide, for example, precise explanation as to how employees should be assessed or how people should be employed for work. The reason for that is to rule out or reduce the possibility of taking into consideration such factors as special favour or family connections. Ethical procedures should be accompanied by a whistleblowing policy. It is an instrument that facilitates the management of an ethical dimension of company's or organisation's operation. This term is understood as informing - by former or current employees - about unethical, illegal or unauthorised activities conducted by other members of an organisation, which can affect its performance. The intention of such communication is to be cognizant of the aspects which – according to a person who reports – are unethical or illegal. Everyone who works in an organisation where a whistleblowing policy has been implemented should be guaranteed that the level of confidentiality is optimal, which enables such person to inform about an incident he or she has noticed. Whistleblowing is a complex phenomenon, which combines cultural, social and cognitive processes. The policy which is designated to inform about activities considered to be ethically dubious is a manifestation of the maturity of an organisation and demonstrates the importance of activities which are performed.

Carrying on responsible business is undoubtedly connected with ethics, thus trainings in the area under consideration, organised in companies, represent yet another instrument that improve an ethical atmosphere inside and outside companies. Depending on what is needed, the goals of such trainings may differ with regard to issues covered by it or with respect to the level of difficulty. They usually provide an explanation about main issues related to unethical and illegal behaviour and give a clear definition of acceptable and desired conduct in an organisation. Another problem tackled during such trainings involves, for example, the improvement of ethical motivation through instilling specific moral values. These meetings, similarly to other educational courses, make it possible to identify certain problems, to familiarise attendees with them, and consequently enable people to deal with such situations in a more efficient way if they occur in real life (Rudnicka, 2012). More and more frequently, companies appoint special teams which deal with ethics and issues related with it. Primary tasks of such teams involve, among other things, monitoring the observance of applicable rules and organising ethical trainings. In some cases, instead of an ethics team, companies employ one individual who performs a function of an ethical officer. Teams are very often formed to resolve a specific ethical problem that is not permanently connected to an organisational structure (Rudnicka, 2012).

5 Conclusion

Values which are encompassed in the CSR definition, such as: fairness and good relationships with stakeholders, care of external environment, recognising needs of local communities, responsibility for one's own decisions – can be the key to build an organisational culture. Nowadays, companies provide information about their own social responsibility and values which they hold in their mission. If CSR has to become the foundation for creating a new identity of an organisation, assurances and declarations are not enough. Employees should become convinced that any ideas propagated by an organisation are really put into practice. Creating a code of ethics together can be perceived as an example of such activity. Also, compiling reports together constitutes an effective method of centring around the values of CSR. It requires gathering information that come from many departments of an organisation, which creates favourable conditions for discussions about corporate social responsibility and makes devising plans for the future easier. Communication, both inside and outside a company, is also of great importance. Owing to it, a company is able to create its positive image of a "good citizen" and a positive employer (CSR, 2015).

Norms that are created as a result of an adopted system of values define boundaries of acceptable behaviour. They reduce a risk of unethical situations, as they define right and wrong in a clear manner. Organisations that highlight their own values and display them through their behaviour on a daily basis not only have better PR, but also greater opportunities to motivate employees. Conclusion should contain evaluation and exact description of achieved results provide a confrontation of the achieved results with previously published papers, author's opinion of established differences, his/her attitude to the results. Also indicate advantages, limitations, and possible applications.

References

- BUDZANOWSKA, D. 2011. Seneka Młodszy o bogactwie, In: Kultura Media Teologia. No. 6.
- CAROLL, A. B. 1987. In Search of Moral Manager. In: Business Horizons. No. 2. pp. 7-8.

CSR.PL, 2015. Available online: http://csr.pl/article/206/>.

- EUROPEAN COMMISSION 2011. Odnowiona strategia UE na lata 2011-2014 dotycząca społecznej odpowiedzialności przedsiębiorstw. Available online: http://eurlex.europa.eu/LexUriServ.do?uri=COM:2011:0681:FIN:PL:PDF.
- FREDERICK, C., DAVIS, K. and POST, J. E. 1988. Corporate Social Responsibility and Business Ethics. New York: McGraw-Hill Publishing Company.
- FREEMAN, R. E. *Strategic Management: A Stakeholders approach*. Boston: Pitman Publishing Company.

- GASPARSKI, W. 2012. *Biznes, etyka, odpowiedzialność*. Warsaw: Wydawnictwa Profesjonalne PWN. pp. 29-31.
- ISO 2015. *ISO 26000 Social responsibility*. Available online: <http://www.iso.org/iso/home/ standards/iso26000.htm>.
- POGANOWSKA, B. 2004. Elementy etyki gospodarki rynkowej. Warsaw: PWE.
- RUDNICKA, B. 2012. CSR- doskonalenie relacji społecznych w firmie. Warsaw: Wolters Kluwer business. pp. 164-166.
- RYBAK, M. 2007. Etyka menedżera społeczna odpowiedzialność przedsiębiorstwa. Warsaw: PWN.
- STECKO, J. Trust vs. corporate social responsibility. In: *Zarządzanie i Marketing*. Vol. 19, No. 2, pp. 153-161.
- SZTOMPKA, P. 2012. Socjologia, Analiza społeczeństwa. Krakow: Socjologia, Analiza społeczeństwa. pp. 315.
- WALKOWIAK, R. and KRUKOWSKI, K. 2009. 2 *Społeczna odpowiedzialność organizacji od odpowiedzialności do elastycznych form pracy*. Wspieranie i Promocja Przedsiębiorczości na Warmii i Mazurach.

Aviation Safety Investment Assessment Utilizing Return on Investment and Bayesian Networks

STANISLAV SZABO¹ – PETER VITTEK² – ANDREJ LALIŠ³ – VERONIKA ČERVENÁ⁴ Czech Technical University in Prague, Faculty of Transportation Sciences Czech Republic

Abstract

Safety is one of the utmost importance in aviation, often globally and regionally emphasized. However, as the market became very competitive over the past years, safety is struggling to retain its ultimate importance from the perspective of aviation corporations and organizations. These are frequently under significant economic pressures and on safety being rather compliant with regulation than proactively concerned with it. This paper describes financial aspects and motivation issues of aviation organizations to allocate resources to safety management. Return on Investment and Bayesian Networks serve as the basic tools for assessing investments. Particular case study for missed approach scenario and simplified deliberation of costs typically involved in aviation safety-related occurrences are included. Results of the analysis are to motivate the corporations to take into consideration that thoroughly-targeted safety investments are not just expenses. Such investments do generate revenue, which may not be visible at a glance. The way how to calculate the estimated revenue of these investments is demonstrated as well.

Key words: Return on Investment, Bayesian Networks, Safety Management, Aviation

JEL Classification: C13, G31, O31

1 Introduction

Safety first – that is the typical highlighted statement anywhere in the aviation industry. It is one of the reasons why aviation is perceived by society as one of the safest means of transport, despite regular, media attractive but rare accidents. On the other hand, majority of aviation organizations are facing difficult market competition today; market deregulation, low-cost air carries, fuel prices and other factors all contribute to the competition and force organizations to be more flexible and cost-efficient (Wittmer, 2011). Consequently, economic issues are overtaking safety more often than not and safety is then limited to what the aviation authorities require by law. Regulators are capable of not allowing the organizations to cross the red line, but on the flip side, as far as an effective and efficient safety management is concerned, forcing the organizations to achieve safety culture within an organization (Hudson, 2001), spend all efforts needed to achieve this state and base all the safety management on that culture. But that would require numerous investments and substantial change of thinking of the personnel, what may be very difficult to achieve without extra motivation. And the motivation is the core issue to be resolved to date.

¹ doc. Ing. Stanislav Szabo, Ph.D., MBA, Horská 3,128 03 Praha 2, Czech Republic, szabo@fd.cvut.cz

² Ing. Peter Vittek, Horská 3, 128 03 Praha 2, Czech Republic, vittek@fd.cvut.cz

³ Ing. Andrej Lališ, Horská 3, 128 03 Praha 2, Czech Republic, lalisand@fd.cvut.cz

⁴ Bc. Veronika Červená, Horská 3,128 03 Praha 2, Czech Republic, cerveve2@fd.cvut.cz

As a starting point, at least investment into some of the proactive activities towards achieving the safety culture should be considered. For Air Navigation Service Providers this became part of the EU legislation within safety performance targets set up to the year 2019 (Commission Implementing Decision (EU) 2015/348), but for other aviation organization there are no such requirements. Yet at this point we encounter problem already known as protection vs. production dilemma (Reason, 1997), depicted on Figure 1.



Organizations are trying to stay in the so called 'safety space', maintaining healthy ratio between production and safety management expenses in order to not to allow either bankruptcy or significant accident that would seriously impact their position on the market. However, they are naturally more motivated to raise production and maximize profit whilst bearing some risk than vice versa. To various extend this is affecting any industry, but the borderline between safety space and catastrophe is shifted in the aviation as the industry is much more sensitive to any safety occurrence. The point is not to justify investments into safety but rather to demonstrate, that these may eventually bring revenues as any other investments, when thoroughly assessed.

2 Return on Investment (ROI)

ROI is one of the popular tools used for assessing investments. Logic of any investment is to get at least what was invested in return, whether directly or indirectly accountable. The ROI indicates final profit or loses, expressed in percentage as per equation (1) (Farris, 2010):

$$ROI = \frac{\text{net profit}}{\text{investment}} = \frac{(G - C)}{C} * 100\%$$
(1)

where 'G' is gain from investment and 'I' refers to cost of investment. Gain may account for direct savings, expenses or generated profit due to particular investment. Getting ROI larger than 100% means investment generated profit, ROI between 0 and 100% that the investment generated profit but smaller than the investment itself, and negative ROI indicates financial loses.

Whilst in other domains this tool is quite easy to use, when incorporated into aviation safety it becomes much more difficult. Any investment into safety should eventually reduce risk, whether

through technology or process improvements. These impact the aviation system by reducing post-occurrence expenses as, ideally, there should be less of the safety occurrences. As an addition, lower occurrence rate may reduce insurance costs as well. All in all, investment into safety shall exhibit indirectly accountable savings first, but due to lack of any reliable tools, these are very difficult to measure. So it is difficult to calculate the ROI or similar economic indicators.

One of the possible solutions to this problem would be to establish some reliable and meaningful safety performance measurement, what is one of the today's concerns in the aviation (Lintner et al, 2009). This would offset the merely financial motivation via adding new type of indicators to the system which could be used internally to justify targeted safety investments, or as open data affecting organizations' benchmark. Safety investments would be then assessed against changes in the safety performance. However, today the motivations still have to remain financial at first place and therefore one of the best solutions is to find how to estimate the ROI.

2.1 ROI estimation

Some of the ROI estimations in the domain of aviation safety was performed owing to the U.S. Federal Aviation Authority (FAA). In a real world example a large maintenance organization began collecting data on the contribution of fatigue to company incidents and accidents and decided to implement fatigue countermeasure training as a safety intervention in year 2011 (Johnson and Avers, 2012). Total investment to deliver this training was estimated to \$204 500, covering all its expenses. Total profit was estimated based on presumption that the training implementation will eventually reduce safety occurrences involving damage and injuries by 10%, on a probability level of success estimated to 80%. In 2011 there were 89 of occurrences involving damage and 189 involving injuries as per Occupational Safety and Health Administration (OSHA), with average costs of \$105 000 and \$6 307 respectively. Sum of these 10% represent on average \$1 053 702.3 what equals to estimated savings for this case study. Final ROI was estimated to 312% and served as a motivation to execute the training implementation.

The core of this estimation is an occurrence probability reduction, utilizing carefully preselected indicators to estimate the probability. The probability of success is a function of prior experience, the level of corporate support, the availability of resources and the amount of planning committed to the development of safety intervention. Because the FAA did the estimation at national level, safety data were available and the set of indicators comprised the most visible and easy to track occurrences. Adjusted ROI calculation to capture the estimation is in equation (2):

$$ROI = \frac{\sum_{k} \Delta_{k} * OC_{k} * p - IC}{IC} * 100\%$$

- *IC* ... investment costs
- *OC* ... average occurrence costs
- k ... number of occurrence types considered
- *p* ... probability of success
- Δ ... occurrences prevented

(2)

However, when normal aviation organizations and their issues are concerned, things will get more difficult. First, these companies typically deal with more complex and less severe occurrences where it is hard to calculate exactly what would be prevented to which extent. Subsequently it is difficult to set the indicators correctly because it may not always be clear what will the investment finally affect. Sometimes, this may raise operational costs too and this should be included in the ROI calculation. Possible solution to this problem could be utilizing Bayesian Networks (BN) when assessing any potential investment. The network works with conditional probabilities of chains of occurrences and there is lot of literature available to its theory (Ruggeri et al, 2007; Darwiche et al, 2009; Neapolitan et al, 1997). To exemplify the application, particular case study will be introduced.

2.2 Bayesian Network and ROI

The case study includes simple BN for missed approach scenario. Missed approach refers to an event when some aircraft is approaching airport active runway, but due to various reasons the approach has to be interrupted and repeated again. The BN for this scenario would be as on Figure 2.



Figure 2 Bayesian Network Source: Bedford and Gelder (2003)

Reasons for missed approach executions include:

- adverse weather conditions low visibility, strong winds etc.,
- air traffic situation the airport may be congested or runways occupied,
- aircraft status such as technical problems,
- trajectory when the aircraft is not stable on the approach,
- in-flight crew alertness crew may not pay attention to all critical flight parameters.

From airlines' perspective any missed approach execution equals to additional costs both direct and indirect, due to additional fuel burned, flight delay etc. However, not executing approach when this should be executed significantly rises risk of collision with terrain, obstacles or other traffic. The costs of such collision would be disproportionately larger compared to missed approach execution, given the prices of any aircraft component or human lives. The BN from Figure 2 was processes (Bedford and Gelder, 2003) and it is depicted on Figure 3, including calculated probabilities per flight. Crew Resource Management (CRM) a Missed Approach (MA) Training are to complete the picture with background data on whether the crew had to pass dedicated trainings for these issues, or not. Figure 4 shows how change in the background affects the probabilities. It is apparent that if an airline would invest into increasing CRM training, it would increase the probability of crew performing a missed approach but it would lower the probability of a collision at the same time.



Figure 3 Processed Missed Approach BN Source: Own processing

From the Figures 3 and 4 it is notable that in some cases flight crews tend to land under conditions for missed approach, exposing the flight to risk of collision, rather than execute missed approach when there are no such conditions. Adding the results of this case study to equations (1) and (2) we get equation (3):

$$ROI = \frac{\left(\sum_{k} \Delta p_{k} * OC_{k} * F - \sum_{j} \Delta p_{j} * AC_{j} * F\right) * p - IC}{IC} * 100\%$$
(3)

AC ... average additional operational costs

- F ... number of flights per time unit of interest (typically per one year)
- IC ... investment total costs
- OC ... average occurrence costs
- *j* ... number of additional operations considered
- k ... number of occurrence types considered
- Δp ... change in occurrence probability $(p_2 p_1)$
- *p* ... probability of success

In the case study Δp_j equals to 0.01%, marginally increasing operational costs. That compares to Δp_k which exhibit decrease by $0.2*10^{-5}$ % what is almost unnoticeable change, but related to much higher costs. Final ROI value depends a lot on size of the organization and volume of traffic concerned and so does the investment. In most cases the difference in magnitude between Δp will be still lower than in magnitude between the additional operational costs and occurrence costs, causing the organizations to consider at least some investment into the CRM training. The ROI calculation from equation (3) should help them to set the best extent for it.



Figure 4 Missed Approach BN with adjusted background Source: Own processing

2.3 ROI estimation for complex issues

Most of the real issues are complex and difficult to estimate because indicators for these will be hard to identify and to measure. Whilst in the simple case study from section 2.2 there were finally two key indicators – number of missed approaches and collisions – for real issues there will be longer list of these. Likewise, the BN concerned will be complex and may include many relations. To overcome the lack of data, at least rough probability estimation can be provided by subject matter experts what may be sufficient for cases where quite often just difference of magnitude matters. Given the high costs involved in the aviation this is one of the important factors to motivate. Also, when complex issues are well resolved, reduced insurance costs may offset part of the investment as well. No matter how many constituents will comprise the final ROI equation, the key will be to calculate presumably how will the operations change with regard to probability distribution of all events and occurrences concerned. Drawing the BN may significantly facilitate the whole process.

3 Conclusion

Motivating aviation organizations to invest into safety and to act proactively requires convenient tools to calculate what respective organization will get in return. Because safety is difficult to quantify, motivations still have to stem from financial advantages. Utilizing the Return on Investment together with Bayesian Networks is one of the tools that may help in many cases. At least this is the starting point where organizations may understand, that investments into safety do not necessary mean costs only. The equations outlined in this paper should serve as a basis for further development and practical applications. These are surely limited to the extent of knowledge available to date, but they do demonstrate the way. Bayesian Networks already have many applications in the aviation industry (Goodheart, 2013; Wang and Gao, 2013) and results of these studies should be taken into consideration when similar issues are being addressed. Because the aviation is globalized industry, there are many safety studies available and also a lot of safety data are often disseminated all over the world.

References

- BEDFORD, T. and GELDER, P. 2003. Safety and reliability: proceedings of ESREL 2003, European Safety and Reliability Conference 2003, Maastricht, the Netherlands. Exton, PA: A.A. Balkema Publishers, II, pp. 1780, pp. 1315-1320.
- DARWICHE, A., KENETT, R. and FALTIN, F. W. Modeling and reasoning with Bayesian networks. New York: Cambridge University Press, xii, pp. 548.
- FARRIS, P. 2010. Marketing metrics: the definitive guide to measuring marketing performance. 2nd ed. Upper Saddle River, N.J.: FT Press, xv, 414 p.
- GOODHEART, B.J. 2013. Identification of Causal Paths and Prediction of Runway Incursion Risk by Means of Bayesian Belief Networks. Transportation Research Record. In: *Journal of the Transportation Research Board*. Vol. 2400, No.1, pp. 9-20.
- HUDSON, P.T.W. 2001.Safety Management and Safety Culture: The Long, Hard and Winding Road. In W. Pearse, C. Gallagher & L. Bluff (Eds.) Occupational Health and Safety Management Systems. Crowncontent, Melbourne, Australia 2001, pp. 3-32.
- JOHNSON, W. B. and AVERS, K. Return on Investment Tool for Assessing Safety Interventions. Shell Aircraft Safety Seminar 2012. The Hague, Netherlands.
- LINTNER, T. M., SMITH, S. D., LICU, A., CIOPONEA, R., STEWART, S., MAJUMDAR, A. and DUPUY, M. D. 2009. The measurement of system-wide safety performance in aviation: Three case studies in the development of the aerospace performance factor (APF). EUROCONTROL Safety R&D Seminar 2009. Munich.
- NEAPOLITAN, R. E, KENETT R. and FALTIN, F. W. 2004. Learning Bayesian networks. Upper Saddle River, NJ: Pearson Prentice Hall, c2004, xv, 674 p. ISBN 01-301-2534-2.REASON, J. Managing the risks of organizational accidents. Brookfield, Vt., USA: Ashgate, c1997, xvii, 252 p.
- RUGGERI, F., KENETT R. and FALTIN, F.W. 2007. Encyclopedia of statistics in quality and reliability. Chichester, England: John Wiley, 4 v. (xliv, 2173 p.).
- WANG, H. and GAO, J. 2013. Bayesian Network Assessment Method for Civil Aviation Safety Based on Flight Delays. In: *Mathematical Problems in Engineering*. Pp. 1-12.
- WITTMER, A. 2011. Aviation Systems: Management of the Integrated Aviation Value Chain. Heidelberg: Springer, xvii, 236 p.

Can the Central Bank Really Influence Inflation Expectations? A Multi Approach Analysis

MAGDALENA SZYSZKO¹ Poznan School of Banking Poland

Abstract

The following paper analyzes consumers' inflation expectations and inflation forecasts. The hypothesis assumes that there are interdependences between the inflation forecast and consumers' expectations. Their strength depends on the central bank's credibility and its consistency in implementing inflation forecast targeting. The examination covers the Czech Republic and Sweden. Research methodology includes comparative analysis and quantitative methods (expectations' quantification, non-parametric measures of association, IFT index). The paper contributes to the literature on the central bank's impact on inflation expectations. It introduces original IFT index.

Key words: Inflation Expectations, Inflation Forecast, Inflation Forecast Targeting

JEL Classification: E52, E58, E61

1 Introduction

Inflation expectations play a predominant role in modern monetary policy. It is the implication of the mainstream monetary theory – New Neoclassical Synthesis (NNS). Monetary transmission mechanism that is in line with NNS findings, relies firstly on expectations channel, which is presented in the literature (Galí, 2008; Goodfriend, 2007; Woodford 2003). As the result of such theoretical background, central banks search for tools that are helpful in shaping inflation expectations and in enhancing their forward-looking attitude. Inflation targeting framework, which is modern monetary policy strategy, is designed to support expectations shaping. Producing and revealing inflation forecast is its main tool.

The paper focuses on the central bank inflation forecasts and consumer expectations. They are analyzed jointly in the context of the central bank's credibility and its consistency in implementing inflation forecast targeting (IFT). The purpose of the following paper is to verify the hypothesis that assumes the existence of the interdependences between inflation forecast and consumers' expectations. The second part of the research verifies whether the central bank's credibility and its consistency in implementing IFT are necessary for the existence of such interdependences.

The examination covers the Czech National Bank (CNB) and Bank of Sweden (Sverige Riksbank, SR). Its starting point is April 2001 for the Czech Republic and December 1997 for Sweden. The research finishes at the end of 2014. The length of the research sample varies because the SR started to publish its forecasts earlier. The SR is one of most experienced central banks in implementing inflation targeting. The Czech National Bank is one of the most forecast-orientated central banks. That is the reason why these central banks have been

¹ Magdalena Szyszko, Ph.D., al. Niepodległości 2, 61 874 Poznań, Poland, magdalena.szyszko@wsb.poznan.pl.
selected for the research. Research methodology covers several steps and includes expectations quantification with the probabilistic method, credibility analysis, measurement of the IFT implementation, non-parametric statistics for the interdependences between the forecast and expectations analysis, and, eventually, – comparative analysis. The variety of methods applied here makes it a multi approach analysis. The index of IFT implementation is a tool made up for the purpose of the following study. It is the first index of IFT presented in the literature. It enables the measurement and cross-country comparison of inflation forecast targeting implementation. The methodology of the research is described in a more detailed way in the next section.

Prior to the methodology description, two introductory remarks should be made. The first one is on the relation of the forecast and expectations. The theory argues that the forecast should be (the most) important input to the expectations formation. However, in formal forecasting models the expectations are the input to the forecast or the models are developed under assumption of rational (or near rational) expectations. That is why it is more reasonable to verify the existence of the interdependences between the forecast and the expectations instead of a cause and effect relation (regression). The second remark is on the choice of consumers' expectations instead of those formulated by professionals. The households' decisions are crucial for transmission mechanism. On the other hand, the consumers are a less qualified group of economic agents. They are secondary readers of the central bank information: the news is processed by professional journalists and spread by the media. Empirical findings confirm that consumers' expectations do not hold rational expectations hypothesis (Forsells and Kenny, 2004; Dias, Duarte and Rau, 2010; Mitchell and Weale 2007; Łyziak, 2003). Recent literature refers to bounded (limited) rationality of consumers' expectations. The example is the theory of inattentive behavior to explain how non-specialist form their expectations (Reis, 2006) or the adaptive learning literature (Evans and Honkapohja, 2003). Therefore, the research questions of this paper are interesting in the context of expectations formation.

2 Research methodology

The following section contains the abridged research methodology (Table 1). The research is divided into 3 main stages regarding interdependences (I), credibility (II) and IFT implementation (III). The sample covers 55 forecasts for the CNB and 82 for the SR. The most important stage of the research is the analysis of the interdependences. The central bank's credibility and its consistency in implementing IFT may be explanatory factors of such a correlation.

If the central bank's information is to be taken into consideration by the public, the central bank should be credible. That is why the second stage of the research focuses on the credibility analysis. It is connected with the second hypothesis. Quite simple but capacious definition of credibility states that the central bank is credible if people believe that it will do what it said (Blinder, 2000). Central bank's credibility is, as other institutional aspects of monetary policy, unobservable directly. One, broadly accepted measure of credibility does not exist. Its measurement refers to the central bank's effectiveness or the beliefs of the public in the central bank's ability to fulfill its obligation. In the following paper the simple measures relying on the deviation of the past inflation (or inflation expectations) and inflation target are applied. Their extension is the Kia&Patron formula as it is the exponential function, the increasing deviation of inflation from the inflation target means that the credibility of the central bank decreases faster.

Table 1 Steps of the research

Stage	Step	Description
I	1	Inflation forecast – data from Inflation Reports or equivalent document. Coding of the forecast results (5 possibilities regarding the relation of central path of inflation to the inflation target). The forecast is encoded, as consumers are a less qualified group of economic agents and the central banks do not reveal the same set of data on central path of inflation. As the forecast is produced with lower frequency than the surveys on expectations, it is assumed that one forecast may influence up to 3 subsequent surveys on expectations.
Interdependences analysis	2	Inflation expectations – survey data on expected inflation are derived from the <i>Business and Consumers Surveys</i> – the European Commission survey on business and household situation. Surveys are held monthly. Data are quantified with adjusted Carlson-Parkin method (Carlson and Parkin, 1975, Lyziak, 2003) under the assumption of normal distribution of the expected rate of price change.
	3	Correlation analysis : non-parametric measures, null hypotheses: H0: $\rho_s = 0$; H0: $\tau = 0$, H0: $\gamma = 0$; for $\alpha = 0.05$.
II Central banks'	4	Credibility measures: (a) Mean absolute deviation of inflation from the inflation target (b) Mean absolute deviation of consumers inflation expectations from the inflation target (c) Kia&Patron formula (Kia and Patron, 2004)
credibility	5	Credibility analysis : the central bank is credible when (a) and (b) are <0,1>. It is consistent with the accepted fluctuation of inflation around inflation target of 1 p.p. Kia and Patron formula consistent with this level is <60,100>
Ш	6	Measure: IFT index. Details: Figure 1 and further explanations below.
implementation	7	IFT implementation comparative analysis. Highest level of the coefficient indicates better result.

Source: Own elaboration

The third stage of the research covers the measurement of IFT implementation. It is based on the index which was elaborated for the purpose of the following research (hereafter referred to as IFT index). The idea of IFT is briefly described here as in this study it is assumed that central banks' consistency in implementing IFT and its transparency covering forecasting inflation, may be of benefit to stronger interdependence between inflation forecast and expectations. Inflation forecast targeting is perceived as a simple policy rule that involves the commitment to a particular decision procedure for the monetary policy and a distinctive approach to the communication policy (regular publication of quantitative projections together with extensive discussion of the reasoning underlying these projections) (Woodford, 2012). It makes the inflation forecast a specific (as not formally established) intermediate goal. It is also argued that subscribing the function of an intermediate target to the inflation forecast simplifies implementing and monitoring monetary policy (Svensson, 1997). While setting the monetary policy instrument, the central bank analyses the relation of the inflation forecast to the inflation target in the monetary policy horizon. This relation indicates next step of the policy maker.

Except for supporting monetary policy decisions, the inflation forecast should support

expectations formation of the economic agents. Therefore the central banks are more and more transparent, however, the optimal level of transparency is still under discussion. IFT and forecasting transparency have not been measured up to now. However, it is possible to elaborate their measure. The IFT index is based on the idea of measuring qualitative aspects of the monetary policy. Firstly, the factors that describe the measured aspects are enumerated. Secondly, the system of weights is attributed. This way of measurement of qualitative factors is broadly accepted and used in empirical research. A good example of this kind of measure is Eijffinger-Geraats index (Eijffinger and Geraats, 2006) which measures the central bank's transparency referring to its different aspects.



Source: Own elaboration

The IFT index also distinguishes 5 possible aspects of IFT implementation (Figure 1). Official declaration on the role of inflation forecasts in the monetary policy helps the public to determine the importance of the forecast for the central banker. This declaration is then confronted with the **actual practice** of the central bank. This aspect checks whether the central bank follows the message of the forecast while making decisions on the interest rates. As this is a curtail feature of IFT, it is attributed a higher weight. At the same time the way of attributing points provides for central banks' flexibility in making decisions. Following the message of the forecast is just an open loop policy -a rule of thumb for the policy makers. Actual practice aspect covers also the decision timing. As the forecast is usually produced with lower frequency than monetary policy meetings occur, points are attributed when the central bank makes the decision on interests' rates when the forecast is up-to-date. The central bank may take wait and see position and wait for confirmation of the forecast or its assumptions. It demonstrates that the central bank does not rely on the forecast solely. The last thing that is assessed here refers to the central bank's communication with the public just after the decision has been made. If the central bank refers to the forecast while explaining the decision, the points are attributed. The aspect called **forecasting method** checks whether the central bank reveals the forecasting model (transmission mechanism) and the assumption on the forecast. The next aspect: publication points regular and frequent publication of central path of inflation, policy path and the risks assessments (probability distribution, alternative scenario). Central path of inflation is the most important in the light of shaping expectations. This is why higher weight is attributed here. Finally, the central bank may evaluate its past forecast. It consists in commenting upon the difference between the two subsequent forecast and assessing the ex post forecast errors in the long term. By ex post forecast evaluation, central bank explains the differences between the forecast and actual inflation.

Three stages of the study in question constitute its complete methodology and enable the hypothesis verification.

3 Research result

Research results are presented in Table 2 and Table 3 (interdependences). CPI/R represents central path of inflation – the most probable inflation at the monetary policy horizon. Exp. stands for expectations. One forecast may influence expectations during several subsequent months. This is why correlations for lags up to 3 months are calculated. For both countries, null hypotheses are rejected for $\alpha = 0.05$. There are interdependences of inflation forecast and inflation expectations of consumers. Statistically significant coefficients are bolded in the tables. For the Czech Republic the interdependences are weak. They proved to be moderate for Sweden. It means that the central bank may influence expectations via inflation forecast however, there are other factors affecting consumers' expectations.

The strength of the interdependences rises with the longer lag. This is consistent with Carroll's epidemiological expectations theory. It argues that the consumers form their expectations taking into consideration professional forecasts distributed by the media. They do it imperfectly, as they need time to absorb the economic content of the news stories (Carroll, 2003).

The results of credibility assessment and the IFT index are presented in table 4. Both central banks are not credible – in the light of the measures applied. The SR is more credible than the CNB. Regardless of the interpretation of the credibility measures (lack of credibility for both central banks), the coefficients are not far from assumed credibility limit (1 for (a) and (b) and 60 for Kia&Patron). On the other hand, the CNB is more consistent in IFT implementation as the average IFT index there is higher. The difference in IFT indices occurs mostly in the aspect of the central bank's actual practice: the CNB decisions were more consistent with the forecast than in the case of the SR.

		=		
	N	Spearman	t(N-2)	р
CPI/R & Exp. (t)	165	0.235952	3.099964	0.002281
CPI/R & Exp. (t+1)	165	0.281993	3.752535	0.000243
CPI/R & Exp. (t+2)	165	0.317556	4.275586	0.000032
CPI/R & Exp. (t+3)	165	0.348494	4.746841	0.000004
	N	Gamma	t(N-2)	р
CPI/R & Exp. (t)	165	0.217497	3.547135	0.000389
CPI/R & Exp. (t+1)	165	0.261744	4.268754	0.000020
CPI/R & Exp. (t+2)	165	0.296899	4.842095	0.000001
CPI/R & Exp. (t+3)	165	0.325389	5.308346	0.000000
	N	Kendall	t(N-2)	р
CPI/R & Exp. (t)	165	0.186050	3.547135	0.000389
CPI/R & Exp. (t+1)	165	0.223900	4.268754	0.000020
CPI/R & Exp. (t+2)	165	0.253972	4.842095	0.000001
CPI/R & Exp. (t+3)	165	0.278427	5.308346	0.000000

Table 2 Interdependences analysis for the Czech Republic

Source: Own calculations

	N	Spearman	t(N-2)	р
CPI/R & Exp. (t)	205	0.567696	9.82512	0.000000
CPI/R & Exp. (t+1)	205	0.605539	10.84122	0.000000
CPI/R & Exp. (t+2)	205	0.612982	11.05389	0.000000
CPI/R & Exp. (t+3)	205	0.621870	11.31407	0.000000
	N	Gamma	t(N-2)	р
CPI/R & Exp. (t)	205	0.631040	9.71458	0.000000
CPI/R & Exp. (t+1)	205	0.672401	10.35133	0.000000
CPI/R & Exp. (t+2)	205	0.681369	10.48938	0.000000
CPI/R & Exp. (t+3)	205	0.689422	10.61335	0.000000
	N	Kendall	t(N-2)	р
CPI/R & Exp. (t)	205	0.456194	9.71458	0.000000
CPI/R & Exp. (t+1)	205	0.486096	10.35133	0.000000
CPI/R & Exp. (t+2)	205	0.492579	10.48938	0.000000
CPI/R & Exp. (t+3)	205	0.498400	10.61335	0.000000

Table 3 Interdependences analysis for Sweden

Source: Own calculations

Table 4 Credibility and IFT index

Coefficient	Czech Republic	Sweden
Credibility (a)	1.47	1.29
Credibility (b)	1.26	1.08
Kia&Patron	55.77	56.68
IFT index	84.68%	79.59%

Source: Own calculations

The second hypothesis of the research may not be confirmed unambiguously. Both countries have a comparable level of credibility and consistency in IFT implementation. However, the research will provide such an opportunity if the panel of countries is expanded.

4 Conclusion

The following paper presents a multi approach analysis of the inflation forecasts of two central banks and the inflation expectations of consumers. It confirms the existence of the interdependences between them. The association is stronger for Sweden. There are several possible explanation of these results. First of all, Sweden started to publish the inflation forecast earlier. It is also one of the most experienced inflation targeting country in the world. Moreover, the SR is more efficient in achieving inflation target than the CNB (coefficient (a) and Kia&Patron). However, it needs to be stated that the difference is not substantial. The SR produces 6 forecasts a year. The Monetary Policy Committee meetings are held just after the forecast is produced. The SR has produced them since 2002Q2. The SR did not change the inflation target during the research period. The CNB did it 4 times. During the period 2002-2005 the fluctuation band stranded for inflation target of the CNB– without highlighting the central point of the corridor. Some of the differences mentioned above may be the explanatory factor for weaker interdependences in the Czech Republic.

For both central banks the strength of interdependences indicates that there are other factors influencing the expectations formation. As both central banks are consistent in IFT implementation, relatively low strength of interdependences for the CNB is surprising.

The results of the paper may not be confronted with the other papers as its methodology was not applied previously except for the other research by the author (Szyszko and Tura 2015). However, it confirms some of the previous results on expectations (they are not rational as they are not purely reflecting the forecast). The households need time to process the information on inflation. The forecast may influence expectations of the households even if consumers are less educated economic agents. The paper contributes to the discussion on shaping expectations by modern central bankers. It contains the description of IFT index which has been developed for the purpose of the following study.

There are possible extensions of the research. The first one consist in expanding the territorial scope of the research. The author has already started to do that for Poland, Romania, Hungary, England and Norway. Broader comparative analysis will enable to draw more binding conclusions.

Acknowledgements

The article presents the results of the research financed by the National Science Center, Poland: Interdependences of Inflation Forecasts and Inflation Expectations of Market Participants. Implications for the Central Banks [No. 2011/03/B/HS4/03705].

References

- BLINDER, A.S. 2000. Central-Bank Credibility: Why Do We Care? How Do We Build It? In: *American Economic Review*. Vol. 90, No. 5, pp. 1421-1431.
- CARLSON, J.A. and PARKIN, J.M. 1975. Inflation Expectations. In: *Economica*. No. 42, pp. 23-138.
- CAROLL, C.D. 2003. Macroeconomic Expectations of Households and Professional Forecasters. In: *Quarterly Journal of Economic*. Vol.118, No. 1, pp. 269-298.
- DIAS, F., DUARTE, C. and RAU, A. 2010. Inflation Expectations In the Euro Area: Are the Consumers Rational? In: Review of World Economics. Vol. 146, Issue 3, pp. 591-607.
- EIJFFINGER, S.C.W. and GERAATS, P.M. 2006. How Transparent Are Central Banks? In: *European Journal of Political Economy*. Vol. 22, pp. 1-22.
- EVANS, G. and HONKAPOHJA, S. 2003. Adaptive Learning and Monetary Policy Design. In: *Journal of Money, Credit and Banking*. Vol. 35, No. 6, pp. 1045–1072.
- FORSELLS, M. and KENNY, G. 2004. The Rationality of Consumers' Inflation Expectations: Survey-Based Evidence for the Euro Area. In: *Journal of Business Cycle Measurement and Analysis.* Vol. 1, Issue 1, pp. 25-30.
- GALÍ, J. 2008. Monetary Policy, Inflation, and the Business Cycle, An Introduction to the New Keynesian Framework. Princeton University Press, Princeton, pp. 41-52.
- GOODFRIEND, M. 2007. How the World Achieved the Consensus on Monetary Policy. In: *The Journal of Economic Perspective*. Vol. 21, No. 4, pp. 47-68.
- KIA, A. and PATRON, H. 2004. Market-Based Monetary Policy Transparency Index, Risk and Volatility - The Case of the United States. In: *Carleton Economic Papers*. No. 7, pp. 3-40.
- ŁYZIAK, T. 2003. Consumer Inflation Expectations in Poland. In: *European Central Bank Working Paper Series*. No. 287, pp. 1-59.
- MITCHELL, J. and WEALE, M. 2007. The Rationality and Reliability of Expectations Reported by British Households: Micro Evidence from the British Household Panel Survey. In: *Discussion Paper Series 1: Economic Studies*. No. 19, pp. 1-35.

- REIS, R. 2006. Inattentive Consumers, In: *Journal of Monetary Economics*. Vol. 53, Issue 8, pp. 1762-1800.
- SVENSSON, L. E.O. 1997. Inflation Forecast Targeting: Implementing and Monitoring Inflation Targets. In: *European Economic Review*. Vol. 41, Issue 6, pp. 1111-1146.
- SZYSZO, M. and TURA, K. 2015. Can Inflation Forecast and Monetary Policy Path be Really Useful? The Case of Czech Republic. In: *Equilibrium. Quarterly Journal of Economy and Economic Policy*. No. 10 (3). Forthcoming.
- WOODFORD, M. 2003. *Interest and Prices*. Foundations of Theory of Monetary Policy, Princeton University Press, Princeton, pp. 1-783.
- WOODFORD, M. 2012. Forecast Targeting as a Monetary Policy Strategy: Policy Rules in Practice. In: *The Taylor Rule and the Transformation of Monetary Policy*. E.F. Koeing, R. Leeson, G.A. Kahn (ed.). Hoover Institution Press Publication, Stanford, pp. 185-234.

The Local Economic Impact of the Technical University of Košice

MIRIAM ŠEBOVÁ¹ – PETER DŽUPKA² Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

Universities can be valuable contributor's to a city's economy. The wide impacts of universities on the hosted city rout in their contribution to the local economic growth. The studies about the local economic impact of the universities is rare in the Central European countries. The economic impact assessment used in the paper is standardized methodology based on the export-base theory. The paper is divided in two parts. We introduce the basic principle of the economic impact assessment in the first part. The second part is focused on the economic impact of Technical University of Košice on the Košice city.

Key words: Local Economic Impact, University, Expenditures of Students

JEL Classification: R1, R15

1 Introduction

Universities can be valuable contributor's to a city's economy. They are immobile institutions fairly resistant to business cycle fluctuations, making them a steady presence in the community (Steinacker, 2005). The research about universities is well developed. There were published hundreds of research studies in this area, the most cited are Steinacker, 2005; Holland et al., 2013; Huggins and Johnston, 2009; Luger , M., 2011 etc.

The wide impacts of universities on the hosted city rout in their contribution to the local economic growth. They have indisputable effects on employment, wages and tax base increase, on the maturing of business environment and they stimulate the human and social capital. All these effects are seen as the long-term effects which occur in the local economy over a longer time. The short-term effects are associated with the economic aspects mainly with the expenditures of the university students which bring new money into local economy.

The research about economic impacts of universities is often provided at the American and British universities. The first study has appeared in 1972 by Cafrey and Isaacs. The authors used the comprehensive methodology for measurement of the economic impacts for the first time. (Caffrey & Isaacs, 1972) Nowadays it is usual practice of the US respectively UK universities to publish every year their economic importance in the city or in region e.g. (Kelly, Mcnicoll, White, 2014; Hoges, Stevens and Rahmani, 2011 etc.) They use the study as the part of institutional marketing, too.

¹ Ing. Miriam Šebová, PhD., Němcovej 32, 040 01 Košice, Slovak Republic, miriam.sebova@tuke.sk

² doc. Ing. Peter Džupka, PhD., Němcovej 32, 040 01 Košice, Slovak Republic, peter.dzupka@tuke.sk

The studies about the local economic impact of the universities is rare in the Central European countries (e.g. Rehák and Šipikal, 2011; Kotosz, 2011).

The Slovak's university education system faces criticism for being ineffective and overgrown. Therefore it is crucial to investigate the system and importance of the universities more deeply. This paper highlights some of the preliminary results of the wider research supported by Slovak Research and Development Agency.

The paper is divided in two parts. We introduce the basic principle of the economic impact assessment in the first part. The second part is focused on the economic impact of Technical University of Košice on the Košice city.

2 The Economic impact of universities

The economic impact assessment is standardized methodology based on the export-base theory. The key concept of the export- base theory is that export activity is the engine for regional economic growth through export sales. It argues that in a county's or community's economy may be distinguished two sectors: an export or basic sector and a non-export or non-basic sector. In this case basic sector is a sector made up of local businesses (firms) that are entirely dependent upon external factors and non-basic in contrast is composed of those firms that depend largely upon local business conditions. (Kimbugwe and Gyawali, 2010) If the students of the universities come from outside the city we could consider the university as the exporter of the education activities.

There is a general consensus that whilst measures related to economic impact assessment are conceptually simple, the actual collection of such information is extremely difficult and time consuming (Bond, 2008). Economic impact studies are used to estimate the economic importance of big cultural or sporting events as well as important infrastructure projects as universities, airports or funparks. The effects of hosting events and infrastructural projects are mainly evaluated in two fields. The first focuses on the short-term impacts which have wide diversity in their range of economic and intangible positive and negative effects on the city and local community. The second concentrates on the long-term impacts which concern the legacy of the construction of facilities and infrastructure improvements (Barghchi et al., 2009).

The aim of this paper is to examine the short-term local economic impacts connected with expenditures of university students.

There are three different types of measurable impacts (or effects) of the university: direct impact, indirect impact and induced impact. Direct impacts are directly related to expenditures of students, employees, visitors and university expenditures on services and goods (e.g. capital investment into buildings, costs for catering etc.), which were spent in the hosting city within the analysed period of time. It is very important to collect all the direct impacts, no matter what source they were funded from (public or private). To ensure the correct implementation of the methodology it is important to cleanse these costs from the expenses causing no additional economic activity within the analysed region (VAT, social insurance etc.).

Induced impacts are changes in the economy caused by the additional production of subcontractors as a result of further rounds of economic activity in the analysed region. These changes include all further rounds of production induced by backward linkages of direct suppliers and their subcontractors (Raabová, 2011). Through the induced impacts, direct expenditure and visitor expenditure are reflected in all other sectors of the economy. The size of induced impact is proportional to the propensity of local firms to purchase inputs from regional suppliers. It is therefore crucial to select the correct methodology for induced impact quantification. Induced impacts of cultural events are usually estimated by regional multipliers. The multiplier concept recognizes that when visitors to a facility or event spend money in a community, their initial direct expenditure stimulates economic activity and creates additional business turnover, personal income, employment, and government revenue in the host community (Crompton, 2010) The induced impacts are calculated using several kinds of multipliers (e.g. Keynesian regional multiplier, multiplier based on Input-output (I-O) matrix).

2.1 The Methodology

According to the previously mentioned methodology of local economic impact, the current research was carried out in several steps:

- 1. Collection of the data.
- 2. Estimation of the average level of spending of students in the local area
- 3. Calculation of the direct local economic impact of the university students.
- 4. Multiplication by the regional multiplier and calculation of the total economic impact of the event university students.

At first we defined the geographical area of the research - the Košice city. The Technical University in Košice is the biggest university in the city with 10,952 students in 2014 (9,398 daily students). The students originate mainly from Košice and Prešov region. The localisation of the universities and the geographical origin of their students analysed in the paper Gurňák (Gurňák et al., 2010; Gurňák et al., 2011). 28.8% of all TUKE students are from Košice city.

In 2014 we conducted the research focused on university students. We collected the information about their expenditures and working experiences. We collected 1,520 questionnaires using the quota sampling procedure. The sample was representative according to the size of the faculties. The questionnaire contained 11 questions about their working experience, the place of staying, the motivation for the study at TUKE and about their expenditures in Košice.

	Jataset								
Year of study	EKF	FEI	FBERG	SJF	SVF	LF	FU	HF	Total
1.	73	56	44	28	27	23	5	23	279
2.	92	66	53	56	39	13	7	22	348
3.	55	85	23	37	41	69	10	18	338
4.	89	78	27	52	11	14	3	31	305
5.	63	58	9	49	3	11	3	6	202
1.	0	2	1	4	4	0	0	1	12
2.	1	8	1	3	1	1	1	1	17
3.	0	10	3	0	2	1	1	2	19

Table 1 The Dataset

	Total	373	363	161	229	128	132	30	104	1,520
a	0	1								

Source: Own research

Several studies emphasized that student expenditures represent an important part of the total economic impact of the university. Especially those universities which attract large number of non-resident students contribute to the growth of demand for local goods and services. Our analysis showed that more than 70% of University students are non-local. We asked all groups of students (students from Košice, students living in campus in Košice, students living in rented flats and daily commuting students), how important is for the existence of TUKE for their staying in Košice. Therefore we reduced the number of students and we calculated only with these students who came to Košice because of TUKE. In the next step we calculated the total expenditures of TUKE student in 1 mont (Table 2).

Students according their accomodation	The number of TUKE students	Reduced number of students	Average expenditures	Total expenditures of reduced number of students
Students staying in dormitory	3,947	3,140	215	676,221,6
Students living in privat accommodation in Košice	806	606	242	146,945,5
Daily commuting students	1,952	1,079	169	183,122,9
Students - residents from Košice	2,510	1,173	180	211,229,2
Total expenditures	9,215	5,998		1,217,519,2

Table 2 Total expenditures of TUKE students in 1 month

Source: Own research

In the next step the average spending of students was calculated in specific sectors of the local economy (accommodation, food, retail, transport etc.). The expenditure of students, who would study at other university or work in Košice in the case that TUKE would not exist, was excluded from the analysis. It was assumed that their spending would have occurred in the local economy whether the TUKE exist or not. This approach is used by most economic impact studies as previously mentioned.

The average expenditure of every kind of students was calculated and multiplied with the reducing coefficient. The result presented the students direct impact on the local economy – the additional income of their expenditure.

The monthly average spending of a student staying in dormitory was 215 Eur, the average spending of a student living in privat accommodation was 242 Eur, the average spending of a daily commuting student from surrounding area was 170 Eur, the average spending of a student living in Košice was 180 Eur.

The students spent the biggest share of their money on accommodation, food and transport. The structure of their expenditures depend on their accommodation style. The biggest expenditures has the group of students who rent some flat (privat accommodation), they spent for accommodation more than 30% of their expenditures. Daily commuting students spent the biggest share of their budget on the transport.

Table 3 presents the expenditure of visitors according to the basic groups of expenditure. The biggest spending occurred in the sector of accommodation and food. The direct economic impact of students spending was $1,217,519 \in$.

	Students expenditures	Expenditures multiplied by output multiplier	Expenditures multiplied by income multiplier	Expenditures multiplied by employment multiplier	Expenditures multiplied by value added multiplier
Expenditures for accommodation and food	663,717€	1,115,045 €	250,885 €	12	485,841 €
Expenditures for transport	123,730 €	189,307€	29,695 €	1	70,031 €
Expenditures for retail	430,072 €	738,004€	151,815€	8	338,467 €
Total students expenditures	1,217,519€	2,042,355 €	432,396 €	22	894,339€

 Table 3 The undirect and induced impact of TUKE students expenditures

Source: Own research

The expenditure of students led to changes in demand in the local economy and thereby to the additional production of goods and services to the amount of in 2,042,355 Eur in 1 month. The income of people who worked in this additional production increased by 432,396 Eur. The employment multiplier expresses new jobs in the local economy. However, it is important to note that estimates done by employment multipliers estimate the increase in jobs measured as full-time job positions. The growth of the local economy could be expressed by a value added multiplier which caused the increase of 894,339 Eur. This can be considered approximately as the increase in regional growth

3 Conclusion

The main purpose of the impact study is typically to quantify the value of a university for the local economy. Universities use such studies to document their importance during the negotiations with the local government. However, impact analysis also enables us to better understand different aspects of local economies. The main problem by providing such impact studies is the using of appropriate multipliers. The regional multipliers are not provided by statistical offices in Slovakia as in most of the CEE countries (Macháček et al., 2013). The regional multiplier used in this paper was calculated with the purpose of accurately evaluating the total economic impact of the Košice European Capital of Culture.

We calculated only the direct, undirect and induced effects only from the students expenditures. The next challenge is to calculate other impacts related to the expenditures of university employees and university sales on services and goods in the local economy.

Acknowledgements

This work was supported by the Slovak Research and Development Agency under the contract No. APVV -14-0512.

References

- AMBARGIS, Z., IANMEAD, CH. and RZEZNIK, S. 2014. University Contribution Studies Using Input-Output Analysis. U.S. Bureau of Economic Analysis. Available at: https://www.bea.gov/papers/pdf/BEAWP_UniversityContributionStudiesIO_022014.pdf>.
- BARGHCHI, M., OMAR, D. and AMAN, M. 2009. Cities, Sports Facilities Development, and Hosting Events. In: *European Journal of Social Science*. Vol. 10, No. 2, pp. 185 194.
- BOND, H. 2008 *Estimating the Economic Benefits of Event Tourism*. A Review of Research Methodologies. University of Manchester. 2008. Impacts 08. European Capital of Culture Research Programme.
- CAFFREY, J. and ISAACS, H.H. 1971. *Estimating the Impact of a College or University on the Local Economy*. Washington D.C. ACOE. ERIC ED 252100
- CROMPTON, J. 2010. Measuring the Economic Impact of Park and Recreation Services. Ashburn: National Recreation and Park Association.
- DŽUPKA, P. 2014. Ekonomický dopad projektu Košice Európske hlavné mesto kultúry 2013. In: Hudec, O., Džupka, P. and Šebová, M., 2014. *Evaluácia Košice Európske hlavné mesto kultúry* 2014. Evaluačná správa 2012-2014. Technická univerzita v Košiciach.
- GURŇÁK, D., LAUKO, V., KRIŽAN, F., 2010. Vybrané aspekty siete vysokých škôl a regiónov ich dochádzky v Slovenskej republike. In: *Geographia Cassoviensis*. Vol. 4, No.1, pp.57-61.
- GURŇÁK, D., LAUKO, V. and KRIŽAN, F. 2011. Aktuálne tendencie vývoja dochádzkových regiónov verejných vysokých škôl na Slovensku. In: *Acta Geographica Universitatis Comenianae*. Vol. 55, No. 1, pp. 39-66.
- HODGES, A., STEVENS, T.J. and RAHMANI, M. 2011. Economic Impacts of the University of Florida in 2009-10. University of Florida.
- HOLLAND, D., LIADZE, I., RIENZO, C. and WILKINSON, D. 2013. *The relationship between graduates and economic growth across countries Department for Business, Innovation and Skills*, Research Paper 110.
- HUGGINS, R. and JOHNSTON, A. 2009. The economic and innovation contribution of universities: a regional perspective. In: *Environment and Planning C: Government and Policy*, Vol. 27, No. 6, pp. 1088-1106.
- KELLY, U., MCNICOLL, I. and WHITE, J. 2014. *The Economic Impact of The Yorkshirea and Humberside Higher Education Sector*. Universities UK. © Universities UK April 2014.
- KIMBUGWE, D. and GYAWALI, B. 2010. *Testing the Export-Base Theory in Alabama*: An Ongoing Case Study. Alabama A&M University, s. 1/2010.
- KOTOSZ, B. 2013. The Local Economic Impact of Higher Education Institutions in Hungary. In: LUGER, M. ET AL., 2001. The Economic Impact of the UNC System on the State of North

Carolina. Office of Economic Development, Kenan Institute. The University of North Carolina at Chapel Hill.

- RAABOVÁ, T. 2011. Návrh certifikované metodiky pro výpočet ekonomických dopadů kulturní organizace. Praha : Institut umění Divadelní ústav, 2011.
- REHÁK Š. and ŠIPIKAL M.2011. *Kvalitatívne metódy v regionálnom výskume*. Bratislava: Vydavateľstvo EKONÓM.
- REHÁK, Š. and SEKELSKÝ, L., 2014. *Ekonomické vplyvy vysokoškolských študentov na hostiteľské mesto*. Prípadová štúdia Ekonomickej univerzity v Bratislave. Ekonomické rozhľady. Vol 43, No. 1. pp. 70 81.
- STEINACKER, A. 2005. The economic effect of urban colleges on their surrounding communities. In: *Urban Studies*. Vol. 42, No. 7, pp. 1161 1175.

Online Dispute Resolution Platform for B2C E-Commerce in the European Union

NIKOLA ŠIMKOVÁ¹ Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

The growth of B2C e-commerce increases the frequency of disputes from these transactions between businesses and consumers. Judicial procedure is slow, expensive, and difficult to deal with. Therefore, the European Commission has adopted several recommendations, directives and regulations to promote online dispute resolution (ODR). The aim of this paper is to assess how the EU countries have implemented these rules and also the status of the ODR platform, which will be operational on 9 January 2016. This description can be useful for businesses because it identifies the requirements in this area which should be incorporated into their strategy.

Key words: Online Dispute Resolution, Alternative Dispute Resolution, ODR Platform, B2C E-Commerce, ODR, ADR

JEL Classification: D74, K41, L81

1 Introduction

The development of ICT technologies is also reflected in business, companies have started to sell their products and services to customers via the Internet. According to the Eurostat, in 2014, 50.2% of individuals purchased online in the European Union which represented the increase of almost 30% compared to 2004. This growth of B2C e-commerce increases the frequency of disputes from these transactions between businesses and consumers. The traditional way to settle disputes is by using the court. In general, this procedure is slow, expensive, and difficult to deal with. Especially in disputes from online transactions, out-of-court dispute resolution mechanisms providing cheap, simple and quick solutions to consumer disputes are desirable.

Tonio Borg as the European Commissioner for Health and Consumer Policy considered that Alternative Dispute Resolution (ADR) and Online Dispute Resolution (ODR) are a win-win for consumers, who will be able to resolve their disputes out-of-court in a simple, fast and low-cost manner, and also for traders who will be able to keep good relations with customers and avoid litigation costs (European Commission, 2013a). Flash Eurobarometer No 358 found that 44 % of consumers in the survey agreed that it is easy to settle disputes with retailers via out-of-court bodies (arbitration, mediation or conciliation body). In Flash Eurobarometer No 359, retailers were asked if they knew and used any ADR bodies for settling disputes with consumers in their country. Results showed that 44% of retailers did not know any ADR bodies in their country in 2012 and 86% of retailers who knew of ADR bodies had not used one in the past two years.

¹ Ing. Nikola Šimková, Němcovej 32, 040 01 Košice, Slovak Republic, nikola.simkova@tuke.sk

The European Commission has adopted several recommendations, directives and regulations to facilitate consumers' access to ADR and ODR. The aim of this paper is to assess how the EU countries have implemented these rules and also the status of the ODR platform, which will be operational on 9 January 2016. This description can be increased business awareness how settle disputes with consumers via out-of-court dispute resolution mechanisms.

The remaining of the paper is structured as follows. Section 2 contains an overview of existing EU instruments on ADR and ODR. In Section 3 we provide a description of how ADR and ODR rules work in practice. Finally, Section 4 discusses the impact of the ODR platform on business and in the last section some concluding remarks and future lines of research are presented.

2 Existing EU instruments on ADR and ODR

The first Commission Recommendation 98/257/EC applies to consumer ADR schemes which either propose or impose a solution to resolve a dispute (arbitration-like mechanisms) and encourages out-of-court bodies responsible for settling consumer disputes to apply the principles of independence, transparency, effectiveness, legality, liberty, representation and adversarial principle. The second **Recommendation 2001/310/EC** applies to a more consensual resolution of disputes, where a third party attempts to resolve the dispute by common consent (mediation-like mechanisms) and respects the principles of impartiality, transparency, effectiveness and fairness. The Commission has set up networks to facilitate consumers' access to ADR and provide guidance on the use of ADR schemes for disputes with traders. The Fin-Net was launched in 2001 and it is a financial dispute resolution network of national out-of-court complaint schemes in the European Economic Area countries that handle cross-border disputes between consumers and financial services providers, such as banks, insurance companies, investment firms and others (European Commission, 2013c). The ECC-Net (The European Consumer Centre Network) was established in 2005 and it consists of the centers based in each EU Member State, Norway, and Iceland. It provides consumers with information on their rights under European consumer legislation, and gives advice and assistance in the resolution of their individual cross-border complaints (European Commission, 2015a).

In 2010, the European Commission presented the Digital Agenda which states that one of the ways of achieving the digital single market and increase consumer trust is the EU-wide Online Dispute Resolution (ODR) system for e-commerce transactions. One of the 12 actions of Single Market Act (European Commission, 2011a) is legislation on ADR for simple, fast and affordable out-of-court settlements for consumers and protects relations between businesses and their customers also in e-commerce dimension.

Several EU Directives, such as the E-commerce Directive, the Postal Services Directive, the Markets in Financial Instruments Directive (MiFID), the Consumer Credit Directive, the Payment Services Directive and Directives regarding the telecom sector and the energy sector encourage establishing ADR schemes. Moreover, the Directive on Mediation encourages judges to promote recourse to mediation (European Commission, 2011b).

In 2011 was initiated a public consultation on ADR which resulted in the adoption of the **Directive on consumer ADR 2013/11/EU** in 2013. It ensures that consumers can turn to quality ADR entities for all contractual disputes from online or offline, domestic or cross-border

purchase in every market sector (excluding disputes regarding health and higher education) and in every Member State. This Directive is linked with the **Regulation on consumer ODR No 524/2013** for disputes from online transactions. It will be created the EU-wide ODR platform which will link all the national ADR entities. This single entry point is designed to be a userfriendly and interactive website, available in all EU official languages and free of charge. The ODR platform should be operational on 9 January 2016 and online traders should provide an electronic link to the ODR platform on their websites to inform consumers, so it is useful for business to know the status achieved in this area.

3 ADR and ODR in practice

In this section, we begin with the current definition of the EU B2C e-commerce market before assessing of the existing EU instruments on ADR and ODR and finally we describe the status of the upcoming ODR platform.

3.1 EU B2C e-commerce market

In 2014, EU consumers purchased goods and/or services online in the amount of \in 368.7 billion which represented 25.6% of worldwide B2C e-commerce turnover. The graph (Figure 1) of the EU B2C e-commerce market immediately shows the importance of the UK. After all, its market has a share of more than one-third of the entire EU e-commerce market. However, the difference between the top 3 and the rest is also significant. Together, the UK, Germany, and France account for almost 70% while the differences between the smaller markets are almost negligible. The share of number four Spain is only 3.5% larger than that of number fourteen Greece.



Figure 1 Country share of the EU B2C e-commerce market in 2014 Source: Ecommerce Europe (2015)

The EU B2C e-commerce continues to grow, in 2014 recorded a growth of 13.7%. The highest increase achieved Hungary. As can be seen on the graph (Figure 2), this is significantly higher than the growth rate of the UK. As a result, the share of the EU leader in terms of B2C e-commerce turnover might be lower in the future.



Figure 2 Top 9 EU countries in terms of B2C e-commerce growth rate in 2014 Source: Ecommerce Europe (2015)

This growth of B2C e-commerce in the EU increases the frequency of disputes from these transactions between businesses and consumers. In light of the slow and expensive judicial process grows the importance of ADR and ODR.

3.2 Using of existing EU instruments on ADR and ODR

The Recommendations 98/257/EC and 2001/310/EC establish a number of minimum guarantees that ADR schemes should respect. On that basis, the Commission has developed a database with the ADR schemes. The study identified 750 ADR schemes relevant for B2C disputes in the EU countries, of which only about 60% are notified to the Commission (European Commission, 2009). The reasons were lack awareness of the notification process or not perceived benefit of notification, so the greatest problem is the transparency.

The same limitation occurs in the evaluation of the use of ADR networks. For the **Fin-Net** we have available data only until 2012 when it had 57 members. The most ADR schemes (11) were in Germany. On the graph (Figure 3) we can see a sevenfold increase in the number of disputes since its creation. The majority of cases are related to the banking sector.



The ECC-Net deals with more cases as the Fin-Net because it is the information provision centre and clearing house directing consumers to the appropriate ADRs including Fin-Net members. In 2014, it had over 90 000 direct contacts with consumers and dealt with more than 37 000 complaints (Figure 4). By 2014, more than two-thirds (nearly 50 000) of the complaints involved e-commerce transactions. Therefore, the establishment of the ODR platform should be desirable.



Figure 4 Total number of contacts and complaints to ECC-Net Source: European Commission (2015)

3.3 Current status of the EU ODR platform

The ODR platform should be operational on 9 January 2016 and on 2 July 2015 was published **Commission Implementing Regulation on consumer ODR 2015/1051**. On this basis, we describe the scheme (Figure 5) as it should work the ODR platform.

There are four actors: a complaint party (consumer or trader), a respondent party (trader or consumer), ADR entities (e.g. mediation, conciliation, arbitration, ombudsmen), and ODR contact points. The ODR contact points shall provide support to the resolution of disputes relating to complaints submitted through the ODR platform and they should be inspired by the experience of the centers of the ECC-Net in facilitating the settlement of disputes between consumers and traders. They should host at least two ODR advisors in each Member State.

The complainant party fills an electronic complaint form available in all the official languages of the institutions of the Union with attaching relevant documents. Information are about name, e-mail, geographical address and language of the consumer, the trader and optionally their representatives, type, and price of the good or service purchased, purchase date, type and description of complaint and others. The draft shall be accessible and editable and if is not submitted, it shall be automatically deleted from the ODR platform six months after its creation. Upon receipt of the fully completed electronic complaint form, the ODR platform shall inform the respondent party about the complaint through e-mail. Upon receipt from *the respondent party* about the complaint through e-mail. Upon receipt from *the respondent party*.

If no competent ADR entity was identified in the electronic complaint form, the ODR platform shall display an indicative list of ADR entities according to the geographical address of the parties and the sector that the dispute relates to. The list shall include a description of each ADR entity such as contact details, fees, languages, average length, binding or non-binding nature of the outcome of the ADR procedure and grounds on which the ADR entity may refuse to deal with a given dispute. If the respondent party refuses using ADR, the parties fail to **agree** within 30 calendar days after submission of the complaint form **on an ADR entity**, or the ADR entity refuses to deal with the dispute, the complaint shall not be processed further and other means of redress shall be used. The personal data shall be deleted from the platform at the latest six months after their conclusion.

The chosen ADR entity shall have to settle the dispute within 90 days from the date of receipt of the complete complaint file. It shall inform the ODR platform about the subject of the dispute, date of conclusion and result of the ADR procedure. The ODR platform shall give the possibility to the parties involved in a dispute to give their feedback upon conclusion of the ADR procedure and for six months thereafter. Moreover, the ODR contact points shall assist with the submission of complaints and facilitate communication between the parties and the competent ADR entity through the ODR platform.



Figure 5 Scheme of the EU ODR platforr Source: Own Processing

On 25 and 27 November 2014, 120 participants (ADR/ODR experts appointed by Member States, consumer and trader representatives, the European Disability Forum) tested the technical functionality and user-friendliness of the ODR platform and of the complaint form, including with regard to translation. About 70% rated their overall impression of the ODR platform with 4 (5 as the highest). They positively assessed that the platform is easy to use and navigate,

information is clear and easy to understand and complaint form is easy to submit. They also identified constructive suggestions for further improvements, such as making next steps and history of case clearer, optimizing quality of translation, improving exchange of messages and dashboards for ADR entities and ODR contact points (European Commission, 2015b). Further testing will be carried out in 2015.

4 Discussion

If businesses sell products or services to consumers through a website they must meet certain legal obligations. These rules apply whether it is a large established company or just start-up. In the European Consumer Centres E-commerce report 2014 is a checklist where traders can make sure they are on the right side of the law and also what information are required to display on their website. **Traders** should provide their email address so that consumers have a first point of contact. In order to ensure broad **consumer awareness** of the existence of the ODR platform, they should inform about this possibility how a potential conflict should be solved. Our scheme (Figure 5) provides a basic overview of the procedures in the ODR platform so businesses can benefit from it.

The EU ODR platform should build on existing ADR entities and respect the legal traditions of the Member States. They may be funded by the private sector, public or a combination of both. Private solutions are focused more on efficiency, speed and outcomes than traditional litigation, but they may lack necessary levels of **transparency**, **predictability** or **fairness** (Thompson, 2014). To eliminate these shortcomings, it is necessary to provide a detailed description of ADR entities. Especially, information about fees, average length and success rate are important aspects for choosing ADR entities. Assessing the **effectiveness** of ADR, it should be carried out also by monitoring how consumers and traders perceive the justice of the ADR procedure. For these reasons, feedback from the parties involved in a dispute is really useful for further development.

The EU ODR platform will not enable resolving the dispute directly, but only facilitates access to ADR entities, such as a conciliator, mediator, ombudsman, complaints board etc. Future research should focus on resolving disputes through the **ODR entities** (e.g. RisolviOnline is an entirely online mediation service) which are more appropriate for e-commerce. In addition, the creation of the ODR platform would be useful also for disputes from **B2B e-commerce** with higher value.

5 Conclusion

In 2014, B2C e-commerce turnover in the EU represented \in 368.7 billion and recorded an increase of 13.7%. Growing B2C e-commerce has brought new trends and challenges in entrepreneurship. The traditional judicial dispute resolution is not always practical or cost-efficient for consumers or businesses. Its costs, risks, complexity, and slowness make it uneconomic for consumers. For businesses, ADR can be a tool for maintaining business reputation and preserving customer trust. Each Member State of the EU has its unique mix of ADR processes and techniques. Therefore, the European Commission has set rules that ADR schemes should respect and has developed their database.

Moreover, two networks were established to facilitate consumers' access to ADR and provide guidance on the use of ADR schemes for disputes with traders. The Fin-Net as a financial dispute resolution network recorded in 2012 a sevenfold increase in the number of disputes since its creation. The ECC-Net deals with more cases as the Fin-Net because it is the information provision centre and clearing house directing consumers to the appropriate ADRs. By 2014, more than two-thirds of the complaints involved e-commerce transactions. For this reason, the EU-wide ODR platform is creating. The aim of this paper was to assess how the EU countries have implemented ADR and ODR rules and also the status of this ODR platform.

Based on available information, we provided the scheme as a basic overview of the procedures in the ODR platform to increase consumer and business awareness. We identified potential risks associated with a lack of transparency, predictability, and fairness. We recommended the detailed description of ADR entities (fees, average length and success rate) and monitoring how consumers and traders perceive the justice of the ADR procedure. We think possible areas for further research include resolving disputes through the ODR entities and the ODR platform for disputes from B2B e-commerce.

References

ECOMMERCE EUROPE. 2015. European B2C E-commerce LIGHT Report 2015.

- EUROPEAN COMMISSION. 1998. Commission Recommendation on the Principles applicable to the bodies responsible for out-of-court settlement of consumer disputes [98/257/EC]. [online]. Available online: http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:31998H0257>.
- EUROPEAN COMMISSION. 2001. Commission Recommendation on the principles for out-ofcourt bodies involved in the consensual resolution of consumer disputes [2001/310/EC]. [online]. Available online: http://eur-lex.europa.eu/legalcontent/EN/ALL/?uri=CELEX:32001H0310>.
- EUROPEAN COMMISSION. 2009. Study on the use of Alternative Dispute Resolution in the
European Union. Final Report. Submitted by Civic Consulting of the Consumer Policy
Evaluation Consortium (CPEC). [online]. Available online:
<http://ec.europa.eu/consumers/archive/redress_cons/adr_study.pdf>.
- EUROPEAN COMMISSION. 2010. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions A Digital Agenda for Europe [COM/2010/0245 final]. [online]. Available online: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=URISERV:si0016>.
- EUROPEAN COMMISSION. 2011a. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Single Market Act Twelve levers to boost growth and strengthen confidence "Working together to create new growth" [COM/2011/0206 final]. [online]. Available online: http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:52011DC0206>.
- EUROPEAN COMMISSION. 2011b. Consultation Paper on the use of Alternative Dispute Resolution as a means to resolve disputes related to commercial transactions and practices in the European Union. [online]. Available online: http://ec.europa.eu/dgs/health_food-safety/dgs_consultations/ca/docs/adr_consultation_paper_18012011_en.pdf>.

- EUROPEAN COMMISSION. 2013a. A step forward for EU consumers: Commissioner Tonio Borg welcomes adoption of Out-of-court Dispute Resolution [Memo/13/192]. [online]. Available online: http://europa.eu/rapid/press-release_MEMO-13-192_en.htm>.
- EUROPEAN COMMISSION. 2013b. Consumer Attitudes Towards Cross-border Trade and Consumer Protection. Flash Eurobarometer 358. [online]. Available online: http://ec.europa.eu/public_opinion/flash/fl_358_en.pdf>.
- EUROPEAN COMMISSION. 2013c. FIN-NET activity report 2012. [online]. Available online: http://ec.europa.eu/finance/fin-net/docs/activity/2012_en.pdf>.
- EUROPEAN COMMISSION. 2013d. Retailers' Attitudes Towards Cross-border Trade and Consumer Protection. Flash Eurobarometer 359. [online]. Available online: http://ec.europa.eu/public_opinion/flash/fl_359_en.pdf>.
- EUROPEAN COMMISSION. 2015a. The European Consumer Centres Network. 10 years serving Europe's consumers. Anniversary Report 2005-2015. Luxembourg: Office for Official Publications of the European Union. [online]. Available online: http://ec.europa.eu/consumers/solving_consumer_disputes/non-judicial_redress/ecc-net/docs/ecc_net_-_anniversary_report_2015_en.pdf>.
- EUROPEAN COMMISSION. 2015b. The Online Dispute Resolution (ODR) Platform. Presentation to IMCO. Available online: <http://www.europarl.europa.eu/meetdocs/2014_2019/documents/imco/dv/odr_ppt_/odr_ppt _en.pdf>.
- EUROPEAN CONSUMER CENTRES NETWORK. 2014. European Consumer Centres Ecommerce report 2014. Part 1. Highlights for traders - Checklist and test yourself tool. [online]. Available online: <http://www.consumereurope.dk/~/media/ForbrugerEuropa/Publikationer/Rapporter/2014/E CC%20Ecommerce%20report%202014%20%20traders%20141117.pdf>.
- EUROPEAN UNION. 2013a. Directive of the European Parliament and of the Council on alternative dispute resolution for consumer disputes [2013/11/EU]. [online]. Available online: <a href="http://eur-chtttp://eur-chtttp://eur-chttp://eur

lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:165:0063:0079:EN:PDF>.

EUROPEAN UNION. 2013b. Regulation of the European Parliament and of the Council on alternative dispute resolution for consumer disputes [No 524/2013]. [online]. Available online: of the Council on alternative dispute resolution for consumer disputes [No 524/2013]. [online]. Available online:

lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:165:0001:0012:EN:PDF>.

- EUROPEAN UNION. 2015. Commission Implementing Regulation on consumer ODR [2015/1051]. [online]. Available online: http://eur-lex.europa.eu/legal-content/EN-SK/TXT/?uri=CELEX:32015R1051&">http://eur-lex.europa.eu/legal-content/EN-SK/TXT/?uri=CELEX:32015R1051&">http://eur-lex.europa.eu/legal-content/EN-SK/TXT/?uri=CELEX:32015R1051
- THOMSON, D. 2014. Implementing Online Dispute Resolution in a Public Justice System. [online]. Available online: http://www.scl.org/site.aspx?i=ed38332>.

Spatial Econometric Modelling of Internal Labour Mobility

MONIKA ŠISEROVÁ¹ – MARTINA ŽUDELOVÁ² Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

The migration modelling has been becoming a very important indicator of the regional economy. This trend is confirmed by several studies that were dealing with the modelling of the linkages between regional labour market variables and the internal migration. Investigation of labour mobility can help to regional and municipal agencies and institutions and also to investors by making proper tactical decisions. The main goal of this paper is a detection of the most significant variables that can affect the job mobility. The analysis focuses on the internal labour mobility of inhabitants between municipalities with larger and smaller amount of vacancies by using a spatial econometric interactional modeling. Our empirical analysis is based on internal labour mobility flows among Slovak municipalities (territorial level LAU-2) using 2011-2014 data.

Key words: Labour Mobility, Spatial Econometric Interactional Model, Slovak Republic

JEL Classification: J21, J68, J61

1 Introduction

Labour mobility carries important economic benefits at the aggregate level. According to the Long and Ferrie "the relocation of workers across regions permits the exploitation of complementary resources as they are discovered in new places, while reallocation across sectors makes possible the use of new technologies and the growth of new industries." Mobility allows to individuals to improve in the economic circumstances of those whose ambitions or skills are not the best match for the location or job in which they find themselves. Labour mobility involves changes in the location of workers across physical space, which is geographic mobility and across a set of jobs, which is occupational mobility. In this article, we deal with the geographic mobility. (Ferrie, Long, 2005)

Spatial econometrics offers a number of possibilities how to model labour mobility. The simpliest way is to calculate the net migration of each region, but there is a problem of losing information of the absolute number of emigrants and/or immigrants. To be accurate, it is necessary to take into account the volumes of both types of flows. According to the Fischer and Griffith, spatial interaction relate to measurements of each migrant that is associated with a link of origin-destination locations that represent areas (regions/municipalities) in space. (Fischer, Griffith, 2008) In order to address the spatial aspect of the phenomenon, spatial econometric interaction models can be considered as a proper method for analysing labour mobility flows in space.

¹ Ing. Monika Šiserová, Němcovej 32, 040 01 Kosice, Slovak Republic, monika.siserova@tuke.sk

² Ing. Martina Žudelová, Němcovej 32, 040 01 Kosice, Slovak Republic, martina.zudelova@tuke.sk

According to Fisher and Griffith "a huge amount of literature exists for spatial autocorrelation with a focus of interest on the specification and estimation of models for cross-sectional attribute data, there is scant attention paid to its counterpart in spatial interaction data." There is no obvious focus on spatial flows data in some of the most cited spatial statistics and econometric texts, such as Anselin (1988) and Cressie (1991). But Griffith and Jones (1980) dealt with this problem. Moreover, some relevant research has been done about network autocorrelation (see Black, 1992; Black and Thomas, 1998; Tiefelsdorf and Braun, 1999).

It is very important to investigate the movement of labour forces because it helps not only to regional and municipal agencies and institutions, but can also help investors by making proper tactical decisions. (Berg et al., 1982) This idea led us to set a main goal of this paper is a detection of the most significant variables that can affect the job mobility. Our empirical analysis is based on labour mobility flows among the Slovak municipalities (LAU 2) estimating a spatial econometric model and comparing the results to OLS estimates.

2 Methods

According to Fisher and Griffith spatial interaction models focus on groups of regions or municipalities rather than on individual regions or municipalities. Their intention is to explain the differences of spatial interaction across geographic space. In our paper we assume a spatial system in which each origin is also a destination, and the labour mobility flows can be depicted by the following interaction matrix \mathbf{Y} (Fischer and Wang, 2011):

$$\mathbf{Y} = \begin{bmatrix} y(1,1) & \cdots & y(1,j) & \cdots & y(1,n) \\ \vdots & \vdots & & \vdots \\ y(i,1) & \cdots & y(i,j) & \cdots & y(i,n) \\ \vdots & & \vdots & & \vdots \\ y(n,1) & \cdots & y(n,j) & \cdots & y(n,n) \end{bmatrix},$$
(1)

where y(i, j) is the number of observed origin-destination flows from origin location i (i = 1, ..., n) to destination location j (j = 1, ..., n).

As the flows are directional, i.e. $y(i, j) \neq y(j, i)$, the re-organisation of the data is necessary. Basically there are two main notational conventions introduced by LeSage and Pace (2008b): origin-centric (the one we also employ in this paper) or destination-centric. The regression model can be specified (LeSage and Fischer, 2010):

 $y = \alpha \iota_N X_{\alpha} \beta + X_{d} \gamma + \theta d + \varepsilon, \tag{2}$

where

y is *N*-by-1 vector of origin-destination flows,

 α is the constant term parameter,

 $t_{\rm N}$ is *N*-by-1 vector of ones,

- X_o is *N*-by-*Q* matrix of *Q* origin-specific variables,
- β is the associated Q-by-1 parameter vector that reflects the origin effects,
- X_d is N-by-R matrix of R destination specific variables,
- γ is the associated *R*-by-1 parameter vector that reflects the destination effects,
- θ is the scalar distance sensitivity parameter,
- *d* is *N*-by-1 vector of distances between origin and destination zones,
- ε is *N*-by-1 vector of disturbances with $\varepsilon \sim N(0, \sigma^2 I_N)$.

In this study we compare traditional OLS estimates of regression model specified in (2) an extension incorporating spatial dependence that was estimated manually.

$$y = \alpha + X_d \beta_d + X_o \beta_o + W_d X_d \beta_d + W_o X_o \beta_o + D\gamma + \varepsilon,$$
(3)

where

- $W_o X_o$ is N-by-1 spatial lag vector of \mathbf{X}_0 that captures origin-based spatial dependence with the associated scalar spatial dependence parameter ρ_0 , and $\mathbf{W}_0 = \mathbf{W} \otimes \mathbf{I}_N$ is a spatial weights matrix that captures origin-based dependence,
- $W_d X_d$ is *N*-by-1 spatial lag vector of \mathbf{X}_d that captures destination-based spatial dependence with the associated scalar spatial dependence parameter ρ_d , and $\mathbf{W}_d = \mathbf{I}_N \otimes \mathbf{W}$ is a spatial weights matrix that captures destination-based dependence (LeSage and Pace, 2008a).

3 Observation units and description of the data

Our sample consists of 2589 Slovak municipalities (territorial level LAU-2) in period of time from 2011 to 2014. District of Košice and Bratislava were merged into one single city districts. We obtained data from Central office of Labour, Social Affairs and Family, Census of population and housing in 2011 and Statistical Office of the Slovak Republis. Selection of the most powerful predictors is based on a number of studies (see e. g. Alecke, 2010; Etzo, 2007; Jivraj, 2013; Mitze and Rienkowski, 2011):

- [dens] *population density* (number of inhabitants per square kilometre)
- [EAP] *number of economic active person* (fraction of the inhabitants aged 15 and over within the districts either employed or actively seeking employment),
- [size_muni] size of the municipality
- [aver_age] *average age in municipality* (average age of inhabitants in particular municipality),
- [num_business] *number of businessmen* (number of self-employed persons in a certain municipality)
- [family_child] *number of families with children under age 25*
- [index_age] *ageing index* (the number of inhabitants in particular municipality 60 years old or over per hundred persons under age 15),

- [unempl] *unemployment rate*
- [lg_unempl] long-term unemployment rate (long-term unemployment of
- inhabitants unemployed for 12 months or more),
- [y_unemp1] youth unemployment rate fraction of inhabitants aged up to 30 out of work),
- [m_unemp1] *medium unemployment rate* fraction of inhabitants aged 30 50 out of work),
- [o_unempl] older unemployment rate (fraction of inhabitants over 50 out of work),

All variables have been standardized by an average value ratio.

4 Results

Our main results and findings are presented in Tab. 1. In table are displayed results of OLS regression model and Regression model extended by spatial dependence. Spatial econometric interaction modelling has been applied in order to model internal mobility flows among Slovak municipalities (territorial level LAU-2). Spatial weight matrix based on 6 nearest neighbor has been used.

It is obvious that in certain cases regression coefficients differ. There are explanatory variables which are not statistically significant at all. However, particular explanatory variables offer different sign of their coefficients. These changes have been apparently caused by applied spatial weight structures.

Statistically significant variables are number of businessman in particular area and number of families with children younger than 25 if spatial weight structures have been taken into account, too. Variable number of unemployment inhabitants (origin and destination) indicates negative relationship with number of inhabitants commuting for working purposes. Simultaneously is independent variable – average age of inhabitants in particular unit in negative relationship with depended variable number of commuters from certain administrative unit.

Our spatial econometric interaction model suggests, that independent variable – number of economic active persons is in positive relationship with out dependent variable.

Table 1 OLS regression model

variables	o.EAP	o.unempl	o.lg_ unempl	o.y_unem pl	o.m_ unempl	o.o_ unempl	o.aver_age	o.index_age	o.dnes	o.size_muni	o.num_ business	o.family_ child
β	0.0422	-0.1127	0.0707	-0.0040	0.0043	-0.0037	-0.1163	0.0030	0.0243	-0.3154	0.2623	-0.1613
SE	0.0011	0.0143	0.0102	0.0043	0.0059	0.0043	0.0496	0.0056	0.0025	0.0204	0.0023	0.0028
t	37.7001	-7.8716	6.9653	-0.9394	0.7271	-0.8518	-2.3442	0.5404	9.5387	-15.4708	116.1913	-57.2348
Р	**2.82E-16	**1.05E-06	**0.0045	0.3624	0.4783	0.4077	**0.0333	0.5969	**9.27E-08	**1.25E-10	**1.4E-23	**5.6E-19
variables	d.EAP	d.unempl	d.lg_ unempl	d.y_unem pl	d.m_ unempl	d.o_ unempl	d.aver_age	d.index_age	d.dnes	d.size_muni	d.num_ business	d.family_ child
β	0.0337	-0.0103	-0.0004	-0.0034	0.0026	0.0030	0.1525	-0.0034	0.0063	0.2754	-0.0091	0.0144
SE	0.0011	0.0143	0.0100	0.0043	0.0059	0.0043	0.0454	0.0056	0.0026	0.0198	0.0023	0.0028
t	29.8728	-0.7203	-0.0444	-0.7941	0.4339	0.6901	3.3555	-0.6159	2.4247	13.9000	-4.0598	5.1163
Р	**8.85E-15	0.4824	0.9652	0.4395	0.6706	0.5007	**0.0043	0.5472	0.0284	**5.66E-10	**0.0010	**0.0001
variables	Wo.	Wo.	Wo.	Wo	Wo.m_	W.o_	Wo	Wo.	Wo.	Wo.	Wo.	Wo.
	EAP	unempl	lg_unempl	y_unempl	unempl	unempl	aver_age	index_age	dnes	size_muni	num_busin	family_chil
β	-0.00081	-0.08922	0.08270	-0.01549	0.02409	-0.01455	0.39435	-0.02268	0.00914	-0.10710	-0.06870	0.06983
SE	0.00344	0.02882	0.01936	0.01062	0.01455	0.01039	0.08751	0.01427	0.00526	0.03641	0.00698	0.00771
t	-0.23609	-3.09580	4.27173	-1.45823	1.65566	-1.40104	4.50614	-1.58942	1.73851	-2.94139	-9.83903	9.05821
Р	0.81655	**0.00738	**0.00067	0.16540	0.11856	0.18155	**0.00042	0.13282	0.10260	**0.01011	**6.18E-08	**0.00181
variables	Wd. EAP	Wd. unempl	Wd. lg_unempl	Wd. y_unempl	Wd. m_unempl	Wd. o_unempl	Wd. aver_age	Wd. index_age	Wd. dnes	Wd. size_muni	Wd. num_busin	Wd. family_chil
β	0.00440	-0.05651	0.02840	-0.00306	0.01553	-0.00671	0.03662	-0.01483	0.00360	-0.00190	0.02251	-0.02368
SE	0.00260	0.02685	0.01865	0.01033	0.01434	0.01041	0.03592	0.01018	0.00527	0.03045	0.00501	0.00621
t	1.69434	-2.10448	1.52234	-0.29585	1.08296	-0.64419	1.01936	-1.45711	0.68376	-0.06257	4.48877	-3.81552
Р	0.11086	0.05261	0.14872	0.77140	0.29593	0.52918	0.32419	0.16570	0.50455	0.95094	**0.00043	**0.00169

Source: Own calculations

Notes: ** Indentification of significance level

In Figure 1 are displayed the most statistically significant variables. These explanatory variables are statistically significant regardless used Spatial Durbin model or Regression model extended by spatial dependence. The highest rate of unemployment is situated in the southern and eastern Slovak municipalities. Families are situated mainly near cities and biggest agglomerations.

We can suppose if inhabitants are forced commute for working purposes, after a certain period of time they decide to change their place of permanent residence. It is supposed mobility is close connected with migration.



Figure 1 Source: Statistical Office of Slovak Republic, own processing

5 Conclusion

The study offer results of the spatial econometric interaction modelling. We have applied our analysis on Slovak municipalities (territorial level LAU-2). Spatial Durbin model and regression model extended by spatial dependence have been used to provide proper results. Twelve

independent variables have been handled. They have been chosen based on previous studies and analysis.

There are variables which are not statistically significant regardless used spatial econometric model – OLS or Spatial econometric model extended by spatial dependence. The most statistically variables are number of unemployment inhabitants in a particular Slovak municipality, number of businessman in particular area and number of families with children younger than 25. Taking into account only one spatial weight matrix based on six nearest neighbors has been used. It might cause some variables are statistically insignificant at all.

We have been limited by computer technology. Otherwise we would offer results of remaining spatial econometric interaction models. These issues is going to be considered as limitations of the study and will be addressed in our future research.

Acknowledgements

This work was supported by grant of the Slovak Grant Agency VEGA No 1/0454/15: Redefining regional development - moving towards resilient regions.

References

- ALECKE, B., MITZE, T. and UNTIEDT, G. 2010. Internal migration, regional labour market dynamics and implications for German east-west disparities results from a panel VAR. In: *Jahrbuch für Regionalwissenschaft*. Vol. 30, No.2, pp. 159-189.
- ANSELIN, L. 1988. Spatial Econometrics: Methods and Models. Dordrecht, Boston, and London: Kluwer.
- BERG, L. VAN DEN, DRWET, R., KLAASEN, L. H., ROSSI, A. and VIJVERBERG, C. H. T. 1982. Urban Europe: A Study of Growth And Decline, Oxford: Pergamon Press.
- BLACK, W. R. (1992). "Network Autocorrelation in Transportation Network and Flow Systems,". In: *Geographical Analysis*. Vol. 24, No. 3, pp. 207–222.
- BLACK, W. R. and THOMAS, I. 1998. "Accidents on Belgium's Motorways: A Network Autocorrelation Analysis,". In: *Journal of Transport Geography*. Vol. 6, pp. 23–31.
- CRESSIE, NOEL A.C. 1991. Statistics for Spatial Data. New York: John Wiley.
- ETZO, I. 2011. Determinants of Interregional Migration in Italy: A Panel Data Analysis. In *Journal of Regional Science*, Vol. 51, No. 5, pp. 948-966.
- FERRIE, J. and LONG, J. 2005. Labour mobility. The Oxford encyclopedia of economic history.
- FISCHER, M. M. and GRIFFITH, D. A. 2008. Modeling Spatial Autocorrrelation in Spatial Interaction Data: An Application to Patent Citation Data in the European Union. In: *Journal of Regional Science*. Vol. 48, No. 5, pp. 969-989.
- GRIFFITH, D. A. and KEN J. 1980. "Explorations into the Relationship Between Spatial Structure and Spatial Interaction,". In: *Environment and Planning A*. Vol. 12, No. 2, pp. 187–201.
- JIVRAJ, S., BROWN, M. and FINNEY, N. (2013). Modelling Spatial Variation in the Determinants of Neighbourhood Family Migration in England with Geographically Weighted Regression. In: *Applied Spatial Analysis And Policy*. Vol. 6, No. 4, pp. 285-304.

- KAPTEYN, A., KOOREMAN, P. and WILLEMSE, R. 1988. Some Methodological Issues in the Implementation of Subjective Poverty Definitions. In: *The Journal of Human Resources*. Vol. 23, No. 2, pp. 222 242.
- MITZE, T. and REINKOWSKI, J. 2011. Testing the Neoclassical Migration Model: Overall and Age-Group Specific Results for German Regions. In: *Zeitschrift für Arbeitsmarkt Forschung / Journal for Labour Market Research*. Vol. 43, No. 4, pp. 277-297.
- RAVALLION, M. 1996. Issues in Measuring and Modelling Poverty. In: *The Economic Journal*. Vol. 106, No. 438, pp. 1328 1343.
- RAVALLION, M. 1992. Poverty comparisons: A guide to concepts and methods. Washington, D. C.: The World Bank.
- TIEFELSDORF, M. and BRAUN, G. 1999. "Network Autocorrelation in Poisson Regression Residuals: Inter-District Migration Patterns and Trends within Berlin." Paper presented at the 11th European Colloquium on Quantitative and Theoretical Geography, September 3–7, Durham City, England.

Financial Integration Process in the EU Countries after the Euro Introduction: Position of Slovakia

ĽUBICA ŠTIBLÁROVÁ¹ Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

Financial integration represents one of the essential requirements for successful economic integration. The aim of this paper is to quantify the level of financial integration in conditions of the European Union. We used factor and cluster analysis to examine selected main determinants in time period 1999-2012. Our goal was to investigate similarities and differences among the EU countries in order to evaluate current and future degree of homogenization contributing to successful circulation of common currency. We also focused our attention on position of Slovakia according to progressing financial integration and identified deviation from less developed Central and Eastern European economies.

Key words: European Union, Financial Integration, Transitive Economies, Cluster Analysis

JEL Classification: F36, C38

1 Introduction

Financial integration process intensified after the euro adoption and it represents one of the main goals of the Eurosystem. As it is stated in its mission (ECB, 2008, p. 7): "... acting as a leading financial authority, we aim to safeguard financial stability and promote European financial integration."

The aim of this paper is to analyze the level of financial integration in the EU countries after the euro introduction in 1999. Our goal is to investigate whether positive impacts on allocation of capital and financial stability can be observed or the monetary policy in the eurozone may not be optimal due to differences among countries.

2 Theoretical background and the definition of financial integration

In this paper we incline to the definition of the European Commission that is generally accepted. According to the European Commission (2004, p. 6): "the market for a given set of financial instruments and/or services is fully integrated if all potential market participants with the same relevant characteristics:

- 1. face a single set of rules when they decide to deal with those financial instruments and/or services;
- 2. have equal access to the above-mentioned set of financial instrument and/or services; and
- 3. are treated equally when they are active in the market."

¹ Ing. Ľubica Štiblárová, Němcovej 32, 040 01 Košice, Slovak Republic, lubica.stiblarova@tuke.sk

The law of one price is often attached to definitions discussing financial integration (Kučerová, 2009). According to the law of one price, assets with identical risks and returns should be priced identically regardless where they have been transacted. Even if this condition is not fulfilled and the law of one price does not hold, price of asset will change due to possibility of arbitrage.

Capital flows play important role in the process of financial integration of economies. According to Mirdala et. al. (2011), financial integration is particularly related to liberalization of capital flows and to the range of restrictions applied on capital flows. Brouwer (2005) defines financial integration as a process through which financial markets become more closely integrated with others. That involves an increase in capital flows and tendency towards equalization in prices and returns on traded financial assets.

2.1 Positive and Negative Aspects of Financial Integration

Previous studies assumed that financial integration leads to an economic growth (see e.g. Edison et al., 2002; Prasad et al., 2003). Giannetti et al. (2002) explain that improved access to investment opportunities caused by financial integration tends to an increase in competition and greater effectivity of financial institutions.

Higher level of financial integration may positively affect allocation of capital (Levine, 1997). Elimination of barriers allows investors to allocate financial sources to more productive investments (Baele et al., 2004).

Rousseau (2002) and Trichet (2007) recognized financial development as one of the benefit of financial integration. It promotes investment opportunities by capital reallocation and increased competition. The European Commission (2004) argues that financial integration facilitates risk sharing and economic growth. Diversification of financial risk due to larger markets enables institutions, companies and households to invest in highly risky projects with potentially high returns.

Financial integration may also induce negative effects. Participated countries may become more vulnerable to external macroeconomic shocks and financial crises due to contagion effect and effect of herd (Stavarek et al., 2011). According to Edison et al. (2002), Baele et al. (2004), Komárek and Komárková (2008), the most essential negative aspects of financial integration are: high degree of concentration and inadequate allocation of capital flows, loss of macroeconomic stability, pro-cyclical movements in short-term capital flows, high degree of volatility of capital flows and risks associated with foreign bank penetration.

2.2 Key Determinants of Financial Integration

Following Furceri et al. (2011), Lane and Milesi-Ferretti (2008), we focus in this study on these variables influencing financial integration:

• Trade openness - Previous studies have argued that trade openness and financial integration go hand in hand (see e.g. Obstfeld, 2007). Trade openness may improve information flows and thereby ameliorate country risk position. This can lead to increased willingness to invest in foreign assets of country and generate cross-border financial flows.

- Financial development Higher level of financial development may lead to increased competition on financial markets, stimulate expansion of domestic financial institutions and affect cross-border financial flows.
- Economic development According to Furceri (2012), higher level of economic development measured as GDP per capita may lead to an increase of foreign financial inflows and thereby improve international investment position of a country. In addition, country risk can be reduced.
- Size of the country This factor is related to trade and financial openness. We assume that smaller countries tend to be more open to trade and financial flows.
- Capital account openness Capital account restrictions tend to a decrease in cross-border flows and have negative impact on the accumulated stocks of foreign assets and liabilities.

3 Data and methodology

For the purpose of this paper, we use data about key determinants of financial integration for 28 EU countries during time period 1999 - 2012 (see Table 1).

	Variable	Source
Trade openness	$\frac{(Export + import)}{GDP}$	IMF, Eurostat
Financial development	$(Market capitalization+bank\ deposits)$	World Bank,
	GDP	Eurostat
Economic development	GDP per capita	World Bank
Size of the country	Total population	World Bank
Capital account openness	Chinn-Ito Openness Index	Chinn-Ito Index dataset

 Table 1 Determinants of financial integration (explanatory variables)

Source: Own compilation

Our goal was to examine the level of financial integration of each country and its progress during selected years. In this order, cluster analysis was selected as the main method. Due to correlation observed in data sample, factor analysis was firstly applied.

In factor analysis, data were standardized because of different scales. Factorability was examined via Kaiser-Meyer-Olkin measure (recommended value higher than 0.5) and principle components analysis was applied (2 factors identified in each year). We used orthogonal factor matrix rotation VARIMAX. Estimations of factor scores were consequently used in cluster analysis.

In cluster analysis, Euclidean distance was selected as a distance measure between observations:

$$d_{ij} = \sqrt{\sum_{k=1}^{n} (X_{ik} - X_{jk})^2}$$
(1)

where X represents characteristic of subject (n subjects – in our case 28 countries, characterized by k characteristics – 5 determinants).

We used hierarchical agglomerative method – Ward's method in which error sums of squares (ESS) is applied as measure of homogeneity. All the calculations were performed in the R environment using packages psych, cluster, NbClust and GPArotation.

4 Results and discussion

We can observe indisputable differences in selected variables among EU countries, as well as in the level of financial integration in the whole EU. There is also evidence that financial integration process slowed when the crisis deepened. Although markets started to pick up, convergence in the Euro area remained higher than in the whole EU and considerable differences are appearing until now. Our analysis approves this argument. Summarized results of cluster analysis during time period 1999-2012 for each of 28 EU countries can be seen in Table 2.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
AU	1	1	1	1	1	1	1	1	1	1	1	1	1	1
BE	2	2	2	2	2	2	2	2	2	2	2	2	2	2
BG	3	3	3	3	3	3	3	2	2	2	3	2	2	2
HR	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CY	1	4	3	4	1	1	1	1	1	1	1	1	1	3
CZ	3	4	4	4	2	2	2	2	2	2	2	2	2	2
DN	4	1	1	1	1	1	1	1	1	1	1	1	1	1
ET	3	4	4	4	2	2	2	2	2	2	2	2	2	2
FI	4	1	1	1	1	1	1	1	1	1	1	1	1	1
FR	5	5	5	5	4	4	4	4	4	4	4	4	4	4
DE	5	5	5	5	4	4	4	4	4	4	4	4	4	4
GR	1	1	1	1	1	1	1	1	3	3	1	1	3	3
HU	3	4	4	4	2	2	2	2	2	2	2	2	2	2
IR	2	2	2	2	1	1	1	1	1	1	1	1	1	1
IT	5	5	5	5	4	4	4	4	4	4	4	4	4	4
LV	3	3	3	3	3	3	2	2	2	3	3	2	2	2
LT	3	3	3	3	3	2	2	2	2	2	2	2	2	2
LU	4	6	6	6	5	5	5	5	5	5	5	5	5	5
ML	2	2	4	4	2	2	2	2	2	2	2	2	2	2
NL	4	1	1	2	1	1	1	1	1	1	1	1	1	1
PO	6	3	3	3	3	3	3	3	3	3	3	3	3	3
PR	1	1	1	1	1	1	1	1	3	3	1	1	3	3
RO	6	3	3	3	3	3	3	3	3	3	3	3	3	3
SK	3	3	3	3	3	3	3	2	2	2	2	2	2	2
SV	3	4	4	4	2	2	2	2	2	2	2	2	2	2
SP	5	5	5	5	4	4	4	4	4	4	4	4	4	4
SW	4	1	1	1	1	1	1	1	1	1	1	1	1	1
GB	5	5	5	5	4	4	4	4	4	4	4	4	4	4

Table 2 Cluster analysis summary

Source: Own compilation, note: number represents number of cluster to which country belongs

Colour distinction: Cluster 3 - cluster to which Slovakia belonged from 1999-2005

Cluster 2 – cluster to which Slovakia belonged from 2006-2012

4.1 Characteristics of Clusters

As we performed cluster analysis during long time period, we can observe changes in positions of countries, not only static results from one year. From 2003 to 2012, 5 different groups of countries were identified (the name of each cluster is simplified according to long-term position of countries in given time period):

- Cluster 1 developed countries (Austria, Cyprus, Denmark, Netherland, Sweden, and Finland);
- Cluster 2 countries with high level of trade openness (Belgium, Ireland, Malta, later joined by transitive economies from cluster 3)
- Cluster 3 transitive economies (Bulgaria, Croatia, Latvia, Lithuania, Poland, Romania, Slovakia, Czech Republic, Estonia, Hungary, Slovenia)
- Cluster 4 developed economies with total population up to 40 million (France, Germany Italy, Spain, and Great Britain)
- Cluster 5 Luxembourg.



Figure 1 Graphic summary of the cluster analysis

Source: Own editing, note: countries in grey color do not belong to particular cluster in the latest observation

Cluster 1 represents developed countries (according to economic and financial development), these countries are characterized by high rate of capital openness, but lower trade openness (on average 70% of GDP) with total population over 8 million. Cluster 2 differs from other clusters due to high level of trade openness (over 100% of GDP). These medium – sized countries with total population about 6 million tend to hold intense trade cooperation with foreign countries. Cluster 2 concluded Belgium, Ireland and Malta, yet many European transitive economies (including Slovakia) firstly belonged to cluster 3 became members of this group due to an increase in trade openness and capital inflow. As we mentioned above, cluster 3 can be characterized as the cluster of transitive economies. Because of the transformation and dynamic increase in foreign capital, trade and financial openness, many of them left this cluster. From 2005, Slovakia is no longer a member of this group. It is the cluster with the lowest level of
capital openness, economic and financial development. On the other side, countries in this cluster are large according to population. Trade openness is on average 80% of GDP. Cluster 4 contains developed economies; it can be characterized by high level of capital openness, economic development and large size of population (average total population is about 60 million). As they are not dependent on foreign countries, trade openness is on lower level. Cluster 5 (excepting year 1999) represents only one country – Luxembourg. This very specific country differs from others by the highest level of capital openness, but on the other side by the lowest level of total population. That is the reason why GDP per capita is as high, as well as financial development.

4.2 Position of Slovakia

Slovakia had stable position in cluster 3 during time period 1999-2005 (see Table 2). In 2005 (Figure 2 on the left side), Slovakia was a member of cluster 3 – cluster of transitive economies which concluded Bulgaria, Poland, Croatia and Romania. Over the years, European transitive economies have changed their position according to their economy's performance and resembled to more developed countries from Western Europe.



Figure 2 Cluster analysis – dendrogram, year 2005 (left) and 2006 (right) Source: Own editing in R

In 2006 (Figure 2 on the right side), situation has changed and from this year Slovakia became a member of cluster 2 which concluded Belgium, Malta, Czech Republic, Slovenia, Estonia, Hungary, Latvia, Bulgaria, and Lithuania. Change in position of Slovakia in 2006 can be explained by continuing process of European integration intensified by the Slovakia's membership of the EU from 2004 supported by legislation changes (fiscal consolidation), increase in direct investment resulting in economic growth, as well as by the preparation for the euro introduction in 2009. In 2005, Slovakia was more similar to countries in cluster 3 mainly because of the low level of capital openness (mean capital account openness of cluster 3 is 0.58 and Slovakia 0.51) and low level of financial development (see Table 3).

		Trade	Financial	Economic	Total	Capital
	~ .	openness	development	development	population	openness
	Cluster 1	64.55%	147.31%	34,792.40	7892,393	0.98
02	Cluster 2	116.88%	95.91%	14,703.90	5012,164	0.96
20	Cluster 3	81.40%	57.78%	7,570.59	15407,970	0.58
ar	Cluster 4	46.09%	168.06%	32,502.46	61533,900	1.00
Ye	Cluster 5	81.23%	460.08%	80,925.22	465,158	1.00
	Slovakia	111.15%	56.26%	11,414.61	5372,807	0.51
	Cluster 1	67.93%	164.87%	35,908.50	7930,164	0.99
90	Cluster 2	122.72%	93.49%	14,007.80	5317,756	0.93
20	Cluster 3	66.83%	72.27%	8,048.20	21258,340	0.69
ar	Cluster 4	49.52%	150.75%	33,268.59	61876,510	1.00
Ye	Cluster 5	79.28%	512.69%	83,575.91	472,637	1.00
	Slovakia	129.34%	55.15%	12,366.63	5373,054	0.57

Table 3 Characteristics of clusters, year 2005 and 2006

Source: See Table 1, own calculation in R

Slovak financial system is relatively small, not resembling to the systems of countries from cluster 2. Even though, GDP per capita of Slovakia is markedly higher than in Bulgaria, Croatia, Romania or Poland. It is also evident that Slovakia varied from cluster 3 by size of population and trade openness (111% of GDP). In 2006, Slovakia became a member of cluster 2 due to increase in capital openness, GDP per capita (12,366.63 USD) and size of population. Trade openness increased by 18% per year.





Slovakia belongs to the top European exporting countries and is significantly dependent on foreign trade partners (e. g. Germany). Long-run increase in trade openness of Slovakia (as well as mean trade openness for cluster 2 and 3 for comparison) is illustrated in Figure 3.

During time period 1999 – 2012 we can observe only one decrease in 2009 due to the economic crisis. In 2012, Slovak trade openness represented about 170 % of GDP which is higher than mean trade openness of cluster 2. Similar level of trade openness can be seen in the Czech Republic, Estonia, Hungary, Malta or Slovenia. Slovakia's economic development measured as GDP per capita gradually increases, although we can see relatively big differences in economic development between cluster 2 and 3 (Figure 3). Cluster 3 consists of countries with the lowest

level of economic development and Slovakia reached always higher level than mean GDP per capita of this cluster.

According to this variable, Czech Republic (circa 14,000 USD in 2012) or Hungary (circa 11,000 USD in 2012) seems similar to Slovakia.



Source: See Table 1, own editing

Slovak financial development measured as a sum of market capitalization and bank deposits to GDP is relatively on stable level due to small financial market without greater expansion. Respecting average level 60% of GDP, Slovakia mainly resembles to Estonia, Hungary or Slovenia. Low level of economic and financial development during 1999-2005 was the main reason of Slovak position in cluster 3. Regarding to size of population, Slovakia is more similar to cluster 2 (as it can be seen in Figure 4) and countries as Bulgaria or Malta. Over the years, situation has changed (mainly due to increase in trade openness) and Slovakia became a member of cluster 2 -cluster of smaller, more opened economies with wider trade cooperation.



Figure 5 Capital account openness during time period 1999-2012 Source: See Table 1, own editing

As it is obvious from Figure 5, Slovak capital openness was always lower than mean capital account openness of cluster 2 or 3 (except year 2010 for cluster 3), but evidently it increasing. Regarding to capital openness, position of Slovakia is similar to Slovenia or Latvia (Chinn – Ito index in 2012 is for these two countries on level about 0.7).

5 Conclusion

According to results from cluster analysis, we identified 5 groups of EU countries that remain stable during selected time period. These groups particularly differ from each other by capital, trade openness or economic development that may not provide effective allocation of capital and may support unequal level of financial integration among EU countries. We observed change in positions of transitive economies (including Slovakia) that due to an increase in trade openness and economic development became more competitive. Slovakia left cluster of transitive economies in 2005 and continues in increasing capital, trade openness and economic development.

Acknowledgements

The paper was elaborated within the projects VEGA No. 1/0892/13 and 1/0994/15.

References

- BAELE, L. et al. 2004. Measuring financial integration in the euro area. *Occasional Paper Series No. 14*. Frankfurt: European Central Bank.
- BROUWER, G. 2005. Monetary and Financial Integration in Asia: Empirical Evidence and Issues. In: *Asia Economic Cooperation and Integration*.
- ECB 2008. *The working of the Eurosystem Monetary policy preparations and decision-making-selected issues*. Frankfurt: European Central Bank.
- EDISON, H. J. et al. 2002. International Financial Integration and Economic Growth In: *Journal of International Money and Finance*. Vol. 21, pp. 749 76.
- EUROPEAN COMMISSION 2004. Tracking EU financial integration. *Commission staff* working document. Brussels: European Commission.
- FURCERI, D. et al. 2011. *Medium- term determinants of international investment positions: The role of structural policies*. World Scientific Publishing Company.
- GIANNETTI, M. et al. 2002. Financial Market Integration, Corporate Financing and Economic Growth, Final Report (22 November 2002). Brussels: European Commission.
- KOMÁREK, L. and KOMÁRKOVÁ, Z. 2008. Integrace finančniho trhu vybranych novych členskych zemi EU s eurozonou. In: *Studie Narodohospodařskeho ustavu Josefa Hlavky*. Vol. 1.
- KUČEROVÁ, Z. 2009. Measuring Financial Integration in Central Europe Through International Investment Positions. In: *Eastern European Economics*. Vol. 47, No. 4.
- LANE, P. R. and MILESI-FERRETTI, G. M. 2008. *The Drivers of Financial Globalization*. Washington: International Monetary Fund.
- LEVINE, R. 1997. Financial development and economic growth: views and agenda In: *Journal* of Economic Literature. Vol. 35, pp. 688-726.
- MIRDALA, R. 2011. Ekonomické aspekty liberalizácie kapitálových tokov v európskych tranzitívnych ekonomikách. Košice: Technická univerzita v Košiciach.
- OBSTFELD, M. 2007. International Risk Sharing and the Costs of Trade. Ohlin Lectures, Stockholm School of Economics.
- PRASAD, E. et al. 2003. Financial Integration and Macroeconomic Volatility. *IMF Staff Papers No. 50.* Washington: International Monetary Fund.

- ROUSSEAU, P. L. 2002. *Historical Perspectives on Financial Development and Economic Growth*. Cambridge: National Bureau of Economic Research.
- STAVAREK, D. et al. 2011. *Theory of financial integration and achievements in the European Union*. London: Routledge.
- TRICHET, J. C. 2007. *Financial markets integration in Europe: the ECB's view*. Frankfurt: European Central Bank.

Innovation Management and Intellectual Property Regimes

DUŠAN ŠTIGLIC¹ Paneuropean University, Faculty of Economics and Business Slovak Republic

Abstract

This work attempts to scrutinize different approaches to innovation management on international and as well on a corporate level with an accent on intellectual property regimes. After analyzing the critical areas, the author synthesizes an optimal solution for each level where the innovation management is usually applied. On the national and international level, conceptual frameworks seem like a viable basis for an intensified innovative environment rather than over-regulated guidelines that result in a slow pace of innovation processes and de-motivated inventors. Therefore, the optimal solution should seek the balance between antagonistic innovation management approaches. The main obstacle the international community should urgently adjust is intellectual property rights regimes. The convenient solution to this global problem would speed-up the innovation processes in both developed and underdeveloped countries improving the standards of living everywhere.

Key words: Innovation Management, Intellectual Property, Startup

JEL Classification: A10, A12

1 Introduction

In a globalized world, the constant need for innovations become a necessary prerequisite for internationally operating companies in order to survive on the global market and further to satisfy the needs and expectations of their customers.

Together with the increasing demand for the ever present "new and improved" products which is semantically a non-sense term, the constant need for innovations in virtually every area related to consumer goods calls for a standardization of innovation management. Needless to say, that there is a discourse in the literature (Gassmann 2006; Kondo 2000; Nambisan 2002), whether any attempt to standardize innovation will not impede the innovation creativity, since it is quite evident that too much discipline with regard to high focus of innovation management might turn into a bureaucratic routine.

Therefore, this work will attempt to scrutinize different approaches to innovation management on international and as well on a corporate level with an accent on the intellectual property regime. After analyzing the key areas, the author will try to synthesize an optimal solution for each level where the innovation management is usually applied.

Innovation and creativity in the world of business are the most notable to the public when it comes to patent cases between the well-known companies or corporations, therefore the intellectual property in relation to innovation management will create a basis for this article.

¹ PhDr. Dušan Štiglic, Tematínska 10, 851 05 Bratislava, Slovak Republic, stiglic.dusan@gmail.com

2 Intellectual property and innovations

"Intellectual property is like a flame of a burning candle, when you pass it, it won't diminish the light of the first candle." Thomas Jefferson

Intellectual property is important for providing incentives for creative people to engage in innovations i.e. innovating activity. Inventors also need resources for producing innovations. The research doesn't have to be necessarily costly itself, but the researchers while engaged in the research projects can't participate in any other money-making activity. Therefore, the research needs to be funded from different resources. This also arises the question about how should be the intellectual property system set up in order to provide incentives for innovators and in the same time to enable others to dwell upon their innovations/inventions without placing an excessive financial burden on them. What is the cost of the intellectual property?

Intellectual property creates the monopoly. Monopoly raises the price. That's a mere science. In the ideal case scenario, knowledge or innovation, should be available as a public goods. Otherwise, it will result in too high prices of goods and too little usage of knowledge. And thus shall it slow down the pace of innovation.

To support the idea, that prevailing regimes of intellectual property protection are and always were inadequate, we can name countless examples of patent court cases:

- Curtis vs. Wright brothers (Macleod 2012) led to a situation whereas nobody knew exactly who to pay for the patent. This case escalated to the point where on the background of the Great War the US Government decided to rewrite the patent and established Manufacturer's Aircraft Association which is by definition a "Patent Pool.";
- Selden vs. Henry Ford (Greenleaf 2011);
- Netscape vs. Microsoft (Tomlin 2004) and its anti-competitive practices turning into Browser wars, where Microsoft as a dominant player on the field of operating systems provided its browser for free in an attempt of pushing the competitors off the market;
- Blackberry vs. NTP ink and a \$612 million settlement for using very similar wireless e-mail technology almost put Blackberry out of business (Kelley 2006).

There is an ongoing fear of making innovations in the software business all around the globe, since nobody wants to break the patent, but in a binary world it is almost impossible under the current US patent regulations.

In the last two decades, the patent claims by several US companies as RiceTech (Economic and Political Weekly 1998) or University of Mississippi Medical Center has reached the level of bizarreness when the first company claimed to have a patent on Basmati rice that has been used in India for centuries, in the other case UM Medical Center successfully registered a patent for the Turmeric (a Curcuma spice has been used for various purposes in India for thousands of years). The latter case was a catalyst for the debate on Biopiracy.

If the U.S patenting system is to by applied worldwide (WTO TRIPs agreement signed in 1994 supports this approach to a certain extent), there needs to be a compensation especially to the developing countries for the protection of their nature in terms of extensive biodiversity protection.

The particular action was taken as The Convention on Biological Diversity (CBD) emerged. The Convention has three main goals:

- Conservation of biological diversity (or biodiversity),
- Sustainable use of its components,
- Fair and equitable sharing of benefits arising from genetic resources in 1992.

Unfortunately, the United States refused to sign this agreement, because a part of the treaty requires US pharmaceutical companies to pay any compensation to the Country where the plant originates as an incentive for the protection of its biodiversity.

In past years, there has been an advancing patent case between Canada that refused to recognize the U.S. patent registered by the Eli Lilly Company claiming to have the ownership of the part of a human genome that is related to breast cancer. This caused the breast cancer drugs be much cheaper in Canada than in the United States (Behsudi 2013).

In terms of human development and improving well-being is privatizing of knowledge highly inefficient. In words of Joseph E. Stiglitz (Stiglitz 2006) "...intellectual property results in a lose-lose situation: the economy loses in the short run, as the higher prices of monopoly lower welfare, and in the long run, as innovation too is lowered."

The basis of the innovation is basic research. In the United States, the research at the Universities is mostly financed by the US government. In the European Union for the programming period 2014-2020 researchers can cumulatively apply for as much as 80 billion Euro (Europa EU 2014) which reflects the understood need for innovations in the EU. This is undeniably a necessary step if the EU wants to compete with China or India – with countries with various competitive advantages.

The Too strict intellectual property rights regime might slow down the innovation process. On the other hand, the advocates of such strict regimes claim that if the system were weaker the speed of research would be hampered (Stiglitz 2006).

On the contrary, the research is quite often impeded by the Corporations themselves, not as a part of some modern conspiracy theory, but simply because while older technologies or patents still provide a substantial income, from the economic perspective, there is no need to invest in innovations especially in the areas where there is an insufficient competition.

3 Business innovation

We can define innovation as the process of translating an idea or invention into a good or service that creates value or for which customers will pay (BusinessDictionary.com 2014).

Innovation involves a deliberate application of information, imagination, and initiative in stemming greater or different values from resources and includes all processes by which new ideas are generated and converted into useful products. An idea has to fulfill the two major conditions to be called a "business innovation":

- Replicability at an economical cost,
- Must satisfy a particular need.

In business, innovations are often generated when ideas are applied by the company in order to accommodate the needs and expectations of the customers.

Furthermore, innovations can be divided into two categories:

- Evolutionary innovations are brought about by many incremental advances in technology or processes. For example, a different type of sockets to which processor is connected that allows higher data transfer speeds;
- Revolutionary/disruptive innovations create a new market or value network, and eventually disrupt an existing ones, displacing an earlier technology. For instance, a processor with ultra-low energy consumption that allowed multimedia smartphones to emerge.

Innovation and risk-taking are quite often understood as synonyms leaving disadvantages connected to risk taking on the part of the company that first created revolutionary products or technologies since it created a new markets.

On the contrary, imitators often take less risk because they just start with an innovator's product and take a more efficient approach. Staying in the computer industry, the examples are IBM's PC against pioneering Apple Computer, Compaq with its cheaper PC's against IBM, and on the opposite end countless "Brands" with their on-demand PC configurations.

Large enterprises in order to prevent the dead end projects and waste resources often develop bureaucratic structures to manage resource allocations, those same processes may at the same time stifle innovation (Stiglitz 2014).

Bureaucratic structures may reinforce the excessive loss aversion to which behavioral economists have called attention (Kahneman 2011). And even if knowledge is supposed to flow freely within a perfect organization, in an imperfect reality individuals realize that knowledge puts them in an advantageous position and deliberately impede its free flow. Innovative firms create organizational designs and incentive structures that attempt to address each of these problems.

Now we can address the question, how such an organizational design can be approached.

4 Conceptual framework of innovation management

Innovation is recognized as essential for competitiveness in economic literature since the one of the greatest 20th-century economist Joseph A. Schumpeter came with the concept of creative destruction (Schumpeter 2010).

In last 80 years there have already been five generations of analysts of innovation processes within organizations as identified by Rothwell (Rothwell 1994).

Due to its multitude, it is not possible to discuss any of them jointly, but the author found Rosseger's linear model (Rosseger 1995), Drejer's contingency model (Murray 1978) or Caraca's interactive chain model (Caraca 2007) very intriguing.

After assessing a plethora of innovation models, Mir and Casadesús (Mir 2011) summarized that the innovation is now recognized as critical to an exceedingly wide range of activities that impinge on business success:

- Accelerating the development of technology-based new products,
- Increasing flexibility and adaptability,
- Organizational change for business success,
- Enhanced awareness of environmental issues,
- A greater focus on customer satisfaction and efficiency.

A Harvard University professor Kanter (Kanter 2013) identifies the major mistakes of internationally operating companies, when it comes to innovation strategy, process, structure and skills and suggests following remedies as indicated in Table 1.

Kanter's position supports the previously mentioned idea that the too rigid system slows down the pace of innovation. Moreover, an interesting ongoing study project innocentive.com (Tidd 2014) revealed "there is a systematic evidence for the premise that innovation occurs at the boundary of disciplines."

Therefore, the concept of innovation framework rather than the strict set of intra-company guidelines and too separated departments seem to suit the pro-innovative environment better.

Innovation Area	Mistake	Remedy
Process	Controls too tight	Add flexibility to planning and control system
Structure	Connections too lose Separations too sharp	Facilitate close connections between innovators and mainstream business
Strategy	Hurdles too high Scope too narrow	Widen the search, broaden the scope
Skills	Leadership too weak Communication too poor	Leaders with great interpersonal skills, surrounded by supportive culture of collaborators

Table 1

Source: Kanter (2013)

5 Innovation framework of the European Union

The Single market, free movement of goods and people, are the most fundamental advantages of the European Union. Even more appealing are these fundamental freedoms from the business perspective. To empower this internal market and enable it to be more competitive, the European Commission introduced The Innovation Union plan (European Commission 2013) which contains over thirty actions points, with the aim of three things:

• Make Europe into a world-class science performer;

- Remove obstacles to innovation like expensive patenting, market fragmentation, slow standard-setting and skills shortages that currently prevent ideas getting quickly to market;
- Revolutionize the way public and private sectors work together, notably through innovation partnerships between the European institutions, national and regional authorities and business.

In addition, In March 2008, the European Commission created the European Institute of Innovation and Technology based on the two-level structure that combines a bottom-up and top-down approaches to integrate innovation, research and growth across the European Union (Brisbanetimes.com.au 2008).

The idea of European Institute of Innovation and Technology (EIT) was developed within the framework of the Lisbon Strategy for Growth and Jobs, and has been specifically implemented to address Europe's innovation shortcomings. It is based on the concept that innovation is a key driver of growth, competitiveness, and social well-being. The EIT's mission is to (EIT 2014):

- increase European sustainable growth and competitiveness,
- reinforce the innovation capacity of the EU Member States,
- create the entrepreneurs of tomorrow and prepare for the next innovative breakthroughs.

The EIT intends to build Knowledge and Innovation Communities based on so-called "Knowledge Triangle" - higher education, research, and business. To reach an effective transmission and sharing of knowledge, information and skills it will be necessary to interconnect all three sides of this "triangle" in the same time for joint exploitation in pursuance of delivering the jobs and growth opportunities in Europe.

EIT mission plan states that it is much less efficient for excellent researchers, students and entrepreneurs to work in isolation when delivering the results needed and wanted by the global market and consumers.

This is perhaps one of the few moments, when European leaders and the European Commission are actually trying to install a supportive framework, rather than extensively prescribe too specific procedures "for everything" including a curvature of imported bananas.

I perceive this initiative as "an Island of positive deviation" or simply The Innovation of what was and still is perceived by the many European citizens as "normal." Perhaps the EU bureaucrats are slowly changing their attitude, or they finally started to listen to the voices they should represent. Shall this be the move aside from a Nobel Prize laureate Daniel Kahneman's (Kahneman 2011) statement "Comforting conviction that the world makes sense rests on a secure foundation: our almost unlimited ability to ignore our ignorance."

6 Conclusion

To successfully manage innovations is nowadays not only an ambitious task for every new Startup but also for a mid- and large- size companies a prerequisite for long-term survival.

Standardizing a process of innovation on the company level requires an enormous amount of creativity and also talented leaders with vision and exceptional interpersonal skills that enable them to accommodate various needs of employees and vicissitudes of constantly changing external

market environment. For a leader to retain a continuous process of innovation, it's inevitable to stabilize the system by setting specific operation procedures with an "error margin." This "error margin" allows to adopt a new criteria when the internal market dynamics. Moreover, it grants adjustment and change the whole process if this seems to be inefficient or obsolete. In other words, a standardized process of innovation needs to be flexible, and information stream has to be omnidirectional. This way the feedback can reach the recipient at every stage of the process and required measures can be applied.

On the national and international level, after synthesizing findings of authors mentioned in this article, conceptual frameworks as a basis for an intensified innovative environment seem rather viable than over-regulated guidelines that result in slow pace of innovation processes and demotivated inventors.

Therefore, the optimal solution should seek the balance between antagonistic innovation management approaches ranging from no constraints for creativity and innovation to excessive supranational innovation management systems. The main obstacle the international community should urgently adjust is intellectual property rights regimes. The convenient solution to this global problem would speed-up the innovation processes in both developed and underdeveloped countries improving the standards of living everywhere.

References

- BEHSUDI, A. 2013. Eli Lilly sues Canada on drug patent. Politico.com [online] [Cited 2013-09-12]. Available online http://www.politico.com/story/2013/09/eli-lilly-sues-canada-overdrug-patents-96743.html
- BRISBANETIMES.COM.AU. 2008. EU nations pick Budapest for technology institute. BrisbaneTimes.com.au [online] [Cited 2014-07-19] Available online <http://news.brisbanetimes.com.au/technology/eu-nations-pick-budapest-for-technologyinstitute-20080618-1ysc.html>
- BUSINESSDICTIONARY.com.
 2014.
 Definition of Innovation.
 BusinessDictionary.com [online]

 [Cited
 2014-11-11]
 Available
 online

 <http://www.businessdictionary.com/definition/innovation.html>
- ECONOMIC AND POLITICAL WEEKLY. 1998. Looking beyond Basmati. In: *Economic and Political Weekly*. Vol. 33, No. 8 (Feb. 21-27, 1998). pp. 371-372, ISSN (Online) 2349-8846
- EIT, 2014 EIT at a Glance: Mission. European Institute of Innovation and Technology.com [online] [Cited 2015-04-04] Available online http://eit.europa.eu/eit-community/eit-glance/mission
- EUROPA EU. 2014. EU Funding [online] [Cited 2015-04-04]. Available online http://europa.eu/about-eu/funding-grants/index_en.htm
- EUROPEAN COMMISSION. 2013. Innovation Union. European Commission [online] [Cited 2013-09-02]. Available online http://ec.europa.eu/research/innovation-union/index_en.cfm
- GASSMANN, O., SANDMEIER, P., WECHT, C.H. 2006. Extreme customer innovation in the front- end: learning from a new software paradigm. In: *International Journal of Technology Management*. Vol. 33, No. 1, pp. 46 66.

- GREENLEAF, W. 2011. Monopoly on Wheels. Henry Ford and the Selden Automobile Patent. Wayne State University Press. 330p.
- KAHNEMAN, D. 2011. Thinking, Fast and Slow. New York: Farrar, Straus and Giroux pp. 339-340. ISBN: 978-0374533557
- KANTER, R.M. 2013. Innovation: The Classic Traps. in: *On Innovation*, Harvard Business School Publishing Corporation. pp. 107-124.
- KELLEY, R. 2006. CNNMoney.com [online] [Cited 2015-03-03] Available online http://money.cnn.com/2006/03/03/technology/rimm_ntp>
- KONDO, Y. 2000. Innovation versus Standardization. In: *The TQM Magazine*. J2(1), pp. 6 10., ISSN: 0954-478X
- MACLEOD, Ch. 2012. Reluctant Entrepreneurs: Patents and State Patronage in New Technosciences, circa 1870–1930. In: *Isis*. Vol. 103, No. 2 (June 2012). The University of Chicago Press. pp. 328 339.
- MIR, M., CASADESÚS, M. 2011. Standardised Innovation management Systems: A case study of the Spanish Standard UNE 16002:2006. In: *Innovar: Revista de ciencias administrativas y sociales*. Vol. 21, No. 40 (Abril junio de 2011), pp. 174.
- MURRAY, J. A. 1978. Towards a Contingency Model of Strategic Decission. In: *International Studies of Management & Organization*. Vol. 8, No. 4, New Challenges for Strategic Management (Winter 1978-79), pp. 7-34.
- NAMBISAN, S. 2002. Designing virtual customer environments for new product development: Toward a theory. In: *Academy of Management Review*, Vol. 27, No. 3, pp. 392 – 413.
- ROSSEGER, G. 1995. *The economics of Production and Innovation, Third Edition: An industrial perspective,* Butterworth-Heinemann, 328p.
- ROTHWELL, R. 1994. Towards the fifth-generation innovation process. In: International Marketing Review. Vol. 11, pp. 7-31.
- SCHUMPETER, J. A. 2010. Capitalism, Socialism and Democracy, Routledge. pp. 73.
- STIGLITZ, J. E. 2006. Making Globalization Work. Penguin Books. London pp. 109-111.
- STIGLITZ, J. E. 2014. Creating a Learning Society: A New Approach to Growth, Development, and Social Progress, Columbia University Press. New York. pp. 89 90.
- TIDD, J., BESSANT, J. 2014. Managing Innovation: Integrating Technological, Market and Organizational Change, Wiley, UK, pp. 280.
- TOMLIN, J. T. 2004. Distinguishing the Illegal from the Legal in Antitrust Damages Calculations: Lessons from "Netscape v. Microsoft". In: *Journal of Forensic Economics*. Vol. 17, No. 2 (Spring/Summer 2004), pp. 223-239.

Understanding Private Equity. Private Equity Investments in European Union

TOMÁŠ ŠTOFA¹ Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

The paper deals with Private Equity investments in Europe. The aim of this work is to define Private Equity investments and analyse Private Equity market in Europe. The introduction contains European definitions of Private Equity capital and data were obtained from EVCA – European Private Equity & Venture Capital Association. In the analytical part, we focused on development and the current situation of Private Equity investments in European Union. In this paper, we can see the impact of the crisis development of investments. Analysis showed that average investment size have felt by half but the number of supported companies have slightly increased.

Key words: Private Equity, European Union

JEL Classification: G23, G34, G24, G32

1 Introduction

Private Equity investments have already appeared in the Roman Empire, but greater expansion was in 15th century supported by export promotion. The most important part of Private Equity development happened in 40th years of last century in USA when rich families started to promote smaller businesses. Modern concept of Private Equity has been created in 1980 in the USA. There and also in UK Private Equity exists a long time but in continental Europe it started to spread later (Achleitner, Betzer, Goergen and Hinterramskogler, 2010). After 1983 Private Equity investments were supported by EVCA - European Private Equity and Venture Capital Association mainly by management-led start-up funding (Payne, 2011). West European Private Equity investments grew significantly until 2008 when crisis effects influenced development in Europe. According to Gavúrová and Šoltés (2014), emerging Europe countries including Slovakia, missed applying systemic tools, used only limited support the establishment of industrial zones and parks and outdated and underdeveloped infrastructure for innovation.

Currently, there is a development of various interesting business ideas that often evolve into business plans. These plans often have a chance to be successful, but European Union, despite many projects by government and universities, still lacks the ideal environment for starting business, especially Slovakia (Alexandros, 2013). If there is demand for these goods or service, business plans can be realized through startups. The main target of these companies is not profit but revenue growth so management must address the issue of financing. One of the possible ways of expanding this companies are alternative investments through providing equity known as Private Equity. Private Equity investments finance startups but also mature companies with growth potential (Payne, 2011). They can change low-performance companies into successful enterprises

¹ Ing. Tomáš Štofa, Němcovej 32, 040 01 Košice, Slovak Republic, tomas.stofa@tuke.sk

through capital providing and other activities needed for business development. These companies represent accelerator of economic growth, innovation and employment in every country (Mura and Buleca, 2012).

2 Definition of Private Equity

EVCA define Private Equity capital as long-term investment not listed on the stock exchange. This capital becomes part of own capital and so investor acts as a co-owner. Private Equity capital support development of company in early and middle stages of the business life cycle. These companies have usually already created product range and produce turnover but management inefficiency creates very low profits or even loses (EVCA, 2015). Mainly risk-averse investors prefer these investments. They, along with capital, have to create company strategy, provide know how and advices in adoption of high-performance management. To support faster company growth investors do not get regular yields and the entire profit they realize to gain at the end of investment, usually by selling company stake on the stock exchange. Investors providing resources do not wish to fully manage the company but they usually achieve majority stake. Nevertheless, they acquire important rights including the right of veto and control rights over executive decisions of the company. This fact can scary companies not to get these investments (Achleitner, Betzer, Goergen and Hinterramskogler, 2010). In the case of company bankruptcy they also have priority rights to settle their claims. After investment usually come changes in management, company policy and strategies.

In context with Private Equity, we have to define Venture Capital. Venture Capital, also known as risk capital, is part of Private Equity capital used to finance company in development stages of its life (EVCA, 2015). Venture Capital helps emerging companies to realize their business plan and allows to create functional business ecosystem. These investments are realized in high-growth industries and usually represent a minority stake in the company. In some cases it can be the only possible way of financing company because of low creditworthiness (EVCA, 2007). Venture Capital investors have to be more active than Private Equity investors because they provide more advices, connections and strategies during the term of the equity partnership. In Table 1 is investment classification according to company life cycle stage published by EVCA. The line between these forms of Private Equity is not determined exactly. Classification of investment can vary because of different definition of various organizations and authors.

Venture Capital	Private Equity
Seed: The firm has not been yet established, but there is a need to finance market research and product development	Growth: often minority investments in mature companies
Start-up: Company has been established but it does not make profit only revenues	Rescue/turnaround: Rescuing company in troubles through restructure
Later-stage venture: Company exists a few year and shows revenue growth	Replacement capital: This capital replaces investments of other companies
	Buyout: Private Equity firm acquire a company through stocks and becomes majority ownership to expand on new markets

 Table 1 Forms of Private Equity

Source: Own processing based on EVCA (2015)

Higher risk is associated with higher potential returns when selling the stake in company (Engel, 2002). Private Equity investors do not want to continue in participation with company when Private Equity agreement ends. At the end of these investments selling company stakes always occurs, what is the true essence of Private Equity financing. Company makes divestments through:

- Initial Public Offering company lists its stocks for the first time on the exchange and Private Equity investor offers his entire stake for sale,
- Repayment of Principal Loans company repay all loans that Private Equity firm provided,
- Repayment of Silent Partnership company repay debt to the silent partner, but in the case of bankruptcy his receivables are repaid as the last one,
- Sale of Quoted Equity investor sells stake in the company already listed on exchange, e.g. after lock-up period,
- Sale to Another Private Equity Firm such a sell is very rare because of low liquidity on Private Equity market,
- Sale to Financial Institution these divestment are similar to the previous one with only difference of other buying company,
- Trade Sell -sale of company shares to industrial investors,
- Write-off company writes down its stake to zero (EVCA, 2015).

Private Equity investments are realized primarily through Private Equity funds (Alexandros, 2013). There are several reasons for the existence of the Private Equity market. The most important reason is that companies need capital for innovative purposes and they cannot get funding from public markets or banks. This market is high-risk and illiquid way of businesses financing. Private Equity investments is also possible through companies specialized in Private Equity or private persons commonly known as Business Angel. Mediation of these investments does not include only provide funding but also help in managing businesses, provision of know-how, mediating relations and enhancing reputation. According to Engel (2002), Private Equity has positive impact on business performance by higher growth rates. In addition to this EVCA determined positive impact on economic growth through following factors:

- increased innovation,
- increased productivity,
- enhanced competitiveness (EVCA, 2007).

All these factors drive the economy in domestic and international level, but the overall impact of Private Equity on the economic performance has not been yet established.

3 Methodology

Despite the fact Private Equity market was developed mainly in USA and United Kingdom, at the beginning of this century, Private Equity investments recorded high growth in developed countries of continental Europe. Especially Western Europe began to be regarded as a promising location for such an investment (Achleitner, Betzer, Goergen and Hinterramskogler, 2010). On the other side transition economies are also slowly recovering while they lack expansion of this form of financing. (Szabo, Šoltés and Herman, 2013). This paper use basic indicators and charts to show development of Private Equity investment and describe individual elements of Private Equity. Obtained data from EVCA reflected situation in whole of Europe, so they were edited to represent only countries of European Union. Data were available only for the time period 2007-2014. These data should mirror all important Private Equity investments in European Union as a result of unified

methodology of investment identification. Very important part of these investments is EU initiative JEREMIE that encourages new investments in startups.

4 Development of Private Equity investments in Europe

Stable economy and positive expectations encouraged growth of alternative investment that lasted until 2007. Positive development of Private Equity was due to the excess liquidity in the pre-crisis period (Seretakis, 2013). The Global Financial Crisis in 2008, started by Lehman Brothers bankruptcy, leaded to global recession and radical investment slump. This shock that is shown in Figure 1 significantly affected positive development of Private Equity. Overall Private Equity investments in 2008 decreased by 23.73% annually. In 2009, it fell down by 54.95% annually and compared to 2007 by 65.64%. Despite the fact that the crisis has ended its effects persist further. Lower demand, problems with company financing and distrust in investments make start of company and development more difficult. There is distrust in the market higher than before the crisis. It seems situation is not going to return to the original level in short time, but current development has positive outlook.



Figure 1 Development of Private Equity and Venture Capital investment volume in EU Source: Own processing based on EVCA (2015)

High investment growth and impact of the financial crisis led to creation of regulation of alternative investments in Europe, also known as Alternative Investment Fund Managers Directive. Crisis effects have appeared in Europe in the second half of the 2008 year and significant fall in investments continued until 2009. Figure 2 shows cumulated volumes of given Private Equity investment forms. That means volume of one Private Equity investment form is difference between cumulated volume of this investment. Buyouts represent biggest, most fluctuated and most reactive part of Private Equity capital. Although overall Private Equity investments in 2008 have decreased Venture Capital investments increased by 4.96%. The most important part of this growth were seed and growth capital investments growing by 35.52%, respectively by 54.85%. Accordingly, it points out that Europe believed that it can avoid the serious consequences of the crisis. The next year the only growing parts were rescuing and replacement capital to rescue companies before bankruptcy and to boost economy.



Figure 2 Development of cumulated volumes of given Private Equity investment forms in EU Source: Own processing based on EVCA (2015)

On the other side in Figure 3 we observe that number of supported companies is not as volatile as investments volume. Compared to 2007 overall Private Equity investments have decreased by 48%, but number of companies have remained roughly unchanged. Fluctuation in 2008 is caused by relative high number of seed companies and by increase in start-up, later stage venture and growth companies. It looks like the problem is not demand decrease but distrust of investors. Coefficient of variation is for number of investments only 5.65% but size of investment shows variation at level 30.07%. This indicates that during recession investors try to invest but only limited amount of money. Number and size of investment also have a positive correlation on the level of 31.24% indicating weak correlation.



Source: Own processing based on EVCA (2015)

Figure 4 shows development of average size of Venture Capital and Private Equity investments. Before crisis in 2007, the average Private Equity investments were at almost 14 mil. EUR and Venture Capital investments at 1.8 mil. EUR. The crisis started sharp drop of average investment size. During two years average Private Equity investment size fell by 66.36%. After critical year 2009 the next development reflects the partial recovery in economic performance. In 2014, Private Equity investments were lower by 38.47% and Venture Capital investments by 48.09% compared with 2007. Last three years were relatively stable in investments development, with moderate growth recorded.



Figure 4 Development of average volume of Private Equity and Venture Capital investment in EU Source: Own processing based on EVCA (2015)

5 Conclusion

The idea was to provide the reader information about alternative way of financing company through Private Equity and to show development of these investments in European Union.

Private equity investments were at highest point before crisis which strongly affected behavior of investors. Because of risks and uncertainties, total amount of investments have decreased. Current economic situation influences every form of Private Equity investments, especially Buyouts, which represent biggest and most important part. Policy efforts to restore economy did not returned risk and development investments to its original level and now investors prefers less risky ways of investing their free funds, although Private Equity market slowly recovers.

Limited amount of investors did not influenced Private Equity demand, which remained relative stable during crisis. Because of decrease of total amount of Private Equity investments and stable demand, average size of investment has halved. The simultaneous growth of supply and demand causes the level of the average investment is renewed very slowly. Nevertheless, it is expected growth of these investments, despite economic stagnation.

References

- ACHLEITNER, A. K., BETZER, A., GOERGEN, M. and HINTERRAMSKOGLER, B. 2010. Private Equity Acquisitions of Continental European Firms The Impact of Ownership and Control on the Likelihood of Being Taken Private (June 17, 2010). In: European Financial Management, Forthcoming; Best Paper Prize, 7th International Conference on Corporate Governance, Birmingham Business School. Available at SSRN: http://ssrn.com/abstract=1319836>.
- CUMMING, D. and JOHAN, S. 2013. Venture Capital and Private Equity Contracting: An International Perspective. Amsterdam: Academic Press. 792 s.
- ENGEL, D. 2002. The Impact of Venture Capital on Firm Growth: An Empirical Investigation. In *ZEW Discussion Paper No. 02-02*. Available at SSRN: http://ssrn.com/abstract=319322>.
- EVCA. 2014. European Private Equity Activity. [online]. Available at: http://www.evca.eu/media/385581/2014-european-private-equity-activity-final-v2.pdf>.
- EVCA. 2007. Guide on Private Equity and Venture Capital for Entrepreneuers. [online]. Available at: http://www.evca.eu/media/78722/guide-on-private-equity-and-venture-capital-2007.pdf>.
- MURA, L. and BULECA J. 2012. Evaluation of Financing Possibilities of Small and Medium Industrial Enterprises. In: *Procedia Economics and Finance*. Vol. 3, 2012, pp. 217-222.
- PAYNE, J. 2011. Private equity and its regulation in Europe. In: European Business Organization Law Review. Vol. 12, No. 4, pp. 559-585.
- SERETAKIS, A. 2013. A comparative examination of private equity in the United States and Europe: Accounting for the past and predicting the future of European private equity. In: *Fordham Journal of Corporate and Financial Law.* Vol. 18, No. 3.
- SZABO, K.Z., ŠOLTÉS, M. and HERMAN, E. 2013. Innovative Capacity & Performance of Transition Economies: Comparative Study at the Level of Enterprises. In: E+M Ekonomie a Management. Vol. 16, No. 1, pp. 52-69.
- ŠOLTÉS, V. and GAVÚROVÁ, B. 2014. Innovation policy as the main accelerator of increasing the competitiveness of small and medium-sized enterprises in Slovakia. In: *Procedia Economics and Finance*. Vol. 15, pp. 1478 – 1485.
- STOWELL, D. 2010. An Introduction to Investment Banks, Hedge Funds, and Private Equity: The New Paradigm. Burlington: Academic Press, 2010. 592 s.

Modelling Value at Risk of Foreign Exchange Rates with Stable Distributions

ALENA TARTAĽOVÁ¹ Technical University of Kosice, Faculty of Economics Slovak Republic

Abstract

The paper presents the theory of stable distributions with connection to financial risk. We performed an analysis of extreme values in returns of exchange rates. We compared two different approaches to compute VaR. We analyzed the returns of Exchange rates CZK, HUF and PLN, for which we find out the stable distribution parameters and test goodness of fit for these distributions. We compared the value of one-day and ten-day VaR based on normality and stable assumption. We observed that VaR under normal distribution assumption underestimate the financial risk for the higher level of confidence.

Key words: Stable Distributions, Value at Risk, Financial Risk

JEL Classification: C4, C5, G2

1 Introduction

The risk management in the financial analysis is always a key role. After the financial crisis at the end of the first decade of the 21st century, this issue came to the awareness of the wider public. Therefore statistical methods that try to estimate the financial risk becomes very important. Currently stable distribution can be attributed to this group of potentially useful methods.

Stable distribution in finance reflected the need to record the occurrence of extreme values pointed out by Mandelbrot (1963) and Fama (1965), which cannot be modelled by conventional methods, based on a normal distribution. For a description of empirical data, the heavy-tailed distribution is suitable, for which the probability tending to extreme values decreases more slowly than for a normal distribution. Stable distributions fulfill these desirable properties, but their distribution functions don't have a uniform analytical shape, what is a considerable computational problem. Today from the works Zolotarev (1986), Nolan (1999), Uchaikin and Zolotarev (1999), Fofack and Nolan (1999), Frain (2009) we have algorithms that provide sufficiently accurate results, which together with the development of computer technology opens the door to wider deployment these methods.

The issue of quantifying the financial risk is associated with method Value at Risk, which soon after its launch in the 90s became very popular. According to the Basel Committee's new capital adequacy, financial institutions can use (after considering regulator) internal risk measurement systems, which increased the topicality of stable distributions in connection with the Value at Risk.

¹ Mgr. Alena Tartaľová, PhD., Němcovej 32, 040 01 Košice, Slovak Republic, alena.tartalova@tuke.sk

The aim of this paper is to emphasize that the stable distributions are more accurate estimates of the rate of occurrence and volatility of extreme observations, thus VaR calculation are more precise and robust in terms of risk management. The work also deals with a comparison of the results of Value at Risk for a stable and normal distribution. Heavy tails were frequently observed empirically on foreign exchange returns (Mandelbrot, 1963; Silent, 2010 or Mina and Xiao, 2001; Taušer and Buryan, 2011), therefor in this research we will focus just on foreign currencies. For this comparison we use the exchange rates returns of countries bordering Slovakia.

This paper is organized in the following way. Section 2 discusses some basic knowledge about Value at Risk methods as a tool for measuring financial risk. Section 3 focuses on introduction of stable distributions. In Section 4, the data used for estimation and forecasting VaR are presented. Also there is a VaR estimation and comparison of VaR using classical approach with normal distribution and stable distribution. Section 5 concludes the results.

2 VaR methodologies to estimate the currency risk

Currency risk, which is in Vokorokosová (2008) defined as the risk of losses from changes in value of instruments sensitive to exchange rates, brings to the financial institution the difference between long and short positions in foreign currency. Such a different position is called the open foreign exchange position, which is expressed in domestic currency recalculated at the current exchange rate, stated by the National Bank. Unsecured foreign exchange position is the basis of the calculation of capital adequacy of financial institutions, according to the needs of NBCA (New Basel Capital Accord). Because the Basel Committee on banking supervision at the Bank for International Settlements requires financial institution to meet capital requirements on the base of VaR estimates, this methodology has become a basic market risk management tool by financial institutions (Basel Committee, 2004). These calculations ensure that the potential losses arising from foreign currency risk will not have the fatal consequences for the institution (Sivák et al, 2009).

Method of VaR (Value at Risk) is a fundamental and complex risk management tool. For the first time the name of the Value at Risk method appeared in the mid-90s in the material published by financial corporation JP Morgan. The popularity of Value at Risk contributed the decision of JP Morgan made this methodology available, but also the decision by many central banks to use VaR as the primary indicator to quantify the risk. (Badík, 2005; Hull and White, 1998).

Generally, VaR can be defined as the largest potential loss, we can expect over a certain period of time at a certain confidence level (Cipra, 2006). Statistical definition of the indicator Value at Risk is that it is a confidence interval of an asset (or portfolio) for the selected period, it's a one-sided confidence interval. Mathematically, Value at Risk is expressed by the following formula

$$P(\Delta V \le -VaR) = 1 - c \tag{1}$$

where p expresses the probability of a change in value of an asset over a certain period of time ΔV and c is the size of the confidence interval.

In practice, the most often used are a 95% or 99% confidence interval (Cipra, 2006). And this

value depends on the degree of risk aversion of a particular financial institution or investor. NBCA material requires from the financial institutions selection of 99% confidence interval. The calculation of the Value at Risk can be implemented in several ways, each of which has its advantages and disadvantages. None of these methods are generally used. The basic methods include: historical simulation, Monte Carlo simulation and analytical approaches (see Artzner, 1999; JP Morgan, and also Rimarčík 1996, 2004; Yama and Yoshiba, 2002). In this paper for the VaR calculation will be used an analytical approach. This approach comes directly from the definition of Value at Risk as a quantile of probability distribution.

3 Stable distributions

Analytical approach of VaR calculation is based on an estimate of theoretical distributions of asset returns and their parameters. This section introduced the basic theory of stable distributions, their properties and parameter estimation (Cizek et al, 2005; Feller, 1971 and Nolan, 2009).

Suppose *n* independent random variables $X_1, X_2, ..., X_n$ with identical probability distribution. The distribution has the property of stability if the sum of independent random variables $S_n = X_1 + X_2 + X_3 + ... + X_n$ has the same probability distribution. More specifically, the stability condition is fulfill when there exists arbitrary constants C_n and γ_n , such that the sum of independent random variables is

$$S_n \stackrel{d}{=} C_n X + \gamma_n \tag{2}$$

where

 C_n is the scaling parameter,

 γ_n is locational parameter. (Frain, 2009)

The only group of probability distributions that are characterized by the property (2) (Feller, 1971) are called stable distributions, which are named according to this property.

The stable distribution is characterized by four parameters: $\alpha \in \langle 0, 2 \rangle$ is called index of stability or characteristic exponent, $\beta \in \langle -1,1 \rangle$ is skewness of the distribution, $\gamma \in R$ is scale of the distribution and $\delta \in R$ is a location parameter. The problem of these distributions is that except normal (Gauss), Cauchy and Lévy probability distribution, there is no formula for a density function of probability distribution. Problems associated with calculation that hinder the practical applications of the stable distribution have been solved by Nolan in 1999. The most known and also the most used are two parameterization.

The first form of parameterized characteristic function of the stable distribution was derived by Samorodnitsky and Taqqu (1994). Another frequently used form of characteristic function was derived by Zolotarev (1986).

The characteristic function of the Zolotarev parameterization S ($\alpha \beta, \gamma, \delta, 0$) is of the form

$$\phi_{0}(t) = \begin{cases} \exp(-\gamma^{\alpha}|t|^{\alpha} \left[1 + i\beta sign(\mu) \tan(\frac{\pi\alpha}{2})(|t\gamma|^{1-\alpha} - 1)\right] + i\delta_{0}t) & \alpha \neq 1 \\ \exp(-\gamma|t| \left[1 + i\beta\frac{2}{\pi} sign(\mu) \log(\gamma|t|)\right] + i\delta_{0}t) & \alpha = 1 \end{cases}$$
(3)

Where

٢

$$\delta_{0} = \begin{cases} \delta + \beta \gamma \tan(\frac{\pi \alpha}{2}) & \alpha \neq 1 \\ \delta + \beta \frac{2}{\pi} \gamma \log(\gamma) & \alpha = 1 \end{cases}$$

$$\tag{4}$$

There are several methods for estimating the parameters of stable distributions. These methods vary in their level of precision and computational complexity. The basic calculation methods include: quantile method, approach based on the characteristic function and the maximum likelihood method. The first two of these methods are quite complicated and does not bring the satisfactory results (Borak et al. (2005); McCulloch (1986)). Due to the highest degree of precision we will use maximum likelihood method.

4 Results and discussion

In this section we estimate the parameters of a stable distribution and we calculate VaR for the daily returns of exchange rates of currencies CZK / EUR, HUF / EUR and PLN / EUR, that capture trend of exchange rates from 03.01 2002 at 31.08 2013. In total, there are three sets of data; the length of each is 2987 records.

Based on these data, we construct the logarithmic returns

$$R_{t+\Delta t} = \ln\left(\frac{P_{t+\Delta t}}{P_t}\right) = \ln P_{t+\Delta t} - \ln P_t$$
(5)

Whereas for the calculation of one-day Value at Risk is length $\Delta t = 1$ and $\Delta t = 10$ accordingly to the ten-day Value at Risk, P_t is a closing price on a day. This transformation allows us to work with stationary time series, and is the usual adjustment in statistical studies of financial data. Stationary time series is series that at the time does not change its characteristics and consequently the probability distribution. These changes can be suppressed to some extent (there is a change of multiplicative relationships to additive). This transformation of input data should be remembered when interpreting the results.

The estimated parameters of the stable distribution were calculated in Mathematica 8 using the extra libraries containing algorithms to calculate the stable distribution. These algorithms use the estimates referred to maximum likelihood method. The calculated parameters of the stable distributions are from the Zolotarev's parametrization (3).

CEFE 2015 - Central European Conference in Finance and Economics

parameter	One-day returns	Ten-day returns
α	1.71392	1.71872
β	-0.308162	-0.0829707
γ	0.207057	-0.104373
δ	-0.00309	0.699683

Table 1 Parameter estimates of stable distribution for CZK/EUR

Source: Own processing

Table 2 Parameter estimates of stable distribution for HUF/EUR

parameter	One-day returns	Ten-day returns
α	1.43375	1.55382
β	0.0763164	0.185957
γ	0.261851	0.820233
δ	-0.0238095	-0.102412

Source: Own processing

Table 3 Parameter estimates of stable distribution for PLN/EUR

parameter	One-day returns	Ten-day returns
α	1.66586	1.72601
β	0.25123	0.662918
γ	0.368877	1.07413
δ	-0.0442914	-0.271308

Source: Own processing

The algorithm was designed by Nolan (2009) and provides reliable results only for α values greater than 0.1. In our case, therefore, the estimates obtained are reliable.

To verify the conformity of empirical data with the stable distribution we can use graphical methods and statistical goodness-of-fit test.

Subjective visual assessment cannot be regarded as an exact method that should be decisive in creating conclusions. We will use statistical tests of Kolmogorov-Smirnov test and Anderson-Darling test. Calculated test results are summarized in the following tables.

Table 4 Goodness - of - fit tests for CZK/EUR

	Kolmogorov-Smirnov	Anderson-Darling
One-day returns	0.0887968	0.10801
Ten-day returns	0.586131	0.44116

Source: Own processing

Table 5 Goodness – of – fit tests for HUF/EUR

	Kolmogorov-Smirnov	Anderson-Darling
One-day returns	0.00194901	0.00244123
Ten-day returns	0.00333684	0.00222757

Source: Own processing

Table 6 Goodness - of - fit tests for PLN/EUR

	Kolmogorov-Smirnov	Anderson-Darling
One-day returns	0.449875	0.481555
Ten-day returns	0.85134	0.60858

Source: Own processing

At a significance level $\alpha = 0.05$ we do not reject the null hypothesis of a stable distribution of empirical data for the exchange rates CZK/EUR and PLN/EUR. For the exchange rate HUF/EUR, the hypothesis is rejected. The reason is probably high kurtosis of empirical values around the mean, what can be seen in the histograms.

This situation can be solved by modeling other distributions for the exchange rate HUF / EUR. There were tested normal, lognormal, Student's t-distribution, and several lesser-used distributions, whose parameters were estimated by the maximum likelihood method. None of them show sufficient match with empirical data.

	One-day returns HUF/EUR		Ten-day returns HUF/EUR	
Distribution	Kolmogorov-Smirnov	Anderson-Darling	Kolmogorov-Smirnov	Anderson-Darling
Stable	0.00194901	0.00244123	0.00333684	0.00222757
Student	0.00823935	0.00731219	0.0156856	0.00542963
Normal	1.51254×10-31	0	4.02×10-28	0

Table 7 Goodness - of - fit tests of various distributions for HUF/EUR

Source: Own processing

Stable, as well as the Student's t-distribution, provide a quite good model of the empirical distribution at the tails in both files. They fail in the central rate. The conformity around the tail is necessary for calculating Value at Risk, and thus given the fact that no distribution was better to fit the empirical values, stable distribution will be used for the further description.

4.1 Calculation of the Value at Risk for stable distribution

In terms of analytical approach, Value at Risk is a quantile of the theoretical distribution. In the previous paragraph, we calculated the parameters of the distribution functions of stable distributions that will be used to estimate quantiles. We consider portfolio consisting of the currency in the amount of 100 units of local currency (EUR), which will be used for the interpretation of results.

The following tables show an estimated quantiles of stable distribution for each currency and associated values of Value at Risk. Data, with which we worked, were transformed to logarithmic returns, so obtained values of quantiles we have to transform back.

α	Quantiles of logarithmic returns			Quantiles of returns
	One-day returns	Ten-day returns	One-day returns	Ten-day returns
1.00%	-1.20095	-3.72511	0.988062	0.963434
5.00%	-0.596579	-1.97514	0.994052	0.980442
10.00%	-0.43207	-1.47295	0.995689	0.985378

Table 8 Quantiles of stable distribution for CZK/EUR

Source: Own processing

α	Quantiles of logarithmic returns		Quantiles of returns	
	One-day returns	Ten-day returns	One-day returns	Ten-day returns
1.00%	-2.23311	-5.06349	0.977916	0.950626
5.00%	-0.833642	-2.27704	0.991698	0.977487
10.00%	-0.557211	-1.63562	0.994443	0.9837777

Table 9 Quantiles of stable distribution for HUF/EUR

Source: Own processing

Table 10 Quantiles of stable distribution for PLN/EUR

α	Quantiles of logarithmic returns		Quantiles of returns	
	One-day returns	Ten-days returns	One-day returns	Ten-days returns
1.00%	-1.78273	-3.84686	0.982331	0.962262
5.00%	-0.950616	-2.57763	0.990539	0.974553
10.00%	-0.710662	-2.03163	0.992919	0.979889

Source: Own processing

Based on the transformed quantiles, we can calculate Value at Risk. Value at Risk is calculated from the relationship:

$$VaR = (1 - Q_{\alpha})V \tag{6}$$

where

 Q_{α} , is α -% quantile after transformation V is the value of the portfolio.

Table 11 Value at Risk for CZK/EUR

α	One-day VaR	Ten-day VaR
1.00%	1.19	3.656
5.00%	0.5948	1.9558
10.00%	0.557	1.4622

Source: Own processing

Table 12 Value at Risk for HUF/EUR

α	One-day VaR	Ten-day VaR
1.00%	2.2084	4.9374
5.00%	0.8302	2.2513
10.00%	0.5557	1.6233

Source: Own processing

Table 13 Value at Risk for PLN/EUR

α	One-day VaR	Ten-day VaR
1.00%	1.7669	3.7738
5.00%	0.9461	2.545
10.00%	0.7081	2.0111

Source: Own processing

The values in the tables 11 - 13 represent the maximum expected loss on the selected confidence level $(1-\alpha)$ -%, which at a given time window (one or ten days) will not be overcome. Values are not high at first sight. For example, the Polish zloty, for which we calculate that with 99% for one day from the portfolio of 100EUR (foreign currency at a given value) losses will not exceed two

euros. However, banks hold positions in foreign currencies in millions of euros. Moreover they operate with a small proportion of equity, so even such loss may have undesirable effect.

4.2 VaR comparison for stable and normal distribution

In this section, we compare the Value at Risk calculated on the basis of stable distribution and the normal distribution. Results are in the tables below.

α	VaR(one-day)	VaR(one-day)	VaR(ten-day)	VaR(ten-day)
	Stable distribution	Normal distribution	Stable distribution	Normal distribution
1.00%	1.19	0.8612	3.656	2.8534
5.00%	0.5948	0.6195	1.9558	2.0605
10.00%	0.557	0.4904	1.4622	1.6351

Table 14 Comparison of Value at Risk based by stable and normal distribution for CZK/EUR

Source: Own processing

The table shows clear differences between the values of VaR by stable and normal distribution. VaR by a normal distribution for $\alpha = 1\%$ are values underestimated, while for the other intervals (with an exception) overestimated.

α	VaR(one-day) Stable distribution	VaR(one-day) Normal distribution	VaR(ten-days) Stable distribution	VaR(ten-days) Normal distribution
1.00%	2.2084	1.393	4.9374	3.6407
5.00%	0.8302	0.9863	2.2513	2.5823
10.00%	0.5557	0.7688	1.6233	2.0133

Table 15 Comparison of Value at Risk based by stable and normal distribution for HUF/EUR

Source: Own processing

VaR for the exchange rate HUF / EUR gives similar results. Again, we find underestimated VaR at 99% confidence interval and overestimated VaR for other intervals. The differences here are lower.

Tuste To comparison of value at Risk subcu sy stable and normal distribution for The (Lett					
a	VaR(one-day)	VaR(one-day)	VaR(ten-days)	VaR(ten-days)	
u	Stable distribution	Normal distribution	Stable distribution	Normal distribution	
1.00%	1.7669	1.552	3.7738	4.236	
5.00%	0.9461	1.1	2.545	3.0149	
10.00%	0.7081	0.8581	2.0111	2.3576	

Table 16 Comparison of Value at Risk based by stable and normal distribution for PLN/EUR

Source: Own processing

Even if the daily return PLN / EUR affirming failure calculations based on the normal distribution. Differences in accuracy, however slightly smaller, but still exhibits high undercutting the confidence limits (99%), and an inflation of the lower confidence limits (90% and 95%). In this case, the 10-day VaR shows still overestimated by the normal distribution, which is beyond past achievements.

5 Conclusion

Modelling for selected foreign exchange rates with stable distributions confirmed the assumption that they can be successfully described by this type of distribution. For the currencies CZK and

PLN, we demonstrate that they follow stable distribution for one-day and ten-day returns. Thus, it can be assumed that the stable property for these currencies occurs regardless of the size of the time window. For the exchange rate of returns HUF/EUR we didn't find the suitable distribution. Stable distribution provides a good model for the tails of the distribution, so we assumed that returns of HUF/EUR come from the stable distribution.

A comparison of VaR at various confidence levels confirmed the assumption about the inappropriateness of using the normal distribution to describe exchange rates returns. In this paper we have shown that a normal distribution distorts values of the Value at Risk, for the high level of significance (99%, or $\alpha = 1\%$), the VaR is underestimated, and for the lower level of significance (90%, or $\alpha = 10\%$), VaR is overestimated. In studying the dependence of the difference from a stable and normal distribution it was showed, that point when the both estimates are more or less the same is near the 95% confidence interval, which is one of the most used interval in practice (Cipra, 2006). There were a few exceptions, such as in the case of the ten-day Value at Risk of currency PLN/EUR, which was still overestimated by normal distribution. These calculations failure can lead to unexpected losses both for the financial institution as well as unnecessary costs for the provision of the risk valuation. This finding was demonstrated for one - day and 10-day returns, therefore we can assume that it doesn't depend on the size of the time window.

Finally, we proved that using normal distribution for calculating Value at Risk distorts its values, using methods based on stable distributions, may not bring much better results for confidence interval around 95%. Stable distribution therefore makes more sense in the calculation for higher levels of confidence, for the distribution with a heavy tail.

Acknowledgements

This paper was supported by the project VEGA 1/0446/15: The development of the banking sector and economic growth: the new EU Member States after 10 years of membership.

References

- BADÍK, P. 2005. Využitie metódy VAR na meranie trhových rizík a výpočet trhovej primeranosti. In: *Biatec.* 2005, Vol. 13, No. 2, s.19-21.
- BASEL COMMITTEE ON BANKING SUPERVISION: International Convergence of Capital Measurment and Capital Standards. [online]. Bank for International Settlements, 2004. [06-2004]. [cit. 01-19-2013]. Available online: http://www.bis.org/publ/bcbs107.htm.

CIPRA, T. 2006. Finanční a pojistné vzorce. Praha: Grada.

- ČIŽEK, P., HÄRDLE, W. and WERON, R. 2005. Statistical tools for Finance and Insurance. Heidelberg: Springer-Verlag.
- FAMA, E. 1965. The behavior of stock prices. In: Journal of Business. No.38, pp. 34-105.
- FELLER, W. 1971. An Introduction to Probablity theory and Applications. New York: Willey. 509 s.
- FOFACK, H. and NOLAN, J. 1999. Tail Behavior, Modes and Other
Distributions.Characteristics of Stable
AvailableCharacteristics of Stable
online:
.Availableonline:

- FRAIN, J.C. 2009. Studies on the Application of the α-stable Distribution in Economics. [online]. Dizertačná práca. Dublin: Trinity College. [cit. 2013-01-20]. Available online: http://www.tcd.ie/Economics/staff/frainj/Stable_Distribution/thesis_main_5.pdf>.
- HULL, J. and WHITE, A. 1998. Value at Risk when daily changes in market variables are not normally distributed. In: *Journal of Derivatives*. Vol. 5, No. 3, pp. 9-19.
- J.P. MOGRAN. 1996. RiskMetrics Technical Document. New York: Reuters, [online]. [cit. 2013-01-20]. Available online: http://www.jpmorgan.com/RiskManagement/RiskMetrics/RiskMetrics.html.
- MANDELBROT, B. 1963. The Variation of ceratin speculative prices. In: *The Journal of business*. Vol. 36, No. 4, pp. 394-419.
- McCULLOCH, J. 1986. Simple consistent estimators of stable distribution parameters. [online]. Colombus: The Ohio State University. [cit. 2013-01-20]. Available online: http://www.econ.ohiostate.edu/jhm/papers/stabparm.pdf>.
- MINA, J. and XIAO, J.Y. 2001. Return to RiskMetrics: The Evolution of a Standard. [online]. New York: RiskMetrics Group. [cit. 2013-01-20]. Available online: http://www.wu.ac.at/banking/sbwl/lvs_ws/vk4/rrmfinal.pdf>.
- NOLAN, J. 2013. Maximum likelihood estimation and diagnostics for stable distributions. [online]. [cit. 2013-01-20]. Available online: http://academic2.american.edu/~jpnolan/stable/mle.pdf>.
- NOLAN, J. 2009. Stable Distributions: Models for Heavy Tailed Data.[online]. [cit. 2013-01-20]. Chapter 1 is available at the American University Stable website Available online: http://academic2.american.edu/~jpnolan/stable/stable.html>.
- RIMARČIK, M. 2004. Využitie metód Value-at-risk na meranie kurzového rizika. Dizertačná práca. Košice: EUKE, Podnikovohospodárska fakulta v Košiciach.
- SAMORODNITSKY, G. and TAQQU, M. S. 1994. *Stable Non-Gaussian Random Processes,* Chapman & Hall : New York.
- SIVÁK, R., GERTLER, Ľ. and KOVÁČ, U. 2009. *Riziká vo financiách a v bankovníctve*. Bratislava: Sprint dva.
- TAUŠER, J. and BURYAN, P. 2011. Exchange Rate Predictions in International Financial Management by Enhanced GMDH Algorithm. In: *Prague economic papers*. Vol. 20, No.3, pp. 232-249.
- TICHÝ, T. 2010. Posouzení odhadu měnového rizika portfolia pomocí Lévyho modelů. In: *Politická ekonomie*. Vol. 58, No.4, pp. 504 521.
- UCHAIKIN, V. and ZOLOTAREV, V. 1999. Chance and stability Stable Distributions and their Applications. [online]. Utrecht: VSP. [cit. 2013-01-20]. Available online: http://staff.ulsu.ru/uchaikin/uchzol.pdf>.

VOKOROKOSOVÁ, R. 2008. Komerčné bankovníctvo. Košice: Elfa. ISBN 978-80-8086-094-3

- YAMAI, Y. and YOSHIBA, T. 2002. On the validity of Value-at-Risk comparative analyses with expected shortfall. [online]. Tokyo: Institute for monetary & econ studies – Bank of Japan. [cit. 2013-01-20]. Available online: http://ideas.repec.org/a/ime/imemes/v20y2002i1p57-85.html>.
- ZOLOTAREV, V.M. 1986. One-dimensional stable distributions, American Mathematical society.

Simulation of an Operational Accident at an Airport and Its Impact on the Financial and Economic Situation of the Airport Company

ALICA TOBISOVÁ¹ – ANDREA SEŇOVÁ² – IVETA VAJDOVÁ³ ^{1, 3}Technical University of Košice, Aeronautical Faculty Slovak Republic ²Technical University of Košice, Faculty of Mining, Ecology, Process Control and Geotechnology Slovak Republic

Abstract

Crisis and crisis situations at airports are becoming frequent issues of the day, consequently, they have to be dealt with by airport authorities responsible for the handling crises and similar events. They have to be prepared for solving all situations, either caused by human factor or natural disasters, even in times when no such events are arising. By origin, crises can result either from human actions or mostly caused by natural disasters. Solutions of airport security in civil aviation can involve authorities such as ministry of transportation, interior, defence, finance or state administration, police forces, or providers of ground or navigations services and all the stakeholders have to act in coordination and efficiently so as to handle events of crises in civil aviation within their competence. To serve the purpose a special committee of crisis management is set up to ensure development and approval of crisis plans regarding safe operation of civil aviation companies.

Key words: Crisis, Crisis Situation, Operational Accident at an Airport, Financial Analysis

JEL Classification: G170

1 Introduction

The most important document regarding handling of a crisis situation at an airport is termed as the emergency plan. It is developed on the basis of the requirements established for managing extraordinary events, which can happen at the airport or in its vicinity.

The Emergency plan ensures coordination of all the airport components covering their areas of responsibilities, so as to facilitate handling of the crisis situation with the primary goal of minimizing all the impacts of such unexpected events.

Event of emergency is a notion covering all the situations, which involve endangering human lives or incurring material damages. Aviation terminology is classifying seven types of emergency events, as follows:

- ground crash of an aircraft,
- aviation accident outside of the terminal management area,
- natural disaster,
- acts of unlawful interference,

¹ Ing Alica Tobisová, PhD., Rampová 6, 041 21 Košice, Slovak Republic, alica.tobisová@tuke.sk

² doc. Ing. Andrea Seňová, PhD., Park Komenského 19, 040 01 Košice, Slovak Republic, andrea.senova@tuke.sk

³ Ing. Iveta Vajdová, Rampová 6, 041 21 Košice, Slovak Republic, iveta.vajdova@tuke.sk

- deterioration of health of a passenger on board,
- ecological disaster,
- operational accident at the airport,
- mass psychology.

For the purpose of solving the issue and in view of the dementedness of the topic, operational accidents of aircraft should remain in focus. Such an emergency situation has been the object of airport accident simulation with the aim to point out the impact of an extraordinary event from the aspect of financial and economic analysis. As a pre-condition of realization, the emergency situation was simulated on the basis of an international airport, more exactly that of Kosice Airport, j.s.c. The simulation of the accident was based on the organizational arrangement of this airport, however, applicable to airports of similar types and the characteristics.

2 Operational accidents at the airport

Crisis situation in civil aviation is understood as an event or series of events posing threats to the safety, fluency or efficiency of air operation.

An operational accident at an airport, incident of air operation, deterioration of health status of a passenger on board, natural disaster, ecological catastrophe at an airport or acts of unlawful interference resulting in fire at an airport, or in its close vicinity might pose threats to air operation and the airport and damage airport assets as well.

Description of an operational accident is a demanding and time-consuming task. A more viable alternative is drawing an algorithm of such an accident as presented in Figure 1. It illustrates the sequence of involvement on the part of the individual components into the process of eliminating the extraordinary situation from its beginning until it is solved.



Figure 1 Operational accident at an airport Source: Own processing based on the Kosice Airport emergency plan

In case of an operational accident at an airport, components of firefighting, rescue and health services are activated as first. The total costs of eliminating an extraordinary event are calculated on the basis of the amount of materials, instrumentation, tools, fuel used for firefighting as well as provision of emergency medical assistance and transportation of the injured to the hospital.

3 Financial analysis of the operational accident at the airport

If an accident is experienced in the airport terminal management area, one has to take into account that at least one fire-fighting vehicle will be needed. Simulated accidents and calculation have helped to find out that the total cost of fire extinguishing agents necessary for a fire-fighting vehicle can start at the sum of 1,280 EUR. The costs are increasing directly as further use of fire-fighting devices is needed, with their prices ranging between 11 EUR and 40 EUR depending on their type and size. The cost of such a device might start from 100 EUR apiece and also on the type made available.

Total costs of fuel consumption for a single fire-fighting vehicle may start from 70 EUR. If the airport has no ambulance available in its facilities, the injured are concentrated into a nest of injured, from where they are taken over by the Medical rescue service. The price of a single assistance is roughly 50 EUR, with one km of driving costing 0.79 EUR.

In case of evacuation and transport of injured passengers, but also airport employees is ensured by additional means of transportation to take them to the hospital. The cost of a single bus used for such transportation, with roughly 50 passengers, is estimated at a sum starting from 200 EUR. Presented in Table 1 the estimated costs are covering the involvements of the components in case of an airport operation accident. The final sum, after having calculated all the items in Table 1 is equal to 1,720 EUR. It enumerates the cost of a single involvement on the part of the rescue component. It is a sum, which should be taken into consideration as a minimal cost, if it comes to and airport operation accident. The calculated sum is increasing accordingly with the extent, seriousness and the necessity of activating further components of rescue services.

Rescue component	Performance	Sum per performance/unit of action (EUR)	
Firefighting service			
	Firefighting agents	from 1,280	
	Firefighting devices	from 11	
	Firefighting tools	from 100	
	Fuel consumption (100 km)	from 70	
Medical rescue service			
	First medical aid	from 50	
	Price per km	from 0.79	
	Alternative transport	from 200	

Table 1 Financial analysis of the airport operation accident

Source: Own processing

4 Simulated operational accident at the airport and its impact regarding the financial analysis of the airport

When simulating airport operational accident was the evaluation focused on the estimated costs of eliminating the fire that broke out in the control tower. The extra costs were also calculated and subsequently recorded into the Profit and loss account thereby affecting indicators of profitability.

The follow-up calculations point out the changes in the status of airport assets and liabilities as a consequence of an extraordinary situation. Such an emergency was a fire that broke out in the

control tower. As a result of a cable set on fire and apart from cancellation of air traffic it caused damages to the equipment, operational rooms and systems of air traffic control.

The total costs of managing an extraordinary event make up approximately 5,200 EUR. This sum includes costs of the fighter fighting assistance, medical rescue service, first medical aid and those incurred with the transportation of the injured to the hospital or a safe area.

Let us suppose that at a simulated fired in the control tower resulted in damaging the operational areas, devices and systems of aircraft guidance as well as the costs of reconstruction to be made on the tower after the fire. It necessitates the acquisition of new equipment for air traffic control, renovation of the operational areas of the control tower and the extraordinary costs of obtaining new assets for the airport.

Table 2 is presenting a list of assets to be acquired in the process of renovating the control tower following the fire. It lists items of assets, costs of installation, configuration and installation along with the expenditures of reconstruction to be carried out in the affected operational areas.

Item	Number	1 piece / EUR	Total / EUR
PC Workstation	1	1 850	1 850
PC HP Z220 Workstation	4	990	3 960
Keyboard and mouse	1	45	45
Monitor LCD 19" EIZO	3	1 200	3 600
Monitor LCD Touchscreen 19"	1	1 500	1 500
KVM Switch	1	250	250
Table TWR with a strip rail	1	10 000	10 000
Communication devices (radio, telephone)	1	3 400	3 400
Installation, configuration and implementation of the	1	3 600	3 600
equipment			
SW LETVIS RDD	1	24 000	24 000
SW LETVIS SMR (Ground)	1	22 000	22 000
SW LETVIS FDO	1	18 000	18 000
SW LETVIS MET	1	16 000	16 000
SW RDD/REP	1	34 000	34 000
ATC armchair	1	850	850
Reconstruction of the operational areas	1	25 000	25 000
Total			168 055

 Table 2 Costs of furnishing and reconstruction of the control tower

Source: Own processing

Further impact within the simulated emergency is that of changes in assets. Airport assets would increase by 139,455 EUR, the total assets estimated at roughly 1,429,431,000 EUR. Thus, acquisition of airport assets would be financed from the equity of the airport. Occurrence of extraordinary costs related to the elimination of the fire in the control tower and the costs of acquiring new equipment will be reflected in the overall revenues of the airport. This change can be monitored in financial rations, namely the indicators concerning profitability.

After substituting the formula, profitability of revenues will equal to 20.43 %. When compared with a standard situation without any emergency, profitability of revenues will drop by 0.08%.

$$Profitability of revenues = \frac{Net \, profit}{Revenues} \tag{1}$$

Following the substitution, profitability of airport assets will be equal to the value of 3.02%. When compared with standard conditions without any emergency, the profitably of assets after the emergency event will be reduced by 0.02%.

$$Profitability of assets = \frac{Net \, profit}{Assets} \tag{2}$$

Profitability of the total capital, following the substitution into next formula, will be equal to 3.74%. Compared to the period without emergency, profitability of the assets after the emergency will fall by 0.01%.

$$Profitability of the \ total \ capital = \frac{Net \ profit + Costs \ of \ interests}{Total \ capital}$$
(3)

Profitability of the owner's equity, following the substitution into the next formula will be equal to the value of 4.21%. Compared to the standard period without emergency, the profitability of owner's equity following the extraordinary event will be reduced by 0.02%.

$$Profitability of the owner's equity = \frac{Net \, profit}{Owner's \, equity} \tag{4}$$

Profitability of the basic capital, following the substitution in the next formula, will be equal to the value of 7.03%. Compared to the period without emergency, profitability of the basic capital after the emergency will drop by 0.03%.

$$Profitability of the basic capital = \frac{Net \, profit}{Basic \, capital} \tag{5}$$

Presented in Table 3 are the indicators of airport profitability before and after the extraordinary event.

Indicators of profitability	Before the emergency	After the emergency	Difference
Profitability of revenues	20,51 %	20,43 %	-0,08 %
Profitability of assets	3,04 %	3,02 %	-0,02 %
Profitability of the total capital	3,75 %	3,74 %	-0,01 %
Profitability of owner's equity	4,23 %	4,21 %	-0,02 %
Profitability of the basic capital	7,06 %	7,03 %	-0,03 %

 Table 3 Indicators of profitability before and after the emergency

Source: Own processing

5 Conclusion

A rather difficult and complex task is enumerating precisely the financial and economic analysis for the various types of emergencies that may happen at airports or outside of them. Airport does not keep any commercial price-lists, which could form the basis of exact calculations. Much depends on the amount or volume of emergency agents, devices and tools used as well as on the cooperating components. Some airports have no budgets for emergency cases, thereby having no idea of the costs of emergency actions as for such cases they have third-party insurance policies for damages to cover the losses incurred by airport operation.

The above-mentioned financial analysis is only a model-based situation, which is assuming sums to serve as starting –points to further considerations regarding emergency cases. The simulated analysis is defining a final sum of minimal costs of separate rescue units. Each of the presented sums is concerned with one performance of the rescue component, e.g. arrival of a fire-fighting vehicle, use of a single tool or engagement of a single medical rescue unit.

At extraordinary events one has to take into account the fact that occurrence of one emergency may invoke another emergency case.

This way, it could be possible to generate a series of simulated emergencies, which could occur at airports, whereby many of them could acquire an idea of minimal costs necessary to handle such situation. Thus, all the analyses could provide basic information for developing a prognosis regarding individual extraordinary cases that affect stability and continuous development of the airport. And, this is why due attention is to be paid to them.

References

AIRPORT Košice, a. s.: Košice Airport Emergency Plan.

- PAVOLOVÁ, H., CSIKÓSOVÁ, A. and BAKALÁR, T.2014. Development of Košice region by implementation of environmental projects in the field of water management Case study. In: *Ekologia Bratislava*. Vol. 33, No. 4, pp. 380-390.
- SZABO, S. and GAVUROVÁ, B. 2011. Vplyv vývoja svetovej ekonomiky na rozvoj leteckej dopravy, In: AERONAUTIKA 2011: International Scientific Conference, 20.-21.10.2011, Herl'any, LF TU in Košice, Košice 2011.
- Act No. 143/1998 Z.z. o civilnom letectve (letecký zákon) a o zmene a doplnení niektorých zákonov.
- ZALAI, K.2010. Finančno-ekonomická analýza podniku, Bratislava: Sprint dva, 2010.
- PUDŁO, P. and, SZABO, S.2014. Logistic Costs of Quality and Their and Their Impact on Degree of Operation Level, In: *Journal of Applied Economic Sciences*. Vol. IX, No. 3(29), Spiru Haret University, Romania, pp. 468-475.
- SOCHA, V. et.al. 2014. Evaluation of relationship between the activity of upper limb and the piloting precision, In: *16th International Conference on Mechatronics, Mechatronika 2014*, December 3 5, 2014, Brno, Czech Republic, pp.405-411.
- DORČÁK, P. et.al. 2014. Analysis of the possibilities of improving an online reputation of public institutions/ In: *IDIMT-2014*, Sept. 10–12. Poděbrady: IDIMT Networking Societies-Cooperation and Conflict 22ndInterdisciplinary Information and Management Talks, 2014, pp. 275-281.
Simulation Model of Price Setting of Retailers under the Effect of Retail Unit Capacity

PETER TÓTH¹ – MAREK GRÓF² Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

This paper presents a simulation model of price setting strategies under different retailer capacity constriction. The model is based on game theory and is applied on consumer grid containing four evenly distributed retailers. We study the effect of changing retailer capacity constrictions on the market wide price. We assume that retailer aim is efficient capacity utilization and consumers want to minimize their purchase costs. Our findings are that higher capacity leads to lower market wide price in case that ineffective capacity usage is penalized.

Key words: Retailer, Price Setting, Game Theory, Simulation

JEL Classification: C70, D21

1 Introduction

The aim of this paper is to analyze retailer price setting problem. Our model is based on fact, that customers minimize travel distances when shopping (Gärling and Gärling, 1988). Capacity restriction is included in the model to motivate retailers to optimal capacity usage (Huang, Kuo and Lu, 2014). Suboptimal capacity usage causes extra costs for retailer. Various game grids have been used in this field of study, from simple linear area containing two retailers (Hotelling, 1929), to more complex using different topology. Among others, Huang and Levison (Huang and Lewison, 2011) studied a market using circle urban area with discreet locations. Granot D., Granot F. and Raviv (Granot, Granot and Raviv, 2010) used an undirected weighted graph with nodes representing outlets and weighted vertices representing customers. Godino and Dias (Godino and Dias, 2013) developed model where two players simultaneously choose their facilities' sites. Our game grid is inspirited by Schelling model (Schelling, 1969). We studied what effect capacity restrictions will have on the retailer price setting strategy. Simulation is based on game theory (Gróf and Tóth, 2014).

The paper is divided as follows. In section 2 we define our simulation model and in section 3 are presented results of the model application on the theoretical urban area.

2 Model definition

The purpose of the paper is to find stable price strategies for retailers situated in the studied urban area. Let *I* be a set of customers (individual consumers, houses, block of flats, etc.) and *J* be a set of retailers. Mobility of customers is represented by travel costs denoted as $d_{i,j}$. Each customer purchases exactly one unit of good. All retailers offer the same product. Each retailer has two

¹ Ing. Peter Tóth, Němcovej 32, 040 01 Košice, Slovak Republic, peter.toth@tuke.sk

² Ing. Marek Gróf, PhD., Němcovej 32, 040 01 Košice, Slovak Republic, marek.grof@tuke.sk

price strategies p_j , where $p_j \in \{1,2\}$. Each customer can purchase at any retailer. His aim is to minimize his total purchase costs consisting of the travel costs $d_{i,j}$ and the actual price p_j . This can be expressed by equation (1), where s_i is the strategy of customer *i*. If the total purchase costs of a customer are the same for two or more retailers, he will split his demand between these retailers equally.

$$s_i = \arg\min_{j \in J} \left(d_{i,j} + p_j \right) \tag{1}$$

The total number of customers D_j of retailer *j* will be equal to the number of customers that select retailer *j*. The payoff $M_{(pj, p-j)}^j$ of retailer *j*, where p_{-j} is the vector of prices set by retailers other than *j*, can be calculated as $M_{(pj, p-j)}^j = D_j p_j$. Let $\varepsilon = D_j / S_j$ be the retailer capacity usage, where S_j is capacity of retailer *j*. We will assume that any deviation from the optimal capacity usage $\varepsilon^* = 1$ (1 customer per unit of capacity) represents a loss for the retailer therefore the aim of retailer is to minimize its deviation from optimal capacity usage by equation (2).

$$\min\left(\frac{\varepsilon_j(p_j, \mathbf{p}_{-j}) - \varepsilon^*}{\varepsilon^*}\right) \tag{2}$$

We will now include the penalty for deviating from the optimal capacity usage in to the retailer payoff (3).

$$M^{j,\varepsilon}(p_j, \mathbf{p}_{-j}) = M^j(p_j, \mathbf{p}_{-j}) \left(1 - \sqrt{\left(\frac{\varepsilon_j(p_j, \mathbf{p}_{-j}) - \varepsilon^*}{\varepsilon^*}\right)^2} \right)$$
(3)

For our study we will use a theoretical area, game grid, containing 4 retailers and 32 customers. We will consider the game grid to be a torus and we will use the 8 cell Moore neighborhood, with the travel costs between any two adjacent cells to be equal to n = 1. Game grid is shown in Figure 1.



Figure 1 Arrangement of retailers and customers on the game grid Note: torus game grid containing retailers (in black) and customers (in gray) Source: Own construction

The simulation model consists of three rules allowing the retailer to change its price. The retailer j will change its price when its payoff is not greater than 0. The second rule is that retailer j will change its price in case of its deviation is equal to the maximum deviation in the period. This is not the case that there are at least two retailers with deviation equal to the maximum deviation in the period. In order to involve randomness in our model, retailer can change its price randomly with probability of 2%. The simulation consists of 10,000 periods.

3 Results

We studied the price game of retailers for various levels of capacity restrictions. First let capacity be $S_j = 10$. Capacity represents number of units of goods. As we can see in **Table 1**, average price for all retailers is 1.216. It means that they usually selected price equal to 1, which is shown in Figure 2. In around 7,500 periods all retailers had low price setting strategies (equal to 1). On the other hand all retailers adopt high price setting strategies (equal to 2) in about 2,000 periods. This means that both, market wide low price setting strategies and market wide high price setting strategies, are stable. It is because when all retailers have high price setting strategy and someone changes its strategy to low price setting strategy, it gains more customers but it does not have enough capacity to supply higher demand. It will produce higher deviation from the optimal capacity usage and therefore it will change its price back to the high price setting strategy. Average market deviation from the optimal capacity usage is -0.200 and average market payoff is 7.657.

	А	В	С	D
Average price	1.206	1.207	1.241	1.208
Average deviation	-0.198	-0.199	-0.204	-0.199
Average payoff	7.679	7.661	7.627	7.661

Table 1 Market indicators under retailer capacity equal to 10

Source: Author's calculations

Second, we studied retailer behavior under capacity $S_j = 12$. Because of penalty for deviating from optimal capacity usage, all retailers adopted low price setting strategies in more than 8,800 periods (Figure 2). Unlike the previous case, there is only one stable situation – market wide low price setting strategies because retailers tried to attract more customers. It is because retailer can increase its payoff by changing its strategy from high price to low price when other retailers adopted high price setting strategy. This is caused by higher capacity. It causes lower average price in the market which is 1.047.

Tuble - fullice maleators anael recanel capacity equal to 12
--

	А	В	С	D
Average price	1.059	1.051	1.033	1.046
Average deviation	-0.342	-0.336	-0.323	-0.332
Average payoff	5.357	5.461	5.564	5.452

Source: Author's calculations

According to Table 2, average market deviation from the optimal capacity usage is in absolute value higher than in the previous case because of higher retailer capacity. It is -0.333. Average market payoff is lower than in the previous situation because of higher retailer capacity and is 5.459.

Further, we set capacity $S_j = 16$. As can be seen in **Table 3**, results are similar as in the case with capacity $S_j = 12$. Average market price is 1.047. This is same as in the previous case because retailers wanted to use their capacity effectively in order to avoid penalizing for deviating from the optimal capacity usage. Higher capacity caused lower average payoff and in absolute value higher average deviation. Average market payoff is 4.150 and average market deviation from the optimal capacity usage is -0.500.



Figure 2 Frequency of price strategies Source: Own construction

Table 3 Market indicators under retailer capacity equal to 1	6
--	---

	А	В	С	D
Average price	1.057	1.030	1.045	1.054
Average deviation	-0.507	-0.491	-0.497	-0.505
Average payoff	4.030	4.298	4.210	4.061

Source: Author's calculations

The final situation that we studied is capacity Sj = 18. In this situation, retailers have high capacity therefore retailers adopted low price setting strategies in most cases (Figure 2). Again, stable strategy is only market wide low price setting strategies. As in the previous cases, higher capacity plays on role by increasing retailer deviation and reducing retailer payoffs. The only stable situation is market wide low price setting strategies. Results are shown in Table 4. Average market price is 1.039, average market payoff is 3.667 and average market deviation from the optimal capacity usage is -0.556.

Table 4 Market indicators under retailer capacity equal to 18

	А	В	С	D
Average price	1.023	1.047	1.048	1.037
Average deviation	-0.547	-0.561	-0.561	-0.553
Average payoff	3.806	3.580	3.569	3.712

Source: Author's calculations

Capacity restrictions affect retailer behavior. As can be seen in Figure 2, in case of $S_j = 10$, retailers adopt high price setting strategy more often as in the other cases. Higher capacity results to low price setting strategies adoption. It is caused by effort to attract more customers in order to be closer to the optimal capacity usage.

Figure 3 shows frequencies of purchases in retailer A. Results are similar for other retailers because of map symmetry. As can be seen, higher capacity caused that retailers attracted customers in distance n = 2 more often. As it was mentioned, they wanted to minimize their deviation from the optimal capacity usage in order to maximize their payoff.



Figure 3 Frequency of purchases in retailer A (in green) Source: Own construction

4 Conclusion

The aim of the paper was to analyze retailer price setting depending on its capacity restriction. We used simulation model, where the goal of the customer was to minimize its purchase costs consisting of the travel costs and actual price. Objective of the retailer was to maximize its payoff, which is connected with minimizing deviation from optimal capacity usage.

Using a simulation model of retailer price setting strategies we have shown that retailer capacity affects market price. Under low retailer capacity is market wide low price setting strategies stable as well as market wide high price strategies. Higher retailer capacity causes that only market wide low price strategies is stable. It is due to the fact that retailers want to attract more customers in order to minimize their deviation from the optimal capacity usage. It is because retailers are penalized for that deviation.

References

- GÄRLING, T. and GÄRLING, E. 1988. Distance minimization in downtown pedestrian shopping. In: *Environment and Planning A*. Vol. 20, No. 4, pp. 547 554.
- GODINO, P. and DIAS, J. 2013. Two-player simultaneous location game: Preferential rights and overbidding. In: *European Journal of Operational Research*. Vol. 229, No. 3, pp. 663 672.
- GRANOT, D., GRANOT, F. and RAVIV, T. 2010. On competitive sequential location in a network ith a decreasing demand intensity. In: *European Journal of Operational Research*, Vol. 205, No. 2, pp. 301 312.
- GRÓF, M. and TÓTH, P. 2014. Price setting of retailers under the effect of retail unit capacity and customer mobility. In: *Relik 2014 : Reprodukce lidského kapitálu vzájemné vazby a souvislosti*. pp. 155 163.
- HOTELLING, H. 1929. Stability in Competition. In: *Economic Journal*, Vol. 39, pp. 41 57.
- HUANG, K.L.,KUO, CH. W. and LU, M. L. 2014. Wholesale price rebate vs. capacity expansion: The optimal strategy for seasonal products in a supply chain. In: *European Journal of Operational Research*. Vol. 234, No. 1, pp. 77 85.
- HUANG, A. and LEVINSON, D. 2011. Why retailers cluster: an agent model of location choice on supply chains. In: *Environment and Planning B: Planning and Design*, Vol. 38, pp. 82 94.
- SCHELLING, T. 1969. Models of segregation. In: *The American Economic Review*. Vol. 59, No. 2, pp. 488 493.

Analysis of the Efficiency of Shared Services Centers in Slovakia and their Impact on Parent Companies

RADOSLAV TUŠAN¹ – ERIKA LIPTÁKOVÁ² Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

Shared services centres that were established mostly by foreign companies are relatively young and yet their number in Slovakia does not exceed twenty. Shared services centres make business in Slovakia as separate legal entities. We analyze in papers if their activities are effectively, respectively, what value they bring to their founders. Subjects were analyzed by Du Pont analysis of the indicators which reflect the profitability, efficiency and financial leverage. Foreign and domestic parent companies were analyzed in periods when services centres were established in Slovakia. We set the hypothesis that results of services centres in Slovakia have a positive impact on financial results of parent companies. The hypothesis was verified by statistical analysis based on the values of selected indicators.

Key words: Shared Services Centers, Financial Indicators, Correlation Coefficient

JEL Classification: C10, G39, M41

1 Introduction

Shared services means either the consolidation of the "back-office" functions used by several business units of a firm into a single internal service entity, or the collaboration by separate firms to establish a single entity from which they purchase these functions (Gill and Cormick, 1999). Bergeron (2003) suggested definition of shared service as: "Shared services is a collaborative strategy in which a subset of existing business functions are concentrated into a new semiautonomous business unit that has a management structure designed to promoted efficiency, value generation, costs savings and improved service for the internal customers of the parent corporation". The functions that could be performed by a shared service center include finance, payroll and human resource, legal, information systems and information technology, purchasing, acquiring, communications and public relations (Gill and Cormick, 1999). Centers undertake specific, repetitive activities, which are relying on established databases and decision rules. Shared services have been viewed as a strategy for achieving efficiencies and improved service in back-office functions such as finance and accounting, human resource, information technology, procurement and facilities management (McIvor et al., 2011). Services centers provide services to the other part of parent organizations. Shared services centers (SSC) are owned and operated by the organization, or can be outsourced to independent vendors (McIvor et al., 2011). Shared services has been viewed as a strategy for achieving both efficiencies and improved service performance levels, as organization have strived to reduce costs and enhance performance in back-office functions (Davis, 2005). Shared services arrangements allow organizations to reduce costs through process standardization, and economies of scale. Standardization reduces process

¹ Ing. Radoslav Tušan, PhD., Němcovej 32, 040 01 Košice, Slovak Republic, radoslav.tusan@tuke.sk

² RNDr. Erika Liptáková, PhD., Němcovej 32, 040 01 Košice, Slovak Republic, erika.liptakova@tuke.sk

duplication, and economies of scale are achieved through combining processes previously carried out independently (Davenport, 2005). Benefits of shared services are in reduction in the cost of providing administrative services, improved performance and better focus on core business of parent entities. Janssen and Wagenaar (2004) examined the concept of a shared services center by investigating the motives and management issues determining its successful implementation. The SSC deals with the relationship between many clients and one vendor, in contrast outsourcing literature addresses the relationship between one client and one or more vendors. According to Goold et al. (2001), increased pressure on cost competitiveness, the drive for service improvements, and new technology applications are making companies think again the potential benefits from centralized services, and a new, stronger concept of shared services has emerged. Shared services with appropriate management are capable of yielding very large performance improvements, for example, 20-50% cost savings (Goold et al., 2001). Borman (2008) examined and assessed the performance of group of shared services which a number of characteristics potentially inhibit or facilitate the successful operation of SSC.

Sector of shared services in Slovakia has a significant role and become more and more relevant. Shared services centers in Slovakia employ more than 21,000 people. Most employees work in area of finance, then in the IT area, human resources and customer service areas.

This contribution explores the relationship between parent companies and subsidiaries in area of shared services centers in selected financial indicators.

2 Research and Results

2.1 Research methodology

We conducted our research by analyzing of financial indicators on the basis of DuPont analysis. According Fabozzi (2009), financial analysis involves the selection, evaluation, and interpretation of financial data and other pertinent information to assist in evaluating the operating performance and financial condition of a company. The information that is available for analysis includes economic, market, and financial information. The operating performance of a company is a measure of how well a company has used its resources to produce a return on its investment. The financial condition of a company is a measure of its ability to satisfy its obligations, such as the payment of interest on its debt in a timely manner (Fabozzi, 2009).

Financial ratios are powerful tool in evaluating profit performance. Most evaluations of profit performance begin with the DuPont analysis (Růčková, 2001). The DuPont analysis is a method of breaking down return ratios into their components to determine which areas are responsible for a firm's performance. This method of analyzing return ratios in terms of profit margin and turnover ratios is credited to the E.I. Du Pont Corporation, whose management developed a system of breaking down return ratios into their components (Fabozzi, 2009). In general, a company that wants to increase its return on equity (ROE) can strive to do so in two different ways: by increasing the profitability and efficiency; and by increasing of assets utilization:

$$ROE = \frac{Net \, Income}{Sales} \quad x \quad \frac{Sales}{Assets} \quad x \quad \frac{Assets}{Equity} \tag{1}$$

ROE = Profitability x Efficiency x Leverage

(2)

Profitability is connected with net income on each sale currency unit; efficiency means to expand the amount of sales generated from each asset item. The financial structure leverage ratio measures the degree to which the company uses equity to finance assets. The ratio of total assets to equity is referred to as the equity multiplier, or financial leverage. This ratio captures the effects of how a company finances its assets.



Figure 1 DuPont Ratio Analysis Framework

2.2 Selected companies

For the analysis, we selected nine parent companies mainly from abroad, which have established SSC subsidiaries in Slovakia. We have excluded those companies from the choice which have not been active for at least six years in the period of 2008 - 2014. Data of parent companies were taken from the annual reports and data of SSC subsidiaries were taken from the national financial statements register. The names of parent companies, its SSC subsidiaries and their activities in Slovakia are mentioned in Table 1.

2.3 Survey of dividends distributions to shareholders

According Mackenzie et al. (2012), dividends represent the pro rata distribution of earnings to the owners of the entity. Cash dividends paid to common stockholders represent distributions of earnings and are the most prevalent type of dividend. Although cash dividends cause a reduction in both cash and retained earnings, they are not an expense to the business and thus are not shown in a company's income statement (Brownlee et al., 2001). We examined the payment of dividends by subsidiaries to parent companies in the reporting period of 2008 - 2014. Only three of the nine companies paid dividends in the period of seven years. The highest dividends paid IBM International Services Centre, s.r.o. in the amount of 37,697 thousand euros. Hewlett-Packard Slovakia, s.r.o. paid dividends in the amount of 9,350 thousands euros, and Accenture Technology Solutions – Slovakia, s.r.o. paid 8,700 thousand euros of dividends.

Parent company	Subsidiary shared service center	Activity of SSC		
IBM Slovensko, s.r.o.	IBM International Services Centre, s.r.o.	Administration of contracts for the provision of IT solutions, reporting, controlling, accounting services according US GAAP, budget planning		
T-Systems International GmbH, Frankfurt/Main, Germany	T-Systems Slovakia, s.r.o.	Remote management and monitoring of server and network infrastructure, database management, customer solutions		
AT&T Global Network Holding LLC, Bedminster, New Jersey	AT&T Global Network Services Slovakia, s.r.o.	Customer support and network engineering		
Dell Global Holdings III B.V.	Dell, s.r.o.	Financial accounting, financial analysis, budgeting, payrolls, taxes, reporting, internal audit, human resources		
Hewlett-Packard Central Eastern European Holding GmbH	Hewlett-Packard Slovakia, s.r.o.	Providing services, support and implementation role in the operation of IT infrastructure		
Accenture International SARL	Accenture Technology Solutions – Slovakia, s.r.o.	System integration, development and maintenance of software solutions		
Lenovo (International) B.V.	Lenovo (Slovakia) s.r.o.	Providing services to customers		
Deutsche Telekom Accounting GmbH, Bonn	Deutsche Telekom Shared Services, s.r.o.	Finance and accounting, operational purchasing, ERP hub		
UNIQA IT Services GmbH, Wien	InsData, spol. s r.o.	Administrative management of the portfolio of commercial insurance companies in the UNIQA Group		

Table	1 Parent	companies	subsidiary	chared	corvicos	centers and	l thair	activities	in Slovakia
Table	1 I al ent	companies,	Substatat y	shareu	sei nices	centers, and	i men	acumues	III SIUvakia

Source: Own elaboration

2.4 Graphical overview on the financial ratios

To obtain a quick overview on the values of the financial ratios (variables: ROE, ROA, FL, ROS, AT) over the period of the years 2008 (resp. 2009) -2014, we use line charts for each company separately. Lines are with markers because there are only few data points. Solid line shows the data of parent company, dashed line shows data of its subsidiary shared service center (see Figure 2, Figure 3, Figure 4, and Figure 5).



Figure 2 Financial ratios ROE, ROA and FL of these companies: IBM, T-Systems, AT&T, Dell, and Hewlett-Packard

Note: solid line represents the values of parent company; dashed line represents the values of its subsidiary Source: Own elaboration







Note: solid line represents the values of parent company; dashed line represents the values of its subsidiary Source: Own elaboration



Figure 4 Financial ratios ROS and AT of these companies: IBM, T-Systems, AT&T, Dell, and Hewlett-Packard

Note: solid line represents the values of parent company; dashed line represents the values of its subsidiary Source: Own elaboration



Figure 5 Financial ratios ROS and AT of these companies: Accenture, Lenovo, Deutsche Telecom, and Uniqa Note: solid line represents the values of parent company; dashed line represents the values of its subsidiary Source: Own elaboration

2.5 Relationship between parent company and its subsidiary in selected indicators

We wondered whether there is a dependency between Parent company and its Subsidiary shared service center in indicators:

- ROE (Return on Equity).
- ROA (Return on Assets).
- FL (Financial Leverage).
- ROS (Return on Sales).
- AT (Assets Turnover).

Given that there is a little data available (only for the last seven, resp. six years), we used nonparametric methods - a Spearman's coefficient of correlation - to determine the relationship between companies. We have done analysis for all selected companies and for all five variables. Pairs of values entering the analysis were data of parent company and its subsidiary in a given year. **Spearman's** r_s or ρ (greek letter *rho*) is also known as **Spearman's rank correlation** coefficient. It is a nonparametric measure of statistical dependence between two variables. So, it does not use specific values of the variables but it works only with their order. It means that it measures the strength of relationship between two ranked variables (associated values of parent company and its subsidiary). The Spearman correlation coefficient is defined as the Pearson correlation coefficient between the ranked variables. For a sample of size n, the n real values (X_i , Y_i), $\models 1, ..., n$, are converted to ranks (x_i , y_i), and ρ is computed from:

$$\rho = 1 - \frac{6 \sum d_i^2}{n \cdot (n^2 - 1)} \tag{3}$$

where $d_i = x_i - y_i$ is the difference between ranks. The Spearman correlation coefficient, r_s, can take values from +1 to -1. A r_s of +1 indicates a perfect association of ranks, a r_s of zero indicates no association between ranks and a r_s of -1 indicates a perfect negative association of ranks. The closer r_s is to zero, the weaker is the association between the ranks.

Next table shows cases, where there is a moderate to strong relationship between parent company and its subsidiary (Table 2). Correlation coefficients in Table 2 are colored due to this rule:

- green color means positive relationship,
- claret color means negative relationship,
- dark tone is for strong relationship,
- light tone is for moderate relationship.

-			 		
	r _s (ROE)	r _s (ROA)	r _s (FL)	r _s (ROS)	r _s (AT)
IBM		0.607		0.464	
T-systems			-0.714		
AT&T	-0.536	-0.679	0.464	-0.5	
Dell	0.943		0.943	-0.657	
Hewlet-Packard	0.6	0.6	0.486	0.771	
Accenture		0.657	-0.486		-0.429
Lenovo	-0.464	0.679		0.571	
Deutsche Telecom	-0.6		-0.429		
Uniqa	-0.429	-0.536	0.857		

Table 2 Spearman's correlation coefficients (relationship between parent company and its subsidiary)

The higher rank of correlation coefficient within parent company, with higher rank of value in its subsidiary also, and vice versa, indicates the relationship between them. Strong positive relationship between the ranks of values obtained in the parent company and its subsidiary, indicates correlation coefficient r_s = 0.943 (ROE, FL, Dell). Strong positive relationship indicates correlation coefficient r_s = 0.857 (FL, Uniqa). High positive relationship indicates correlation coefficient r_s = 0.607 (ROA, IBM), r_s = 0.6 (ROE, ROA, Hewlett-Packard), r_s = 0.771 (ROS, Hewlett-Packard), r_s = 0.657 (ROA, Accenture), r_s = 0.679 (ROA, Lenovo), r_s = 0.571 (ROS, Lenovo). Moderate positive relationship indicates correlation coefficient r_s = 0.464 (FL, AT&T), r_s = 0.486 (FL, Hewlett-Packard).

Significant negative relationship demonstrates r_s = - 0.714 (FL, T-Systems), r_s = - 0.536 (ROE, AT&T), r_s = - 0.679 (ROA, AT&T), r_s = - 0.657 (ROS, Dell), r_s = - 0.6 (ROE, Deutsche Telecom), r_s = - 0.536 (ROA, Uniqa). Moderate negative relationship indicates correlation coefficient r_s = - 0.5 (ROS, AT&T), r_s = - 0.486 (FL, Accenture), r_s = - 0.429 (AT, Accenture), r_s = -0.464 (ROE, Lenovo), r_s = - 0.429 (FL, Deutsche Telecom), and r_s = - 0.429 (ROE, Uniqa). Fields in Table 2 with an empty value demonstrated weak or no correlation.

Our hypothesis was that the results of the SSC subsidiaries in Slovakia have a positive impact on the financial results of the parent companies. Table 2 refers to 13 positive and 12 negative dependencies in selected indicators between parent company and its subsidiary. Apparent from the above is that the hypothesis has not been confirmed.

Another way to verify the hypothesis was to determine if the profitability of the assets of the parent company (ROA) and the profitability of the subsidiary's equity (ROE) is demonstrated. We were based from the premise that effectiveness of parent companies gave a positive ROA indicator as their financial investment is part of the assets. On the other side, the profitability of equity is an appropriate indicator of the effectiveness of subsidiaries, because investment of shareholder is a part of its shareholder equity. We examined 60 ROA indicators of parent companies and 60 ROE indicators of subsidiaries for the years 2008 – 2014. The ROA results showed 54 cases of positive values, and 6 cases of negative values. Regarding the ROE indicator of subsidiaries, 52 had positive and 8 had negative values. Values obtained in this way confirmed the positive impact of subsidiaries on the financial results of the parent companies.

3 Conclusion

According to Herbert and Seal (2013), in the past 20 years there has been a trend for replacing the traditional model of organising service activities in business divisions with an outsourced model. The argument for outsourcing was that it let the company focus on important core activities. But there is another alternative that's relatively neglected: the shared service centre. Their formation has enabled the parent company to deal with core competencies, while support activities such as purchasing, billing, cost analysis, debt collection and so on were enabled by the SSC.

We hypothesized that the results of the SSC subsidiaries in Slovakia have a positive impact on the financial results of the parent companies. We analyzed for all selected companies and for five variables: ROE, ROA, FL, ROS, and AT. Pairs of values entering the analysis were data of parent company and its subsidiary in a given year. Using the nonparametric method - a Spearman's coefficient of correlation – we explored the relationship between companies. Research revealed 13 positive and 12 negative dependencies between correlation coefficients. In this way, the hypothesis has not been fully confirmed. The next step was to find out if the ROA of the parent company and the ROE of the subsidiary is demonstrated due to their mutual connection. The ROA results showed 54 cases of positive values, and 6 cases of negative values, the ROE recorded 52 positive and 8 negative values. Values obtained in this way confirmed the positive impact of subsidiaries on the financial results of the parent companies.

Acknowledgements

This contribution 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.

References

BERGERON, B. 2003. Essentials of shared services. Wiley, Hoboken.

- BROWNLEE, R., E., FERRIS, R., K. and HASKINS, M., E. 2001. Corporate Financial Reporting. New York: McGraw-Hill, Inc.
- BORMAN, M. 2008. The Design and Success of Shared Services Centres. In: *European Conference on Information Systems*. ECIS 2008 Proceedings. Paper 77.
- DAVENPORT, T. 2005. The coming commoditization of processes. In: Harvard Business Review. pp. 100 108.
- DAVIS, T. 2005. Integrating shared services with the strategy and operations of MNEs. In: *Journal of General Management*. Vol. 31, No. 2, pp. 1 17.
- FABOZZI, J., F. 2009. Institutional Investment Management: Equity and Bond Portfolio Strategies and Applications. New Jersey: John Wiley & Sons, Inc.
- GILL, D. and MacCORMICK, J. 1999. *Shared Services Centres*. New Zealand: State Services Commission.
- GOOLD, M., PETTIFER, D. and YOUNG, D. 2001. Redesigning the Corporate Centre. In: *European Management Journal.* Vol. 19, No. 1, pp. 83 91.
- HERBERT, I. and SEAL, W. 2013. The rise and rise of shared-service centres is a revolution that is going under the radar. In: *Financial Management*. July/August 2013, pp. 14 15.
- JANSSEN, M. and WAGENGAAR, R. 2004. An Analysis of a Shared Services Centre in Egovernment. In: *Proceeding of the 37th Hawaii International Conference on System Sciences*.
- MACKENZIE, B., COETSEE, D., NJIKIZANA, T., CHAMBOKO, R., COLYVAS, B. and HANEKOM, B. 2012. *Interpretation and Application of International Financial Reporting Standards*. New Jersey: Wiley and Sons Inc.
- McIVOR, R., McCRACKEN, M. and McHUGH, M. 2011. Creating Outsourced Shared Services Arrangements: Lessons from the Public Sector. In: *European Management Journal*. Vol. 29, pp. 448 – 461.
- REVSINE, L., COLLINS, J. and JOHNSON, W. 2002. *Financial Reporting & Analysis*. New York: Prentice Hall.
- RŮČKOVÁ, P. 2011. Financial Analysis. Praha: Grada Publishing.

The Unpaid Work Activities Performed in the Specific Groups of the Single-Person Households in Slovakia

MÁRIA URAMOVÁ¹ – ALENA KAŠČÁKOVÁ² – MIROSLAVA KNAPKOVÁ³ Matej Bel University Banská Bystrica, Faculty of Economics Slovak Republic

Abstract

Households represent one of the basic units in every economy. Not all households, however, are the same. We can divide them according to the number of household's members, type of living, income group or structure of the members. In the last few years, the increasing amount of the single-person households has become a significant issue in Slovakia. In 2011, ratio of single-person households was more than 25 % in Slovakia. It is an interesting phenomenon influencing not only labour market (paid work), but also unpaid work activities performed in the free time. Unpaid work includes many activities that individuals perform every day in their households and for the society for free. In Slovakia, there has not been, however, any official statistical research conducted concerning unpaid work activities till now. Starting from 2012, interdisciplinary team of researchers from the Faculty of Economics, Matej Bel University in Banská Bystrica, Slovakia, has conducted several original primary researches on the unpaid work in Slovakia. Researches already confirmed that unpaid work in Slovakia covers approximately 30 % of Gross Domestic Product (which is comparable with other countries of the European Union and rest of word). Researches also showed that individuals spent in average 25.8 hours per week by unpaid work (it is approximately 222 minutes per day). However, extent of the performed unpaid work activities vary according to the gender, place of living and structure of the households 'members. The aim of this paper is to present results of our unique research from 2013, focusing on the unpaid work activities performed in households in Slovakia. Within the research, we questioned 1892 households from which almost 25 % were single-person households. In this article we present results concerning particularly single-person households. Besides other particularities, we stress importance of the gender and place of living of the single-member households. To test our hypothesis, we have used non-parametric tests, mostly Mann-Whitney Test. We test hypothesis on the probability level $\alpha = 0.05$. This paper is an output of scientific project of Grant Agency VEGA no. 1/0935/13 "Unpaid work as a potential source of socio-economic development of society and the determinant of individual well-being"

Key words: Unpaid Work, Single-Person Households, Gender, Place of Living

JEL Classification: D10, O12, O18

1 Introduction

The economic theory focuses regularly on the households, because they are, besides government and private enterprises, important market actors. Households represent both demand side as well as offer side of the market. On the offer side, they offer production factors and also their ability to work. On the demand side, households are represented by consumers of various goods and services. The most comprehensive attention economists pay to households as consumer units; much less importance is being paid to households as bearers of the production factors.

¹ prof. Ing. Mária Uramová, PhD., Tajovského 10, 975 90 Banská Bystrica, Slovak Republic, maria.uramova@umb.sk

 ² Ing. Alena Kaščáková, PhD., Tajovského 10, 975 90 Banská Bystrica, Slovak Republic, alena.kascakova@umb.sk
 ³ Ing. Mgr. Miroslava Knapková, PhD., Tajovského 10, 975 90 Banská Bystrica, Slovak Republic, miroslava.knapkova@umb.sk

Households are able to produce goods and service. These goods and services are either traded at the market, or they are independent from the market (in this case, they are not statistically registered as a real production of goods and services). This fact also influences measurement of the macroeconomic aggregates, such as gross domestic product.

There are, however, many activities of the households that are so far unnoticed by economists and statistical records. These activities do not serve for satisfying needs of other subject, but for satisfying needs of households'' members. Most probably this is also the reason, why there is no adequate importance dedicated to them (even more, they are usually beyond any interest). It is, however, interesting to know and analyses what are the motives of these activities and what the extent of them is.

Statistically, households are researched either as economic units (they manage the common budget) or as census households. To analyze extent of the activities that are performed regardless the market in the households, we consider households as economic units. Activities, which households' members preform for themselves and which do not enter the market represent unpaid work in the households.

Households are very dynamic. Not only number of households and structure of households according to the number of members, but also households' economy, division of the time a spending of the time are changing quite often. Not only relationship inside the household, but also outside relationships and connections with the friends, wider family and neighbors are influenced by many factors. Many changes in households' behavior correspond with the general changes in the society. In Slovakia and also some other countries, important all-society changes that have influenced also households, were mostly transformation of the whole society in the nineties of the previous century. An important change in the structure of households, as is also declared by several articles and researches (for example Prognóza vývoja rodín a domácností na Slovensku do roku 2030, 2014), is an increase of the single-person households (both, increased total number as well as their ratio of the total amount of households). Single-member households have many specific features compering to the multi-persons households - household's budget utilization as well as spending the free time (or outside the job time). The same as other households, single-person households must perform standard activities in the time not spending at work - food preparation, housekeeping, pet care and others. However, extent and structure of these activities seems to be different than in multi-persons households. There are many factors that influence extent and structure of the unpaid work. Most important are gender, age, place of living, income, health conditions, education (Hronec, 2007), time spent in a paid job and others. In this article, we will focus on two factor that influence unpaid work in single-person households - gender and place of living (village and town).

Knowing extent and structure of the unpaid work activities in particular households (including single-person households) as well as factors that influence it, we can estimate demand for specific market services that households could request and utilize (such as food delivery, household cleaning and others).

2 Methodology

In 2013, our multidisciplinary research team performed a preliminary field research, which focused on identifying motives for demanding (eventually not demanding) market services substituting unpaid work activities in the households. This preliminary research was performed as a part of scientific project of Grant Agency VEGA no. 1/0935/13 "Unpaid work as a potential source of socio-economic development of society and the determinant of individual well-being". In the preliminary field research we also tried to find out the extent of the time that individuals spend by the unpaid work activities.

In this article we focus on the particular group of the respondents from the preliminary field research – persons who live alone, it means single-person households. In the preliminary field research, we requested 1892 respondents. From them, 473 (almost 25%) were persons living in single-person households.

To find out the extent of the unpaid work, we focus on different kind of unpaid work activities. We distinguished between activities that are included in the System of National Accounts (SNA) and activities that are not part of the System of National Accounts. Unpaid work activities not included in SNA are food preparation, housekeeping, preparation and maintenance of cloths, growing ornamental plants, pet care, preparation and maintenance of furniture and cars, shopping and services (total value up to 1000 euro), children care, adults' care, volunteer work. Unpaid work activities included in SNA are growing of useful plants, breeding of farm animals, constructions and building work. These are the activities, for which households or individuals can get financial reward for them.

In the article, we present results of testing two hypothesis concerning single-person households and unpaid work:

- 1. There are statistically significant differences between single-person households according to the gender (we assume, that women perform more unpaid work than men).
- 2. There are statistically significant differences between single-person households according to the place of living (we assume, that in villages single-person households perform more unpaid work than single-person households in towns)

To test the hypothesis, we have used non-parametric tests, mostly Mann-Whitney Test. We test hypothesis on the probability level $\alpha = 0.05$.

3 Single-person households in Slovakia

According to "The 2011 Population and Housing Census in Slovakia" (www.slovak.statistics.sk), the single-person households represent 25.7 % of all Slovak households (it is similar ratio, as we noticed in our preliminary field research). Even more, ration of single-person households has grown significantly in last thirty years. In the Table 1, there are data from the Slovak censuses showing the structure of Slovak households according to the number of members.

CEFE 2015 - Central European Conference in Finance and Economics

able 1 Structure of Stovak households according to the number of household's members							
Data/year	1961	1970	1980	1991	2001	2011	
Households (in thousands)		1267	1585	1778	1900	1852	
according to the number of members(%): 1			18.1	20.9	26.3	25.7	
2			21.7	22.9	21.5	21.7	
3			18.8	18.1	17.9	19.4	
4			23.3	23.4	20.8	18.8	
5			11.2	9.9	8.3	7.8	
6+			6.9	4.8	5.2	6.6	

Table 1 Structure of Slovak households according to the number of household's members

Source: Own elaboration according to Statistic yearbook 2003 and http://portal.statistics.sk/

According to data from the table 1, there is an increasing trend of the ratio of single-member households on the total number of households. Within the last thirty years, ratio of single-member households increased by more than 7.5 percentage points.

It is not easy to predict further trends of the single-person households in Slovakia. Slovakia is being considered as a country with traditional family structure. However, it seems that single-person households are becoming more and more spread also in Slovakia. The most common reasons for the single-person households existence in Slovakia are dissolution of the standard family, death of one partner (this is more common in a higher age and another partner is living without children) and divorce (it occurs mostly in the second part of the production age; again, divorced partner is living alone without children). Another important group of single-person households represent single persons in a young age (source: Prognóza vývoja rodín a domácností na Slovensku do roku 2030). This is a specific group, because they live single, they are economically independent and there is a significantly high probability, that within few years they will establish a standard family.

We can assume that different reasons for single-person households' existence will lead also to many different ways of living of these households. Divorced man will probably not have the same way of living that single young woman. Also their attitude towards passing time at home, performing unpaid work activities or demanding market substitutes of unpaid work will be different. That is why we consider necessary to focus on various types of single-person households in more details.

4 Unpaid work in single-person households according to gender

According to our researches, individuals (in this case there is no difference whether they live in ingle-person or multi-persons households) spend in average 25.8 hours per week by unpaid work (it is approximately 3.7 hours or 222 minutes per day). This extent is comparable with the Time Use Surveys results from other European countries (for example 223 minutes in Portugal, 230 min. in Poland, 217 min. in Denmark, 212 min. in Germany, 213 min. in Ireland, 231 min. in Slovenia, 217 min. in Spain (source: www.oecd.org). Other interesting results refer to the gender structure of the respondents. In average, men spend 21.41 hours per week by unpaid work activities, while women spend about 35.58 hours per week by these activities. These results are general, regardless the type of household in which individual lives. However, we consider interesting to verify extent of unpaid work according to the gender also in single-person households. We assumed that there are statistically significant differences between single-person households according to the gender and that women perform more unpaid work than men).

In the Table 2, there are information about the time that men and women in single-person households spend by particular unpaid work activities.

We tested, by the mean of Mann-Whitney non-parametric test, whether there are statistically significant differences in the extent of unpaid work performed by the single-person households by men and by women. In general, women spend more time (more than 281 minutes per week) by unpaid work activities than man (only 184 minutes per week). We found out, that there are statistically significant differences in all activities, except of pet care, shopping and services and farm animals breeding. It seems to be logic, because pets as well as farm animals require the same care regardless the gender of person who owns them, and shopping and services are inevitable for any kind of households.

a a 4 ** 4			Mean	a a 4ii 4			Mean
activity	gender	Ν	Rank	activity	gender	Ν	Rank
food	man	216	171,03	children	man	192	193,71
preparation	woman	257	292,44	care/week	woman	237	232,25
	Total	473			Total	429	
housekeeping	man	216	198,99	adults	man	192	198,24
	woman	257	268,95	care/week	woman	233	225,16
	Total	473			Total	425	
textiles	man	209	155,03	volunteer	man	192	221,38
	woman	257	297,32	activities/week	woman	232	205,15
	Total	466			Total	424	
ornamental	man	204	174,93	useful	man	199	206,32
plants	woman	251	271,13	plants/week	woman	247	237,34
	Total	455			Total	446	
pet care	man	204	214,74	farm	man	192	213,49
	woman	240	229,09	animals/week	woman	236	215,32
	Total	444			Total	428	
maintenance	man	204	240,43	building and	man	192	223,06
and	woman	237	204,27	reconstruction/	woman	232	203,76
preparation	Total	441		week	Total	424	
shopping and	man	216	231,99	unpaid work	man	216	184,17
services	woman	257	241,21	total	woman	257	281,40
	Total	473			Total	473	

Table 2 Unpaid work in single-person households according to gender

Source: Own elaboration

In case of activities with statistically significant differences, women usually spend more time by unpaid work than man (there are also exceptions – building and reconstruction, volunteer activities and maintenance and preparation). This result is also not surprising. Building and reconstruction, as well as maintenance and preparation are traditionally activities that are performed more by men than by women. Men often perform them as a hobby, not as a necessity. On the other side, women living alone perform them usually only if they must. It will be, however, interesting to find out whether women utilise more market services for building, reconstruction, maintenance and preparation than men, or not.

5 Unpaid work in single-person households according to place of living

We found out, that there are differences in the extent of the unpaid work performed in households also with regard the place of living of the household. WE distinguish between the rural and urban environment (however, we did not distinguish between the regional and other towns and we also did not distinguish whether households lives in block of flats or in the private house). Regional disparities, however, can have important influence also on the single-person households and their life style (Uramová and Kožiak, 2008). In general (considering all types of households), households living in rural areas spent in average 75.8 hours per week by unpaid work activities, while households living in urban areas spent by these activities only 61.79 hours per week in average.

By the mean of Mann-Whitney non-parametric test, we tested our hypothesis that there are statistically significant differences in the extent of unpaid work performed by the single-person households living in towns and villages (we supposed that single-person households living in the villages perform more unpaid work activities than single-person households living in towns).

	type of		Mean			type of		Mean
	living	Ν	Rank			living	Ν	Rank
food	town	315	225,95	c	children	town	290	212,30
preparation	willage	158	259,03	c	care/week	willage	139	220,64
	Total	473				Total	429	
housekeeping	town	315	223,63	a	adults	town	288	211,97
	willage	158	263,65	c	care/week	willage	137	215,17
	Total	473				Total	425	
textiles	town	308	219,28	V	volunteer	town	288	219,34
	willage	158	261,22	a	activities/week	willage	136	198,01
	Total	466				Total	424	
ornamental	town	298	191,65	υ	useful	town	296	184,43
plants	willage	157	296,99	ŗ	plants/week	willage	150	300,60
	Total	455				Total	446	
pet care	town	296	201,72	f	farm	town	288	190,50
	willage	148	264,06	a	animals/week	willage	140	263,87
	Total	444				Total	428	
maintenance	town	294	217,48	t	ouilding and	town	288	215,90
and	willage	147	228,04	r	reconstruction/	willage	136	205,29
preparation	Total	441		V	week	Total	424	
shopping and	town	315	256,03	υ	unpaid work	town	315	216,63
services	willage	158	199,05	t	otal	willage	158	277,60
	Total	473				Total	473	

 Table 3 Unpaid work in single-person households according to place of living

Source: Own elaboration

In the Table 3, there are information about the time that single-person households living in villages or towns spend by particular unpaid work activities.

Single-person households living in villages spend significantly more time (277.60 minutes per week) by unpaid work activities than single-person households in towns (only 216.63 minutes per week). Considering each particular activity, there are statistically significant differences in all of them, excepting maintenance and reparations, children and adults care. I tis interesting because we expected that time spent by children and adults care will be statistically different in towns and villages (much more in villages). In this case, however, persons form single-person households live alone, so we can assume that adults and children care refer only to distant relatives. That is why there could not be differences between the households in towns and villages.

In all other activities, there are statistically significant differences between the single-person households in towns and villages. Households in towns spend more time by shopping and services and volunteering. It seems to be clear, because volunteering could be a part of the life style in the towns. Towns also offer much more possibilities for shopping and utilising services than villages. In all other activities, households in villages spend more time by performing them than households in towns.

6 Conclusion

Single-person households are very specific phenomena, not only regarding their status in society and family life, but also regarding their economic activities. Actually, more than 25% of all households in Slovakia are single-person households and this ratio has increasing trend. In our field research, in which we focused on the extent and activities of the unpaid work, about 25% of all respondents were single-person households (what correspond with the situation in the whole Slovakia). WE found out that single-person households have lot of particularities compering to multi-persons households also in the area of unpaid work. By the means of Mann-Whitney nonparametric test, on the probability level $\alpha = 0.05$, we confirmed two hypothesis concerning single-person households. We confirmed, that there are statistically significant differences between single-person households according to the gender. We found out that women perform more unpaid work than men almost in all unpaid work activities. WE also confirmed that there are statistically significant differences between single-person households according to the place of living. We found out, that in villages single-person households perform more unpaid work than single-person households in towns. This is the true in almost all unpaid work activities.

Extent of the unpaid work, as well as the life style of single-person households predestined them to be a serious subject matter of our research interest also in the future. We consider necessary to focus more deeply on them, also regarding their interest to substitute unpaid work by services offered by the market.

Acknowledgements

This paper is an output of scientific project of Grant Agency VEGA [no. 1/0935/13] "Unpaid work as a potential source of socio-economic development of society and the determinant of individual well-being".

References

- HRONEC, M. 2007. The education Unemployment relationship in the Slovak Republic: An analysis with special regard to economic education. In: *New Educational Review*. 2007. Vol. 11, No. 1, pp. 115-126.
- OECD. STATISTICAL DATABASE (OECD. StatExtracts). [Online database]. Available at: http://stats.oecd.org/>.
- ŠPROCHA, B., VAŇO, B. and BLEHA, B. 2014. *Prognóza vývoja rodín a domácností na Slovensku do roku 2030*. Bratislava: EKONÓM.
- URAMOVA, M. and KOZIAK, R. 2008. Regional disparities in Slovakia from the aspect of average nominal wage. In : *E & M Ekonomie a Management*. Vol. 11, No. 2, pp. 6–18.
- VEGA No. 1/1141/11 The Labor Market in the Specific Context of the Unpaid Work, the Measurement of Unpaid Work Value and its Impacts into Households, the Business Sector and the Economy. Research period: 2011 2012.
- VEGA No. 1/0935/13 Unpaid work as a potential source of socio-economic development of society and the determinant of individual well-being. Research period: 2013-2016.

STATISTICAL YEARBOOK OF SLOVAK REPUBLIC. 2012. Bratislava: VEDA. 2012.

STATISTICAL OFFICE OF THE SLOVAK REPUBLIC. ©2015. [Online database]. Available at: http://portal.statistics.sk/>.

Crowd Investing as a Financing Alternative for Small and Midsized Enterprises (SME)

MARTIN UŽÍK¹ – CHRISTIAN MARTIN HOFFMEISTER² Berlin School of Economics and Law Institution Germany Technical University of Kosice, Faculty of Economics Slovak Republic

Abstract

More and more start-up and mid-sized companies are looking for alternative financing options. Recently crowd investing has become one attractive variety. Crowd investing has evolved from the original idea of crowd sourcing with the focus on finance. This method has advantages on both sides, the investors can diversify their investment risks and the borrowers have fast access to realize their projects. In this paper we review the different kinds of crowd funding with the emphasis on crowd investing. It is mainly used for financing projects of start-up companies, but these projects have a high failure rate. The key idea of crowd investing is that a potential loss of the risky project can be absorbed easier if the amount of each investment is very small. The common procedure is constructed simply and is implemented via platforms in the Internet. The project initiators present their projects on the platform. Registered investors can choose among the projects if they like to support one. For a secure processing and safe contract design on both sides a trustee is involved. The investor's motivation evolves mainly from getting broad information and easy entrance to all business sectors. Particularly, for SMEs and start-up companies crowd investing is a new financing instrument to realize projects quickly. Internal financing sources are limited and underlie the fluctuations of economy. Thus, the use of crowd investing as additional financing source can increase the performance of economy.

Key words: Crowdfunding, Crowd Investing, Financing, Internet, Investment, Start-up

JEL Classification: G230

1 Introduction and definition

The scientific literature cannot stick with the speed of development, which prevails on the Internet. This causes the lack of a commonly accepted scientific definition of crowd investing at the present time. The term crowd investing is referable to Jeff Howe, who first has introduced the so-called crowd sourcing (Howe, 2006). This effect can be achieved by using the knowledge of a plurality of people, in order to optimize the output results of a process. Today this method is being used in product development of online gaming for example.

The crowd investing should be seen as an embodiment of crowdfunding, which is an increase regarding the financial level compared to crowd sourcing and is defined in literature as follows: "crowdfunding involves an open call, essentially through the Internet, for the provision of financial resources either in the form of donation or in exchange for some form of reward and / or voting rights" (Belleflamme, Lambert and Schwienbacher, 2010).

In this article the definition of crowdfunding of Moritz and Block is used. It means that crowdfunding is a form of financing, which is carried out via an open call over the Internet (with or without an intermediary) and aims to obtain funds for a project or business, with or

¹ Prof. Dr. Martin Uzik, Badensche Straße 50-51, 10825 Berlin, Germany, marin.uzik@hwr-berlin.de

² Dipl. Econ. Christian Martin Hoffmeister, Memeler Straße 5, 50735 Cologne, Germany,

christian.hoffmeister@student.tuke.sk

without a direct financial reimbursement. Crowdfunding usually is based on the participation of a large number of individual investors (Moritz and Block, 2013).



Figure 1 Crowdfunding (Kaltenbeck, 2011)

The following points are based on the crowd-principle:

- Crowdwisdom: makes use of the intelligence of a community. The crowd is asked to reflect and activate on their knowledge.
- Crowdcreation: makes use of the creative potential of a crowd. The collected ideas of the crowd are used in the form of texts, audio files, illustrations and similar forms.
- Crowdvoting: makes use of the opinions and judgement of the crowd to assess ideas or content. The opinions retrieved from this process then serve as the basis for decisions by the crowd. Hence, it can be used as a forecasting tool.
- Crowdfunding: "fundraising technique, which allows businesses to obtain capital from a large number of individuals from the general public, the 'crowd'" (Belleflamme et al., 2012).

Crowdfunding can occur in the forms listed below (Moritz and Block, 2013):

- Reward- vs. donation-based crowdfunding: this represents the donation form of crowdfunding. It should enable the realization of cultural and creative projects, whereby no financial reimbursement is refunded to the donor. The donor either benefits by the results of the advantage is pure fundraising matter. The main difference in contrast to the known structures of donation projects is due to the use of the Internet.
- Lending-based crowdfunding: this deals with the allocation of microfinance. The lenders lend their capital by using platforms to selected projects and expect an interest rate and the repayment of the capital within the agreed periods.
- Equity-based crowdfunding: This provides a type of equity financing and is also referred to as crowd financing. In this case of crowdfunding the investors ("Crowd") are involved in the net asset value of the company. As a classical equity donor the investors have to accept the total loss of the equity. They investors directly participate from the profits of the crowd investing project by a percentage basis of paid shares.

The equity-based crowdfunding thus corresponds to the crowd investing and is the focus of this paper.

2 Crowd investing process

The procedure as well as the structure of a crowd investing process is based on a trivial idea. The aim is to collect small amounts by a large number of people ("crowd") and to facilitate in this way the realization of projects. Therefor the Internet has been successfully used as a medium to attract a large number of potential investors. The initiators of projects under the

crowd investing process are primarily companies or entrepreneurs. Start-up entrepreneurs especially use this method of financing, because they are associated with a high risk of a total loss of equity. The loss of each individual investor of the crowd is only a small amount and even a total loss can be neglected. The process can be figured under recourse to the process structure of crowdfunding.

The participants in the crowd investing process are the project initiators, intermediaries and the investors ("crowd"). In the framework presented here primarily capital seeking or private legal persons occur as project initiators. On platforms provided by the intermediaries in the Internet they represent their projects and try to find people who are willing to finance such an innovative project. In the first step the capital seekers send the information about the project and their financial intend to the intermediary. The registered investors obtained via the exchange platform (intermediary) all relevant information; the intermediary hereby can provide assistance with the framework and conclusions of contracts between the two parties. A trustee administers the capital made available until the project initiators will be settled (Moritz and Block, 2013).



Figure 2 The process of crowdfunding (Adapted after Moritz, 2013)

Regarding the risk rating from the investors perspective crowd investing is a risky investment. Citing results of Anglo-American sources Meschkowski and Wilhelmi (2013) assess the risks of crowd investing investments (Meschkowski and Wilhelmi, 2013).

The mentioned numbers, however – even without presenting detailed scientific analysis – are not judged to be negative. These authors approximate the results of a study on the business of crowd funding. They found that about 53% of all investigation result in a negative outcome. Just 7% of the investments result in a tenfold increase of the initially investigated financial volume (Meschkowski and Wilhelmi, 2013). Generally the individually given risk-return

constellation has to be considered as the relevant point of view. Thus, the initial results, which could be found in the realization of crowd investing projects, particularly in the United States, certainly correspond to those referred in the portfolio theory framework. The approximated failure rate seems to be approximated very high (52% of projects achieved a negative return), but it is almost at a similar level of failure rates attributed to M & A transactions (Meyer, 2011). Therefor, this has to be considered rather positively regarding a very young source of founding.

3 Motivation of the investors

The investor's motivation results from the possibility of a wide analysis of projects as well as from the fast access to relevant information (Hornuf and Klöhn, 2013). Additionally the investors open access to formally difficult or not at all available business sectors. Particularly in the field of private equity investments, this methodology represents a new way of equity financing. At the same time the crowd investing can gain a significant role in venture capital financing, which is in Germany not a well-developed source compared to other industrial countries. The low scale of investment amounts permits additional diversification benefits of the crowd investment and thus it leads to a better risk management in their own portfolio.



Figure 3 Stages of entrepreneurial firm development (Cumming and Johan: 2009, p. 7)

An option of trading project shares (such as in the crowd investing platform Bergfürst corrects the original illiquidity of this investment alternative from the perspective of the crowd and raises it even to the level of exchange-traded securities – assuming the liquidity of trading is guaranteed by a sufficient number of participants.

4 Financing possibilities of medium-sized companies by crowd investing

The currently rarely encountered use of crowd investing as a financing alternative is due to the low volume of capital, which is transacted through the platforms on the market. However, it can be assumed that an increase in financing volumes will occur by the on going improvement of the legal framework for this type of financing. At the same time the crowd investing still belongs to the group of the little known financing sources, which in the near future will become more well known due to the expected success in profits. The German middle class in particular has – using this new financial instrument – an alternative for financing of new developments and industrial prototypes the. One of the major issues, that has to be solved, is certainly the fear of publishing of relevant technological information as part of the project conception. Nevertheless, successful project in the start-up sector indicate that such risk scan be handled.

Countries	Volume in EUR million	Volume per inhabitant in EUR
UK	2337,0	36,18
Estoniea	22,0	16,77
Sweden	107,0	10,96
The Netherland	78,0	4,61
Finland	17,0	3,11
France	187,0	2,33
Germany	140,0	1,73
Switzerland	12,0	1,46
Spain	62,0	1,33
Denmark	2,5	0,44
Austria	3,6	0,42
Belgium	2,5	0,22
The Czech Republic	2,0	0,19
Slovakia	1,0	0,18
Italy	8,2	0,13
Poland	4,0	0,10

Figure 4 Crowdfunding volumes per capita in euro in 2014 (data from Zhang et al., 2015)

5 Conclusion

The crowd investing can be considered as a useful financing alternative especially for start-up companies. By classifying between the bank financing and venture capital financing the crowd investing completes the existing gap in the common funding sources (Meschkowski and Wilhelmi, 2013). However, this instrument provides an interesting alternative of financing for small and mid-sized companies in Germany. Hereby, it might be helpful by allowing financing of the often-cited innovative power and niche specialization mainly of the mid tier in order to e.g. the financing of prototypes. The innovative power arises by project implementations, which the German SME sector mainly realizes by internal financing sources. However, these sources are limited and underlie the cyclical development of the economic. At this point the use of crowd investing can accomplish an additional development boost for the economy.

References

- BELLEFLAMME, P., LAMBERT, T. and SCHWIENBACHER, A. 2010. Crowdfunding: An Industrial Organization Perspective. In: *Working Paper*.
- BELLEFLAMME, P., LAMBERT, T. and SCHWIENBACHER, A. 2014. Crowdfunding: Tapping the right crowd. In: *Journal of Business Venturing*. Vol. 29, No. 5, pp. 585-609.
- HORNUF, L. and KLÖHN, L. 2013. Crowdinvesting und Portfolioverifizierung. In: Venture Capital Magazin. Vol. 2, pp 34-35.
- HOWE, J. 2006. The rise of crowdsourcing. In: Wired magazine. Vol. 14, No. 6, p. 2.
- KALTENBECK, J. 2011. Crowdfunding und Social Payments im Anwendungskontext. In: *Open Educational Resources*. Vol. 1, Berlin: BIMS e.V.
- MESCHKOWSKI, A. and WILHELMI, K. A. 2013. Investorenschutz im Crowdinvesting. In: *Betriebsberater*. Vol. 24, 10.06.2013, pp. 1411-1418.
- MEYER, M. 2011. Erfolgsfaktoren bei Mergers & Acquisitions. University of Wuppertal 2011.
- MORITZ, A. and BLOCK, J. 2013. Crowdfunding und Crowdinvesting State-of-the-Art der wissenschaftlichen Literatur. *Working Paper*.
- WARDROP, R., ZHANG, Z., RAU, P.R. and GRAY, M. 2015. Moving Mainstream The European Alternative Finance Benchmarking Report. University of Cambridge and Ernst & Young, pp. 1-44.

Implementation of EURO-Currency in the V4 Countries and the Impact on the Economic Result of Companies

MARTIN UŽÍK¹ – PETER DŽUPKA² – CHRISTIAN HOFFMEISTER³ ¹Berlin School of Economics and Law Institution Germany ^{2,3}Technical University of Kosice, Faculty of Economics Slovak Republic

Abstract

Presented paper is focused on examination of the impact of EUR currency introduction in V4 countries on companies' economic performance. With used of the simple economic model, we have simulated the introduction of EUR currency in all V4 countries and estimated impact on the typical industrial company. The economic models was built on macro as well as micro parameter. The typical company was described with use of average profit and loss statement for company from industrial sector. For running simulation we established three different scenarios based on data from Bloomberg and Eurostat from period 1999-2008. The results are presented on simulation of the EBIT margin in each of the V4 countries.

Key words: EURO Currency, Company Economic Performance, EBIT Margin

JEL Classification: F36 Financial Aspects of Economic Integration

1 Introduction

The Visegrád Group was founded in February 1991 by the leaders of the neighboring states of Poland, the former Czechoslovakia and Hungary, with the objective of strengthening regional cooperation in political and economic issues in the Hungarian town of Visegrád. Jointly these countries aimed on accession to European political and economic organizations, such as the EU and NATO - an endeavor that has now been crowned with success. After the dissolution of Czechoslovakia in 1993, the two successor states of the Czech Republic and Slovakia with Poland and Hungary have founded the "Visegrád 4" (V4). The historical roots of cooperation between the countries can be traced back to the year 1335. At that time, the Visegrád castle was the synonym for regional cooperation between the countries of Poland, Bohemia and Hungary. At a summit of the mentioned countries, cooperation in the fields of politics and commerce has been agreed.

From today's perspective, the countries of the Visegrád 4 form a significant economic union in Europe. The 64.3 million residents in the Visegrád 4 generated in 2012 a gross domestic product (GDP) of EUR 702.2 billion. This corresponds to 5.41 percent of the GDP of all EU countries. The high economic significance was taken as an opportunity to examine the euro introduction.

¹ Prof. Dr. Martin Užík, Baden Strasse 50-51, 10825 Berlin, Germany, martin.uzik@hwr-berlin.de

² doc. Ing. Peter Džupka, PhD., Němcovej 32, 040 01 Košice, Slovak Republic, peter.dzupka@tuke.sk

³ Dipl. Econ. Christian Martin Hoffmeister, Memeler Strasse 5, 50735 Cologne, Germany,

christian.hoffmeister@student.tuke.sk

The present paper examines the impact of the introduction of the euro in the V4 countries based on the economic results of enterprises. For this reason the impact of exchange rates and productivity growth are considered in a joint interaction. The objective is to determine whether a euro introduction may have a positive effect on the business results. With Slovakia there is already a candidate who has implemented the introduction of the euro at 1.1.2009. For this reason, analyzes relate to the period up to 31.12.2008.

2 Euro in the V4 countries

In the middle of 2004, ten countries – most of them from the Central and East European region – joined the European Union (EU). All of the new member states are required to adopt the euro in the future. Before introducing the euro, however, these countries must fulfil the so-called Maastricht convergence criteria, but there is no explicitly defined deadline for this. The Maastricht criteria, as seen in the table blow, can be divided into 4 major units:

- 1. The fiscal criterion includes the requirements for the government debt that should not exceed 3% of the GDP on public balance, which should not be higher than 60% of the GDP or at least prove a significant decreasing trend.
- 2. Low inflation Maastricht criterion is preventing countries to have an early real exchange rate advantage (cheap products- more competitive) and in long-term keeps the business cycles over Eurozone synchronized as it prevents country going to recession, as high inflation under fixed exchange means recession. Inflation criterion is based on average of the three EU countries with the lowest inflation plus 1,5%.
- 3. The long-term interest rates should not be higher than 1.5 percentage points than the average of three countries in EU with lowest inflation. The main reason behind this criterion is the fear of too big difference in interest rates of the countries entering Eurozone that could vitiate system. If the securities of one country would be more lucrative than the securities of the other, it would be beneficial to sell less yielding securities and buy the more gainful. Such speculations would cause disturbance on the capital market.
- 4. To fulfil the Maastricht criterion, the country must become member of ERM II for at least two years, with fluctuation bank plus/minus 15% without depreciation of the currency.

	Public balance	Government debt	НІСР	Long term interest	Exchange rate
2001			3.1	6.92	
2002			2.6	6.85	
2003			2.7	6.12	of /-15
2004		60	2.2	6.28	tion +
2005		00	2.5	5.37	ctua imu
2006			2.9	6.24	fluc max
2007			2.8	6.4	
2008			4.1	6.6	

 Table 1 Reference Maastricht criteria for potential Eurozone members

Financial markets form their own view about the future date of entry to the Eurozone of these countries. If a change in the circumstances persuades markets that the convergence process will be

delayed. the expected entry date may be shifted out. Because of the forward-looking nature of financial markets. such a revision may affect current monetary conditions. i.e. the spot exchange rate and long-term yields.

2.1 Euro in Slovakia

On January 1th 2009 accepted Slovakia Euro as a national currency. being a 16th member of the Eurozone. In 2007 Slovenia. in 2008 Malta and Cyprus. in 2011 Estonia and in 2014 also Latvia has completed the final stage of EMU and accepted euro. It took first European countries nine years to adopt Euro as an official currency. It took Slovenia two years and seven months in ERM II. Cyprus and Malta two years and 8 months in ERM II. Slovakia planned to accept euro in the shortest period (two years one month) with a challenging "catch up" plan for the standard of living (real convergence). The entrance to the European monetary union had been a top priority for the Slovak economy in past 10 years. The requirements of acceptance to the Eurozone are defined by the EU and were inserted into the changeover plan. There was one major concern: the fulfilment of Maastricht criteria.

	Public balance	Government debt	НІСР	Long term interest	Exchange rate
2001	-6.5	48.9	7.2	8.04	42.78
2002	-8.2	43.4	3.5	6.94	41.503
2003	-2.8	42.4	8.4	4.99	41.17
2004	-2.4	41.4	7.5	5.03	38.745
2005	-2.8	34.2	2.8	3.52	37.88
2006	-3.5	30.4	4.3	4.41	34.435
2007	-1.9	29.4	1.9	4.49	33.418
2008	-2.2	27.6	3.9	4.72	30.126

 Table 2 Macroeconomic indicators of Slovakia from 2001 until 2008

2.2 Euro in Poland

Poland entered the European Union in May 2004. and the estimated date to enter the Eurozone was originally January 1. 2012. Poland still has its policies geared toward having a convergence to the euro area. However, the original goal to adopt Euro must have been postponed. The centre-right government has conceded that 2012 is unrealistic, given the scale of an economic slowdown that has eroded state revenues and driven up the budget deficit, though it remains publicly committed to that entry date. Updated adoption date is 2014 with the condition of entrance into ERM-II in the second quarter of 2012. As can be seen from the table Poland still has got some difficulties in fulfilment of the Maastricht criteria. The public balance deficit was successfully reduced at -1.9% GDP in 2007, however, in 2008 raised back to its former level from 2006. The government debt is handled very carefully and Poland succeeded to tighten the deficit to around 47% GDP with ca. 13% reserve. NBP was successful enough to bring the two-digit inflation rates (around 10 percent) down to 2 percent at the end of 2002 and has kept it in the range up to 4 percent afterward. It has also succeeded in lowering the long term interest rate to acceptable from year 2003 when the interest rates fell from 7.36% to 5.78% on the long run. In year 1990 introduced Poland a stabilisation policy together with fixed rate regime. At the moment is Zloty fixed to euro, which

means the fluctuations from the fixed level are low. However, the exchange rate criterion is not of a high value at present because Poland has not entered the ERM-II mechanism yet.

	Public balance	Government debt	ніср	Long term interest	Exchange rate
2001	-5.1	37.6	5.3	10.68	3.6721
2002	-5	42.2	1.9	7.36	3.8574
2003	-6.3	47.1	0.7	5.78	4.3996
2004	-5.7	45.7	3.6	6.9	4.5268
2005	-4.3	47.1	2.2	5.22	4.023
2006	-3.9	47.7	1.3	5.23	3.8959
2007	-1.9	44.9	2.6	5.48	3.7837
2008	-3.9	47.1	4.2	6.07	3.5121

Table 3 Macroeconomic indicators of Poland from 2001 until 2008

2.3 Euro in Hungary

From May 2004 is Hungary a full member of the EU. However, there are still a few years ahead to introduce the Euro. for which the budget and exchange rate stability are essential. Official plans of Hungarian government were to enter the Eurozone and accept the Euro by 2012, but the updated prognoses state the date at 2013 earliest. Acceptance of Euro as a national currency in 2012 would have meant that Hungary entered the ERM-II system in second quarter of 2009, which is rather improbable. Hungary could not meet any of the Maastricht criteria so far and as already mentioned has not entered the ERM-II mechanism as well. The public balance deficit fell down after steep increase from -9.2% GDP in 2006 to -3.4% GDP in 2008, but still has not breached the 3% border. Furthermore, the Government debt deficit deepens from year to year with the current value of 73% GDP in year 2008.

Table 4 Macroeconomic indicators of Hungary from 2001 until 2008

	Public balance	Government debt	НІСР	Long term interest	Exchange rate
2001	-4	52.1	9.1	7.95	256.59
2002	-9	55.8	5.2	7.09	242.96
2003	-7.2	58.1	4.7	6.82	253.62
2004	-6.4	59.4	6.8	8.19	251.66
2005	-7.8	61.7	3.5	6.6	248.05
2006	-9.2	65.6	4	7.12	264.26
2007	-4.9	65.8	7.9	6.74	251.35
2008	-3.4	73	6	8.24	251.51

2.4 Euro in Czech Republic

Czech Republic entered the Europe Union in May 2004. In January 2005 recommended in line with the earlier approved euro adoption strategy the Ministry of Finance. the Ministry of Industry and Trade. and the CNB to the Czech government not attempt to enter the euro area during 2005. The estimated date to enter the Eurozone was set to year 2012. This date was since than postponed and the new estimations are set to year 2019. However. Czech Republic meets all the criteria to enter the Eurozone and the process is an intention of Czech government to prevent the overheating of economy.⁴

	Public balance	Government debt	НІСР	Long term interest	Exchange rate
2001	-5.7	25.1	4.5	6.31	34.068
2002	-6.8	28.5	1.4	4.88	30.804
2003	-6.6	30.1	-0.1	4.12	31.846
2004	-3	30.4	2.6	4.82	31.891
2005	-3.6	29.8	1.6	3.54	29.782
2006	-2.6	29.6	2.1	3.8	28.342
2007	-0.6	28.9	3	4.3	27.766
2008	-1.5	29.8	6.3	4.63	24.946

 Table 5 Macroeconomic indicators of Czech Republic from 2001 until 2008

3 Methodology

3.1 Model description

In this chapter follows the elaboration of the Euro adoption conditions. Both macroeconomic and microeconomic parameters have to be considered. On the macroeconomic side are primarily productivity and labour effectiveness data of importance. Furthermore have the GDP values for the measurement of economy's economic performance a notable role. On the microeconomic side was the micro sector analysis performed. where a typical industrial company is simulated and from it's point the positives and negatives of Euro adoption are analysed.

3.2 Typical company

Because of the strong orientation of the Visegrád Group on machine production is the market influenced mainly by engineering industry. as well as iron industry and metalworking. A typical model is Slovak Republic with it's high concentration of mechanical engineering production thanks to enlarged automobile production. The result is a model of standardised company. from which the Profit and loss is derived. From the Table 6 is obvious that personal and material costs involve up to 74% of the sales revenue.

⁴ http://www.euractiv.sk/ekonomika-a-euro/clanok/r-holman-pre-cesko-je-lepsie-euro-neprijat
	Companies Average in EUR	Quota
Sales	2009.59	
Personnel Expenses	528.04	26.28%
Cost of Materials	950.36	47.29%
other operating Expenses	346.98	17.27%
EBITDA	184.21	9.17%
Depreciation&Amortization	77.77	3.87%
EBIT	106.44	5.30%
Interest Expenses	25.10	1.25%
EBT	81.34	4.05%
Tax	15.45	0.77%
EAT	65.89	3.28%

Table 6 Model of a Profit & Lost Statement of a typical average industry Company

3.3 Scenario description

In this chapter there are three scenario analyses taken into consideration. All three scenarios begin in year 1999 and include the time period of 10 years until the end of year 2008. All three scenarios are subsequently described and shortly explained:

- 1. First scenario considers a model company in the countries of V4 where 50% of the production is exported. This is a simple scenario with a reference to developing exchange rate to euro and labour costs in each country. Every company takes the full cross currency risk. The tax rate does not change in whole years in every country. The growth rate of Sales is zero. The cost of material. the cost of personal and the other expenses will be simulated in dependency of Sales. That means, that we will use the material, personal or other operating expenses -ratio. For example the material ratio we counted in databases of typical company is 47. 29%. Product of this ration and the company sales will count the euro amount of cost of materials. We assumed that the invest-ratio is constant. That means that the Depreciations and Amortizations only depend from sales. We also assumed that the capital structure of company is still constant.
- The second scenario considers a model company where 50% of the production is exported. All 2. the conditions from the first scenario are kept. Furthermore. the GDP growth. grow of employee salaries and the labour productivity are involved, which generates a dynamic model. he annual turnover equals the revenue of the previous year increases proportionally with the growth of GDP. This Means that the company is growing at the same growth rate as the GDP. All cost items such as personnel costs. material costs and other operating expenses are 50% reliant on the exchange rate between the national currency and the euro. The cost items are dependent on the revenues in a corresponding ratio. Staff costs are also modeled in the dependence of the exchange rates on Euro. depending on the price index as well as the development of productivity. While the price index increases the personnel costs. productivity acts inversely on the level of personnel costs. as these are reduced with the increase in productivity. This is due to the fact that employees produce more products per working hour which contributes to the reduction of the average income. This factor acts as a natural logarithm of the ratio between the current and last year's productivity and corrected according to the amount of personnel costs.
- 3. Considered is a company with 50% exported production. Moreover is hypothesized that from 1999 is Euro a national currency in all of the V4 countries. In this scenario is for simplification assumed that the labour productivity does not exceed the inflation level.

4 Results

4.1 Basic input data

The data used are taken from the database Bloomberg and Eurostat. When considering the exchange rate information it is already apparent that the Slovak koruna has enhanced most of all V4 countries against the euro. The average annual growth rate of the Slovak koruna was 3.38% in the period from 1999 to 2008 The Hungarian forint annually lost 0.38% against the euro. The Polish zloty rose slightly and the Czech crown was the second strongest currency.

	SKKEUR Currency	CZKEUR Currency	HUFEUR Currency	PLNEUR Currency
Date	Cross Rate	Cross Rate	Cross Rate	Cross Rate
31.12.2008	0.0332	0.0372	0.3765	0.2410
31.12.2007	0.0298	0.0377	0.3957	0.2787
29.12.2006	0.0290	0.0363	0.3978	0.2610
30.12.2005	0.0264	0.0344	0.3959	0.2601
31.12.2004	0.0258	0.0329	0.4076	0.2450
31.12.2003	0.0243	0.0309	0.3805	0.2128
31.12.2002	0.0240	0.0316	0.4245	0.2488
31.12.2001	0.0232	0.0316	0.4091	0.2836
29.12.2000	0.0226	0.0285	0.3759	0.2567
31.12.1999	0.0238	0.0277	0.3913	0.2401
CAGR	3.38%	2.99%	-0.38%	0.04%

Table	7	Currency	cross rate	1999 - 2	2008
rable	1	Currency	CI 055 I ale	1777-4	2000

As shown in the description of the scenario. this information will be used in the simulation model. It can already be predicted that Slovakia and the Czech Republic should introduce the euro due to reasons of economic policy. This issue will be examined in the context of the simulation. Due to the financial crisis in 2008 is also seen that all the currencies of the V4 countries depreciated against the euro. Only the Slovak koruna developed constant due to the prepared changeover on euro and consequent fixing of the exchange rate of the Slovak koruna. The financial crisis of 2008 caused the restriction of the analysis to the period up to 31.12.2008.



Figure 1 Exchange rates of the V4 countries to the euro

As part of the modeling for each country. the data on the annual salaries. labor productivity and the growth of GDP is needed. No reliable source on the salary and wage development was available for the Czech Republic. The only information was based on data from 2005. The comparison with the salaries of Slovakia resulted in a quotient of 1.475 which was then used to convert the Slovak salaries in the considered analysis period to Czech standards.

	Country aver	age salary index (in	EUR)	
Date	SVK	CZE	HU	PL
30.12.2008	787.6		831.4	825.8
31.12.2007	761.0		832.1	901.1
29.12.2006	701.4		800.6	789.2
30.12.2005	646.2		711.4	725.4
31.12.2004	596.0		693.1	673.9
31.12.2003	537.1		668.6	567.0
31.12.2002	506.7		690.7	629.0
31.12.2001	464.3		558.3	700.9
29.12.2000	425.0		436.6	605.3
31.12.1999	399.2		391.6	523.8
CAGR	7.03%		7.82%	4.66%

Table	8	Country	average	salary	index	(in	EUR)
						(

-0,40

In terms of labor productivity it can be seen that Slovakia achieved the highest growth rates which is important information for the simulation.

	Labour productivity index fixed in year 2000 on 100 points										
Year	SVK	CZE	HU	PL							
2008	148.4	118.5	114.7	121.1							
2007	141.6	116.4	113.3	119.9							
2006	131.0	113.1	113.2	120.5							
2005	123.5	111.0	112.1	120.7							
2004	117.5	110.2	111.6	121.1							
2003	111.5	107.6	111.0	118.1							
2002	107.6	101.9	109.5	106.1							
2001	102.8	102.4	105.0	102.6							
2000	100.0	100.0	100.0	100.0							
1999	96.7	100.2	95.8	97.0							

Table 9 Labor Productivity Index

The development of productivity is exactly the same as the development of the gross domestic product. Slovakia also was able to gain the highest growth of GDP.

	GDP Growth	Rate in %		
Date	SVK	CZE	HU	PL
30.12.2008	13.5	3.2	0.5	5.0
31.12.2007	12.5	6.0	1.2	6.6
29.12.2006	11.0	6.8	4.0	6.2
30.12.2005	10.1	6.3	3.9	3.6
31.12.2004	9.5	4.5	4.7	5.3
31.12.2003	9.0	3.6	4.3	3.9
31.12.2002	8.5	1.9	4.4	1.4
31.12.2001	8.1	2.5	4.1	1.2
29.12.2000	7.6	3.6	5.2	4.3
31.12.1999	7.6	1.3	4.2	4.5

Table 10 GDP Growth

The level of rates will have no effect on the determination result. since the comparison of the results is carried out at the level of EBIT margin. The export rate is assumed to be 50% for the first two scenarios and set equal for all countries. Only in the last scenario, the export ratio does not matter, since it is assumed that in the euro zone, all products are sold. The common currency thus exerts no influence on the exchange rate and the economic results of the companies.

Table 11 Tax rates and Export-Ratio

<u>Basic Model Input Data</u>									
	SVK	CZE	HU	PL					
Tax Rate	19.0%	24.0%	16.0%	19.0%					
Export Quota	50.0%	50.0%	50.0%	50.0%					

The following input factors listed are used in the modeling. A turnover of 100 units is defined by definition. The cost positions evolve proportionately as it was calculated of the model firms (Table 6). The results of the impact will be show for the profit and loss account of the company in Slovakia. For each V4 country three scenarios are simulated over the investigation period. resulting in a total of 120 P & L statements. For the other countries only the developments of EBIT margins are displayed.

	Profit&Lost Statement										
31.12	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	
Sales	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
Personnel Expenses	26.28	27.20	28.98	29.06	27.98	29.88	28.73	29.77	28.81	28.65	
Cost of Materials	47.29	46.07	47.91	48.09	47.58	48.71	47.83	49.51	47.93	49.84	
other operating Expenses	17.27	16.82	17.50	17.56	17.38	17.79	17.47	18.08	17.50	18.20	
EBITDA	9.16	9.91	5.62	5.28	7.06	3.62	5.97	2.64	5.75	3.30	
Depreciation&Amortization	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	
EBIT	5.29	6.04	1.75	1.41	3.19	-0.25	2.10	-1.23	1.88	-0.57	
Interest Expenses	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	
EBT	4.04	4.79	0.50	0.16	1.94	-1.50	0.85	-2.48	0.63	-1.82	
Tax	0.77	0.91	0.09	0.03	0.37	0.00	0.16	0.00	0.12	0.00	
EAT	3.27	3.88	0.40	0.13	1.57	-1.50	0.69	-2.48	0.51	-1.82	
EBIT-Margin	5.29%	6.04%	1.75%	1.41%	3.19%	-0.25%	2.10%	-1.23%	1.88%	-0.57%	
Moving Average		5.66%	3.89%	1.58%	2.30%	1.47%	0.92%	0.43%	0.32%	0.66%	

 Table 12 Simulated Profit&Lost Statements for all three Scenarios in Slovak republic

Szenario 1): 50% Export

Szenario b) 50% Export + growth of the Sales based on GDP-Change and the allowance of the labor productivity in the personnel expenses

<u>Profit&Lost Statement</u>										
31.12	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Sales	100.00	107.60	115.78	125.16	135.79	148.02	162.08	178.45	198.08	222.84
Personnel Expenses	26.28	28.29	30.44	32.90	35.70	38.91	42.61	46.91	52.08	58.58
Cost of Materials	47.29	49.57	55.47	60.19	64.62	72.09	77.53	88.35	94.94	111.07
other operating Expenses	17.27	18.10	20.26	21.98	23.60	26.33	28.31	32.27	34.67	40.56
EBITDA	9.16	11.64	9.61	10.08	11.88	10.68	13.63	10.92	16.38	12.62
Depreciation&Amortization	3.87	4.16	4.48	4.84	5.26	5.73	6.27	6.91	7.67	8.62
EBIT	5.29	7.48	5.13	5.24	6.62	4.95	7.35	4.01	8.72	3.99
Interest Expenses	1.25	1.35	1.45	1.56	1.70	1.85	2.03	2.23	2.48	2.79
EBT	4.04	6.13	3.69	3.67	4.93	3.10	5.33	1.78	6.24	1.21

CEFE 2015 - Central European Conference in Finance and Economics

Tax	0.77	1.17	0.70	0.70	0.94	0.59	1.01	0.34	1.19	0.23
EAT	3.27	4.97	2.99	2.98	3.99	2.51	4.32	1.44	5.06	0.98
EBIT-Marge	5.29%	6.95%	4.43%	4.19%	4.88%	3.35%	4.54%	2.25%	4.40%	1.79%
Moving Average		6.12%	5.69%	4.31%	4.53%	4.11%	3.94%	3.39%	3.32%	3.10%

Szenario 3) Anticipated implementation of the Euro Currency growth of the Sales based on GDP-Change and the allowance of the labor productivity in the personnel expenses

		<u>Proj</u>	fit&Lost Stat	tement_						
31.12	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Sales	100.00	107.60	115.78	125.16	135.79	148.02	162.08	178.45	198.08	222.84
Personnel Expenses	26.28	29.04	32.20	34.13	36.42	40.70	43.75	47.75	51.92	57.73
Cost of Materials	47.29	50.88	54.75	59.19	64.22	70.00	76.65	84.39	93.67	105.38
other operating Expenses	17.27	18.10	20.26	21.98	23.60	26.33	28.31	32.27	34.67	40.56
EBITDA	9.16	9.57	8.57	9.86	11.56	11.00	13.37	14.05	17.81	19.16
Depreciation&Amortization	3.87	4.16	4.48	4.84	5.26	5.73	6.27	6.91	7.67	8.62
EBIT	5.29	5.41	4.09	5.01	6.30	5.27	7.10	7.14	10.15	10.54
Interest Expenses	1.25	1.35	1.45	1.56	1.70	1.85	2.03	2.23	2.48	2.79
EBT	4.04	4.07	2.64	3.45	4.61	3.42	5.07	4.91	7.67	7.75
Tax	0.77	0.77	0.50	0.66	0.88	0.65	0.96	0.93	1.46	1.47
EAT	3.27	3.29	2.14	2.79	3.73	2.77	4.11	3.98	6.21	6.28
EBIT-Marge	5.29%	5.03%	3.53%	4.00%	4.64%	3.56%	4.38%	4.00%	5.12%	4.73%
Moving Average		5.16%	4.28%	3.77%	4.32%	4.10%	3.97%	4.19%	4.56%	4.93%



The consideration of the EBIT margins provides the best conclusions from the analyzes.

Figure 2 Simulation analysis of the EBIT margin development for Slovakia

In the baseline scenario the development of the EBIT margin of the company is dramatically negative. If the export ratio is increased to 70%, the EBIT margin dropped back to -2.55% At 100% strength export quota, the EBIT margin would be -5.52%. Companies with a negative EBIT margin will realize losses, which is not feasible in the long term. Companies would be forced to rethink their strategy and one of the option would be the cessation of production in one country and the relocation to another country.

If the baseline scenario is now extended by other factors such as GDP growth and labor productivity. companies can compensate the negative consequences of the development of the exchange rates partly. if the GDP growth and also productivity has positive values. It can already be recognized at the beginning of the analysis period in 1999 that companies can benefit in form of positive and partly rising EBIT margins. This situation is due to the fact that the exchange rate risk is eliminated entirely.



Figure 3 Simulation analysis of the EBIT margin development for Czech Republic

A development similar to Slovakia is also noticeable in the Czech Republic. however. the volatility of EBIT margin is significantly higher. which could indicate a increased exchange rate risk. At the same time it should be noted that a euro introduction in the Czech Republic would not have caused the positive effect in strength as it was in Slovakia.



Figure 4 Simulation analysis of the EBIT margin development for Hungary

For Hungary and Poland the introduction of the euro would lead to worse rather EBIT margins of the companies. which testifies that the companies will benefit from the exchange rate risk. There seems also no clear trend in the exchange rate development such as determined in Slovakia.



Figure 5 Simulation analysis of the EBIT margin development for Poland

Regarding to the euro introduction Slovakia is clearly the country where the euro introduction would have led to economic policy to the best results. This can also be observed from the overall consideration of the EBIT margin development of all countries.



Figure 6 Comparison of the simulation analysis of the EBIT margin development for the V4 countries

5 Conclusion

The political rearrangements in Europe at the end of the eighties marked after almost half a century. The beginning of a new era of economic collaboration between West- and East-European countries and their respective companies. West-European companies took advantage of their liquidity reserves to open up the new markets by means of foreign direct investments. One of the strategic challenges was to identify those East-European countries which offer the highest economic potential as investment targets. In this paper we focus on currency development in the countries belonging to the so-called Visegrád Group which was recognised in our analysis as primary investment region within Eastern Europe. In the analysis we focus on the macroeconomic indicators of the Visegrád Group countries and their influence on the Euro adoption as a national currency. Presented is a simulated company model with its standardized balance performance. Here derive we the profit and loss according to the macroeconomic development towards the Euro. As a result different profit and loss scenarios are presented. It is shown in particular that it was the right step that the Slovakian republic adopted the euro. The other countries, however are not yet in a position suitable for the introduction of the euro due to the total Economic Development in the period under review.

Acknowledgements

This paper was created within the project VEGA 1/0548/14 "Analysis of differences in innovation performance of spin-off and start up firms in Slovakia".

References

ÁRENDÁŠ. M. 2006. An Assessment of the Potential Effects of the Euro Changeover on Slovakia's business sector. In: *Biatec*. Vol. XIV. No. 9. pp. 2-6.

BEGLEY. S. 2007. The Roots of Fear. Newsweek

GRAUWE. P. 2007. Economics of Monetary Union. Oxford University Press.

- HAJNOVIČ. F.. KOMINKOVÁ. Z. and NEMEC. M. 2004. Stages of introducing the euro in the SR: In: *Biatec.* Vol. XII. No. 5. pp. 16-19.
- LYNGBY BUSINESS ACADEMY. 2007. *Marketing Management. An International Perspective*. Pearson Education Limited. Vol. 2.
- NBS. 2007. Communication strategy on euro introduction in Slovakia. [online]. Available online: http://www.nbs.sk/_img/Documents/_PUBLIK_NBS_EURO/KOMUNIKACNA_STRATEGIA_AJ.pdf
- OECD. 2007. Economic Surveys: Slovak Republic. OECD.
- ŠUSTER. M. 2006. The Effects of Euro Adoption on the Slovak Economy. In: *Biatec*. Vol. XIV. No. 6. pp. 2-6.
- SZOVICS. P. and. DUBAYOVA. M. 2006. Are Slovak Citizens Informed About the Euro Changeover? In: *Biatec*. Vol. XIV. No. 8. pp. 16-17.

Identification of the Needs of Start-ups Acting on University and Students Tendency forward to Entrepreneurship

VILIAM VAJDA¹ Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

Currently in Slovakia is establishment of start-up most used method of initiating business. Start-ups are seen as an innovation drivers and significant percentage of the start-ups in Slovakia are established by the people with master or higher degree. University environment thus plays in this ecosystem an important role not only as educator, but also as a generator of ideas and a node for connecting people, companies and research. For effective support of university environment towards to increasing tendency to entrepreneurship is necessary understand opinions and needs come from the students as well as from university start-ups. At this time the questionnaire among students at the Faculty of Economics was performed. At the same time the interviews with start-up companies from Technical University Startup Centre were provided. The aim of the questionnaire was to identify needs of the respondents and thus ensure the quality of support from the University in the area ideas creation and already existing start-ups future development. The results and findings are presented in the paper.

Key words: Entrepreneurship, Start-up, Education, Tendency, Behavior

JEL Classification: A20, M13, P46

1 Introduction

Drucker (2007) defined innovation as "the specific tool of entrepreneurs, the means by which they exploit change as an opportunity for a different business or a different service. It is capable of being presented as a discipline, capable of being learned, capable of being practiced". Entrepreneurship and tendency to act as entrepreneur is, in most cases, culmination of innovation activities among young people and especially within the Europe among university students. Roja and Nastase (2014) are analysed technology entrepreneurial ecosystem and according to their work, the most important component of this ecosystem is the entrepreneur itself, and he is the key catalyst in the process of business sectors emergence and start-ups growth. They said that technology entrepreneurs have more technical skills and competences than non-technical ones, for example business skills and also one important step in the new venture success is the transformation of the entrepreneurial mind into managerial one. According to KPMG Startup Survey 2014, there is majority of hardware and equipment start-ups in Slovakia. The same study identify that 79% of respondents had a master's degree or higher. In this case, the university has an undeniable role not only act as educational component of ecosystem, but also as a start-up and spin-off generator. According to Houser (2014), universities besides attracting high-achieving individuals, house students from multidisciplinary backgrounds and provide a means for such individuals to easily interact with each other due to proximity. The survey among university students and start-ups at Technical University in Kosice is trying to identify needs to increase the tendency towards entrepreneurship and enhanced support from the university.

¹ Ing. Viliam Vajda, PhD., Němcovej 32, 040 01 Košice, Slovak Republic, viliam.vajda@tuke.sk

2 Survey and findings

A new wave of entrepreneurship in Europe calls for fresh look and new support also in a form of education. This new wave is in recent years represented by start-up activities and while education especially in the technical and technological area is mostly on a pair with a world, in the field of business Europe continually lags. New start-ups are well equipped with technological expertise, but final execution and penetration to the market is for Slovak start-ups still problematic. With a state and also private support raises the need for education and increased support from universities towards to inclination for entrepreneurship. In university environment it is necessary to support multidimensional collaboration, and as evidence from Startup Centre at Technical University of Kosice showed, the collaboration with the business educated students is for startups significant. Research was carried out among students from the Faculty of Economics and interview with start-ups acting at the Startup Centre at TU. The survey, together with startups representatives' interviews, was divided into several sections. In the first section the opinions of the respondents about entrepreneurship and business education were examined. The second section of questions was dedicated to the mentoring. One of the main goals of this survey was to indicate preferences of potential "clients" of Startup Centre - students - about access to the infrastructure and services. Also interviews with the start-ups indicated needs among startups acting in the Startup Centre. The last section was devoted to the opinion about financing in various forms. The response rate from the students was approximately at the level 14.5% and all startups from Startup Centre participated at the interview.

2.1 Entrepreneurial and business education

In this section the tendency to prefer education in finance was expected, especially from the students of Faculty of Economics with the degree program Finance, Banking and Investment. Responses confirmed this expectation and as we can see in Figure1 more than 87% respondents declared that education in Finance is for entrepreneurship important. Also more than 80% of the respondents confirmed necessity of education in Soft skills and Creativity and more than 16% indicated that education in accounting and management is for entrepreneurship not necessary.



Figure 1 Opinion of education needs - students at Faculty of Economics

Figure 2 shows answers from start-ups acting at Startup Centre at TUKE. Together with students they agree, that education in Finance and Soft skills is important and necessary, but on the other hand, in contrast of the student's answers, the education in Management and Marketing was at the same level of necessity as education in Finance. Start-ups don't prefer education in

accounting, which may be caused by already existing outsourcing of these services. Half of them also marked Creativity and education in this area as not important and necessary.



Figure 2 Opinion of education needs - start-ups at TUKE Startup Centre

2.2 Mentoring with professionals

Mentoring provided by professionals, well established local or national mentors, business man or entrepreneurs is crucial for future development of ideas and start-up companies. In this section the tendency and necessity of mentoring was examined. As shown in Figure 3, students most prefer mentoring in Financing of company development, but they also realize the need of mentoring in Product or service improvement, with more than 80% level and mentoring in a Growth of company, with more than 78% necessity.



Figure 3 Opinion about mentoring - students at Faculty of Economics

The Figure 4 shows preferences of start-ups. Unlike the students the startups prefers mentoring in the field of Growth of company, followed by mentoring in Financing of the company development. More than 12% seems mentoring in the Product or service improvement and Financing of the company development as not necessary and not important.



Figure 4 Opinion about mentoring - start-ups at TUKE Startup Centre

2.3 Access to the services

Support from the universities, but also from the centers dealing with start-ups, is important for the future success of ideas and emerging companies. The opinion about necessity of selected services was monitored among students as well as within start-ups. The Figure 5 shows opinions from the students and we can see that Law services and Finance gathering were the most preferred services. The unexpected result from this section was that more than 21% students at the Faculty of Economics found Business plan development as not necessary service for start-ups.



Figure 5 Opinion about need for access to the services - students at Faculty of Economics

Figure 6 shows percentage responses from start-ups at TUKE Startup Centre and they found Law service and service dealing with patents and intellectual property rights as the most necessary services from all selected. Also as students, they identified Finance gathering and Partner searching as high needed service. On the other hand help with Establishment of the company and Accounting 50% of the respondents see as not necessary service from the side of Startup Centre.



Figure 6 Opinion about need for access to the services - start-ups at TUKE Startup Centre

2.4 Access to the infrastructure

Access to the university infrastructure is important for product or service development what is also confirmed by the answers together from students as well as from start-up's representatives. Production spaces and production technologies found students as most important and necessary for emerging company and they also prefer access to Technological equipment.



Figure 7 Opinion about need for access to the infrastructure - students at Faculty of Economics

Start-ups acting in Startup Centre preferred access to the Production spaces and technologies before Technological equipment and Offices and office equipment. More than 37% of the respondents from Startup Centre said that access to the Offices is for them not necessary and rather they would welcome access to the production place.



Figure 8 Opinion about need for access to the infrastructure - start-ups at TUKE Startup Centre

As we can see form the Figure 8, not all of start-ups have preferences towards to production and technologies. Disagreements are caused by and are related to the structure and focus of the start-ups. Service oriented start-ups prefer office while product oriented start-ups prefer technologies like 3D scanners and printers.

2.5 Willingness to use funding

Funding is one of the fundamental issues for start-up companies. Reluctance to lose equity is in contrast to the relatively inexpensive raising funds for the development of ideas and constructs a prototype. Student's responses showed interesting willingness to accept more expensive financing through Commercial loans and unexpected distrust to the Venture capital.



Figure 9 Willingness to use funding - students at Faculty of Economics

Figure 10 shows that start-ups don't want to use financing from Commercial loans, where more than 71% said they won't use loans as a funding source and they rather lose equity in a favor of Angel investment or Venture capital.



Figure 10 Willingness to use funding - start-ups at TUKE Startup Centre

3 Conclusion

Survey among students and start-ups confirmed necessity of entrepreneurial education at University environment. Both groups recognized needs of education in finance, soft skills and marketing. Difference arises in the case of education needs in the field of accounting and especially in the case of creativity education. Disagreements arose also in the need of mentoring from professionals. While students prefer mentoring in financing of the company, start-ups representatives prefer mentoring in a growth of the company. In the section represented services, provided by the university and departments, preferences of the both groups are the same, both groups prefer law services at the first place. Students also prefer finance gathering while start-ups prefer service in the area of patents and intellectual property rights. All respondents identified that it is essential to have access to production space, while providing office space for them was irrelevant. Start-ups and students as a source of financing favor angel investments at the first place. Differences in opinions occurred on financing through the venture capital. Start-ups prefer this source which may be caused by experience with this type of financing, on the other hand students this type of financing denied. It must be noted that the sample of students was from the Faculty of Economics which also affect the responses and preferences towards to finance and therefore it is necessary, in the future research, expand questionnaire to whole students of the university to ensure better objectivity, explanatory power and identify differences among students from various study programs.

References

- DRUKER, P. 2007. Innovation and Entrepreneurship, Elsevier, Butterworth-Heinemann, Burlington, Mass, USA.
- Houser, C. 2014. Why the University Is the Ideal Startup Platform. Wired.com http://www.wired.com/insights/2014/02/university-ideal-startup-platform/.
- ROJA, A., NĂSTASE, M. 2014. Technology entrepreneurship and entrepreneurial strategies, In: Management challenges for sustainable development. Proceedings of the 8th international management conference. pp. 107-117.
- Startup Survey Slovakia. 2014. The Startup Studio inspired by KPMG.
- Witholt, B. 2003. The European university as a startup generator. Bioentrepreneur ISSN 1542-6572. Macmillan Publishers Limited.

The Regulation Model as the tool in Gas Distribution Providers Value Management - Research Results on European Best Practise Solutions

ADAM WĘGRZYN¹ Wrocław University of Economics Poland

Abstract

The objective of the article is presenting initial results of the research focused on the development of an arithmetic model for energy regulation purposes in the form of an empirical instrument that can be used for tariffing the gas distribution providers' income and as a value creation tool for energy providers. Methodology covers review of worldwide literature and studies based on sources of power industry. Author is carrying out questionnaire surveys on a sample power companies pursuing concession activities in energy industries in UE and questionnaire surveys carried out among Regulators from European power markets and global markets. The research contribute to the development of the theory of tariffing through the development of empirical measures to limit the negative impact of state intervention in sector of energy companies operating in the regulated market and the development of the use of econometric models in the process of enterprise value creation. The model will also contribute to the development of tools catalogue under the concept of VBM. There are some symptoms for the proliferation of empirical instruments in both science and economic practice in the form of econometric models used for regulatory purposes in tariffing procedures for energy business. The Model will represent an empirical approach to the task of negotiation of the regulated income for energy providers particularly for gas fuel distribution providers. The Model in its instrumental and methodological di-mension will be designed based on best practices on the global energy markets and will contribute to design the VBM tools for energy companies' development. This article is presenting the results of analysis of international experience regarding the regulation of the gas fuel distribution sector. Based on the results of analyses of international experience, general regulatory guidelines and best practices were identified for determining individual components of regulated revenue of entities pursuing gas fuel distribution activity. Implementation results of the research can be a pioneering approach to the creation of the empirical basis for the process of tariffing.

Key words: Regulatory Process in Energy, Tariffing, Arithmetic Models, Gas Distribution Sector, Best Practices, VBM

JEL Classification: G390, G380, C58, C51

1 Introduction

The objective of the article is presenting the part of results of the research focused on the development of an arithmetic model for energy regulation purposes, in the form of an empirical instrument that can be used for tariffing the price of gas transmission providers and as a value creation tool for energy providers. The resulting model will represent an empirical approach to the task of administrative negotiation of the regulated income for the gas fuel distribution sector, as a compromise between the recipients' price preferences and the suppliers' (distributors') rate of return preferences related to the expected return on invested capital at the level surpassing that of the average capital cost in Poland. The resulting model, both in its instrumental (econometric) and methodological dimension (the methodology of its application for tariffing purposes) will be

¹ Adam Węgrzyn Ph.D., Komandorska 118-120, 53-345 Wrocław, Poland, adam.wegrzyn@ue.wroc.pl

designed from the ground up, based on selected best practices in the field, as employed for similar purposes on the energy markets of the EU and the world.

Indirect objectives of the research include:

- 1. determination of regulative solutions targeted for the Polish gas fuel distribution providers, as adopted on energy markets in the EU and in other developed energy markets of the world,
- 2. determination of regulative solutions adopted in Polish sectors of electrical power engineering and heat engineering,
- 3. the establishing of regulative solutions (accepted by Regulatory Offices in the future) that may be employed for the gas fuel distribution sector in relation to solutions adopted elsewhere.

In Poland at present, there are no Regulator-approved tariff negotiation solutions based on econometric models to address the gas fuel transmission and distribution sector and even to energy state-owned providers quoted on the Warsaw Stock Exchange (main sector in Polish energy business), particularly with respect to the principles of calculating the operating expenditures of licensed activities (OPEX), regulatory asset valuation or the weighted average cost of capital (WACC). The need for an empirical approach in the calculation of regulated income in Polish energy sector was first observed in the sectors of electrical power engineering and gas engineering. The Polish electrical power distribution sector was subject to a three-year regulation period, initiated on January 1 2008 (Zaleski 2010). In 2009, the regulations were in force for 14 Distribution System Operators; those entities were formally obliged to submit their tariff proposals based on a pre-established methodology. The electrical power sector in Poland is being regulated on the basis of the retail price index (RPI-X). In the years 2008-2009, the regulated income for electrical power distribution was calculated as a sum of operating expenditures of licensed activities and the associated cost of capital. In the case of the gas engineering sector, the pending Long-Term Regulation Model (LTRM), based on an econometric model, was used for the six Gas Distribution System Operators affiliated with the Polish Gas and Oil Company capital group. The model was intended to stay in force for the period of three consecutive annual tariff years of 2012 -2014. In 2012, it was temporarily put on suspension, and, later on (in 2013), set aside, as a result of consolidation processes in the sector of gas distribution (Wegrzyn 2013).

The main premise behind the design of the LTRM model was the negative evaluation of the sector's profitability and economic added value. The evaluation was done by the owner (indirectly: the State Treasury), as the gas distribution sector was an element of the public capital group quoted on the Warsaw Stock Exchange. The analysis in question identified a number of negative factors to influence the performance of individual gas engineering companies, namely (Węgrzyn 2013):

- 1. no potential for including the full return on invested capital in the regulated income (the so-called RoIC gap),
- 2. the lack of potential to include the full depreciation rate value in the regulated income (the so-called amortisation gap),
- 3. the lack of capacity to include the full value of operating expenditures in the regulated income (the so-called operating expenditure gap).

In the light of the above, the Regulator decided to introduce measures intended to optimize the operating expenditures of the distribution segment, with particular focus on the inclusion of those costs which had been deemed unsubstantiated by the Regulator for the purpose of the tariffing process. In addition, the Regulator intended to increase the income level by negotiating individual

tariff rates to cover the real value of operating expenditures related to the licensed activities and to ensure proper allocation of return on capital among the applicable energy sector companies. Previous to that, the regulation principles applied to the gas distribution sector in Poland had been quite volatile, both in terms of its main assumptions and the methods used in the calculation of the distribution tariffs, resulting in considerable uncertainty on the part of individual companies, since there was no way to forecast the future tariff rates approved by the Regulator for the next tariff period. This had also had a negative effect on the companies' financial performance, since the Regulator offered no warranties of full return on invested capital and repeatedly questioned the eligibility of certain cost items on the list of the operating expenditures related to the licensed activities. Such a short-sighted approach to tariff regulation has also contrasted with the best practices used by regulators in other EU Member States. The new regulation model for gas engineering companies required changes in the regulation principles in three fundamental areas, namely:

- 1. regulation periods for companies,
- 2. regulation of eligible rates of return on capital,
- 3. regulation of eligible rates of operating expenditures.

With respect to the length of the regulation periods, it was necessary to design a range of assumptions and parameters which would be in force for the whole duration of the regulation period. With respect to the RoC rate regulations, the Regulator had to design a method for establishing fair values of invested capital and specify the methodology for calculation of the weighted average cost of capital (WACC). With respect to setting the range of eligible operating expenditure rates, it was necessary to provide an objective classification of dependent and independent costs, in order to provide a properly diversified structure of the regulation methods. In the latter aspect, the most important task was to establish base (input) level of dependent operating expenditures (OPEX₀), to form a basis for setting (indexing) the costs for the following years of the regulation period. Other important elements included establishing a methodology of operating expenditure indexation and designing the applicable indexing indicators. The most important result of the LTRM research comes in the form of a calculation sheet representing the econometric regulatory model for gas companies, to support the process of estimating the regulated income for individual entities (Wegrzyn 2013).

For both sectors, i.e. electrical power and gas industry, the postulated solution applied solely to large state-owned companies operating under natural monopoly conditions. For the remaining actors the tariffing process is still arbitrary (non-empirical), due to the lack of proper methodological approach on the part of the Regulator, with no empirical instruments to support the tariffing process in this segment.

The regulation principles in the sector of energy production and distribution in Poland over the last few years have been quite volatile, both in their fundamental assumptions and the structure of variables used for tariff calculation purposes. This had the effect of elevating the uncertainty level for energy companies, due to difficulties in forecasting the prices for the next tariffing year. Their financial performance also suffered, since the Regulator offered no warranties of full return on the invested capital and repeatedly questioned the eligibility of certain cost items on the list of the operating expenditures related to the licensed activities. Such a short-sighted approach to tariff regulation has also been in contrast with the best practices used by regulators in other EU member States. This problem is particularly evident in SME sector companies, which are often unable to carry the cost of external consultancy or professional tariffing teams, and reduced to strict observance of administrative decisions imposed by the Regulator, which has the effect of constraining their development opportunities. In the light of the above, it seems advisable to design empirical fundaments of the tariffing process for the energy sector, based on econometric models, and utilizing some of the best practices observed in the industry, both in domestic electrical power sectors, and the more developed energy markets of Europe and of the world. This approach may contribute to the formation of a predictable environment for tariff negotiations between individual companies and the Regulator, by formulating an empirical fundament for pricing purposes and by alleviating the burden of uncertainty for the involved actors.

The novelty of the approach can be justified by the fact that it represents an attempt at formulating an empirical instrument that can be used as platform for tariff negotiations conducted annually by state authorities, represented by the office of the Regulator, with the gas distribution segment of energy companies. In methodological terms, the pioneering nature of the research is substantiated by the use of the best practices benchmarking method, based on the existing solutions employed on mature energy markets of Europe and the world, to complement the design of econometric models for tariffing purposes in the gas distribution sector. The unique character of the postulated research lies also in the attempt at producing a scientific solution for state administration and business entities, to enhance the empirical fundaments of the process instead of resorting to the largely arbitrary administrative decisions imposed by the state-appointed executive bodies.

In this article Author is presenting the results of analysis of international experience regarding the regulation of the gas fuel distribution sector. Based on the results of analyses of international experience, general regulatory guidelines and best practices were identified for determining individual components of regulated revenue of entities pursuing gas fuel distribution activity.

2 Analysis of models of regulation of natural gas distribution activity in selected European Union members

In order to identify best practices in the field of determination of regulated revenue in gas fuel distribution activity, experience of institutions regulating both the gas and the electrical energy market was analysed. This decision results from the fact that these markets are characterised by a high degree of similarity as regards operation mechanisms, which means that enterprises pursue their activity in the conditions of a natural monopoly. Therefore, it is necessary to develop such regulation mechanisms that ensure balancing the interests of both consumers of distribution services and energy enterprises. In addition, regulation mechanisms of gas distribution and electrical energy sectors should generate stimuli that are similar to the market mechanism as much as possible. The analysis of international experience for the gas market was very broad – it covered most EU member states and selected non-EU countries which are characterised by a high degree of gas market development (e.g. Australia). The analyses of experience in the regulation of the electrical energy distribution sector, in turn, was limited to the experience of Poland.

The analysis of regulation models of natural gas distribution activity was carried out based on a questionnaire survey which made telephone interviews, information shared by the Regulators and expert knowledge of Deloitte more specific. An abridged description of the questionnaire survey methodology and key conclusions from the analyses of international experience ("best practices") are presented below.

2.1 Description of questionnaire survey methodology

The participation in the questionnaire survey was proposed to 24 European Regulators in accordance with the list presented in Table 1. A survey composed of the following 6 main parts was prepared specifically for each of the remaining 24 EU member states:

- 1. Part I general evaluation of the regulation model of the natural gas distribution segment,
- 2. Part II methodology of determining reasonable costs of distribution activity,
- 3. Part III methodology of determining regulatory depreciation,
- 4. Part IV methodology of determining permitted rate of return on capital employed for distribution activity,
- 5. Part V methodology of determining regulatory value of assets employed for distribution activity,
- 6. Part VI other questions.

In addition, the analyses incorporated regulation models applied in Australia and New Zealand, because these countries have very extensive practical experience and scientific achievements in the field of optimum regulation of the gas distribution and electrical energy sector.

No.	Country	ry Regulator name	
1	Austria	E-Control GmbH	
2	Belgium	Commission de Régulation de l'Electricité et du Gaz	
3	Bulgaria	State Energy & Water Regulatory Commission	
4	Czech Republic	Energetický regulační úřad	
5	Denmark	Energitilsynet	
6	Estonia	Konkurentsiamet	
7	Finland	Energiamarkkinaviraston	
8	France	Commission de Régulation de l'Énergie	
9	Greece	Regulatory Authority for Energy	
10	Spain	Comisión Nacional de Energía	
11	Netherlands	Energiekamer	
12	Ireland	Commission for Energy Regulation Ireland	
13	Lithuania	Valstybine kainų ir energetikos kontroles komisija	
14	Luxembourg	l'Institut Luxembourgeois de Régulation	
15	Latvia	Sabiedrisko pakalpojumu regulēšanas komisija	
16	Germany	Bundesnetztagentur	
17	Portugal	Entidade Reguladora dos Serviços Energéticos	
18	Romania	Autoritatea Nationala de Reglementare in domeniul Energiei	
19	Slovakia	Úrad pre reguláciu sieť ových odvetví	
20	Slovenia	Javna agencija Republike Slovenije za energijo	
21	Sweden	Energimyndigheten	
22	Hungary	Magyar Energia Hivatal	
23	Great Britain	The Office of Gas and Electricity Markets	
24	Italy	Autorita per l'energia elettrica e il gas	

Table 1 List of Regulators covered by the questionnaire survey

Source: Own work

Out of 24 questionnaires sent to European Regulators, 9 were filled in a manner enabling carrying out credible analyses. Based on the responses given in questionnaires, the analysis of enclosed documents, best practices regarding the general approach to the regulation of the gas distribution sector and the methodology of determining the regulated revenue were identified.

2.2 Best practices regarding regulation of gas fuel distribution activity

It is crucial in the process of natural gas distribution sector regulation that this regulation is carried out in accordance with "good regulatory practices", which should be general regulatory guidelines. General regulatory guidelines are universal and shall be taken into account when developing assumptions for each regulation model of sectors where enterprises pursue their activity in the conditions similar to a natural monopoly.

General regulatory guidelines to a considerable extent determine the solutions applied by the Regulators as regards the determination of operating costs and capital costs of pursuing the gas distribution activity (methodology of determining permitted rate of return on capital employed for distribution activity). It should be borne in mind that detailed solutions used for example for determining the regulatory value of assets or recognising individual cost items as reasonable costs might depend also on historical issues and the generally accepted regulatory practice in a given country. Nevertheless, it is possible to distinguish prevailing solutions which enable identifying "best practices" applied to gas distribution sector regulation.

In addition, the key influence on the detailed solutions applied by the Regulators in the field of methodology of determining the regulated revenue of distribution companies is exerted by the adopted goals of the gas distribution sector regulation. A summary of responses given by the European Regulators to the question "What are the most important goals of the applied model of gas fuel distribution sector regulation?" is presented below. The analyses reveal that the main goals of regulation concern above all the promotion of cost effectiveness of distribution company operation and ensuring the stability of distribution service prices - both these goals were indicated as the most important regulation goals by more than half of the surveyed Regulators. This indicates unambiguously that certain solutions applied by the Regulators as regards detailed methodologies of determining operating costs and capital costs are oriented on the minimisation of unreasonable profits of energy companies resulting from the so-called monopolist allowance. In addition, institution regulating the natural gas distribution market in Europe strive for applying regulatory solutions which are generally accepted by all regulation process participants (56% of responses). This indicates that sometimes compromise solutions are chosen, which are not always optimum and consistent with "good practices" but considerably streamline the approval process of the regulated revenue of distribution companies and thereby enhance the effectiveness of the regulation model in a given country.

One of the top places, with 44% of the total number of votes, was occupied by the strive for generating proper investment stimuli by the adopted regulation model as regards the expansion of the gas distribution network and the provision of high quality of distribution services (44% of all responses). These goals determine the expansion of the gas distribution network in individual countries in terms of quantity and quality. Minimisation of distribution fee rates received merely 33% of responses. This means that the vast majority of Regulators find artificial lowering of distribution service prices as unacceptable since in the long term this brings very unfavourable effects on the operation of the whole distribution sector.

Safe operation of the gas sector as the main goal of the distribution sector regulation was indicated by merely 11% of the Regulators. Such a result is only seemingly surprising. Actually, safe operation of the gas sector will be provided as a result of achievement of the previous regulation goals, in particular the provision of distribution service price stability and generation of proper investment stimuli as regards development investments. Every fifth Regulator indicated encouraging gas enterprises to connect new consumers to the gas distribution network as "other goals of the regulation model". This is because dedicated support mechanisms are required to increase the rate of gas supply access in a country since the connection of new consumers is characterised by decreasing marginal profitability in all countries.

In summary, it can be stated that the primary goals to be accomplished by regulation models of the natural gas distribution sector in Europe assume the provision of effective distribution services by energy enterprises, i.e. finding a balance between the distribution service price (costs of enterprises) and the level of the distribution services provided. It is also crucial to ensure stability of costs of use of network infrastructure by consumers and proper stimuli for its expansion. Detailed results of responses concerning the primary goals of regulation of the gas fuel distribution sector are presented below (Most important goals set by Regulators for the model of natural gas distribution sector regulation):

- 1. Promoting cost effectiveness of distribution companies -56%.
- 2. Stability of distribution service price level -56%.
- 3. Applying a generally accepted regulation method -56%.
- 4. Generating proper investment stimulating -44%.
- 5. Providing high quality distribution services -44%.
- 6. Minimising distribution fee rates -33%.
- 7. Simple application -33%.
- 8. Safe operation of gas sector -11%.
- 9. Other 22%.

2.3 International experience in natural gas distribution sector

Based on the results of analyses of international experience, general regulatory guidelines and best practices were identified for determining individual components of regulated revenue of entities pursuing gas fuel distribution activity. As part of general regulatory guidelines, it is definitely most important to balance the interests of the energy market participants. The results of the benchmarking survey, show that more than half of European Regulators determine their regulation model as balanced, i.e. ensuring balance between satisfaction of interests of distribution enterprises and of consumers of their services. The application of a "balanced" regulation model was declared above all by Czech Republic, Great Britain, Spain, Italy, Ireland, Hungary, Portugal, Lithuania and Latvia, i.e. countries with a well-developed gas fuel distribution service market in the majority of cases. The adopted general regulatory guidelines determine the Regulators' approach regarding the methodology employed for the calculation of reasonable capital and operating costs related to the pursuit of gas fuel distribution activity. The analysis of best practices in this regard was divided into four main areas:

- 1. Method of determining the regulated rate of return.
- 2. Methodology of determining the regulatory value of assets.

- 3. Determining the amount of writing-down allowances taken into account in the regulated revenue.
- 4. Determining the amount of reasonable operating costs.

Re. 1 The results of the questionnaire survey reveal that most often the permitted rate of return on capital employed for distribution activity is determined based on the weighted average cost of capital (WACC). This methodology is used by 89% of the surveyed Regulators. An important issue when calculating the weighted average cost of capital is to take into account the tax burden, i.e. to decide whether the cost of capital before tax (WACC_{before-tax}) or after (WACC_{after-tax}) tax should be employed for calculating the return on capital. Based on international experience, it can be stated that WACC_{before-tax} methodology is far easier to be used in regulatory practice and thanks to that it is employed more often.

Re. 2 Based on the responses submitted by European Regulators, the analysis of regulatory experiences from other developed gas markets (e.g. Australia, New Zealand) and the analysis of scientific studies concerning the methodology of determining the regulatory value of assets of companies pursuing their activity in the conditions of a natural monopoly, two primary approaches to determining the regulatory value of assets were identified, i.e.: Cost approach and Value based approach.

The cost approach comprises four primary methods:

- **Historic cost method (HC)** assumes that the regulatory value of assets is determined based on the initial cost of purchase of assets employed for the pursuit of gas distribution activity (or another activity pursued in the conditions of a natural monopoly). Example countries using this method are: Portugal and Luxembourg.
- **Indexed historic cost method (IHC)** consists in indexing the base value of assets by an inflation ratio or other indicators which reflect the changes occurring in the sector being subject to regulation. The base value is determined, as a rule, using other methods than the purchase costs which were determined between the Regulator and DSO companies (e.g. market value, replacement value). Example countries using this method are Ireland, Hungary, Italy and Lithuania.
- **Replacement cost method (RC)** consists in determining the regulatory value of assets as a sum of ongoing replacement costs of individual items of assets with assets of similar characteristics and ensuring an unchanged level of distribution service provision. Example countries using the replacement cost method for assessing the regulatory value of assets are Belgium and Latvia. The implementation of the replacement cost method is planned also in Czech Republic from the new regulatory period on (2010).
- **Depreciated optimised replacement cost method (DORC)** allows the determination of the regulatory value of assets corresponding to the value of an optimum distribution system.

The value based approach assumes the use of a market mechanism (understood also as the asset capability of generating cash flow based on the existing regulatory environment) for determining the actual value of assets employed for the gas fuel distribution activity. Four methods are distinguished also in this approach:

Fair market value method, which consists in aggregating the revenue which could be achieved by selling the distribution assets on a competitive market (for example for privatisation process purposes). This method was used in particular by Great Britain, Romania and France .

- **Net present value method**, which assumes that the best estimate of the regulatory value of assets is the sum of discounted cash flow generated by individual items of assets employed for gas distribution activity. This method is used for example in Finland.
- **Deprival value method (DV)**, where the regulatory value of assets is defined as a theoretical value of the loss which the gas fuel distribution enterprise would sustain if deprived of assets employed for the distribution activity and the associated cash flow. Therefore, deprival value is lower than the replacement value and net present value (NPV). Deprival value method (DV), which may assume a modified form taking into account an optimum configuration of the gas distribution network (Optimized Deprival Value, ODV), is used in Australia and New Zealand.

In summary, it can be argued that there is no single optimum method of determining the regulatory value of assets, which would be generally accepted and applied in practice, but DV and ODV methods are characterised by the greatest number of advantages regarding the regulation of enterprises operating in the conditions of a natural monopoly. They allow a compromise between ensuring investment attractiveness of the gas fuel and electrical energy distribution sector and the necessity to restrict unreasonable profits for enterprises operating in the conditions of a natural monopoly.

Apart from the method of determining the regulatory value of assets, it is also crucial to determine which balance sheet items are recognised as an asset value subject to compensation. International experience shows that it is beyond doubt that all fixed assets used for pursuing the gas fuel distribution activity must be subject to compensation. However, the Regulators' approach is not to uniform in the case of such items as working capital, long-term financial assets or construction in progress.

Re. 3 International experience reveals that the most often applied method of determining depreciation for regulatory purposes is the calculation of writing-down allowances on indexed value of assets (45% of surveyed Regulators – e.g. Czech Republic, Italy, Austria, Ireland) and book value of assets (27%). Nearly one fifth (18%) of the surveyed Regulators declared that regulatory depreciation was calculated based on the value of assets determined based on replacement cost. Due to the fact that the amount of writing-down allowances achieved by distribution enterprises in the regulated revenue should ensure cash enabling at least replacement of the existing distribution assets, it is crucial that they are calculated on the value of assets as close to their fair value as possible.

Re. 4 As regards the determination of the level of reasonable operating costs, there are two very differing approaches in the regulatory practice. In particular, it is crucial to make a decision as to the selection of cost items that are taken into account when calculating the reasonable costs, the method of determining the reasonable level of individual cost categories and the mechanism of operating cost level indexation. International experience shows also that it is common practice to prolong regulatory periods (a five-year period is applied most often) so that the advantages of cost indexation mechanism are fully used and the regulation process is streamlined.

3 Conclusion

In this article Author is presenting the results of analysis of international experience regarding the regulation of the gas fuel distribution sector. Based on the results of analyses of international experience, general regulatory guidelines were identified:

- 1. The primary goal of regulation of price level for gas distribution services should be balancing the interests of all distribution market participants. The interest of energy enterprises is to provide the possibility to achieve profitability on economic activity. Moreover, the stability, effectiveness and transparency of the regulation process as well as ensuring stable and balanced operation of the sector in the long term are crucial.
- 2. In the case of distribution service consumers, the Regulator's goal shall be to protect both existing and future consumers of gas fuels.
- 3. It is crucial that the applied regulation mechanisms do not lead to a distortion of the market mechanism.
- 4. Regulators should provide energy enterprises with a possibility to cover reasonable costs and to achieve a fair rate of return on capital employed for the pursuit of gas fuel distribution activity. It is crucial to enable investors to achieve a fair rate of return, not to ensure it automatically.
- 5. Regulator should enable regulated enterprises to recover costs of pursuit of distribution activity, including full costs of capital. The profit level should be to a large extent dependent on the effectiveness of gas distribution activity.
- 6. It is crucial to determine longest possible regulation periods, during which the methodology of regulated revenue calculation does not change.
- 7. It is common practice to change the methodology of calculating the regulated revenue only in the case of a considerable change in the conditions in which enterprises pursue their activity
- 8. Pro-effectiveness mechanisms should be in the form of controlling the method of determining the regulated revenue not of artificially limitating the level of costs related to the pursuit of the distribution activity. Therefore, it is crucial that the regulated distribution companies are encouraged to increase the operation effectiveness by allowing them to achieve higher profits by reducing the costs.

Based on the results of analyses of international experience best regulatory practises for future the Long-Term Regulation Model (LTRM) were also identified:

- 1. Most often the permitted rate of return on capital employed for gas distribution activity is determined based on the weighted average cost of capital (WACC). It can be stated that WACC_{before-tax} methodology is far easier to be used in regulatory practice,
- 2. There is no single optimum method of determining the regulatory value of assets, which would be generally accepted and applied in practice, but Deprival Value and Optimized Deprival Value methods are characterised by the greatest number of advantages. They allow a compromise between ensuring investment attractiveness of the gas fuel distribution sector and the necessity to restrict unreasonable profits for enterprises operating in the conditions of a natural monopoly.
- 3. International experience reveals that the most often applied method of determining depreciation for regulatory purposes is the calculation of writing-down allowances on indexed value of assets,
- 4. International experience also reveals that it is crucial to make a decision as to the selection of cost items that are taken into account when calculating the reasonable costs, the method of

determining the reasonable level of individual cost categories and the mechanism of operating cost level indexation,

5. International experience shows also that it is common practice to prolong regulatory periods (a five-year period is applied most often).

The results of empirical research presented in article are the development of tariff negotiation strategies in Poland and elsewhere, since empirical instruments have the potential of reducing the extent of state interventionism in the gas distribution and whole energy sector, particularly the highly susceptible segment of SMEs operating on regulated markets. The results of empirical research will contribute to the development of econometric models for business, particularly with respect to value creation in the segment. The resulting econometric model will also broaden the range of applicable Value Based Management instruments that can be used in the design of development strategies for enterprises of the energy sector (more in Michalski 2014).

References

- MICHALSKI, G. 2014. Value-Based Working Capital Management. Determining Liquid Asset Levels in Entrepreneurial Environments. In: *Palgrave Macmillan, New York 2014*.
- WĘGRZYN, A. 2013. Wieloletni model regulacji spółek gazownictwa jako przykład narzędzia budowania wartości koncernu multienergetycznego na przykładzie grupy kapitałowej PGNIG SA. In: Uniwersytet Szczeciński Zeszyty Naukowe vol 761. Finanse, Rynki finansowe, Ubezpieczenia. vol 60. Wydawnictwo Uniwersytetu Szczecińskiego, Szczecin, pp. 335–343.
- WĘGRZYN, A. 2013. Wieloletni model regulacji jako narzędzie zarządzania wartością przedsiębiorstwa na przykładzie operatorów systemu dystrybucyjnego gazu. In: Nowak E, Nieplowicz M (ed) Rachunkowość a Controlling. Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu. Vol 291, Wydawnictwo Uniwersytetu Ekonomicznego we Wrocławiu, Wrocław, pp.552—563.
- WĘGRZYN, A. 2000. Benchmarking. Nowoczesna metoda doskonalenia przedsiębiorstwa, Oficyna Wydawnicza Antykwa, Kluczbork–Wrocław.
- WRÓBEL-ROTTER, R. Osiewalski, J. 2002. Bayesowski model efektów losowych w analizie efektywności kosztowej na przykładzie elektrowni i elektrociepłowni polskich. In: *Przegląd Statystyczny* 49/2002, pp.47—68.
- WRÓBEL-ROTTER, R., Osiewalski. J. 2012. Model ekonometryczny: narzędzie oceny efektywności operatorów systemów dystrybucyjnych elektroenergetycznych. In: *Biuletyn* Urzędu Regulacji Energetyki. Vol. 1/2012: pp. 9–23.
- ZALESKI, P. 2010. Regulacja cen w energetyce. Zalety i wady modeli taryfowania. In: *Nowa Energia*. Vol. 6/2010: pp.50—53.

Intraday Correlations between European Stock Markets

TOMASZ WÓJTOWICZ¹ AGH University of Science and Technology Poland

Abstract

In this paper we investigate intraday relationships between three European stock exchanges: in Frankfurt, Vienna and Warsaw. These are diverse markets. Two of them are developed, while the last one is an emerging market. Additionally, Frankfurt Stock Exchange is one of the largest and the most important European market, while stock exchanges in Vienna and Warsaw are smaller, but they are among the largest stock markets in the CEE region. Via DCC models we analyze and compare time-varying conditional correlations of daily and intraday returns of the main indices of the stock exchanges. On the basis of daily data, we discover strong correlations between the indices. Moreover, correlations have increased after the financial crisis in 2007. We also confirm Granger causality from FSE to CEE stock markets. Application of intraday returns leads to similar conclusion about conditional correlations and causality relations between the stock markets under study.

Key words: CEE Stock Markets, DCC-GARCH Model, Emerging Markets, Intraday Data

JEL Classification: G15

1 Introduction

Existence and strength of relations between stock markets is an important issue examined in the economic and econometric literature in the recent years. An increasing number of papers investigate short- and long-term linkages between returns and volatility on different stock exchanges. Such studies have been also performed for European stock markets, however, some of their results still lack consensus.

On the basis of daily data from the period 1993-2002, Voronkova (2004) shows the existence of long-term linkages between European developed markets and three CEE stock markets. Syriopoulos (2004, 2007) additionally indicates that relations between CEE and developed markets are stronger than among CEE countries itself. On the other hand, Černy and Koblas (2005) and Égert and Kočenda (2007) do not find long-term relations between intraday data of emerging and developed European stock markets.

Investigation of short-term relations, particularly Granger causality, leads to more common results. Hanousek et al. (2009) prove significant spillover effects on three CEE emerging markets, namely Prague, Budapest and Warsaw. Their main indices influence each other, but they are also significantly influenced by returns of DAX. The impact of the Frankfurt Stock Exchange is even stronger than the impact of any of the emerging markets. Similar results are also evidenced by Černý and Koblas (2005). Important role of developed European markets for CEE emerging markets is also indicated by Égert and Kočenda (2007). On the basis of intraday data, they show significant causalities between returns of CEE markets and causal relations from

¹ Tomasz Wójtowicz; Ph.D., Al. A. Mickiewicza 30, 30-059 Krakow, Poland, twojtow@agh.edu.pl

developed to emerging markets. Analogous pattern is observed for volatility time series. However, there is also evidence of the opposite relations from volatility of BUX and WIG20 to volatility of DAX and UKX.

Interdependencies and comovement of European stock markets in the recent years have been analyzed mainly via multivariate GARCH models. Using CCC and STCCC models, Savva and Aslanidis (2010) show that largest CCE markets (in Czech Republic, Hungary and Poland) exhibit stronger correlations with euro area than smaller emerging markets (as Slovenia and Slovakia). They also prove strong impact of relations with euro zone on the increase in the correlations between CEE markets. Additionally, Syllignakis and Kouretas (2011) show that correlations between developed and emerging European markets increase over time. The largest shift was caused by 2007-2009 financial crisis. Strong correlations between CEE markets and markets in euro area is confirmed by Gjika and Horvath (2013). They show that accession of CEE countries to EU increased correlations. On the other hand, Égert and Kočenda (2011) show something opposite. They find very little positive time-varying correlations among intraday returns of BUX, PX50 and WIG20. Correlations between these markets and Western European stock markets also are very weak.

The abovementioned papers indicate the difference in the nature of linkages between stock markets when daily and intraday data are analyzed. In this paper we try to explain these differences. We use both type of data (daily and intraday) to describe and compare linkages between selected European stock exchanges. We study time-varying comovement of prices on three European stock exchanges: in Frankfurt, Vienna and Warsaw. The stock markets under study differ considerably. Frankfurt Stock Exchange (FSE) is an example of a large developed market. It is one of the largest and the most important stock market in Europe. Its capitalization is about eighteen times greater than capitalization of Vienna Stock Exchange (VSE) and about eleven times greater than Warsaw Stock Exchange (WSE)². On the other hand, stock exchanges in Frankfurt and Vienna are developed markets, while WSE is still seen as an emerging market. Hence, in the paper we analyze relationships between large and smaller stock markets and also between developed and emerging stock markets. Despite the differences, there are also similarities between the markets. Both, VSE and WSE are among the largest stock markets in Central and Eastern Europe. In fact, in recent years VSE and WSE have been competing markets in CEE region. Therefore, in this paper we study how these similarities and differences are reflected in correlations between the markets and how they impact relations between them.

In order to analyze evolution of linkages between FSE, VSE and WSE we apply the dynamic conditional correlation (DCC) model introduced by Engle (2002). Analysis of time-varying correlations on the basis of daily data from the period between January 4, 2000 and December 31, 2014 show how relations between the markets have changed in the last fifteen years. It is particularly interesting in the context of European integration and global financial crisis of 2007-2009. Estimation of VAR models, which is a part of the estimation on DCC model, allows also the analysis of Granger causality between the markets.

² At the end of July 2015 capitalization of FSE was at the level of 1 625 718 mln € compared to 147 417mln € of capitalization of WSE and 90 932mln € capitalization of VSE. [Source: Federation of European Securities Exchanges, www.fese.eu]

We compare results for daily data with results of the analogous analysis performed on the basis of intraday returns. This comparison answers the question how linkages during a trading session are related to linkages between daily data. Particularly, it verifies results of Egert and Kočenda (2011) of very weak intraday correlations between CEE markets and European developed markets.

The rest of the paper is organized as follows. In the next section we give short description of DCC-GARCH models. In Section 3 we present and analyze in detail the data which we use in the empirical study. Section 4 contains the main empirical findings. Short summary concludes the paper.

2 DCC-GARCH Models

Dynamic conditional correlation (DCC) model introduced by Engle (2002) is a generalization of the constant conditional correlation (CCC) model of Bollerslev (1990). It allows quite simple description of time-varying correlation between return series. The model assumes that *n*-dimensional vector of returns $r_t = (r_{1,t}, ..., r_{n,t})'$ has conditional multivariate normal distribution with zero mean and covariance matrix H_t , i.e. $r_t \mid \Omega_{t-1} \sim N(0, H_t)$, where Ω_{t-1} is the information set available at time $t - 1^3$. In DCC model, the covariance matrix can be decomposed into:

$$H_t = D_t R_t D_t \tag{1}$$

where $D_t = diag(h_{1,t}, ..., h_{nn,t})$ is a diagonal matrix of conditional standard deviations from univariate GARCH models and R_t is the time-varying conditional correlation matrix of the form:

$$R_{t} = diag \left(Q_{t}\right)^{\frac{1}{2}} Q_{t} diag(Q_{t})^{\frac{1}{2}}$$
⁽²⁾

Dynamics of conditional correlations depends on the definition of Q_t . In the simplest DCC model with one lag, Q_t evolves in time according to the formula:

$$Q_t = (1 - a - b) \bar{Q} + a\varepsilon_{t-1}\varepsilon'_{t-1} + bQ_{t-1}$$
(3)

where $\varepsilon_t = D_t^{-1} r_t$ are standardized returns, $\overline{Q} = E(\varepsilon_t \varepsilon_t)$ is the unconditional correlation of standardized returns and *a* and *b* are nonnegative parameters such that a + b < 1.

Parameters of such DCC-GARCH model are estimated via two-step procedure. In the first step parameters of univariate GARCH model for each return series are estimated and returns are standardized. Then, a and b are estimated in the second step.

In order to introduce possibly asymmetry in conditional correlations, DCC model can be generalized to asymmetric DCC (aDCC) model of Cappiello te al. (2006). In the aDCC model dynamics of conditional correlation is as follows:

³ In practice, returns r_t are replaced by residuals from appropriate VAR model.

$$Q_t = (1 - a - b)\overline{Q} - \gamma\overline{Q} + a\varepsilon_{t-1}\varepsilon'_{t-1} + bQ_{t-1} + \gamma Z_t Z'_t$$

$$\tag{4}$$

where $Z_t = (z_{1,t}, ..., Z_{n,t})'$ are the zero-threshold standardized returns (i.e. $z_{i,t} = \varepsilon_{i,t}$ only if $\varepsilon_{i,t} > 0$) and $\bar{Q} = E(Z_t Z'_t)$ Parameter γ describes the asymmetry of conditional correlations.

3 Data

The analysis presented in this paper is based on two datasets describing main indices of stock exchanges in Frankfurt, Vienna and Warsaw. First data set contains daily returns of the main indices of the stock markets under study, namely DAX, ATX and WIG20. The returns cover the period from January 4, 2000 to December 31, 2014. Second dataset contains intraday 5-minute returns of the above indices from March 22, 2013 to September 5, 2013. In the analysis, we take into account only returns from days when all the markets were open. Data come from Bloomberg, Vienna Stock Exchange and Warsaw Stock Exchange.

In the analysis of intraday data trading hours on the stock markets must be taken into account. The stock markets under study are open in different hours. In 2013, continuous trading started at 8:55 on VSE and at 9:00 on FSE and WSE. It ended at 17:20 (WSE), 17:30 (FSE) and at 17:35 (VSE). Moreover, on the FSE there was the intraday auction from 13:00 to 13:02. On the VSE the intraday auction lasted from 12:00 to 12:06 on settlement days or from 12:00 to 12:04 on non-settlement days of the derivatives market.

Intraday relations can be analyzed only in the periods when all three markets are open that is between 9:00 and 17:20. However, taking into account increased volatility at the beginning and at the end of trading sessions we restrict our study to shorter period between 9:15 and 16:45. The restriction of the analysis to the shorter period does not remove completely periodic pattern from volatility series. Figure 1 confirms U-shaped pattern in intraday return volatility. It also shows strong impact of news about the U.S. economy released usually at 14:30⁴.



Figure 1 Cross-sectional means of squared 5-minute returns of ATX, DAX and WIG20 in the period March 22, 2013 – September 5, 2013

To deal with periodicity in volatility we allow conditional volatility of intraday returns to follow the multiplicative components GARCH model described by Engle and Sokalska (2012). Conditional volatility of $r_{t,i}$ return at day t and on time is a product of a daily variance

⁴ See e.g. Harju and Hussain (2011)

component (h_t) , diurnal variance pattern (s_i) and intraday variance component $(q_{t,i})$. Daily variance component is approximated by volatility forecasts form GARCH model applied to daily data. Diurnal variance pattern is approximated by cross-sectional variance of all returns computed on time *i*. To remove these factors, and to model only intraday conditional variance, before estimation of GARCH models, we divide 5-minute returns by $\sqrt{h_t}$ and $\sqrt{s_i}$.

4 Empirical Results

First, we examine correlations between the stock markets on the basis of daily data. This will be a background for further analysis of intraday comovements. Table 1 presents unconditional correlations between daily returns of ATX, DAX and WIG20. They give very general information about average strength of relations between the indices. Computed values of correlation coefficients indicate strong interdependency, particularly between stock markets in Frankfurt and Vienna. Correlations between WSE and the both developed markets are very close.

Table 1 Unconditional correlations between daily returns of ATX, DAX and WIG20 in the period 2000-2014

ATX-DAX		ATX-WIG20	DAX-WIG20
Correlation	0.60	0.51	0.51

To describe how linkages between the stock markets evolved from 2000 to the end of 2014, we estimate trivariate dynamic conditional correlation model. More precisely, we first estimate trivariate VAR model with one lag to take into account autocorrelation presented in daily returns series⁵. In this step, significance of coefficients of the model indicate the existence of four linear Granger causalities: bidirectional causality between ATX and DAX and causalities running from DAX and ATX returns to WIG20. This results indicate strong impact of developed markets on WSE. It is in line with more detailed analysis presented in the literature. However, interpreting these raw results we must take into account that the period under study is not homogeneous. In particular, accession of Poland to the EU is the important event that have influenced causality relationships between WSE and other European stock markets.

On the basis of residuals from the VAR(1) model we estimate trivariate DCC-GARCH(1,1) model with multivariate normal distribution. Due to nonnormality and asymmetry of daily returns we model univariate conditional volatility by GARCH(1,1) model with t-Student's conditional distribution. Significance of α and β parameters in Table 2 confirm existence of ARCH effect in residuals of the estimated VAR model. Values of β are very close to one, what indicates high persistence of daily returns volatility. Parameters *a* and *b*, describing conditional correlations are equal to 0.012 and 0.985, respectively. Both of them are significant at the 1% level.

⁵ VAR(1) model is chosen on the basis of Schwartz-Bayesian information criterion

	ω	α	β	shape
ATX	1.62E-06	0.077***	0.915***	7.50***
DAX	1.73E-06	0.088	0.907	10.29
WIG20	1.53E-06	0.055***	0.939	8.58
Note: *** indicates significance at 1% level.				

Table 2 Parameters of univariate GARCH (1,1) models for residuals of VAR(1) model of ATX, DAX and WIG20daily returns

Figure 2 shows time-varying conditional correlations between the markets under study computed on the basis of the abovementioned DCC-GARCH model. In the case of all pairs, conditional correlations increase. The whole period 2000-2014 may be divided into two subperiods. The first subperiod of the lower correlation and the second period of the higher correlation. Correlations in the first period are below the unconditional correlation presented in Table 1. On the other hand, conditional correlation in the second period are greater than results from Table 1. Length of the subperiods is different and depends on indices. For the ATX and DAX pair, lower correlation (close to 0.4) is observed in 2000-2004. Then conditional correlation slowly increases, but the period of stronger relationship begins in 2007-2008. For the other pairs higher correlation is also observed after 2007. Transitional period for ATX-DAX covers years 2004-2007. Similar, slow increase of conditional correlation is observed between ATX and WIG20. These results confirm previous observations in the literature that financial crises substantially shift stock markets correlation (Syllignakis and Kouretas, 2011; Gjika and Horvath, 2013). However, change in the conditional correlation is not as abrupt as in Syllignakis and Kouretas (2011). The clearest cut-off is present when correlation between DAX and WIG20 is examined. Up to 2006 conditional correlation is close to 0.4 and then, after the global financial crisis, conditional correlation is about 0.6. However, since 2011-2012 relationship between the markets has weakened. Similar behavior of conditional correlation in the recent years is observed between ATX and WIG20.



Figure 2 Conditional correlations between ATX, DAX and WIG20 in the period January 4, 2000 – December 31, 2014

Significance of the differences between correlations before and after the crisis is confirmed when we regress conditional correlations on a constant and a dummy variable that is equal to one in the years 2008-2012. In the cease of all pairs slope and intercept are significant at 1% level.

To compare results of the above analysis with Gjika and Horvath (2013) we also estimate aDCC model. However, the asymmetry parameter γ is insignificant. This leads to the conclusion that correlations between ATX, DAX and WIG20 are symmetric.

To study comovement between the markets during trading sessions we first compute unconditional correlations between 5-minute returns. For the all pairs correlations are significantly greater than zero. However, values in Table 3 are smaller than analogues values in Table 1 and indicate rather mild interdependence between the indices in the intraday scale. This difference is caused be change of data frequency and replacement of daily returns by intraday returns⁶. Similarly to the results in Table 1, the strongest linkage is observed between both developed markets in Frankfurt and Vienna. On the other hand, application of intraday data reveals different strength of comovement of WSE and the other markets. Correlation of the stock exchange in Warsaw with FSE is stronger than with VSE.

Table 3 Unconditional	correlations between	5-minute returns	ofATX.	DAX and WIG20
rubie e cheomathoma	corrections between			

ATX-DAX		ATX-WIG20	DAX-WIG20
Correlations	0.42	0.22	0.31

More in-depth analysis of intraday relations is made on the basis of DCC-GARCH model. Results of Ljung-Box tests indicate that 5-minute returns show more autocorrelation than daily returns. As before, to model conditional means of returns we apply vector autoregression. Information criteria indicate VAR models with 1 (BIC) or 3 (AIC) lags. However, residuals autocorrelation disappears when VAR model with 5 lags is applied. Thus, we estimate VAR(5) model. Analysis of the estimated coefficients of the VAR model indicate that on 5-minute level the only significant linear causalities run from DAX returns to both ATX and WIG returns. This is in line with previous results indicating strong impact of large developed European markets on stock exchanges in CEE region. Moreover, it indicates that such an impact is observed not only for emerging markets, but also for mature markets like VSE.

To model conditional variance of univariate returns residuals we apply GARCH (1,1) models with t-Student distribution and with correction of diurnal pattern in volatility as described in Section 3. Time-varying correlations of the standardized residuals are modeled via DCC model with 1 lag and multivariate normal distribution⁷. All parameters of univariate conditional variances are significant at 1% level. Similarly to daily data, the parameters of DCC model *a* and *b* are equal to 0.001 and 0.998, respectively. As previous, they are significant at 1% level.

⁶ This phenomenon of decreasing empirical correlation between returns when sampling frequency increases, was first described by Epps (1979) and is called *Epps effect*.

⁷ As a comparison, we also analyzed DCC model with 2 lags, but additional parameters a_2 and b_2 were insignificant. We also estimated asymmetric DCC models, but, as for daily returns, the asymmetry parameter γ was insignificant
	ω	α	β	shape	
ATX	0.072***	0.085***	0.845	5.62***	
DAX	0.028***	0.063***	0.913***	4.56	
WIG20	0.037***	0.085	0.882***	4.55***	
Note: *** indicates significance at 1% level.					

Table 4 Parameters of univariate GARCH(1,1) models for residuals of VAR(5) model for 5-minute returns of ATX, DAX and WIG20

Figure 3 presents intraday conditional correlations between the indices. In general, they are in line with correlations computed on the basis of daily returns. From Figure 2 it follows that between March and September 2013 correlation between ATX and DAX was almost constant, while correlation between WIG20 and the other indices decreased. similar pattern is visible in Figure 3. Here, it should be noted that during estimation procedure, matrices Q_t in DCC model are computed recursively with matrix of unconditional correlations as a starting value. Hence, all presented conditional correlation series begin at levels close to values in Table 3. Then, the impact of starting values decays geometrically with ratio very close to 1. It means that initial increase of conditional correlations observed in Figure 3 is rather artificial.

As in Figure 2, intraday correlation between WSE and the developed markets slowly weakens from 0.3 to 0.2 in the case of VSE and from 0.4 to 0.3 in the case of FSE. In the same time, the strength of linkages between VSE and FSE varies around 0.4. The existence of positive intraday correlations between developed markets is in line with results of Égert and Kočenda (2011). On the other hand, positive and significant correlations between WSE and developed markets differ from the results of Égert and Kočenda (2011) obtained for intraday data from 2003-2006. This means a significant change in intraday linkages between CEE emerging markets and European developed markets in the recent years.



Figure 3 Intraday conditional correlations between ATX, DAX and WIG20 in the period March 22, 2013 – September 5, 2013

5 Conclusions

In this paper we analyze and compare interrelations between stock markets in Frankfurt, Vienna and Warsaw. The analysis is performed on the basis of daily data from the period 2000-2014 and on the basis of 5-minute data from the period March 22, 2013 – September 5, 2013. Application of appropriate VAR models to both types of data confirms previous results about Granger causality running from large developed markets to stock markets in Central and Eastern Europe. This causal relations is observed in daily as well as in intraday data. further analysis of conditional correlations indicate that correlations between the indices under study have increased. The largest values of correlations between WSE and developed markets have weakened. Analysis of intraday conditional correlations leads to similar conclusion. It means that relationships between European stock markets are present also on intraday level.

Acknowledgements

Financial support for this paper from the National Science Centre of Poland [Research Grant DEC-2012/05/B/HS4/00810] is gratefully acknowledged.

References

- BOLLERSLEV, T. 1990. Modelling the Coherence in Short-Run Nominal Exchange Rates: A Multivariate Generalized ARCH Model. In: *The Review of Economics and Statistics*. Vol. 72, No. 3, pp. 498-505.
- CAPPIELLO, L., ENGLE, R. and SHEPPARD, K. 2006. Asymmetric dynamics in the correlations of global equity and bond returns. In: *Journal of Financial Econometrics*. Vol. 4, pp. 537–572.
- ČERNÝ, A. and KOBLAS, M. 2005. Stock Market Integration and the Speed of Information Transmission: The Role of Data Frequency in Cointegration and Granger Causality Tests. In: *Journal of International Business and Economics*. Vol. 1, pp. 110-120.
- ENGLE, R.F. 2002. Dynamic Conditional Correlation. In: *Journal of Business and Economic Statistics*. Vol. 20, No. 3, pp. 339-350.
- ENGLE, R.F. and SOKALSKA, M.E. 2012. Forecasting intraday volatility in the US equity market. Multiplicative component GARCH. In: *Journal of Financial Econometrics*. Vol. 10, No. 1, pp. 54–83.
- EPPS, T.W. 1979. Comovements in Stock Prices in the Very Short Run. In: *Journal of the American Statistical Association*. Vol. 74, pp. 291–298.
- ÉGERT, B. and KOČENDA, E. 2007. Interdependence between Eastern and Western European Stock Markets: Evidence from Intraday Data. In: *Economic Systems*. Vol. 31, No. 2, pp. 184–203.
- ÉGERT, B. and KOČENDA, E. 2011. Time-varying synchronization of European stock markets. In: *Empirical Economics*. Vol. 40, No. 2, pp. 393-407.
- GJIKA, D. and HORVÁTH, R. 2013. Stock Market Comovements in Central Europe: Evidence from Asymmetric DCC Model, In: *Economic Modelling*. Vol. 33, pp. 55–64.
- HANOUSEK, J., KOČENDA, E. and KUTAN, A.M. 2009. The reaction of asset prices to macroeconomic announcements in new EU markets: evidence from intraday data. In: *Journal of Financial Stability*. Vol. 5, No. 2, pp. 199-219.

- HARJU, K. and HUSSAIN, S.M. 2011. Intraday seasonalities and macroeconomic news announcements. In: *European Financial Management*. Vol. 17, pp. 367–390.
- SAVVA, C.S. and ASLANIDIS, C. 2010. Stock Market Integration between New EU Member States and the Eurozone. In: *Empirical Economics*. Vol. 39, No. 2, pp. 337–351.
- SYLLIGNAKIS, M.N. and KOURETAS, G.P. 2011. Dynamic Correlation Analysis of Financial Contagion: Evidence from the Central and Eastern European Markets. In: *International Review of Economics & Finance*. Vol. 20, No. 4, pp. 717–732.
- SYRIOPOULOS, T. 2004. International portfolio diversification to Central European stock markets. In: *Applied Financial Economics*. Vol. 14, pp. 1253–1268.
- SYRIOPOULOS, T. 2007. Dynamic linkages between emerging European and developed stock markets: Has the EMU any impact? In: *International Review of Financial Analysis*. Vol. 16, No. 1, pp. 41–60.
- VORONKOVA, S. 2004. Equity Market Integration in Central European Emerging Markets: A Cointegration Analysis with Shifting Regimes. In: *International Review of Financial Analysis*. Vol. 13, No. 5, pp. 633–647.

Tax Competition Model of Three Countries

MARTIN ZORIČAK¹ Technical University of Košice, Faculty of Economics Slovak Republic

Abstract

The aim of the paper is to construct agent based model of tax competition considering the model of three countries. Countries compete for mobile capital, which means important tax base and source of wealth of a country. Country defined as the worst changes its policy by adjusting tax rate or deficit rate. Simulation results imply that all countries lower their tax rates in order to at least preserve their position, which is compensated by rising deficit rate. Equilibrium among countries is obtained by enumerating interest rate, which leads to segregation of countries to either creditors or debtors.

Key words: Tax Competition, Agent-Based Modeling

JEL Classification: C63, H21, H63

1 Introduction

Tax revenues are main part of the public finance all around the world. Countries usually define their tax policy with focus on obtaining sufficient level of resources for providing public goods. Tax policy is closely linked to the development of public debt. Public debt became pressing issue for many countries after the financial crisis (Ruffert 2011). Tax policy proved to be a popular instrument for improving public debt. By changing their own tax policy (Hemmelgarn and Nicodème 2010), countries interact with each other and are competing for e.g. mobile financial capital². Many authors have been interested in the topic of tax competition, which results in several models. One of the first authors who addressed tax competition problem was Charles Tiebout (1956). Main ideas of the model are that local governments have more precise knowledge about needs of their residents, thus they are able to provide right quantity and quality of public goods for them than central government. Residents can choose most suitable municipality by ratio of costs - tax rates and utility - public goods. After Tiebout, many authors made modifications of the original model. Authors Zoodrow and Mieskowski (1986) analyzed effects of tax competition between fixed numbers of identical regions where movement of mobile capital can cause underpovision of public goods due to equilibrium is set on low tax rates. Another issue was country size. Different country size causes change in prediction of the baseline model (Bucovetsky 1991; Wilson 1999).

In the past decades we witnessed considerable fall of tax rates among countries of European Union. In the Figure 1, it is shown the gradual lowering of the tax rate by each country in the selected group. Despite of tax rates development in EU, phenomena *Race to the Bottom* is not an issue here according to Holzinger and Sommerer (2011). They suggest that reason of lowering

¹ Ing. Martin Zoričak, Němcovej 32, 040 01 Košice, Slovak Republic, martin.zoricak@tuke.sk

² Competition for mobile financial capital is the most common, although countries might compete also for human capital or consumptions.(Hafner 2015)

tax rates is rather harmonization process. By lowering tax rates, the countries are able to stay competitive in attracting foreign mobile capital.



Figure 1 Tax rates in selected European countries for years 1981 – 2013, in %

2 Model and Methods

In the paper, we used an agent based model for analysing tax competition among countries. Model consists of one company (which represents many small homogenous companies), three countries which are differentiate in the size of their potential product, initial level of capital and public infrastructure. Aim of the company is to maximize its profit, which is done by shifting among countries according to efficiency of the investment measured by marginal capital productivity. Aim of the countries is to maximize their wealth, which is defined as a sum of the capital amount in the country and public infrastructure from, which are subtracted the cumulative debts. To reach its goal, country can choose from four different strategies given by elementary changes two variables – tax rate and deficit rate³. Country can choose to increase or decrease on of the variable. At first, country choose random strategy and afterward evaluate impact of the strategy on its wealth. If the strategy has positive effect on the wealth, country keeps the strategy in memory and use it next time. If selected strategy proves to be not helpful to increase wealth, country choose random strategy once again. Decision making by countries is based on Bak-Sneppen model (Bak and Sneppen 1993) where agent considered as the worst (in our case country with the lowest increase of wealth) has to change its strategy.

2.1 Variables

Our model consists of 16 variables shown in Table 1. All of these variables are describe each country and change during the simulations process. In the model, there are following parameters included: potential product and depreciation rate which are constant and equal.

³ Deficit rate is defined as ratio of tax revenues. If the rate is below 1, country creates surplus; if the rate is more than 1, country creates deficit

Variable	Description	Variable	Description	
r	interest rate in a country	W	wealth of a country	
Y	real product of a country	def	deficit of a country	
R	tax revenues of a country	τ	tax rate of a country	
П	profit of the firm	MK	marginal product of capital in a	
	pione of the min	MIK	country	
Ι	investments of the firm in specific	MKM	modified marginal product of capital	
	country		in a country	
K	capital of a country	worst	indicator of the worst country	
Yinf	infrastructure of a country	mem	memory of a country	
Debt	debt of a country	choice	specific decision by a country	

2.2 Model

Real product of a country depends on its potential product and amount of capital in a country. Function of real product (Equation 1) of a country is concave and comes close to the potential product, depending on level of capital.

$$Y_t^i = a_t^i \left(1 - e^{-\frac{\kappa_t^i}{50}} \right) \tag{1}$$

Afterwards are calculated tax revenues (Equation 2) as product of real product of a country and its tax rate.

$$R_t^i = \tau_t^i Y_t^i \tag{2}$$

Profit (Equation 3) of the company is calculated as difference between real product and tax revenues. Infrastructure is taken into the consideration as a level of relative infrastructure compared to the average infrastructure in the system of all countries. Interest rate in the country for given period also effects company's profit.

$$\pi_t^i = \left(\frac{\frac{Y_{inf_t^i}}{Y_t^i}}{\frac{Y_{inf_t}}{Y_t}} Y_t^i - R_t^i\right) r_t^i \tag{3}$$

Cumulative (from all countries) profit is distributed between countries in form of investments (Equation 4). Profit is distributed among countries according marginal product of capital, which is defined as first derivative of the real product function and afterward is rescaled. In a result each country has certain share of total profit according to expected efficiency of new investment (capital).

$$I_t^i = \pi_t \frac{MKM_t^i}{MKM_t^n} \tag{4}$$

Capital (Equation 5) of a country is sum of cumulative, depreciated capital and new investments. There is a condition which provide minimal level of capital in a country. Condition is based on empirical observation, that there is always some capital in every country.

$$K_{t+1}^{i} = \begin{cases} (1-d)K_{t}^{i} + I_{t}^{i}, \ (1-d)K_{t}^{i} + I_{t}^{i} \ge 0\\ 0, \ (1-d)K_{t}^{i} + I_{t}^{i} < 0 \end{cases}$$
(5)

Infrastructure (Equation 6) is, same as capital, sum of depreciated previous infrastructure and new infrastructure as product of tax revenues and deficit rate. It is obvious, that all tax revenues are transformed into new infrastructure.

$$Yinf_{t+1}^{i} = (1-d)Yinf_{t}^{i} + (1+def_{t}^{i})R_{t}^{i}$$
(6)

Debt (Equation 7) is sum of cumulative debt and current deficit (eventually surplus) of a country. Debt equilibrium among countries is reached by interest rate which also determines whether country is debtor or creditor. Mathematically, interest rate is subject of minimization function. Aim is to minimize distance between interest rates under the constraint of equilibrium between all debts and interest rates.

$$Debt_{t+1}^{i} = \left(Debt_{t}^{i} + def_{t}^{i}R_{t}^{i}\right)r_{t+1}^{i}$$

$$\tag{7}$$

Wealth (Equation 8) of a country consist of level of capital and infrastructure from which is debt subtracted.

$$W_{t+1}^{i} = K_{t+1}^{i} + Yinf_{t+1}^{i} - Debt_{t+1}^{i}$$
(8)

Country decides whether to change or to keep its strategy depending on relative difference of wealth between t and t - 1 period. Country, which has the lowest value, changes its strategy. If country has preferred strategy in a memory, country choose this strategy. In a case when a country has not any strategy in a memory or strategy, which was used last time did not lead to better position, the country choose random strategy.

3 Results

In simulation we analyzed 3 countries and 18 different variables for 1 000 periods. In results we focus on development of the most important variables. For model simulation we used application RStudio (RStudio, Inc. 2014), with programming language R (R Development Core Team 2011). Some of the variables had set initial values, which are shown in Table 2.

Variable	Country A	Country B	Country C		
Potential product	50	30	10		
Depreciation rate		0.20			
Interest rate	1				
Capital	5	3	1		
Infrastructure	5	3	1		
Debt	-10	6	4		
Deficit	0.1				
Tax rate	0.2				

 Table 2 Initial values of selected variables

3.1 Real product

Development of the real product of all countries is shown in Figure 2. The real product of all counties oscillates near potential product. We can see economic cycles which are the most recognizable around 700 and 1950 periods. The reason for oscillation is a fact that when real product is getting close to the potential product, marginal product of capital fall down and capital (in form of investments) shifts to other countries where higher productivity of capital is.



Figure 2 Real product of countries A, B, C

3.2 Tax revenues

On the Figure 3, we can see fall in tax revenues in all counties. This fall is caused by gradual lowering of tax rate by each country. Oscillation is present also in tax revenues, which is caused by initial oscillation of real product, which is magnified by changing tax rate.



Figure 3 Tax revenues in countries A, B, C

3.3 Debt

As we can see on Figure 4, country A became debtor, and its debt was rising for around first 300 periods. After initial steep increase of debt country A starts to applying restrictive policy which prohibits to create new deficit. Restrictive policy leads to slower increase of debt. Country B has inverse position, which has negative debt – country B is creditor. Country C is in small, debtor position.



Figure 4 Debt in countries A, B, C

3.4 Wealth

Development of wealth is illustrated on Figure 5. The wealthiest is country B, which is caused by its creditor position shown on Figure 4. Country A has average wealth near zero. Country C as smallest country has steady, positive average wealth. Main factor for significant difference between country A and B is debt position of analysed countries.



Figure 5 Wealth in countries A, B, C

3.5 Tax rates

We can see significant fall in tax rates (Figure 6) in each country after initial periods. All countries drop their tax rates to the lowest possible level. There is condition that country has to have at least 5 % tax rate. By this condition all countries have at least some tax revenues which prevents country from "dying out" – it means that all capital would shift to other countries. Countries try to rise their tax rates but it was not possible for any country to hold higher tax rate in long run.



Figure 6 Tax rates in countries A, B, C

3.6 Deficit rate

Countries in order to preserve infrastructure, with gradually lowered tax rates, have to rise their deficit rate. As we can see on Figure 7, all countries tend to increase their deficit coefficient. Important difference is in country A which had to applied restrictive policy which prevents country from creating more deficit. There are, however, periods where country improve its position so it is possible for it to create new deficit. The most significantly it occurs between 400 - 600 periods.



Figure 7 Deficit coefficient in countries A, B, C

4 Conclusion

The aim of this article was to analyse existing tax competition models and propose agent based model alternative which includes all proven assumptions from mentioned papers. Model used in paper consists of three asymmetrical countries. Countries change their tax policy in order to improve their position, which is measured by wealth of the country. Country can change its tax rate or deficit coefficient. Important part of the model is debt compensatory mechanism which is defined by interest rate for each country. Presented results of simulation suggest that country became either debtor or creditor. Position of a country has significant impact on wealth development which leads to changes in tax policy. For further research we suggest to focus on compensatory mechanism between countries and to implement more sophisticated learning mechanism for changing countries policy.

References

- BAK, P. and SNEPPEN, K. 1993. Punctuated Equilibrium and Criticality in a Simple Model of Evolution. In: Physical Review Letters. Vol. 71, No. 24: pp. 4083–4086. doi:10.1103/PhysRevLett.71.4083.
- BUCOVETSKY, S. 1991. Asymmetric Tax Competition. In: Journal of Urban Economics. Vol. 30, No. 2: pp.167–181.
- HAFNER, K. 2015. Tax Competition and Economic Integration. In: Review of Development Economics. Vol. 19, No. 1: pp.45–61.
- HEMMELGARN, T. and NICODÈME, G. 2010. The 2008 Financial Crisis and Taxation Policy. SSRN Scholarly Paper ID 1546973. Rochester, NY: Social Science Research Network.
- HOLZINGER, K. and SOMMERER, T. 2011. Race to the Bottom'or 'Race to Brussels'? Environmental Competition in Europe. In: JCMS: Journal of Common Market Studies. Vol. 49, No. 2: pp. 315–39.
- R Development Core Team. 2011. R: A Language and Environment for Statistical Computing. Vienna, Austria: R Foundation for Statistical Computing.
- RStudio, Inc. 2014. RStudio. rstudio.com.
- RUFFERT, M. 2011. The European Debt Crisis and European Union Law. In: Common Market Law Review, Vol. 48, No. 6: pp. 1777–1805.
- TIEBOUT, CH. M. 1956. A Pure Theory of Local Expenditures. In: Journal of Political Economy. Vol. 64.
- WILSON, J. D. 1999. Theories of Tax Competition. In: National Tax Journal. pp. 269-304.
- ZODROW, G. R. and MIESZKOWSKI, P. 1986. Pigou, Tiebout, Property Taxation, and the Underprovision of Local Public Goods. In: Journal of Urban Economics. Vol.19, No 3: pp. 356–70.

Technical University of Košice Faculty of Economics

Central European Conference in Finance and Economics (CEFE2015) September 30 - October 1, 2015 Herl'any, Slovak Republic

Proceedings of the International Scientific Conference

Edited by Beáta Gavurová and Michal Šoltés

Editorial Board: Beáta Gavurová, Michal Šoltés, Jozef Glova, Rajmund Mirdala, Marianna Siničáková, Tomáš Želinský, Lucia Mihóková

Published by Technical University of Košice, Faculty of Economics, Košice 2015, 1 st edition, 2015, number of copies 300, Printed by: Technical University of Košice ISBN 978-80-553-2467-8