

The Faculty of Operation and Economics of Transport and Communications
University of Zilina
Univerzitná 1
010 01 Zilina
Slovak Republic

<https://fpedas.uniza.sk/~globalization/>



GLOBALIZATION AND ITS SOCIO-ECONOMIC CONSEQUENCES

18th International Scientific Conference

10th – 11th October 2018 Rajecké Teplice, Slovak Republic

Proceedings Part IV.



UNIVERSITY OF ZILINA
Faculty of Operation and Economics of Transport and Communications

Globalization and Its Socio-Economic Consequences
18th International Scientific Conference - Proceedings Part IV.



ZU – UNIVERSITY OF ZILINA
Faculty of Operation and Economics of Transport and Communications,
Department of Economics

GLOBALIZATION AND ITS SOCIO-ECONOMIC CONSEQUENCES

18th International Scientific Conference

Proceedings

(Part IV. – Behavioural Finance)

10th – 11th October 2018
Rajecké Teplice, Slovak Republic

ORGANIZED BY

ZU – UNIVERSITY OF ZILINA, Faculty of Operation and Economics of Transport and Communications, Department of Economics.

EDITED BY

prof. Ing. Tomas Kliestik, Ph.D.

TITLE

Globalization and Its Socio-Economic Consequences

ISSUED IN

Zilina, Slovakia, 2018, 1st edition

PAGES

2926

ISSUED BY

ZU – UNIVERSITY OF ZILINA

PRINTED IN

GEORG, Bajzova 11, 010 01 Zilina, Slovak Republic

NUMBER OF COPIES

80 (each part)

Not for sale

ISBN 978-80-8154-249-7

ISSN 2454-0943

GUARANTEES OF THE CONFERENCE

prof. Ing. Tomas KLIESTIK, Ph.D.	University of Zilina, Slovak Republic
Dr.h.c. prof. Ing. Tatiana COREJOVA, Ph.D.	University of Zilina, Slovak Republic
prof. Ing. Anna KRIZANOVA, CSc.	University of Zilina, Slovak Republic

PROGRAMME COMMITTEE

prof. Ing. Tomas KLIESTIK, Ph.D. – chairman	University of Zilina, Slovak Republic
assoc. prof. Ing. Viera BARTOSOVA, Ph.D.	University of Zilina, Slovak Republic
prof. Ing. Jaroslav BELAS, PhD.	Tomas Bata University in Zlin, Czech Republic
prof. Dr. Stefan BOJNEC, Ph.D.	University of Primorska, Slovenia
prof. Jelena BOROCKI	University of Novi Sad, Serbia
Dr.h.c. prof. Ing. Tatiana COREJOVA, Ph.D.	University of Zilina, Slovak Republic
assoc. prof. Ing. Viktor V. DENGGOV, Ph.D.	Saint Petersburg State University, Russian Federation
assoc. prof. Ing. Beata GAVUROVA, MBA. PhD.	Technical University of Kosice, Slovak Republic
prof. Ing. Valentina V. GERASIMENKO, Ph.D.	Lomonosov Moscow State University, Russian Federation
assoc. prof. Ing. Ales HES, CSc.	University of Finance and Administration, Praha, Czech Republic
Dr. Anita KOLNHOFER-DERECSKEI	Obuda University, Budapest, Hungary
prof. Dr. Barbara KOS, Ph.D.	Economics academia, Katowice, Poland
assoc. prof. Pavol KRAL, Ph.D.	University of Zilina, Slovak Republic
prof. Ing. Anna KRIZANOVA, CSc.	University of Zilina, Slovak Republic
prof. Dr. Colin W. LAWSON	University in Bath, United Kingdom
assoc. prof. George LAZAROIU, PhD.	Spiru Haret University, Bucharest, Romania
prof. Ing. Zbigniew LUKASIK, DrSc.	University of Technology, Radom, Poland
JUDr. Mgr. Martina LUBYOVA, Ph.D.	Slovak Academy of Sciences, Slovak Republic
prof. Ing. Alexander N. LYAKIN, DrSc.	Saint Petersburg State University, Russian Federation
prof. Ing. Olga P. MOLCHANOVA, Ph.D.	Lomonosov Moscow State University, Russian Federation
assoc. prof. Ing. Hussam MUSA, Ph.D.	Matej Bel University, Banska Bystrica, Slovak Republic

prof. univ. dr. Elvira NICA	Bucharest University of Economic Studies, Romania
prof. Ing. Jan POKRIVCAK, Ph.D.	Slovak University of Agriculture in Nitra, Slovak Republic
prof. Gheorghe H. POPESCU, PhD.	Dimitrie Cantemir Christian University, Bucharest, Romania
prof. Dr. Mladen RADISIC	University of Novi Sad, Serbia
assoc. prof. Mariana SEDLIACIKOVA, PhD.	Technical University in Zvolen, Slovak Republic
assoc. prof. Pengfei SHENG, Ph.D.	University of Henan, People Republic of China
prof. nadzw. dr hab. Włodzimierz SROKA	University of Dabrowa Gornicza, Poland
Ing. Jarmila STRAKOVA, PhD.	The Institute of Technology and Business in Ceske Budejovice, Czech Republic
Dr. phil., prof. Velga VĒVERE	The University College of Economics and Culture, Latvia
assoc. prof. Ing. Marek VOCHOZKA, MBA, Ph.D.	The Institute of Technology and Business in Ceske Budejovice, Czech Republic
prof. Ing. Natalia A. ZHURAVLEVA, PhD.	Emperor Alexander I St. Petersburg State Transport University, Russian Federation

REVIEWED BY

assoc. prof. Ing. Viera BARTOSOVA, Ph.D. prof. Ing. Jaroslav BELAS, PhD.	University of Zilina, Slovak Republic Tomas Bata University in Zlin, Czech Republic
Dr.h.c. prof. Ing. Tatiana COREJOVA, Ph.D. assoc. prof. Ing. Viktor V. DENGGOV, Ph.D. prof. Ing. Valentina V. GERASIMENKO, Ph.D.	University of Zilina, Slovak Republic State University in St. Pettersburg, Russia Lomonosov Moscow State University, Russian Federation
assoc. prof. Ing. Ales HES, CSc.	University of Finance and Administration, Praha, Czech Republic
Dr. Anita KOLNHOFER-DERECSKEI prof. Ing. Tomas KLIESTIK, Ph.D., assoc. prof. Jana KLIESTIKOVA, Ph.D. assoc. prof. Pavol KRAL, Ph.D. prof. Ing. Anna KRIZANOVA, CSc. assoc. prof. Gheorghe LAZAROIU, PhD.	Obuda University, Budapest, Hungary University of Zilina, Slovak Republic University of Zilina, Slovak Republic University of Zilina, Slovak Republic University of Zilina, Slovak Republic Spiru Haret University, Bucharest, Romania
prof. Ing. Alexander N. LYAKIN, DrSc., prof. Ing. Olga P. MOLCHANOVA, Ph.D.	State University in St. Petersburg, Russia Lomonosov Moscow State University, Russian Federation
assoc. prof. Ing. Hussam MUSA, Ph.D., prof. univ. dr. Elvira NICA	Matej Bel University, Banska Bystrica, Slovak Republic Bucharest University of Economic Studies, Romania
assoc. prof. Gheorghe H. POPESCU, PhD.	Dimitrie Cantemir Christian University, Bucharest, Romania
assoc. prof. Mariana SEDLIACIKOVA, PhD.	Technical University in Zvolen, Slovak Republic
prof. nadzw. dr hab. Włodzimierz SROKA Dr. phil., prof. Velga VĚVERE	University of Dabrowa Gornicza, Poland The University College of Economics and Culture, Latvia
assoc. prof. Ing. Marek VOCHOZKA, MBA, Ph.D.	The Institute of Technology and Business in Ceske Budejovice, Czech Republic
prof. Ing. Natalia A. ZHURAVLEVA, PhD.	Emperor Alexander I St. Petersburg State Transport University, Russian Federation

PUBLICATION ETHICS AND MALPRACTICE STATEMENT

The conference Globalization and its socio-economic consequences fulfils the requirements of the publishing process, it recognizes the ethical responsibilities of all parties of the publication process. Thus, we take our duties of guardianship over all stages of publishing very seriously and we recognize our ethical duties and other responsibilities.

Editorial Board

The editor and the guarantees of the conference are recognized experts in their fields, their full names and affiliations are provided on the conference website in the section Home on the conference website. The contact information for the editorial team is on the conference website, section Contact on the conference website.

Authors and Authors responsibilities

The paper must be an original unpublished work written English, Slovak or Czech languages. The submitted paper should neither be published before nor be under consideration for publication in another conference proceedings or journal. Authors, whose names appear on the paper have contributed sufficiently to the scientific work and therefore share collective responsibility and accountability for the results. The content of the paper must correspond to the publishing strategy of the conference and the article must meet the other conditions given in the author's guidelines (section Important dates/ Author guidelines/ Forms on the conference website). There is a publication fee for the paper processing (section Conference fee on the conference website).

All papers are subjected to a double-blind, peer-review process. Firstly, each submission is reviewed by the conference editors, who may reject it, if it is not dealing with the subject matter of the conference and does not meet the conference requirements or if it is of a low quality. In the second stage of the review process, the paper is sent to two independent reviewers. Reviewers are asked to evaluate the paper and they may recommend to: (i) accept the paper in the current form, (ii) accept the paper with minor correction, (iii) accept the paper with major corrections, (iv) accept the paper only after corrections and repeated review, and (v) reject the paper. Reviewers include the recommendations and comments, which are then sent to the author(s). The editors should not reverse decisions on publication unless serious problems are identified.

Each paper must be submitted by e-mail to: globalizacia@fpedas.uniza.sk. The paper is successfully submitted if the author receives a confirmation e-mail.

Peer-review process

All submitted papers received by the editorial office are firstly checked by the editors to determine if they are properly prepared and follow the ethical policies of the conference. The editors are responsible for deciding which of the submitted papers should be published. The editors are guided by the policies of the conference editorial team and constrained by such legal requirements as copyright infringement and plagiarism. Papers that do not fit the ethics policy or do not meet the requirements of the conference will be rejected before the peer-review process. Papers that are not properly prepared will be returned to the authors for revision and resubmission.

Once a paper passes the editorial checks, it will be assigned to two independent experts for a double-blind peer-review. Judgements should be objective, reviewers should have no conflict of interest and should point out relevant published work which is not yet cited. Reviewed

articles should be treated confidentially. Reviewers are asked to evaluate the paper and may recommend to: (i) accept the paper in the current form, (ii) accept the paper with minor correction, (iii) accept the paper with major corrections, (iv) accept the paper only after corrections and repeated review, and (v) reject the paper. The final decision to accept or reject the manuscript will also be sent to the corresponding author along with any recommendations made by the reviewers.

All reviewer comments should be responded to in a point-by-point fashion.

The editors and reviewers should evaluate manuscripts for their intellectual content without regard to race, gender, sexual orientation, religious belief, ethnic origin, citizenship, or political philosophy of the authors. The editors' decision to accept or reject a paper for publication should be based only on the paper's importance, originality and clarity, and the study's relevance to the aim of the conference.

Publication ethics

The editors of the conference proceedings enforce a peer-review process together with ethical policies and standards to ensure to add high-quality scientific works to the field of scholarly publication.

Authors wishing to publish their papers in the conference proceedings must abide by the following:

- Any facts that might be perceived as a possible conflict of interest of the author(s) must be disclosed in the paper prior to submission.
- Authors should accurately present their research findings and include an objective discussion of the significance of their findings.
- Data and methods used in the research need to be presented in sufficient detail in the paper.
- Simultaneous submission of manuscripts to more than one conference proceedings or journal is not tolerated.
- Republishing content that is not novel is not tolerated.
- If errors and inaccuracies are found by the authors after publication of their paper or some corrections are to be made, they need to be promptly communicated to the editors of this conference so that appropriate actions can be taken.
- Plagiarism, data fabrication and image manipulation are not tolerated and the following measures will be taken accordingly. First, the manuscript that has been proven to be involved in plagiarism will be immediately rejected along with the immediate rejection of any other manuscript submitted by the same authors. Second, each author involved in the violating manuscript will be banned from submitting any new manuscript to the conference in a period of two years.

For any complaints or concerns with regard to any publishing article, please contact us at **globalizacia@fpedas.uniza.sk**. We will acknowledge your e-mail and provide an estimated time to study and solve your complaints or concerns.

Retraction and correction policy

The editors are committed to upholding the integrity of the literature and publishes editorially significant correction dependent on the situation. In all cases, the original articles will be removed and replaced with a note stating the reason of retraction and with the corrected

version. If plagiarism is found, a whole article will be removed from the conference proceedings.

When an author discovers a significant error or inaccuracy in their own published work, it is the author's obligation to promptly notify the conference editors or publisher and cooperate with the editors to retract or correct the paper. If the editors or the publisher learns from a third party that a published work contains a significant error, it is the obligation of the author to promptly retract or correct the paper or provide evidence to the editor of the correctness of the original paper.

Originality and plagiarism

The authors should ensure that they have written entirely original works, and if the authors have used the work and/or words of others, then this has been appropriately cited or quoted. Plagiarism takes many forms, from rewriting another's paper as the author's own paper to copying or paraphrasing substantial parts of another paper (without attribution and citation), to claiming results from research conducted by others. Plagiarism in all its forms constitutes unethical publishing behaviour and is unacceptable.

Authorship of the paper

Authorship should be limited to those who have made a significant contribution to the conception, design, execution, or interpretation of the reported study. All those who have made significant contributions should be listed as co-authors. Where there are others who have participated in certain substantive aspects of the research project, they should be acknowledged or listed as contributors. The corresponding author should ensure that all appropriate co-authors and no inappropriate co-authors are included on the paper and that all co-authors have seen and approved the final version of the paper and have agreed to its submission for publication.

Copyright and Access

The author(s) must agree that the published version of the paper will be placed on the website of the conference (in pdf format) in the conference proceedings. Before an article goes to print, the author(s) must sign and return the copyright agreement (a scanned signed copy in pdf).

Archiving

The editors ensure digital preservation of access to the conference proceedings content on the conference website. All the printed issues of the conference proceedings are available in the registry and library of the Department of Economics, Faculty of Operation and Economics of Transport and Communications at the University of Zilina.

Website

The editors ensure that the conference website, including the text that it contains, demonstrates that care has been taken to ensure high ethical and professional standards.

Publishing schedule

Conference Globalization and its socio-economic consequences is a peer-reviewed scientific conference published by the University of Zilina.

Name of the conference

Conference Globalization and its socio-economic consequences is unique and it cannot be easily confused with other conferences or misled potential authors and readers about the conference origin or association with other conferences.

TOPICS

- Accounting
- Advertising Management
- Banking and Insurance
- Business & Economics
- Business Ethics
- Business Intelligence
- Business Information Systems
- Business Law
- Business Performance Management
- Business Statistics
- Change Management
- Consumer Behaviour
- Corporate Finance and Governance
- Corporate Governance
- Cost Management
- Decision Sciences
- Development Planning and Policy
- Economic Development
- Economic Methodology
- Economic Policy
- E-Business
- E- Marketing
- Economic Systems
- Entrepreneurship
- Finance & Investment
- Financial Accounting
- Financial Economics
- Globalization
- Global Business
- Global Marketing
- Growth; Aggregate Productivity
- Household Behaviour and Family Economics
- Human Resource
- Industrial and Manufacturing Engineering
- Information Systems
- Information Technology Management
- International Business
- International Economics
- International Finance
- Labour Economics
- Labour Relations & Human Resource Management
- Law and Economics
- Management Accounting
- Management Information Systems
- Management Science
- Market Structure and Pricing
- Marketing Research and Strategy
- Marketing Theory and Applications
- Monetary Theory
- Operations Research
- Organizational Behaviour & Theory
- Prices, Business Fluctuations, and Cycles
- Product Management
- Production and Organizations
- Production/Operations Management
- Public Administration and Small Business Entrepreneurship
- Public Economics and Finance
- Public Finance and Taxation
- Public Relations
- Public Responsibility and Ethics
- Regulatory Economics
- Resource Management
- Strategic Management
- Strategic Management Policy
- Supply Change Management
- Systems Management
- Systems Thinking
- Taxes
- Technological Change; Research and Development
- Technology & Innovation
- Time Management
- Total Quality Management
- Travel/Transportation/Tourism
- Welfare Economics

TABLE OF CONTENTS

PART I

ADAMOVA MARKETA, SOUKUPOVA NIKOLA, DOSTALOVA ELISKA, KRNINSKA RUZENA MODERN TRENDS IN HUMAN RESOURCE MANAGEMENT.....	1
ALPATOV E. GENNADY, NOVIKOV V. ANDREY GLOBALIZATION AND EMIGRATION OF RUSSIAN SCIENTISTS	7
ANTALOVA MARIA THE IMPORTANCE OF GLOBALIZATION AND HUMAN CAPITAL FOR ECONOMIC GROWTH	14
BALCEROWICZ-SZKUTNIK MARIA THE IMPACT OF GLOBALISATION PROCESSES ON CHANGES IN THE CONSUMPTION MODEL - AN ATTEMPT TO EVALUATE.....	22
BENCIKOVA DANA, MALA DENISA, DADO JAROSLAV DEVELOPING INTERCULTURAL COMPETENCE OF GLOBAL MANAGERS AND GLOBAL ENTERPRISES	30
BLAZEKOVA OLGA, VOJTEKOVA MARIA INCREASING OF EMPLOYMENT RATE AS AN IMPORTANT GLOBAL OBJECTIVE.....	38
BLYZNIUK VIKTORIIA, SHUMSKA SVITLANA MACROECONOMIC AND GLOBAL EFFECTS OF EXPANDING THE INFORMAL SEGMENT OF LABOR MARKET: THE CASE OF UKRAINE	46
BODISLAV D. ALEXANDRU, POPESCU LOREDANA, ALPOPI CRISTINA MANAGERIAL INSTRUMENTS FOR SUSTAINABLE BUSINESS ADMINISTRATION	54
BOTIK MILAN GLOBALIZATION OF SOCIETY AND CIRCULAR ECONOMY	62
BOTLIK JOSEF, BOTLIKOVA MILENA GLOBALIZATION AND MIGRATION CENTERS DEVELOPMENT WITH INTENSIVE EFFECT ON STRUCTURE OF THE CZECH REPUBLIC POPULATION - FOREIGNERS STAYING MORE THAN 12 MONTHS.....	70
DENGOV V. VIKTOR, TULYAKOVA R. IRINA, GREGOVA ELENA MILITARY-TECHNICAL COOPERATION OF RUSSIA IN THE CONTEXT OF GLOBALIZATION: EXPERIENCE OF COOPERATION WITH CHINA	78
DURISOVA MARIA, CHODASOVA ZUZANA, TOKARCIKOVA EMESE IMPORTANCE OF VALUE MANAGEMENT TOOLS IN A GLOBALLY OPERATING ENTERPRISE	87
FABINYJOVA SVETLANA THE IMPACT OF GLOBALIZATION ON WAGE POLICY	95

GARBAROVA MIRIAM, HOLLA BACHANOVA PETRA SHARING ECONOMY AS A NEW FORM OF BUSINESS IN GLOBAL ENVIRONMENT.....	103
HADAS-DYDUCH MONIKA EMPIRICAL ANALYSIS OF CHINA'S CONNECTIONS WITH SELECTED COUNTRIES IN THE CONTEXT OF GLOBALIZATION AND INTEGRATION	111
HANSUT LUKAS, DAVID ANDREJ PIRACY IN MARITIME TRANSPORT AND ITS IMPACT ON THE GLOBAL WORLD MARKET	119
HEINZ KRZYSTYNA, CHYLKOVA MARTINA SELF-EVALUATION OF STUDENTS' PROGRESS WITHIN THE ECMT ERASMUS+ IP PROGRAMME DEVELOPING ENTREPRENEURIAL AND COMMUNICATIVE SKILLS	127
HREHOVA DANIELA GLOBAL ENTREPRENEUR - ETHICAL ENTREPRENEUR	136
CHLEBIKOVA DARINA, DURANA PAVOL INFLUENCE OF GLOBALIZATION ON WORK RELATIONSHIPS	144
JANOSOVA DENISA, HULAJOVA LUBICA IMPACT OF GLOBALISATION PROCESS ON CIRCULAR ECONOMY	151
JERMOLAJEVA JELENA, BOGDANOVA TATIANA, SILCHENKOVA SVETLANA HUMAN RESOURCES IN SCHOOL EDUCATION: TEACHER'S PROFESSIONALLY DETERMINED BEHAVIOR IN THE GLOBALIZATION ERA.....	158
JEZOVA DANIELA GDPR – RESULT OF GLOBALIZATION?.....	167
KAMASHEVA ANASTASIA, YAGUDIN RAMIL, GILYAZOV TIMUR THE STATE OF HEALTH AS A BARRIER TO ENTRY AND DEPARTURE OF MIGRANTS: THE IMPACT OF GLOBALIZATION	175
KAMPOVA KATARINA, MAKKA KATARINA, ZVARIKOVA KATARINA CRISIS MANAGEMENT AS A TOOL FOR THE CONCEPT OF SOCIALLY RESPONSIBLE BUSINESS IN GLOBALIZING WORLD.....	182
KEDZIOR-LASKOWSKA MALGORZATA IMPACT OF INTERNATIONALIZATION PROCESS ON SERVICE QUALITY – PERSPECTIVE OF POLISH CARRIERS	190
KOKOVIKHIN ALEXANDR IMPACT OF INTERNATIONAL LABOUR MOBILITY ON HUMAN RESOURCE MANAGEMENT IN REGIONS OF RUSSIAN FEDERATION	198
KOTYNKOVA MAGDALENA SOCIAL PROTECTION EXPENDITURE IN THE LIGHT OF THE GRADUAL CHANGES IN THE EUROPEAN LABOUR MARKET	206
KOVACIKOVA HANA, BLAZO ONDREJ ENTREPRENEURS' LEGAL RESPONSIBILITY FOR HUMAN RIGHTS OBSERVANCE IN GLOBALIZED BUSINESS WORLD	214

KUCHARCIKOVA ALZBETA

COMPARISON OF VIEWS ON THE EVALUATION OF PROGRAMMES OF ACTIVE
 LABOUR MARKET POLICY 222

KUSA ALENA, PIATROV IGOR

GLOBAL TRENDS IN MARKETING COMMUNICATION OF THE BRANDS APPLYING
 THE PRINCIPLES OF CIRCULAR ECONOMY 230

KUVALDIN B. VICTOR, MOYSA I. NATALIA

SOCIO-ECONOMIC INTEGRATION OF IMMIGRANTS INTO EUROPEAN SOCIETY
 (STUDY OF ETHNIC MINORITIES OF GREAT BRITAIN) 238

LANCARIC DRAHOSLAV, SAVOV RADOVAN, KOZAKOVA JANA

WORK FORCE DIVERSITY AND DIVERSITY MANAGEMENT IN THE SLOVAK
 REPUBLIC IN GLOBALIZATION ERA 243

**LAZAROIU GEORGE, IONESCU LUMINITA, MEILA ALEXANDRA DANA,
 BOGDAN CURTEANU ADRIAN, BOGDAN ALEXANDRU**

PRECARIOUS WORK OF MIGRANTS IN GLOBAL CITIES. AN EMPIRICAL
 INVESTIGATION 251

**MOHIRTA IONEL, NEGURITA OCTAV, GRECU GHEORGHE, DUMITRESCU
 OANA CATALINA, DRUGAU-CONSTANTIN ANDREEA**

AUTOMATION, GLOBAL LABOR MARKET, AND OUTPUT: DO PRODUCTIVITY-
 IMPROVING TECHNOLOGIES RAISE OVERALL WORK DEMAND? 257

**NEGULESCU IULIAN, GRECU IULIA, NEGURITA OCTAV, SPONTE (PISTALU)
 MARIA, DRUGAU-CONSTANTIN ANDREEA**

GLOBAL EMPLOYMENT PRECARIOUSNESS: THE PREDOMINANCE OF LOW-PAID
 JOBS ENTAILING FLEXIBLE WORKING CONTRACTS AND RELATED
 REGULATORY CHALLENGES 263

NEUMANN PAVEL

GLOBALIZATION AND ECONOMY PROTECTION IN THE U.S. TRADE POLICY
 DEVELOPMENT 269

NOVIK ALINA, LUKIANENKO IRYNA

DYNAMIC MODELLING OF MIGRATION FLOWS IN UKRAINE IN THE CONTEXT OF
 GLOBALIZATION 276

OSTOJ IZABELA

PAID ANNUAL LEAVE AS A FACTOR OF DIFFERENTIATION OF WORKING
 CONDITIONS IN THE GLOBAL SCALE 282

PALIY G. IRINA, PAVLOVA L. HELEN

INTERNATIONAL LAW AND GLOBALIZATION 290

**POPESCU H. GHEORGHE, ANDRONICEANU ARMENIA, MITEA DANA RALUCA
 ELENA, CIURLAU FLORIN CRISTIAN, ANDREI JEAN-VASILE**

SERVICE-FOCUSED CHARACTER OF THE SHARING ECONOMY: PLATFORM
 COOPERATIVISM, NON-STANDARD LABOR, AND FLEXIBLE WORKING
 ARRANGEMENTS 297

PRIHODOVA KATERINA, HUB MILOSLAV IMPACT OF GLOBAL CHANGES ON THE USE OF MODERN TECHNOLOGIES TO ENSURE THE STATE SECURITY	303
RADZIK PAULINA, BALCEROWICZ-SZKUTNIK MARIA LABOUR MARKET RESPONSE TO GLOBALIZATION IN SELECTED COUNTRIES OF THE EUROPEAN UNION	310
RIEVAJOVA EVA, PRIVARA ANDREJ INTERNATIONAL MIGRATION IN CONTEXT OF ITS INFLUENCE ON DEMOGRAPHIC DEVELOPMENT IN THE SLOVAK REPUBLIC	318
ROLENC JAN MARTIN REFLECTION OF GLOBALIZATION IN THE KEY FOREIGN-POLICY DOCUMENTS OF THE CZECH REPUBLIC.....	326
ROSPUTINSKY PETER MEMBERSHIP IN INTERNATIONAL ORGANIZATIONS WITH RESPECT TO THE CREATION OF THE SOFT POWER OF THE SLOVAK REPUBLIC.....	334
SEDLIACIKOVA MARIANA, SATANOVA ANNA, MORESOVA MARIA HOW EMPLOYEES PERCEIVE CONTROLLING IN THE CONTEXT OF GLOBALIZATION?.....	342
SEEMANN PETER, STOFKOVA ZUZANA, BINASOVA VLADIMIRA FUTURE OF GLOBALIZATION AND ITS IMPLICATIONS FOR WORLD BUSINESS AND MANAGEMENT EDUCATION	350
SEMES MIROSLAV SOCIAL CONSEQUENCES OF GLOBALIZATION	358
SERENCES ROMAN, GALIK JOZEF, HOLUBEK IVAN COMMODITY EFFICIENCY OF FOOD – PROCESSING INDUSTRY	366
SOJKA ELZBIETA FOREIGN WORKERS ON POLISH LABOUR MARKET IN CONDITIONS OF GLOBALISATION OF ECONOMIC RELATIONS	374
STRENTZEROVA MARIANA IMPACT OF GLOBALIZATION ON THE EMPLOYEE MOTIVATION – BENEFITS SATISFYING THE EMPLOYEES’ REQUIREMENTS	382
SVEC ROMAN, SLABA MARIE, MARTISKOVA PETRA DIFFERENCE IN GUESTS’ PREFERENCES OF GLOBALLY OPERATING AND LOCAL ACCOMMODATION FACILITIES	390
SYCHEVA V. EVELINA, BUDAGOV S. ARTUR ANTI-CRISIS MANAGEMENT UNDER CONDITIONS OF GLOBALIZATION	398
TERESHINA NATALIA, BOGDANOVA TATIANA, PODSORIN VICTOR, DANILINA MARIA MODERN PROBLEMS OF LABOUR PRODUCTIVITY INCREASE IN RUSSIAN TRANSPORT COMPANIES DUE TO GLOBALIZATION.....	405

TESAROVA VENDULA

CONSEQUENCES OF ECONOMIC GROWTH SUPPORT IN SMALL OPEN ECONOMY
 IN A GLOBALIZED WORLD 413

TKOCZ-WOLNY KATARZYNA, WSZELAKI ANETA

INFLUENCE OF INTERNATIONAL LAW ON THE DISCLOSURE OF SOCIAL AND
 EMPLOYEES' ISSUES IN NON-FINANCIAL REPORTS OF SELECTED PUBLIC
 INTEREST ENTITIES IN POLAND 421

TRELOVA SILVIA, KULHANEK RASTISLAV

MACROECONOMIC IMPACT OF GLOBALIZATION ON LABOUR MARKET 429

VARVAZOVSKA PAVLA, KUCIRKOVA LENKA

REGIONAL SOCIAL BUSINESS IN GLOBALIZATION ERA 437

VRTANA DAVID

MULTICULTURAL COMPETENCE AND MOTIVATION OF EMPLOYEES 445

WARZECHA KATARZYNA

IMPLEMENTATION LEVEL OF EUROPE 2020 STRATEGY TARGETS AS REGARDS
 LABOR MARKET IN EUROPEAN UNION COUNTRIES 453

ZAGORA-JONSZTA URSZULA

STATE IN THE ERA OF GLOBALIZATION 461

ZHULEGA A. IRINA, GAGULINA L. NATALYA, SAMOYLOV V. ALEXANDR

SUSTAINABLE DEVELOPMENT UNDER CONDITIONS OF THE SANCTION WORLD
 ORDER 468

PART II

BOHINSKA ALEXANDRA

ROLE OF A COMPLIANCE PROGRAM IN AN ORGANIZATION 476

DZIAN MICHAL, PALUS HUBERT, SUPIN MIKULAS, PAROBEK JAN

THE EU POSITION IN THE GLOBAL TIMBER TRADE ENVIRONMENT 484

FALAT LUKAS, HOLUBCIK MARTIN

ANALYSIS OF THE STRATEGY OF A SELECTED FIRM FROM THE GAME THEORY
 POINT OF VIEW 492

FURA BARBARA

INTERACTIONS BETWEEN ENVIRONMENTAL INITIATIVES OF COMPANIES AND
 THEIR FACTORS OF COMPETITIVENESS 501

**GAJANOVA LUBICA, MORAVCIKOVA DOMINIKA, NADANYIOVA
 MARGARETA**

ANALYSIS OF SLOVAK AND CZECH CONSUMERS MANNERS FROM ASPECT OF
 BEHAVIOURAL ECONOMICS ON GLOBAL DIMENSION 509

GALIERIKOVA ANDREA, SOSEDOVA JARMILA

INLAND WATERWAY TRANSPORTATION OF DANGEROUS GOODS: RISK
 ASSESSMENT AND DECISION-MAKING STRATEGIES 517

GRESAKOVA EMILIA, CHLEBIKOVA DARINA THE NEED OF SELF-MANAGEMENT TO QUALIFY MANAGERS IN GLOBAL ENVIRONMENT.....	524
GROFCIKOVA JANKA, IZAKOVA KATARINA CORPORATE GOVERNANCE AND FIRM PERFORMANCE IN SLOVAKIA	532
HES ALES GLOBAL ASPECTS OF INTERCULTURAL COMMUNICATION IN CONTEMPORARY SOCIETY	540
HORAK JAKUB, MACHOVA VERONIKA BUSINESS ENTERPRISES AND GENERATORS OF THEIR VALUE.....	547
CHAROCHKINA EKATERINA, SOGACHEVA OLGA, BELOUSOVA LARISA ROLE OF SMALL INNOVATIVE BUSINESS IN GLOBAL ECONOMY	555
CHRUZIK KATARZYNA, WACHNIK RAFAL PRACTICAL APPLICATION OF THE PROCESS OF EVALUATING THE SIGNIFICANCE OF A CHANGE AND RISK MANAGEMENT	561
JAMBAL TSOLMON, LIZBETINOVA LENKA, STUCHLY JAROSLAV ATTITUDES OF SOUTH BOHEMIAN CUSTOMERS TO FORMS AND SET LOYALTY PROGRAM CONDITIONS.....	570
JANOSKOVA KATARINA, KRAL PAVOL A COMPREHENSIVE LITERATURE REVIEW OF INTERNATIONAL BRAND VALUATION METHODS	577
KARKALIKOVA MARTA, LACKOVA ALICA IDENTIFYING BENEFITS OF A MANAGEMENT SYSTEM IN THE CONTEXT OF GLOBALIZATION	584
KICOVA EVA TRENDS OF FACILITY MANAGEMENT IN GLOBALIZATION PROCESS IN SLOVAKIA	592
KLEMENTOVA JARMILA, STROKOVA ZUZANA SOCIO-ECONOMIC FACTORS OF GLOBALIZATION TRENDS IN THE SERVICE QUALITY MANAGEMENT	600
KLIESTIKOVA JANA, KOVACOVA MARIA, RADISIC MLADEN CSR AS AN INNOVATIVE CONCEPT OF SME'S BRAND MANAGEMENT IN GLOBALISED MARKET CONDITIONS.....	608
KOHLHOFFER-MIZSER CSILLA MAKING OUR OWN DECISIONS–MANAGEMENT IN CONFLICT	616
KOVACOVA MARIA, KLIESTIKOVA JANA, BOROCKI JELENA EMPLOYER BRANDING IN SCOPE OF GLOBAL CHALLENGES	624
KOZENA MARCELA, BRODSKY MARTIN ANALYSIS OF FUNCTIONING OF THE REGIONAL BRAND VYSOČINA REGIONAL PRODUCT IN THE GLOBALIZED ENVIRONMENT.....	632
KRAL PAVOL, JANOSKOVA KATARINA BRAND PORTFOLIO MANAGEMENT AND STRATEGY	640

KRNINSKA RUZENA, ADAMOVA MARKETA, ZIDOVA NIKOLA, SKOPEC ONDREJ	
CORPORATE CULTURE AS A MOTIVATING FACTOR	648
KRYLOV SERGEY	
STRATEGIC CUSTOMER ANALYSIS BASED ON BALANCED SCORECARD IN PRESENT-DAY GLOBAL ECONOMIC ENVIRONMENT	656
LININA IVETA, VEVERE VELGA, ZVIRGZDINA ROSITA	
IMPLEMENTATION OF CUSTOMER RELATIONSHIP MANAGEMENT IN RETAIL TRADE ENTERPRISES OF THE BALTIC COUNTRIES	664
LIZBETINOVA LENKA, JAMBAL TSOLMON, STUCHLY JAROSLAV	
LOYALTY PROGRAMS FROM A CUSTOMER'S PERSPECTIVE IN THE REGION OF SOUTH BOHEMIA	673
LOUCANOVA ERIKA, OLSIAKOVA MIRIAM, DRLICKOVA EVA	
REGIONAL MARKETING AND BUSSINES IN CONTEXT „ACT LOCALLY, THINK GLOBALLY“	681
MAJERNIK MILAN, DANESHJO NAQIB, SANCIOVA GABRIELA, DUDAS PAJERSKA ERIKA, STOFKOVA ZUZANA	
IMPLEMENTATION OF GLOBALIZED TOOLS OF GREEN ECONOMY IN BUSINESS PRACTICE IN SLOVAKIA	688
MALIKOVA IVETA	
IMPACT OF GLOBALIZATION ON CONSUMER BUYING BEHAVIOR	699
MASAR MATEJ, HUDAKOVA MARIA, LUSKOVA MARIA	
PROJECT RISK MANAGEMENT IN GLOBAL ENVIRONMENT	707
MAZANEC JAROSLAV, BARTOSOVA VIERA	
FACILITY MANAGEMENT IN INTERNATIONAL CONTEXT	715
MICUROVA SKOLKOVA SLAVOMIRA, PALIDEROVA MARTINA	
THE IMPACT OF GLOBALIZATION ON THE LEGAL ORDER OF THE SLOVAK REPUBLIC.....	723
MILIC BERAN IVONA, KRZELJ-COLOVIC ZORICA	
GLOBAL TREND IN SUPPLY OF SMALL AND MEDIUM-SIZED HOTEL ENTERPRISES	730
MILICHOVSKY FRANTISEK, MRACEK PAVEL, MUCHA MARTIN	
KNOWLEDGE OF OUTDOOR BRANDS IN MARKETING COMMUNICATION CAMPAIGNS ON THE WAY OF GETTING NEW CUSTOMERS IN CONDITIONS OF GLOBAL MARKET	738
MINAROVA MARTINA, BENCIKOVA DANA	
ETHICAL BEHAVIOR OF MANAGERS AND BUILDING TRUST WITHIN AN ENTERPRISE IN A GLOBAL ENVIRONMENT.....	746
MORAVCIKOVA DOMINIKA, KICOVA EVA	
BRAND AS A STRATEGIC MARKETING TOOL OF A COMPANY IN CONDITIONS OF GLOBALIZATION	755

MUSOVA ZDENKA, MUSA HUSSAM GLOBAL TRENDS INFLUENCING RESPONSIBLE BEHAVIOUR OF CONSUMERS AND BUSINESSES.....	763
NADANYIOVA MARGARETA, GAJANOVA LUBICA, MORAVCIKOV DOMINIKA SPECIFIC ASPECTS OF THE BRAND IN A GLOBAL PERSPECTIVE	771
NICA ELVIRA, SABIE OANA MATILDA, POTCOVARU ANA-MADALINA, DUMITRESCU OANA CATALINA, MITEA DANA ELENA RALUCA BLURRING BOUNDARIES BETWEEN PRODUCTION AND CONSUMPTION IN PLATFORM-BASED LABOR MARKETS. AN EMPIRICAL ANALYSIS	777
PAUROVA VERONIKA, GOGOLOVA MARTINA THE IMPORTANCE OF CORPORATE IDENTITY AND ITS COMPONENTS IN CONDITIONS OF GLOBALIZATION	783
PELLESOVA PAVLINA GLOBALIZATION AND TRENDS IN INTERNATIONAL TRAVEL.....	791
PERACEK TOMAS, MUCHA BORIS, BRESTOVANSKA PATRICIA IMPACT OF GLOBALIZATION ON SELECTED LEGAL INSTITUTIONS TO SECURE COMMITMENTS IN CONDITIONS OF THE SLOVAK REPUBLIC.....	799
PETRUNOV GEORGI TRAFFICKING IN HUMAN BEINGS IN THE ERA OF GLOBALIZATION	807
PIROGOVA OKSANA, PLOTNIKOV VLADIMIR FACTORS OF TRADING ENTERPRISE FUNDAMENTAL VALUE CREATION IN CONDITIONS OF GLOBALIZATION	813
PLOTNIKOV A. VLADIMIR, VOLKOVA A. ALBINA, NIKITIN A. YURY INFLUENCE OF SERVICES ON SOCIAL SPHERE.....	822
POLOZHENTSEVA YULIA, VERTAKOVA YULIA, ANDROSOVA IRINA QUANTITATIVE ASSESSMENT OF THE DEVELOPMENT LEVEL OF INTERREGIONAL RELATIONSHIP OF THE ECONOMIC SPACE	830
PONISCIAKOVA OLGA GLOBALIZATION AND EFFECTS OF DEVELOPMENT TENDENCIES IN CUSTOMER RELATIONSHIP MANAGEMENT	839
POPESCU CATALIN KANTY, PERA AUREL, BOGDAN ALEXANDRU, CURTEANU BOGDAN ADRIAN, CIURLAU FLORIN CRISTIAN FLEXIBILITY IN THE ON-DEMAND SECTOR: THE STRUCTURAL EXPANSION AND SEGMENTATION OF CONTINGENT WORK.....	848
PREDANOCYOVA KRISTINA, KUBICOVA LUBICA, KADEKOVA ZDENKA FACTORS AFFECTING CONSUMER DECISION MAKING IN THE MARKET OF BAKERY PRODUCTS.....	854
RADULESCU CARMEN VALENTINA, BRAN FLORINA, BURLACU SORIN OUTPUT OF DURABLE DEVELOPMENT FOR BUSINESS ADMINISTRATION	863
REBETAK FILIP TRENDS IN SELECTION PROCESSES OF SALES REPRESENTATIVES IN GLOBAL COMPANIES IN SLOVAKIA	871

RYBANSKY RUDOLF, JANOS DOMINIK

IMPACT OF GLOBALISATION ON CONSUMER BEHAVIOUR BY UTILISING
 CIRCULAR ECONOMY 877

SALKOVA DANIELA, REGNEROVA OLGA

BEHAVIOR OF CUSTOMERS IN THE PURCHASE OF BAKERY PRODUCTS WITH A
 FOCUS ON GLUTEN-FREE PRODUCTS IN THE GLOBAL WORLD 885

SAVOV RADOVAN, LANCARIC DRAHOSLAV, KOZAKOVA JANA

TALENT MANAGEMENT AND ECONOMIC RESULTS IN GLOBAL
 ENTERPRISES 892

SUKALOVA VIERA, CENIGA PAVEL

CURRENT ISSUES OF THE IMPACT OF GLOBALIZATION ON MANAGERIAL WORK
 900

SZEWIECZEK ALEKSANDRA

BARRIERS AND INCENTIVES OF BUSINESS MODEL TRANSITION IN A HEALTH
 CARE ENTITY 908

TIMOKHINA GALINA, KAPUSTINA LARISA, AGABABAEV MUSHFIG

MANAGING THE CREATION OF CONSUMER VALUE CHAIN IN A GLOBAL
 COMPANY 916

TOTH MARIAN, RABEK TOMAS, HOLUBEK IVAN

STRUCTURAL CHANGES IN SLOVAK AGRICULTURE AFTER EU ACCESSION ... 924

VAGNER LADISLAV

APPLYING FACILITY MANAGEMENT IN A GLOBAL BUSINESS 932

VACHAL JAN

BUSINESS PROCESSES IN MEDIUM-SIZED AND LARGE ENTERPRISES IN
 CONDITIONS OF A GLOBALIZING ECONOMY 938

**YAGUDIN RAMIL, KOLESNIKOVA JULIA, ZAGIDULLINA VENERA,
 ABDRAKHMANOV AMIRKHAN**

DETERMINATION OF THE LEVEL OF DEVELOPMENT OF INTANGIBLE PROPERTY
 IN A GLOBALIZING WORLD 947

ZIDOVA NIKOLA, ADAMOVA MARKETA, KRNINSKA RUZENA

STRESS MANAGEMENT IN THE CONTEXT OF DEVELOPMENT IN THE
 INTERNATIONAL ENVIRONMENT 956

PART III

ALEXANDROVA MATILDA

PROJECT PORTFOLIO MANAGEMENT IN A GLOBALIZED ENVIRONMENT: A
 FACTOR ANALYSIS FOR BULGARIAN ORGANIZATIONS 963

ARENDAS PETER

EVOLUTION OF RELATIONSHIP BETWEEN V4 AND GERMAN STOCK
 MARKETS 971

BALCERZAK ADAM P. CLIMATE CHANGE AND ENERGY OBJECTIVES IN EUROPE. CLUSTER ANALYSIS FOR THE EU 15	978
BEDNARIK JAROSLAV CIRCULAR ECONOMY AS A PREREQUISITE OF SUSTAINABLE DEVELOPMENT IN THE GLOBAL ENVIRONMENT	986
BIELIKOVA ALZBETA, BARTKOVA HANA SLOVAKIA AND TAX EVASION OF VALUE ADDED TAX IN THE GLOBAL ECONOMY	994
BIUKSANE INESE WORLD COMPETITIVENESS OPPORTUNITIES IN NOWADAYS: KEY OF LATVIAN FISH PROCESSING SECTOR	1001
BOTLIKOVA MILENA, BOTLIK JOSEF COMPARISON OF OUTBOUND TRAVEL DESTINATIONS OF THE CZECH REPUBLIC IN THE CONTEXT OF GLOBALIZATION TRENDS	1009
BRUKSLE IEVA, DRINKE ZANE PRICING COMPETENCES AS A TOOL FOR COMPETITIVENESS INCREASE OF LATVIAN COMPANIES IN GLOBAL MARKET	1017
CENIGA PAVEL, SUKALOVA VIERA TRANSPORT LOGISTICS AS A SOURCE OF IMPROVEMENT QUALITY OF LIFE IN A REGIONAL CONTEXT IN THE PROCESS OF GLOBALIZATION	1024
CISZEWSKI TOMASZ, NOWAKOWSKI WALDEMAR, CHRZAN MARCIN ACCIDENTS ON EUROPEAN RAILWAYS CAUSES, CONTEXT AND CONSEQUENCE.....	1033
DOLINAYOVA ANNA, KENDRA MARTIN, KVIZDA MARTIN COMPETITION IN THE RAIL TRANSPORT MARKET – THE WAY TO INCREASE THE MODAL SHARE OF RAIL TRANSPORT	1041
DRAPALYUK MICHAEL V., DOROKHIN SERGEI V., NEBESNAYA ANNA Y. DEVELOPMENT OF MULTIMODAL TRANSPORT SERVICES IN THE GLOBAL LOGISTICS CLUSTER.....	1049
DURANA PAVOL GLOBAL QUALITY MANAGEMENT SYSTEMS IN SLOVAK COMPANIES	1057
DVORAKOVA LISKOVA ZUZANA, SKODOVA PARMOVA DAGMAR, DVORAK PETR, KLUFOVA RENATA GLOBALIZATION AND ECONOMIC CONDITIONS OF BROWNFIELDS REGENERATION IN THE VISEGRAD GROUP COUNTRIES	1065
FIRLEJ KRZYSZTOF, FIRLEJ CHRYSTIAN SPECIALIZATION IN THE FOOD SECTOR IN POLAND IN AN ASPECT OF IMPLEMENTATION OF A NEW DEVELOPMENT PATHWAY.....	1072
GREGOVA ELENA, DENGGOV VICTOR V., TULYAKOVA IRINA R. GLOBAL TRENDS IN RUSSIAN RETAIL: A COMPARISON OF THE MARKET OF ST. PETERSBURG AND MOSCOW	1079

GRZEGA URSZULA

GLOBALIZATION OF CONSUMPTION AND THE STANDARD OF LIVING IN POLAND
 – SELECTED ISSUES..... 1087

HAMPLOVA EVA, KOVARNIK JAROSLAV

GLOBALIZATION AND ITS IMPACT ON FOREIGN CONTROLLED CORPORATIONS
 IN THE CZECH REPUBLIC 1095

HOLUBEK IVAN, TOTTH MARIAN, RABEK TOMAS, PALKOVIC JOZEF

EVALUATION OF GLOBALIZATION IN SLOVAKIA AND V4 COUNTRIES 1103

CHLUSKA JOLANTA

EVOLUTION OF COST MANAGEMENT IN POLISH HOSPITALS IN THE CONTEXT OF
 GLOBALIZATION OF MEDICAL SERVICES 1112

JEROMANOVA-MAURA SILVA, ZVIRGZDINA ROSITA, LININA IVETA

DEVELOPMENT OF SOCIAL ENTREPRENEURSHIP IN LATVIA 1120

**KAPUTA VLADISLAV, MATOVA HANA, SUPIN MIKULAS, TRIZNOVA
 MIROSLAVA**

ECONOMIC ENVIRONMENT OF THE SLOVAK REPUBLIC IN THE GLOBAL
 CONTEXT 1127

KLEVTSOVA MARIA, POLOZHENTSEVA YULIA, LEONTYEV EVGENIY

RUSSIAN ECONOMY GROWTH MODELING IN THE TRANSFORMATION
 CONDITIONS IN THE GLOBALIZATION PERIOD..... 1135

KOLNHOFER DERECSKEI ANITA, PAWLICZEK ADAM

TALENT MANAGEMENT AS AN EFFECT OF GLOBALIZATION IN CASE OF
 VISEGRAD 4 COUNTRIES 1143

KONECNY STEPAN, MAZANEK LUKAS, VRANIAK LUKAS

TRANSFORMATIONAL LEADERSHIP IN CZECH COMPANIES: RELATIONS WITH
 SUBORDINATES IN THE CONTEXT OF GLOBALIZATION 1153

KORNASZEWSKI MIECZYSLAW, PNIEWSKI ROMAN

GLOBAL APPROACH TO OPERATIONS MANAGEMENT OF RAILWAY TRANSPORT
 DEVICES IN POLAND..... 1162

KOSTKOVA MIROSLAVA

GLOBALIZATION TRENDS IN THE TOURIST SUPPLY IN THE SILESIAN MORAVIAN
 REGION..... 1171

KRAJNAK MICHAL, MEIER VOJTECH

EVALUATION OF THE DEVELOPMENT OF RUNNING TIME ON SELECTED LONG-
 DISTANCE LINES OF RAILWAY IN THE CZECH REPUBLIC 1179

KWASNY JAKUB, MROCZEK ARKADIUSZ, ULBRYCH MARTA

INDUSTRIAL CLUSTERING AS A RESPONSE TO CONTEMPORARY WAVE OF
 GLOBALISATION IN SEARCH FOR EVIDENCE FROM POLAND 1187

LEBEDEV PAVEL

MANAGEMENT ACCOUNTING IN RUSSIAN MID-SIZED COMPANIES: RESULTS OF
 AN EXTENDED SURVEY-BASED STUDY 1196

MACH JIRI, DVORAK MAREK, HOSKOVA PAVLA EU MILK AND DAIRY MARKET CHANGES AND IMPACT OF GLOBALISATION TRENDS	1204
MARIN-PANTELESCU ANDREEA, RAKOS ILEANA-SORINA, TIRAU ADRIAN ROMANIAN TOUR OPERATORS IN THE GLOBALIZATION AGE	1213
MIRONOVA MARINA, SHOLUDKO ALEXANDER, KUZNETSOVA NATALIYA SOCIO-ECONOMIC DEVELOPMENT OF THE CITIES OF THE TRANS-SIBERIAN RAILWAY OF RUSSIA.....	1220
MITKOVA VERONIKA GLOBALIZATION EFFECTS IN THE MULTIPLIER ANALYSIS – CASE OF SLOVAKIA	1228
MROCZEK ARKADIUSZ CENTRAL AND EASTERN EUROPE METROPOLISES IN THE CONTEXT OF GLOBALIZATION	1236
NOVAK-SEDLACKOVA ALENA, SVECOVA DENISA REGIONAL AIRPORTS UNDER THE LEGAL AND ECONOMIC REGULATORY FRAMEWORK OF THE EU: BENCHMARKING OF PIESTANY, PARDUBICE AND PARMA AIRPORT.....	1244
NOVAKOVA MARIA, BURDA EDUARD, CAPIKOVA SILVIA SOCIAL AND HEALTH REALITY IN SLOVAK REPUBLIC AS A RESULT OF GLOBALISATION.....	1252
NOVIKOV ARTHUR I., NOVIKOVA TATYANA P. NON-DESTRUCTIVE QUALITY CONTROL OF FOREST SEEDS IN GLOBALIZATION: PROBLEMS AND PROSPECTS OF OUTPUT INNOVATIVE PRODUCTS	1260
NOWAKOWSKI WALDEMAR, CISZEWSKI TOMASZ, LUKASIK ZBIGNIEW AN ANALYSIS OF THE SAFETY OF LEVEL CROSSINGS IN POLAND	1268
PARVANOV PETAR, KRASDEV VLADISLAV, ATANASOVA IRINA LEGAL OPPORTUNITIES FOR THE DEVELOPMENT OF SOCIAL ENTERPRISES HUMAN POTENTIAL IN BULGARIA	1275
PAVLU KAROLINA, KOTIKOVA SYLVIE IMPACT OF GLOBALIZATION ON THE STRUCTURE OF ACCOMMODATION CAPACITIES IN THE BORDER AREA OF THE FORMER SUDETENLAND	1283
POKRIVCAK JAN, BIELEKOVA EVA, CUPAK ANDREJ GLOBALIZATION AND FOOD SECURITY IN CENTRAL AND EASTERN EUROPE	1291
REICHER REGINA ZSUZSANNA CORPORATE SOCIAL RESPONSIBILITY AMONG SMALL AND MEDIUM-SIZED ENTERPRISES IN HUNGARY	1300
ROGALSKA ELZBIETA CLUSTER ANALYSIS OF ENTREPRENEURSHIP IN POLAND AT NUTS 3 LEVEL...	1308

SADYRTDINOV RUSLAN, RODNYANSKY DMITRY, MAKAROV OLEG, MILOVANOV YEVGENIY	
CHRONIC POVERTY ESTIMATION IN RUSSIA IN CONTEXT OF GLOBALISATION.....	1316
SOKOLOV YU I., GALABURDA V.G., LAVROV I.M., ANIKEEVA-NAUMENKO L.O.	
ENHANCED QUALITY OF RAIL FREIGHT TRAFFIC AS A TOOL TO IMPROVE EFFICIENCY OF GLOBAL ECONOMY	1324
SOKOLOV YURI IGOREVICH, TERESHINA NATALIA PETROVNA, MEZHOKH ZOYA PAVLOVNA, ZHAKOV VLADIMIR VLADIMIROVICH, KORISHEVA OLGA VIKTOROVNA	
INTERNATIONAL STRATEGIC PRIORITIES OF DEVELOPMENT: COMPETITIVENESS AND ECONOMIC SAFETY IN THE SPHERE OF TRANSPORT.....	1332
SOLOVYEVA ANNA, ANTONYAN OLGA, MAKSIMCHUK OLGA	
ALIGNING THE RUSSIAN SYSTEM OF CONSTRUCTION PRICING WITH THE CURRENT GLOBAL STANDARDS	1341
SOROKOVA TATIANA, PETRIKOVA DANIELA	
PARTICIPATION OF SLOVAKIA IN THE GLOBAL VALUE CHAIN IN THE AUTOMOTIVE INDUSTRY	1349
STANKOVA ZLATKOVA MARIYA	
TOURISM BETWEEN THREATS AND SUSTAINABILITY IN THE CONTEXT OF GLOBALIZATION	1358
STRAKOVA JARMILA	
STRATEGIC MANAGEMENT OF CZECH ENTERPRISES IN CONDITIONS OF GLOBALIZATION AND HYPER-COMPETITION	1366
SYSOEVA TATIANA, TIMOKHINA GALINA, IZAKOVA NATALYA	
PERSPECTIVES OF ENTERING THE CHINESE JEWELRY MARKET BY THE RUSSIAN COMPANY	1377
SZYMANSKI ANDRZEJ, KRZYZAK-SZYMANSKA EWA	
PHYSICAL ACTIVITY OF INHABITANTS OF THE BALTIC COUNTRIES AS A SOCIAL PROBLEM IN GLOBALIZATION ERA	1385
TRETYAK VLADIMIR, MACHERET DMITRY, SOROKINA ANASTACIA	
CORPORATIZATION OF RUSSIAN RAILWAYS: STATUS AND PROSPECTS OF GLOBAL CORPPORATION DEVELOPMENT	1393
TULYAKOVA IRINA R., DENG OV VICTOR V.	
MILITARY-TECHNICAL COOPERATION OF RUSSIA IN THE CONTEXT OF GLOBALIZATION: EXPERIENCE OF COOPERATION WITH INDIA.....	1401
URAZGALIEV VLADIMIR S., MENSHIKOVA GALINA A., ALTUNYAN ARMEN G.	
INTEGRITY ANTI-CORRUPTION STANDARDS: GLOBAL TRENDS IN ESTIMATION AND RUSSIAN REALITIES	1409
VASENSKA IVANKA	
GLOBAL CREATIVE ECONOMIC INTERPRETATIONS OF THE VALLEY OF THE THRACIAN KINGS ON THE EXAMPLE OF STAROSEL, BULGARIA.....	1417

**VESELA KAMILA, BROZ DAVID, NAVRATILOVA MIROSLAVA, BERANOVA
 MARKETKA**

INFLUENCE OF THE EU AND COMMON CURRENCY ON THE STRUCTURE OF
 FOREIGN COMMERCE..... 1425

VRANIAK LUKAS, MAZANEK LUKAS, KONECNA ZDENKA

MANAGEMENT RESEARCHES OF CEE COUNTRIES: RESEARCHES OF THE CZECH
 REPUBLIC IN TERM OF GLOBALIZATION 1433

WOJCIECHOWSKI JERZY, OLCZYKOWSKI ZBIGNIEW, LUKASIK ZBIGNIEW

POLISH ELECTRICAL TRACTION POWER ENGINEERING IN THE CONTEXT OF THE
 COMMON EUROPEAN RAILWAY SYSTEM 1441

**YAKUNINA REGINA PETROVNA, PSHENICHNYI SERGEY PAVLOVICH,
 RYZHOVA ASYA SERGEEVNA, ALEKSEEVA JULIA PETROVNA**

CLUSTER APPROACH TO THE HEALTH SYSTEM IN RUSSIAN FEDERATION
 WITHIN THE CONTEXT OF GLOBALIZATION 1450

ZEMANOVA STEPANKA, DRULAKOVA RADKA

GLOBALIZING SUSTAINABILITY AT BUSINESS SCHOOLS? LIMITS TO
 IMPLEMENTATION OF THE UN PRINCIPLES FOR RESPONSIBLE MANAGERIAL
 EDUCATION IN V4 COUNTRIES 1456

PART IV

BERANOVA MARKETKA, SIMA JAN, NAVRATILOVA MIROSLAVA

FINANCIAL LITERACY OF UNIVERSITY STUDENTS IN THE AREA OF OWN
 FINANCES 1464

BIKAR MILOS, VAVROVA KATARINA

TECHNICAL ANALYSIS USAGE BY THE PREDICTION OF FINANCIAL ASSETS
 PRICES 1472

BOHM PATRIK, BOHMOVA GABRIELA

EFFECT OF FLAT RATE INCOME TAX IN SELECTED EU MEMBER STATES ON
 THEIR ECONOMIC GROWTH 1480

BOYKO TATYANA, FROLOVA NATALYA

SMALL INNOVATIVE FIRMS OF GLOBAL IMPORTANCE: APPROACHES TO
 PERFORMANCE EVALUATION 1488

BUTKUS MINDAUGAS, MORKIENE AGNE

FINANCIALIZATION IN A GLOBAL PERSPECTIVE OVER LAST HALF OF THE
 CENTURY 1494

CUGOVA ANETA, CEPEL MARTIN

THE USE OF MULTI-CRITERIA BENCHMARK METHOD IN A GLOBALIZED
 FINANCIAL ENVIRONMENT 1502

**DANESHJO NAQIB, MAJERNIK MILAN, SANCIOVA GABRIELA, DUDAS
 PAJERSKA ERIKA, REPKOVA STOFKOVA KATARINA**

INTERNATIONAL STANDARDIZATION IN THE ECONOMIC-ENVIRONMENTAL
 ACCOUNTING OF BUSINESS MATERIAL FLOWS 1510

DITTRICHOVA JAROSLAVA, SVOBODOVA LIBUSE, HEDVICAKOVA MARTINA FINANCING AND LOANS OF THE BUSINESS ENTITIES IN THE GLOBALIZED SOCIETY	1520
DOMONKOS TOMAS, JANOSOVA MIROSLAVA SLOVAK GENERATIONAL ACCOUNTS	1528
DONATH LILIANA EVA, NEAMTU MIHAELA, MIRCEA GABRIELA INTERNATIONAL IMPACT OF FINANCIAL SYSTEMIC RISKS. A DYNAMIC ANALYSIS WITH TIME DELAY	1536
DURICA MAREK FINANCIAL DISTRESS MODELLING IN SLOVAK COMPANIES: DECISION TREES APPROACH.....	1544
DVORAK MAREK, MACH JIRI, HOSKOVA PAVLA EVALUATING THE FINANCIAL PERFORMANCE OF FIRMS IN RELATION TO THE LEGAL FORM OF ENTERPRISE IN THE ASPECT OF THE GLOBAL ECONOMY ..	1552
FERENCZI VANOVA ALEXANDRA, KRAJCIROVA RENATA, MARIS MARTIN, BOJNANSKY JOZEF, DURKACOVA PETRA TAX LICENSE IN THE SLOVAK AGRICULTURAL LEGAL ENTITIES	1560
FRONCZEK MALGORZATA, CZECH KATARZYNA GLOBALIZATION IN FOREIGN TRADE MEASURED BY VALUE ADDED – EXAMPLE OF V4 AND EU-28.....	1568
GAMON WOJCIECH ANALYSIS OF THE COST-EFFECTIVENESS OF IMPLEMENTING A NEW METHOD OF PROTECTING RAILWAY BUFFER HEADS.....	1576
HAJDUCHOVA IVETA, GIERTLIOVA BLANKA, SULEK RASTISLAV FINANCING OF FOREST ECOSYSTEM SERVICES IN CONDITIONS OF GLOBALIZATION	1583
HAKALOVA JANA, PALOCHOVA MARCELA, PSENKOVA YVETTA EFFECTIVENESS OF MODERN TOOLS USED BY FINANCIAL ADMINISTRATION IN TERMS OF GLOBALIZATION TRENDS IN ACCORDANCE WITH THE IMPLEMENTATION OF EU DIRECTIVES AND FORTHCOMING CHANGES IN TAX LEGISLATION IN THE CZECH REPUBLIC	1591
HORNYAK GREGANOVA RADOMIRA, PAPCUNOVA VIERA, ORSZAGHOVA DANA EVALUATION OF FINANCIAL PERFORMANCE OF THE LOCAL SELF - GOVERNMENT IN CONDITIONS OF SLOVAKIA IN CONTEXT OF GLOBAL CHANGES	1599
CHUTKA JAN TRADING OF INTERNATIONAL FINANCIAL MARKETS BASED ON TECHNICAL ANALYSIS IN CONDITION OF GLOBALIZATION	1607
JEDLICKA VIT, KUBENKA MICHAL, NOVOTNY JOSEF, SEJKORA FRANTISEK TAX HAVENS IN THE EUROPEAN UNION, THEIR IDENTIFICATION AND USE BY THE MULTINATIONALS.....	1614

JUHASZOVA ZUZANA, TUMPACH MILOS, KUBASCIKOVA ZUZANA AUDIT OF AUDITING COMPANIES	1622
JURIS ROMAN, GREGOVA ELENA IMPACT OF THE ECONOMIC CRISIS ON THE AVAILABILITY OF FINANCIAL RESOURCES IN SMALL AND MEDIUM-SIZED ENTERPRISES IN THE FACE OF GLOBALIZATION	1630
KAJANOVA JANA TARGET AND PROCESS ORIENTATION OF FINANCIAL MANAGEMENT FROM THE ASPECT OF GLOBALIZATION	1637
KLONOWSKA ALINA GLOBALIZATION AND TAX GAP AS A RESULT OF THE TAXPAYERS NONCOMPLIANCE – EVIDENCE FROM POLAND.....	1645
KLUCKA JOZEF, MASAR MATEJ COMPARISON OF BONITY INDEX WITH SELECTED FINANCIAL INDICATORS IN THE PROJECT	1653
KOSOVSKA IVETA, VARYOVA IVANA IMPACT OF GLOBALIZATION ON STRUCTURE AND CONTENT OF FINANCIAL STATEMENTS IN FINANCIAL ACCOUNTING WITH THE IMPLEMENTATION OF EU DIRECTIVES IN THE SLOVAK REPUBLIC	1661
KOTLEBOVA JANA PROBLEMS OF CAPITAL FLIGHT OF EA19 FROM FLOW OF FUNDS' VIEW OF POINT	1669
KRAJNAKOVA EMILIA WAYS OF FINANCING CLUSTERS IN SLOVAKIA AND IN THE WORLD	1676
KRISKOVA PETRA, UZIK JAN ANALYSIS OF WEAKNESSES IN COMPLIANCE WITH AUDITING STANDARDS IN VIEW OF THE RISK OF EXPRESSING AN INAPPROPRIATE AUDITOR'S OPINION ON FINANCIAL STATEMENTS IN CONDITIONS OF GLOBALIZATION	1684
KUBALA PAVOL COMPARISON OF WACC CALCULATION IN THE INTERNATIONAL BUSINESS ENVIRONMENT.....	1691
KUKALOVA GABRIELA, MORAVEC LUKAS, FILIPOVA DANA BINA, WEBROVA KAMILA EXCISE TAXES RATES CHANGES EFFECTS ON TAX YIELDS IN GLOBAL ECONOMY: CZECH REPUBLIC CASE STUDY.....	1699
MELNIKOV YURY BORISOVICH, ONOKHINA ELENA ALEXANDROVNA, SHITIKOV SERGEY ALEXANDROVICH MODELING THE MECHANISM FOR FORMING REQUESTS IN THE ACTIVITIES OF THE TAX AUTHORITY.....	1707
MICHALKOVA LUCIA, KOVACOVA MARIA ANALYSIS OF THE VALUE OF TAX SHIELD IN THE GLOBAL ENVIRONMENT.	1715

MORAVEC LUKAS, HINKE JANA, KUKALOVA GABRIELA, MYSLIVCOVA JANA VAT CONTROL STATEMENT GLOBAL EFFECTS: CZECH REPUBLIC CASE STUDY IN RELATIVE COMPARISON TO SLOVAKIA	1724
MYSKOVA RENATA, KOPECKA EVA, KUBENKA MICHAL, SEJKORA FRANTISEK ACCOUNTING HARMONIZATION - A CONSEQUENCE OF GLOBALIZATION AND INTERNATIONALIZATION	1732
NOVOTNY JOSEF, KUBENKA MICHAL, JEDLICKA VIT INVESTMENT ACCORDING TO GLOBAL DIVERSIFIED APPROACH	1740
PANUS JAN, HAJNY JAN EXPONENTIAL RANDOM GRAPH MODEL AS A TOOL FOR ANALYZING THE INTERNATIONAL TRADE	1748
PERA JACEK MARKET RISK PREMIUM AND DEFAULT UNDER THE CONDITIONS OF GLOBALIZATION OF MAJOR CAPITAL MARKETS OF THE UE AND GFCI COUNTRIES	1755
PODHORSKA IVANA, SIEKELOVA ANNA OUTLIERS DETECTION TECHNIQUES: IMPACT ON THE PREDICTION ABILITY OF INTERNATIONAL PREDICTION MODELS	1763
POLIAKOVA ADELA THE INTERNATIONAL TAX TREATMENT IS NOT SUFFICIENT – AN EXAMPLE OF ROAD TAX RELIEF IN THE SLOVAK REPUBLIC	1771
PRZYBYLSKA-MAZUR AGNIESZKA IMPORTANCE OF AN EARLY-DETECTION INDEX IN THE ANALYSIS OF PUBLIC DEBT IN THE GLOBAL ECONOMY	1779
RAKOVSKY PETER IMPACT OF GLOBALIZATION ON THE TRANSFER PRICING AFTER BEPS	1787
REZNAKOVA MARIA, PETA JAN MERGER AND ACQUISITION EFFECTIVENESS: GLOBAL TRENDS AND DEVELOPMENT IN THE CZECH REPUBLIC	1794
RYLKOVA ZANETA, SEBESTOVA JARMILA, KREJCI PETRA STRATEGIC COST MANAGEMENT IN BUSINESSES	1802
SEJKORA FRANTISEK, MYSKOVA RENATA, NOVOTNY JOSEF, JEDLICKA VIT USE OF TAX HAVENS BY CZECH COMPANIES IN CONDITIONS OF GLOBALIZATION	1810
SIEKELOVA ANNA, PODHORSKA IVANA FINANCIAL DISTRESS PREDICTION MODELS: INTERNATIONAL REVIEW	1817
SOLOMA ANDRZEJ, SKORWIDER-NAMIOTKO JAROSLAW, WYSZYNSKI ARTUR IMPACT OF THE BANKING GLOBALIZATION ON THE COOPERATIVE BANKS: EVIDENCE FROM POLAND	1824

STANOVSKY MATEJ

GLOBALIZATION OF ACCOUNTING PROFESSION IN SHARED SERVICES CENTERS 1831

STROJEK-FILUS MARZENA

CONSEQUENCES OF APPLYING THE EQUITY METHOD IN FINANCIAL REPORTS IN THE FACE OF GLOBALIZATION ON THE EXAMPLE OF LISTED COMPANIES IN POLAND..... 1839

STROKOVA ZUZANA, KLEMENTOVA JARMILA

PSYCHOLOGICAL ASPECTS OF CONTROLLING IN BUSINESS AND GLOBALISING ENVIRONMENT..... 1847

SULIK-GORECKA ALEKSANDRA

POSSIBILITIES OF HARMONISATION OF INVESTMENT FUNDS FINANCIAL REPORTING STANDARDS. A VIEW FROM POLAND..... 1855

SVABOVA LUCIA, KRAMAROVA KATARINA, VALASKOVA KATARINA

IMPACT OF FINANCIAL RATIOS ON INTERNATIONAL BANKRUPTCY PREDICTION MODELS 1863

SZKUTNIK WLODZIMIERZ, SZKUTNIK WERONIKA

GLOBAL FINANCIAL MARKET REGULATIONS AND THEIR IMPACT ON PRICE CONVERGENCE IN EU COUNTRIES 1871

TOTHOVA ALENA, KOZAKOVA MARIA

VARIABILITY OF FINANCIAL RESULTS OF SELECTED INDUSTRIES IN SLOVAKIA IN AN ENVIRONMENT OF GLOBALIZATION OF ECONOMICS 1879

VALASKOVA KATARINA, BAKES VLADIMIR

INTERNATIONAL PERCEPTION OF THE COSTS OF EQUITY ESTIMATION..... 1887

VALJASKOVA VIERA

KEY ASPECTS OF PRICING AND SELECTION OF PRICING STRATEGY IN GLOBAL ENVIRONMENT..... 1895

VARYOVA IVANA, KOSOVSKA IVETA

TRANSFER PRICING OF TRANSACTIONS BETWEEN RELATED PARTIES AS A RESULT OF GLOBALIZATION 1903

VAVROVA KATARINA, BIKAR MILOS

GLOBAL CONDITIONS OF THE BEHAVIORAL ASPECT OF TAX EVASION..... 1911

VIRDZEK TOMAS, KUBASKA PETER, URADNICEK VLADIMIR

IDEAL EQUITY CURVE AS A TOOL OF PORTFOLIO RISK MANAGEMENT IN THE TIME OF FINANCIAL GLOBALIZATION 1919

VOCHOZKA MAREK, KRULICKY TOMAS

ANALYSIS OF ENTERPRISES IN THE MANUFACTURING INDUSTRY USING ARTIFICIAL NEURAL STRUCTURES – KOHONEN NETWORKS 1927

VRBKA JAROMIR, VOCHOZKA MAREK

DEVELOPMENT OF THE PRICE OF GOVERNMENT BONDS DEPENDING ON BASIC MACROECONOMIC INDICATORS..... 1935

**YURKOV DMITIY, KOLESNIKOVA JULIA, FAKHRUTDINOV RUSLAN,
 ZAGIDULLIN VENERA**

DETERMINANTS OF M&A PREMIUM IN THE GLOBAL MARKET 1943

**ZINOVYEVA EKATERINA GEORGIEVNA, KOPTYAKOVA SVETLANA
 VLADIMIROVNA**

PROSPECTS FOR THE BANKING SECTOR DEVELOPMENT WITHIN THE
 CONDITIONS OF INTERNATIONAL FINANCIAL GLOBALIZATION IN THE RUSSIAN
 FEDERATION..... 1951

PART V

BAUEROVA RADKA

EVALUATION OF ONLINE GROCERY SHOPPING BASED ON THE HYPE CURVE
 CONCEPT..... 1959

**BAULINA OKSANA ALEKSANDROVNA, KLYUSHIN VLADISLAV
 VLADIMIROVICH, MAKSYMCHUK OLGA VIKTOROVNA**

"SMART LIVING" AS ONE OF THE ASPECTS OF THE FORMATION OF THE "SMART
 CITY..... 1967

BEZAKOVA ZUZANA

GEOLOCATION SERVICES AND THEIR IMPORTANCE IN SOLVING GLOBAL
 ENVIRONMENTAL PROBLEMS 1978

**BOLESNIKOV MINJA, RADISIC MLADEN, TAKACI ALEKSANDAR,
 BOLESNIKOV DRAGANA, STIJACIC MILICA POPOVIC**

NEED FOR NEW BUSINESS MODELS DEVELOPMENT WITHIN A GLOBAL
 CYCLICAL INDUSTRY..... 1984

BOMBINSKA ELZBIETA

GLOBALISATION OF SERVICES – SOME EVIDENCE ON INTERNATIONAL
 SERVICIFICATION OF MANUFACTURING 1992

BRACINIKOVA VERONIKA, MATUSINSKA KATERINA

TECHNOLOGICAL SKILLS ACROSS GENERATIONS 2000

BUMBEROVA VERONIKA, MILICHOVSKY FRANTISEK

DEVELOPMENT OF SERVICES UNDER GLOBALIZATION 2007

CEBAKOVA ANDREA, PUTNOVA ANNA, ZAKLASNIK MARTIN

FULFILMENT OF THE INNOVATION POTENTIAL OF LARGE BUSINESSES:
 IDENTIFYING THE CRITICAL FACTORS 2015

CWIEK MALGORZATA

DIGITAL DIVIDE IN HOUSEHOLDS OF ELDERLY PEOPLE. EVIDENCE FROM
 POLAND..... 2022

DAVYDOV STANISLAV, SPASSKOVA ANNA

RAIL TRANSPORT PROJECT MANAGEMENT IN THE CONTEXT OF
 GLOBALIZATION AND DIGITAL TRANSFORMATION OF THE ECONOMY..... 2029

GIRDZIJAUSKAITE EGLE, PECIURE LINA, RADZEVICIENE ASTA MAKERSPACES IN ENTREPRENEURIAL UNIVERSITIES: A SOURCE OF INNOVATION AND CREATIVITY	2037
GREGOR MILAN, HOC MICHAL, MEDVECKA IVETA, BINASOVA VLADIMIRA FACTORY OF THE FUTURE AS THE PRODUCT OF ENGINEERING WORK IN THE GLOBALIZATION PROCESS	2045
GRECHENYUK OLGA, VERTAKOVA YULIA, GRECHENYUK ANTON EFFICIENCY FACTORS OF INNOVATIVE ACTIVITY IN THE CONDITIONS OF GLOBALIZATION	2053
HUB MILOSLAV, PRIHODOVA KATERINA IMPACT OF GLOBAL SOCIAL CHANGES ON THE SECURITY OF PASSWORD AUTHENTICATION.....	2061
CHLEBIKOVA DARINA CHANGE MANAGEMENT IN ENTERPRISES OF THE SLOVAK REPUBLIC IN THE CURRENT GLOBALIZED ENVIRONMENT.....	2067
CHLUSKI ANDRZEJ, KARCEWSKA ANNA THE USE OF BIG DATA RESOURCES IN PATIENT RELATIONS MANAGEMENT IN HEALTHCARE	2075
CHROMCAKOVA ADELA, STARZYCZNA HALINA USING CRM TECHNOLOGY IN CZECH ENTERPRISES	2083
JACIOW MAGDALENA, TWARDZIK MALGORZATA, WARZECHA KATARZYNA SUSTAINABLE DEVELOPMENT OF RETAIL TRADE IN EUROPE - THE REQUIREMENT OF GLOBALIZATION.....	2091
JANIGA-CMIEL ANNA ANALYSIS OF THE LEVEL OF INTERNET-BASED INFORMATION PROCESSING IN THE USA AND SELECTED COUNTRIES OF THE EUROPEAN UNION AGAINST A BACKGROUND OF GLOBALIZATION	2099
JURISOVA VLADIMIRA ZERO WASTE CONCEPT AS A PART OF ECO-INNOVATIONS IN GLOBAL COMPANIES.....	2107
JURKOVIC MARTIN, KALINA TOMAS, ILLES LADISLAV, GAJARSKY MAREK IDENTIFICATION OF USER REQUIREMENTS FOR SHIP SIMULATORS.....	2114
KADLUBEK MARTA, SZYMCZYK KATARZYNA 21-ST CENTURY LOGISTICS – TIME FOR RESPONSIBLE BUSINESS AND SUSTAINABLE DEVELOPMENT IN A GLOBAL CONCEPT	2120
KANOVSKA LUCIE BENEFITS OF SMART SERVICES IN MANUFACTURING COMPANIES IN THE CONTEXT OF THE GLOBAL AREA	2128
KANTOROVA KATERINA, ZAHALKOVA ANNA TOURISM AND SOCIAL NETWORKING IN CUSTOMER COMMUNICATION.....	2136
KAPUSTINA LARISA, KONDRATENKO YULIA, SYSOEVA TATJANA GLOBAL MARKET OF INDUSTRIAL ROBOTS: TRENDS AND PROSPECTS.....	2144

KAZANSKAYA LILIYA, SAKS NADEZHDA, EGOROV YURIY DIGITALIZATION AS A FACTOR OF FORMATION OF NEW ECONOMIC OPPORTUNITIES UNDER GLOBALIZATION CONDITIONS	2152
KICHEVA MARIA, PETKOVA NADEZHDA, BOGDANOVA MARIELA THE IMPACT OF GLOBALIZATION ON THE DEVELOPMENT OF HUMAN POTENTIAL IN AN INNOVATIVE SOCIO-CULTURAL SPHERE AND OPPORTUNITIES FOR SOCIAL ENTREPRENEURSHIP	2159
KOMARKOVA JITKA, KUPKOVA DENISA WEB-BASED GEOGRAPHIC INFORMATION SYSTEMS AS A PART OF SMART CITIES GOVERNANCE IN THE AGE OF GLOBALIZATION – A CASE STUDY	2167
KOROSTYSHEVSKAYA ELENA COMPETENCE CENTERS AS AN INSTRUMENT TO COMMERCIALIZE TECHNOLOGY DEVELOPMENTS IN THE CONTEXT OF GLOBALIZATION.....	2175
KOS-LABEDOWICZ JOANNA THE IMPACT OF ICT USE ON THE COMPETITIVENESS OF THE EU TRANSPORT SECTOR IN GLOBAL MARKETS	2183
KOS BARBARA GLOBAL TRENDS IN INTELLIGENT DEVELOPMENT OF URBANIZED AREAS ..	2191
LIWINSKI JACEK WAGE PREMIUM FROM COMPUTER AND INTERNET SKILLS IN POLAND	2199
LOSONCZI PETER PUBLIC WI-FI NETWORKS IN THE GLOBAL ENVIRONMENT AND THEIR SECURITY	2206
LYAKINA MARIA, VOLKOVA ELENA, TRETYAK VLADIMIR APPLICATION OF DIGITAL ECONOMY GLOBAL TRENDS IN RUSSIAN TRANSPORT SYSTEMS	2214
MAKAROVA S. EKATERINA, NURTDINOV I. ILGIZ EVALUATING THE INNOVATIVE CAPACITY OF THE REGION AS A REGIONAL GROWTH TOOL.....	2220
MARTISKOVA PETRA, SVEC ROMAN, SLABA MARIE PERCEIVED SENSITIVITY OF PERSONAL DATA IN THE GLOBALISED WORLD: COMMON PERSONAL DATA AND HEALTH-RELATED DATA	2229
MIKHAILOV FEDOR BORISOVICH, YURIEVA OKSANA VLADIMIROVNA, MIASNIKOV DMITRII ALEKSEEVICH STRATEGIES OF THE HUMAN CAPITAL DEVELOPMENT IN CONDITIONS OF ACCELERATING DIFFUSION OF TECHNICAL INNOVATION UNDER INFLUENCE PROCESSES OF GLOBALIZATION	2237
MIKLENCICOVA RENATA GLOBAL PERCEPTION OF THE USE OF ECO-PRODUCTS IN THE INTERNET SPACE	2244
MISIK TOMAS, STOFKOVA JANA MOBILE-FIRST AS A GLOBAL TREND OF CITIZEN-ORIENTED GOVERNMENT SERVICES	2251

NOSALOVA MARTINA, LOUCANOVA ERIKA, PAROBEK JAN, PALUS HUBERT GLOBALIZATION AND INTELLIGENT INNOVATION	2259
NOVAK JAROMIR MAIN DISPLAYS OF CHOSEN SYSTEMS BEHAVIOR IN GLOBAL WORLD	2267
NOVIKOVA P. TATYANA, NOVIKOV I. ARTHUR PRODUCTION OF COMPLEX KNOWLEDGE-BASED SYSTEMS: OPTIMAL DISTRIBUTION OF LABOR RESOURCES MANAGEMENT IN THE GLOBALIZATION CONTEXT	2275
PASHKUS A. NATALIYA, PASHKUS YU. VADIM, KOLTSOVA A. ANNA BREAKTHROUGH POSITIONING OF INNOVATIVE PRODUCTS IN THE GLOBAL ECONOMY: APPROACHES AND PROBLEMS	2282
PASIECZNY JACEK CONDITIONS FOR THE DEVELOPMENT OF ORGANISATIONAL GAMES	2291
PATAKYOVA MARIA, MAZUR JAN FACEBOOK – GLOBAL ISSUE WITHOUT (EXISTING) SOLUTION?	2298
PLAKHOTNIKOVA MARIA, SIMONENKO ELENA, POKRAMOVICH OLGA GLOBAL PROBLEMS OF INCREASING COMPETITIVENESS OF TELECOMMUNICATION ORGANIZATIONS, OPPORTUNITIES PROVIDED BY THE DIGITALIZATION OF THE ECONOMY	2307
POMFFYOVA MARIA, ROSTASOVA MARIA POSSIBILITIES OF SPIN-OFF COMPANIES AS A DRIVER OF INNOVATION IN REGIONS	2315
POPOV YURI LEONIDOVICH, GUSHINA YULIA VALERYEVNA, KARPUSHOVA SVETLANA EVGENIEVNA IMPACT OF GLOBALIZATION ON COMPETITION AND DIVERSITY OF BUSINESS AND TECHNOLOGY DEVELOPMENT	2321
RYBICKA KAROLINA, RYBICKI PIOTR IMPLEMENTATION OF INFORMATION SYSTEMS IN MANAGEMENT UNDER CONDITIONS OF GLOBALIZATION	2328
SETEK JAROSLAV ECONOMIC ASPECTS OF CYBERCRIME IN THE GLOBAL DIMENSION	2336
SIUDA DAGNA ACTIVITY OF THE VIRTUAL BRAND COMMUNITIES MEMBERS ON FANPAGES	2344
SOLOSICHENKO ZH. TATYANA , NESTEROVA V. ZINAIDA, GONCHAROVA A. NADEZHDA MODERN ASPECTS OF INTERNET MARKETING DEVELOPMENT IN EDUCATIONAL INSTITUTIONS IN THE CONTEXT OF GLOBALIZATION	2352
SROKA ALICJA, BALCEROWICZ-SZKUTNIK MARIA TELECOMMUTING AS AN ECHO OF GLOBALISATION	2361
TRAVNICKOVA ZUZANA GEOCACHING: GLOBAL GAME IN THE LIGHT OF FREEDOM INDICES	2369

VIDROVA ZDENKA, CENIGA PAVEL

LOGISTICS SYSTEMS IN CONDITIONS OF GLOBALIZATION 2377

VOKOUN MAREK

GLOBALIZATION AND INNOVATION: INNOVATION ACTIVITIES OF
 MULTINATIONALS IN THE CZECH REPUBLIC 2008-2014..... 2385

VOLKOVA A. ALBINA, PLOTNIKOV A. VLADIMIR, NIKITIN A. YURY

DIGITAL TECHNOLOGIES OF MANAGEMENT IN A GLOBALIZED ECONOMY.. 2392

**YORDANOVA NIKOLAEVA DANIELA, HRISTOV TSVETAN, KIROVA PENEVA
 MILENA, PENCHEVA TSANEVA MIGLENA, EVSTATIEV BORISOV IVAN**

OPPORTUNITIES FOR STUDY OF UNIVERSITY GRADUATES PROFESSIONAL
 REALISATION USING WEB BASED TOOLS 2399

ZADNANOVA SILVIA, HRASKOVA DAGMAR

SIMULATION AS A MODERN AND EFFECTIVE METHOD FOR MEASURING
 HEALTH QUALITY THROUGH THE ASSUMPTIONS OF BENEFITS AND
 INVESTMENTS WITHIN THE GLOBAL ENVIRONMENT 2407

ZAK STEFAN, HASPROVA MARIA

GLOBAL VIEW OF THE CONSUMER DECISION JOURNEY ON THE MOBILE HEALTH
 MARKET 2414

ZAUSKOVA ANNA, REZNICKOVA MONIKA

IMPACT OF SOCIAL MEDIA ON RAISING AWARENESS OF ECO-INNOVATIONS IN
 A GLOBAL ENVIRONMENT 2421

ZHURAVLEVA NATIALIA, SHAVSHUKOV VIACHESLAV

GLOBAL TRENDS IN THE CYBERSECURITY OF TRANSPORT COMPANIES AND
 METHODS OF BUSINESS PROTECTION..... 2429

ZIEMKIEWICZ BARTOSZ, PIETRZAK BERNARD MICHAL

CLUSTER ANALYSIS OF DIGITAL ECONOMY IN THE EUROPEAN UNION..... 2437

PART VI

ABAKUMOVA JULIET, PRIMIEROVA OLENA

ECONOMIC GROWTH, GLOBALIZATION AND INCOME INEQUALITY: THE CASE
 OF UKRAINE 2445

ALSHATTI SCHMIDT DUSANA

WORK-LIFE BALANCE AS A KEY FACTOR IN ACQUIRING AND RETAINING
 GLOBAL TALENT 2453

ALTUNYAN ARMEN G., URAZGALIEV VLADIMIR S., MENSHIKOVA GALINA A.

GLOBALIZATION AND INEQUALITY IN SOCIETY 2462

COREJOVA TATIANA, AL KASSIRI MARIO, MADUDOVA EMILIA

GLOBALIZATION AND BETTER LIVE INDEX LEVEL IN V4 COUNTRIES 2469

DIMA CRISTINA

ASSESSING THE SOCIAL IMPACT OF PUBLIC INVESTMENT 2476

DOBREA RAZVAN CATALIN

ASSESSING THE ECONOMIC IMPACT OF PUBLIC INVESTMENT 2484

DYSHAEVA LYUDMILA

THEORETICAL FOUNDATIONS OF ECONOMIC EDUCATION AS AN
 INTERNATIONAL PROBLEM..... 2492

FIRLEJ CHRYSYTIAN, MIERZEJEWSKI MATEUSZ

PROFITABILITY CONDITIONS OF SELECTED COMPANIES FROM THE WIG FOOD
 INDUSTRY INDEX IN 2011-2017 2500

GAZDIKOVA JANA, BOHM PATRIK

EFFECTS OF THE EURO CHANGEOVER ON THE INFLATION IN BALTIC
 STATES 2508

GOGOLOVA MARTINA, HAMPL MAREK

GLOBAL APPROACH TO THE PROPOSAL OF METHODOLOGY FOR MOTIVATING
 AND ACTIVATING STUDENTS TOWARDS LEARNING 2516

GUCIK MARIAN, MARCIS MATUS

SUSTAINABLE DEVELOPMENT OF TOURISM: TRANSITION FROM GLOBAL TO
 LOCAL DIMENSION 2524

HASKOVA SIMONA

A NEW GLOBAL TREND IN PROGNOSIS OF ECONOMIC DEVELOPMENT: FUZZY
 APPROACH TO THE ESTIMATION OF GDP GROWTH RATE 2532

HEDVICKAKOVA MARTINA, SVOBODOVA LIBUSE

GLOBALIZATION AND IMPACT OF INDUSTRY 4.0 AND SOCIETY 4.0 ON THE
 LABOUR MARKET 2540

HEJDUKOVA PAVLINA, KUREKOVA LUCIE

GLOBALIZATION AND HEALTH: PRIORITIES FOR RESEARCH ACTIVITIES AND
 NATIONAL POLICIES WITH EMPHASIS ON STATISTICAL ANALYSIS..... 2548

CHOVANCOVA BOZENA, SLOBODNIK PATRIK

ANALYSIS OF METHODS MEASURING COUNTRY RISK ON GLOBAL BOND AND
 STOCK MARKETS 2554

IMPPOLA JORMA JAAKKO

SUSTAINABILITY CHALLENGES IN GLOBALIZED WORLD..... 2562

KARCZEWSKA ANNA, CHLUSKI ANDRZEJ

NEW GLOBAL PHENOMENA IN THE SPHERE OF WORK AND CONSUMPTION AND
 THE QUALITY OF LIFE 2570

**KIROVA MILENA PENEVA, NEDYALKOV NEDYALKOV ANTON, PENCHEVA
 MIGLENA TSANEVA, YORDANOVA DANIELA NIKOLAEVA**

UNIVERSITY AS PREREQUISITE FOR SUSTAINABLE REGIONAL DEVELOPMENT
 IN INTERNATIONAL CONTEXT..... 2578

KOPACKOVA HANA, LIBALOVA PETRA

CITIZEN REPORTING SYSTEMS IN THE GLOBAL AND CZECH SPECIFIC
 VIEW.. 2586

KOVARNIK JAROSLAV, HAMPLOVA EVA

FOREIGN TRADE IN GLOBALIZED WORLD: COMPARATIVE ANALYSIS IN
 SELECTED COUNTRIES FROM CENTRAL EUROPE 2594

LENARTOVA GIZELA

ROLE OF INTERNATIONAL EXCHANGE OF INFORMATION IN THE FIGHT
 AGAINST TAX EVASION AND FRAUD IN GLOBALIZED ECONOMY 2602

LYAKIN ALEXANDER, DAROVSKI IVAN

IMPACT OF RECESSION ON THE ECONOMIC GROWTH 2612

MACKOVA MARIE, DVORAKOVA LILIA

PROPOSAL OF ECONOMIC MANAGEMENT METHODOLOGY IN SELECTED
 SEGMENT OF NON-GOVERNMENTAL NON-PROFIT ORGANIZATIONS IN
 CONDITIONS OF GLOBALIZED ECONOMY 2620

MARECEK JAN, MACHOVA VERONIKA

IMPORTANCE OF ANALYZING THE DEVELOPMENT OF THE NATIONAL
 ECONOMY IN THE CONTEXT OF A GLOBAL WORLD 2629

MASTALERZ-KODZIS ADRIANNA

METHODOLOGY OF MEASUREMENT OF SOCIO-ECONOMIC DEVELOPMENT IN
 GLOBALIZATION CONDITIONS - SPATIAL ANALYSIS OF SELECTED
 CHARACTERISTICS 2637

MISKIEWICZ-NAWROCKA MONIKA

THE POPULATION LIVING STANDARD IN AGING EUROPE 2644

MLYNAROVA DENISA, SCERBA KAMIL, ORVISKA MARTA

ENVIRONMENTAL PUBLIC EXPENDITURES ON DIFFERENT GOVERNMENTAL
 LEVELS 2652

MORESOVA MARIA, SEDLIACIKOVA MARIANA

GLOBALIZATION TRENDS AND THEIR IMPACT ON ECONOMIC AND SOCIAL
 ASPECTS OF HOUSING 2660

**MUCHA BORIS, BRESTOVANSKA PATRICIA, PERACEK TOMAS, STRAZOVSKA
 LUBOMIRA**

SPECIAL FEATURES OF FAMILY BUSINESS IN THE CONTEXT OF GLOBALIZATION
 2668

MYSLYAKOVA YULIYA, ZAKHAROVA VICTORIA

EVALUATION OF INNOVATIVE INDEX OF INDUSTRIAL DEVELOPMENT FOR
 BRICS MEMBER COUNTRIES IN GLOBALIZATION CONDITIONS 2676

NAGRANOVA MARIA

SOCIO-ECONOMIC IMPLICATIONS OF GLOBALIZATION – THE BENEFIT OR THE
 THREAT? 2683

NEMTSEV VIKTOR N., VASILYEVA ANASTASIA G.

CYCLICAL AND INNOVATIVE DEVELOPMENT OF THE INSURANCE MARKET IN
 CONTEXT OF GLOBALIZATION 2688

NOVAK DAVID

IMPACT OF CLIMATE CHANGE ON INSURANCES AND INSURED 2696

NOVIKOV ANDREY V., ALPATOV GENNADIY E.

ECONOMIC DEVELOPMENT OF SOCIETY: INSTITUTIONAL FEATURES AND
 GLOBALIZATION PREREQUISITES 2704

NOVY MILOS

GLOBALIZATION AND DUAL QUALITY OF FOOD AND DRUG PRODUCTS 2711

PALIDEROVA MARTINA, MICUROVA SKOLKOVA SLAVOMIRA

COMPARISON OF THE TAX BURDEN ON NATURAL AND LEGAL PERSONS IN THE SLOVAK REPUBLIC AND IN THE CZECH REPUBLIC IN GLOBAL ECONOMY CONTEXT 2719

PASHKUS VADIM Y., PASHKUS NATALIYA A., PASHKUS MARGARITA V.

STRATEGIC POSITIONING OF TERRITORIES IN THE GLOBAL ECONOMY: BRAND DEVELOPMENT IN ACCORDANCE WITH THE MATRIX OF COMPETITIVENESS OF TERRITORIES 2727

PAWLAS IWONA

DISPARITIES IN DEVELOPMENT IN THE LIGHT OF TAXONOMIC RESEARCH – EVIDENCE FROM SELECTED WESTERN HEMISPHERE COUNTRIES 2735

PELECKIS KESTUTIS, PELECKIENE VALENTINA, PELECKIS KESTUTIS K., LAPINSKIENE GIEDRE, POLAJEVA TATJANA, NEDELKO ZLATKO, POTOCHAN VOJKO

SEARCH FOR EQUILIBRIUM OF NEGOTIATING POWERS IN BUSINESS NEGOTIATIONS UNDER CONDITIONS OF GLOBALIZATION (CASE OF MONOPSONY) 2743

REGNEROVA OLGA, REGNEROVA MARTA, STURCOVA JANA

WATER AS A PHENOMENON OF LIFE IN GLOBALIZED WORLD 2751

ROWLAND ZUZANA, VOCHOZKA MAREK

ANALYSIS OF THE DEVELOPMENT OF THE EU ECONOMY 2758

RUIZ CHICO JOSE, PENA SANCHEZ ANTONIO RAFAEL, JIMENEZ GARCIA MERCEDES

ANALYSIS OF THE AGRICULTURAL PRICE DIFFERENTIAL BY COUNTRIES WORLDWIDE, UNDER CRITERIA OF FOOD SECURITY OF SUPPLY 2766

SACZEWSKA-PIOTROWSKA ANNA

HIGHER EDUCATION AS A DETERMINANT OF POVERTY EXIT IN THE ERA OF GLOBALIZATION: A META-ANALYSIS 2773

SALGOVICOVA JARMILA

RELATIONSHIP BETWEEN THE CIRCULAR ECONOMY AND THE QUALITY OF LIFE IN A GLOBALIZED SOCIETY 2781

SHELUDKO IGOR, KIROVA MILENA

MODIFICATION OF DATA ENVELOPMENT ANALYSIS FOR RISK RANKING IN INTERNATIONAL BUSINESS 2789

SIMONOVA STANISLAVA, FOLTANOVA NIKOLA

APPLYING THE GLOBAL PRINCIPLES OF THE SUSTAINABLE DEVELOPMENT FOR BETTER QUALITY OF LIFE 2797

SOLTES VIKTOR, REPKOVA STOFKOVA KATARINA

IMPACT OF GLOBALIZATION ON SELECTED QUALITY OF LIFE INDICATORS 2805

SREDL KAREL, SOUKUP ALEXANDR, RODONAIA ELIZBAR

GLOBAL BUSINESS IN CANNED FOOD MARKET 2813

STANEK DUSAN, POLAKOVA ZDENKA

GLOBALIZATION AND ITS IMPACT ON DIVERGENCE IN THE EU WITH REGARD
 TO THE DIRECTION TOWARDS TRADE WARS..... 2821

**STOFKOVA ZUZANA, GOGOLOVA MARTINA, HRASKOVA DAGMAR,
 STALMASEKOVA NATALIA**

E-HEALTH AS A SUPPORTIVE FACTOR OF IMPROVING QUALITY OF LIFE 2830

STRAPUC CONSTANTIN

SUBTERRANEAN ECONOMY IN GLOBALIZATION ERA 2838

STRAZOVSKA LUBOMIRA, SULIKOVA ROZALIA, RAFAJ PETER

BENCHMARKING AS A TOOL FOR EFFECTIVE ENHANCEMENT OF SLOVAK
 CITIES AND REGIONS IN THE GLOBAL ENVIRONMENT 2846

SULDINA GALINA, SADYRTDINOV RUSLAN, VLADIMIROVA SVETLANA

QUALITY OF LIFE EVALUATION FOR LARGE CITIES IN GLOBALIZED
 WORLD.. 2854

SWADZBA SLANISLAW

GLOBALIZATION IN THE NEW COUNTRIES OF THE EUROPEAN UNION..... 2862

SWADZBA URSZULA

THE ECONOMIC KNOWLEDGE OF THE YOUNG GENERATION OF VISEGRAD
 GROUP COUNTRIES - A SOCIOLOGICAL ANALYSIS 2870

SWIETLIK BEATA

SHELTERED WORKSHOPS AS ONE OF THE METHODS OF PREVENTING GLOBAL
 SOCIAL EXCLUSION OF THE DISABLED 2878

VESELKOVA ALEXANDRA

QUALITY OF THE EDUCATION SYSTEM VERSUS COMPETITIVENESS 2886

VOJTKOVA MARIA

GLOBAL PROBLEM OF POVERTY WITH A FOCUS ON INCOME AND MATERIAL
 DEPRIVATION IN SLOVAKIA 2894

VOLEJNIKOVA JOLANA, KUNHARTOVA LENKA

GLOBALISATION AND ECONOMIC POSITION OF SENIORS IN THE CZECH
 REPUBLIC..... 2902

ZEUG-ZEBRO KATARZYNA

SPATIAL ANALYSIS OF THE STANDARD OF LIVING OF THE POPULATION IN THE
 EUROPEAN UNION..... 2910

ZIEMELIS MARIS, RADIN MICHAEL A., IEVINS JANIS

WORK SAFETY SYSTEM IMPROVEMENT AND DECREASING WORK
 ENVIRONMENT RISKS IN CONSTRUCTION INDUSTRY 2918

FINANCIAL LITERACY OF UNIVERSITY STUDENTS IN THE AREA OF OWN FINANCES

Markéta Beranová^{1,a,*}, Jan Šíma^{2,b} and Miroslava Navrátilová^{3,c}

¹Department of Trade and Finance, Faculty of Economics and Management, Czech University of Life Sciences Prague, Kamýcká 129, Prague, 165 21, Czech Republic

²Department of Sport and Management, Faculty of Physical Education and Sport, Charles university, José Martího 269/31, Prague, 162 52, Czech Republic

³Department of Trade and Finance, Faculty of Economics and Management, Czech University of Life Sciences Prague, Kamýcká 129, Prague, 165 21, Czech Republic

^amberanova@pef.czu.cz, ^boregnerova@pef.czu.cz, ^cnavratilovam@pef.czu.cz

*Corresponding author

Abstract. In today's globalized world, there is an increasing emphasis on financial education. The aim of this paper is to assess the level of financial literacy among full time higher education students in relation to their own finances. Primary data were obtained by a quantitative research using a questionnaire survey ($n = 446$) during the autumn of 2017 amongst full time bachelor's and master's degree students at the Faculty of Physical Education and Sports, Charles University in Prague. The results show that 95% of students responded "yes or rather yes" to the question if they are aware of the state of their finances while 5% of respondents were not aware of their instantly disposable income. 80 % of the respondents monitor their personal income and expenditures by doing a budget, mostly by means of internet or computer applications. 20 % of respondents do not monitor their own finances either, because they do not consider it necessary or they do not have time. Almost 71 % of respondents save a part of their income for unexpected expenses while nearly 30 % of the respondents do not make financial provisions. Statistical evaluation proved a dependence between the field and the level of study and the responses mentioned above.

Keywords: budget, finance, financial literacy, student, own sources, university

JEL Classification: A20, D14, G10, I22

1. Introduction

Finance and financial flows can be seen as an extremely important part of today's modern society. The ability to manage one's personal finance is becoming more and more important in the globalized world. If individuals are unable to manage their finance, it is not only their own problem, but also a problem of the whole society (Haiyang & Volpe, 1998; Lusardi & Mitchell, 2014).

The world's authors, educators, and experts focused on financial literacy generally agree that the majority of the population is not sufficiently financially literate (Allgood & Walstad, 2016; Perry, 2008). This is especially critical with young people (da Silva et al., 2017). We can see similar results in the Czech Republic (Beranová et al., 2017; Šíma et al., 2018; Opletalová, 2014).

Young people's attitudes towards finance may differ. Jorgensen and Savla (2010) state that parents also have a direct and quite significant influence on their children's financial attitudes. Financial attitudes and good financial literacy at a young age are a useful tool for making optimal financial decisions - which then in turn can have an influence on one's entire life (Japelli & Padula, 2013; Calcagno & Monticone, 2015).

The aim of this paper is to evaluate the financial literacy of bachelor's and master's students of both an economic and non-economic field in relation to their own attitudes towards their finance, and specifically their approach to managing their money, tracking it, and saving for unexpected situations. This evaluation will be based on a primary study conducted by the authors.

The chapter Introduction sets out the theoretical framework. The chapter Methods and Materials shows how the primary study was conducted and describes the respondent sample based on basic social and demographic characteristics. In Results and Discussion we present the results of the study and discuss and compare the findings of the study with similar studies in the field. The chapter Conclusion summarizes the most important findings.

2. Methods and Materials

The theoretical background of this paper is based on an analysis of secondary sources gained from scholarly papers and specialized literature. Primary data have been obtained through a conducted survey.

The questionnaire survey was conducted using paper questionnaires during the academic year 2017/2018. The respondents were full-time bachelor's and master's students of two programmes: Physical education and sport (TVS, a non-economic programme) and Physical education and sport management (MNG, an economic programme) at the Faculty of Physical Education and Sport at Charles University. The selective sample was intentional, with 446 respondents taking part in the financial literacy questionnaire survey. The paper focuses on questions related to approaches to personal finance management, tracking, and to saving money for unexpected situations.

Basic sociodemographic factors of the reference group of respondents were as follows:

Table 1: Sociodemographic factors of respondents in %.

Gender	Female	37.00
	Male	63.00
Level of study	Bachelor's degree	56.50
	Master's degree	43.50
Field of study	TVS	49.55
	MNG	50.45
Permanent Residence	Prague	38.34
	Central Bohemian Region	23.99
	Ústí Region	4.04
	South Bohemian Region	6.05
	Hradec Králové Region	6.50
	Pardubice Region	4.93
	Vysočina Region	2.47

	Plzeň Region	4.48
	Moravian-Silesian Region	1.45
	Karlovy Vary Region	2.24
	Liberec Region	4.26
	South Moravia Region	0.90
	Zlín Region	0.90
	Olomouc Region	0.45
Size of Place of Residence	up to 500 inhabitants	5.61
	501 – 2 000 inhabitants	7.17
	2 001 – 5 000 inhabitants	5.16
	5 001– 10 000 inhabitants	8.52
	10 001 – 50 000 inhabitants	21.52
	over 50 000 inhabitants	52.02

Source: Own research, 2017

The contingency table is used for transparent visualization of mutual relations of two statistical variables. The type of the contingency table is given by the number of rows r and the number of columns s , is means $r \times s$ (Hindls, 2007). Obviously, χ^2 is a measurement of the overall dissimilarity of n_{ij} and m_{ij} . The bigger the difference between observed and expected values, the higher the test statistic χ^2 .

$$m_{ij} = \frac{n_i \cdot n_j}{n} \quad (1)$$

$$\chi^2 = \sum \frac{(\text{frequency observed} - \text{frequency expected})^2}{\text{frequency expected}} \quad (2)$$

$$\chi^2 = \sum_{i=1}^r \sum_{j=1}^s (n_{ij} - m_{ij})^2 / m_{ij} \quad (3)$$

i and j are indexes of rows and columns, n_{ij} are observed marginal frequencies, n_i and n_j are marginal totals, n is grand total of observations, m_{ij} are expected frequencies. We compare χ^2 to the critical value χ^2 with a chi-square distribution of $(r-1)(s-1)$ degrees of freedom at the chosen level of significance. We reject the hypothesis if χ^2 is larger than the table value. This test is valid asymptotically, and thus can only be applied if there are a sufficient number of observations. All expected values ought to be higher than one (Hendl, 2009); at the same time, the table should not contain more than 20% theoretical incidence rates (frequencies) of less than 5. Where zero values occur in any of the fields, we proceed to analyse a derived table, created by merging a small number of categories (Hendl, 2009). Cramér's V was used to determine the degree of association between the variables.

The data analysis was focused on the following tested hypotheses.

Table 2: Summary of tested hypotheses.

Nr. of Hypothesis	Text of Hypothesis
H0 ₁	The overview over the amount of money the respondents have at the moment is not dependent on respondent gender.

H0 ₂	The overview over the amount of money the respondents have at the moment is not dependent on respondent field of study.
H0 ₃	The overview over the amount of money the respondents have at the moment is not dependent on respondent level of study.
H0 ₄	Tracking personal income and expenses, or budgeting is not dependent on respondent gender.
H0 ₅	Tracking personal income and expenses, or budgeting is not dependent on respondent field of study.
H0 ₆	Tracking personal income and expenses, or budgeting is not dependent on respondent level of study.
H0 ₇	Saving part of one's income in case of unpredictable expenses is not dependent on respondent gender.
H0 ₈	Saving part of one's income in case of unpredictable expenses is not dependent on respondent field of study.
H0 ₉	Saving part of one's income in case of unpredictable expenses is not dependent on respondent level of study.

Source: Own research, 2017

The following abbreviations are used in this paper: TVS = Physical Education and Sports; MNG = Management of Physical Education and Sports; FTVS = Faculty of Physical Education and Sports; UK = Charles University.

3. Results and Discussion

The respondents' gender, field of study, and level of study are very important attributes when studying university students' attitudes to finance. This chapter tests these variables in relation to selected questions.

Table 3: Relation between personal finance overview and respondents' gender, field of study and level of study.

Gender/Answer	yes	rather yes	rather no	no
Female	108	51	4	0
Male	158	107	18	0
Total	266	158	22	0
Field of study / Answer	yes	rather yes	rather no	no
MNG	171	48	6	0
TVS	95	110	16	0
Total	266	158	22	0
Level of study / Answer	yes	rather yes	rather no	no
Bachelor's	190	57	5	0
Master's	76	101	17	0
Total	266	158	22	0

Source: Own research, 2017

94.9% of all respondents (answers "yes and rather yes") state they have an overview of how much money they have at their disposal at the moment, meaning in cash, in their current account, in their savings account, etc. Only 5.1% respondents chose the answer "rather no". This corresponds with Belás et al.'s (2016) claims. They say that personal finance management and overview create prerequisites for a good and successful financial life. Da Silva et al. (2017) also mention this, stating that the inability to track and manage one's income and expenses can cause both economic and social problems. The chi-squared value, 6.33, is over 5.99, which is the critical value of distribution, at 1 degree of freedom, for level 0.95. The null hypothesis can therefore be rejected. The overview over the amount of money that university students have at the moment is dependent on respondent gender. Gender differences in financial attitudes and financial literacy in general are confirmed for example by study of OECD (2012).

97.3% of all TVS respondents stated they have an overview of the money at their disposal (with many more answering "yes" than "rather yes"). Only 2.7% do not have an overview ("rather no"). When it comes to the TVS field, the results are similar: 92.8% answered they had an overview of their finances (with many more answering "rather yes" than "yes"). The chi-squared value, 50.60, is over 7.81, which is the critical value of distribution, at 1 degree of freedom, for level 0.95. The null hypothesis can therefore be rejected. The overview of the amount of money that university students have at the moment is dependent on the field of study of the respondent.

59.6% of respondents in the master's and bachelor's programmes answered they had an overview of their income ("yes"). 35.4% answered "rather yes" and only 5% answered they rather did not have an overview. The chi-squared value, 61.15, is over 7.81, which is the critical value of distribution, at 1 degree of freedom, for level 0.95. The null hypothesis can therefore be rejected. The overview of the amount of money that university students have at the moment is dependent on the level of study of the respondent.

Table 5: Relation between income tracking, or budgeting, and respondent's gender, field of study and level of study.

Gender / Answer	yes	rather yes	rather no	no
Female	190	57	0	0
Male	76	101	0	0
Total	266	158	0	0
Field of study / Answer	yes	rather yes	rather no	no
MNG	188	37	0	0
TVS	167	54	0	0
Total	355	91	0	0
Level of study / Answer	yes	rather yes	rather no	no
Bachelor's	219	33	0	0
Master's	136	58	0	0
Total	355	91	0	0

Source: Own research, 2017

The results in Table 5 show that tracking personal income and expenses, or budgeting, is normal for most respondents. Tomášková et. al. (2011) also concur, stating that only financially literate individuals can responsibly manage their personal budgets. No dependency was proven from the point of view of gender, meaning the chi-squared value 1.10, is less than 3.85, which is the critical value of distribution, at 1 degree of freedom, for level 0.95. The null hypothesis therefore cannot be rejected. Tracking personal income and expenses is therefore not dependent on respondent gender. Dependency was proven from the point of view of field of study, meaning the chi-squared value 4.38, is less than 3.84, which is the critical value of distribution, at 1 degree of freedom, for level 0.95. The null hypothesis can therefore be rejected. Dependency was also proven from the point of view of level of study, meaning the chi-squared value 19.05 is less than 3.84, which is the critical value of distribution, at 1 degree of freedom, for level 0.95. The null hypothesis can therefore be rejected. Tracking personal income and expenses is dependent on the respondents' field of study and level of study. None of the respondents stated they did not track their expenses at all (nobody chose the answers "rather no" or "no").

Table 6: Relation between saving money in case of unexpected situations, and respondent's gender, field of study and level of study.

Gender / Answer	yes	rather yes	rather no	no
Female	120	43	0	0
Male	196	87	0	0
Total	316	130	0	0
Field of study / Answer	yes	rather yes	rather no	no
MNG	164	61	0	0
TVS	152	69	0	0
Total	316	130	0	0
Level of study / Answer	yes	rather yes	rather no	no
Bachelor's	181	71	0	0
Master's	135	59	0	0
Total	316	130	0	0

Source: Own research, 2017

In case of saving money for cases of unexpected expenses, no dependency was proven. 70.85% of the total number of respondents answered that they saved some of their income ("yes") and 29.15% answered "rather yes". None of the respondents stated they saved no money at all. No dependency was proven from the point of view of gender, meaning the chi-squared value 0.95, is less than 3.84, which is the critical value of distribution, at 1 degree of freedom, for level 0.95. The null hypothesis therefore cannot be rejected. Dependency was also not proven from the point of view of field of study, meaning the chi-squared value 0.91, is less than 3.84, which is the critical value of distribution, at 1 degree of freedom, for level 0.95. The null hypothesis therefore cannot be rejected. There was also no proven dependency from the point of view of level of study, because the chi-squared value 0.27 is less than 3.84, which is the critical value of distribution, at 1 degree of freedom, for level 0.95. Mandell & Schmid Klein (2007) state that students connect successful financial literacy with their perception of future life goals, and they accentuate the importance of motivation in this field.

4. Conclusion

The results of a study carried out at the Faculty of Physical Education and Sport, Charles University, in 2017 show positive results in terms of overview of personal finance, tracking personal income and expenses, and saving money in case of unexpected situations. The study compared the awareness of students of an economic study programme, Sport management, and a non-economic one, Physical education and sport. The study proved statistical dependencies between the selected questions and the students field and level of study.

The paper's theoretical contribution consists of pointing out the issues of financial literacy in relation to basic attitudes and approaches to personal finance. Its practical contribution is presenting the results of financial literacy of university students at FTVS UK, and proving the relation of financial literacy with their field and level of study.

Acknowledgement

This work was supported by the Internal Grant Agency of Faculty of Economics and Management, Czech University of Life Sciences Prague - grant number 20181015 – “The Impact of Climate Change on the Structure of Agricultural Production in the Czech Republic”

References

- [1] Allgood, S. and Walstad, W. B. (2016). The effects of perceived and actual financial literacy on financial behaviors. *Economic inquiry*, vol. 54, no. 1, pp. 675-697.
- [2] Belás, J., Nguyen, A., Smrčka, L., Kolembus, J., and Čipová, E. (2016). Financial Literacy of Secondary School Students. Case Study from the Czech Republic and Slovakia. *Economics & Sociology*, vol. 9, no. 4, pp. 191-206.
- [3] Beranová, M., Navrátilová, M., Šišková, J. and Stárová, M. (2017). Financial literacy of university students in relation to financial security in old age. *Proceedings of the 14th International Conference Efficiency and Responsibility in Education (ERIE 2017)*. Prague, Czech Republic, pp. 25-32.
- [4] Calcagno, R., and Monticone, C. (2015). Financial literacy and the demand for financial advice. *Journal of Banking & Finance*, vol. 50, pp. 363-380.
- [5] Chen, H., and Volpe, R. P. (1998). An Analysis of Personal Financial Literacy among College Students. *Financial Services Review*, vol. 7, no. 2, pp. 107-128.
- [6] da Silva, T. P., Magro, C. B. D., Gorla, M. C., and Nakamura, W. T. (2017). Financial education level of high school students and its economic reflections. *Revista de Administração*, vol. 52, no. 3, pp. 285-303.
- [7] Hendl, J. (2009). *Přehled statistických metod: analýza a metaanalýza dat*, Praha: Portál.
- [8] Hindls, R., Hronová, S., Seger, J. and Fischer, J. (2007). *Statistika pro ekonomy*. Praha: Professional publishing.
- [9] Jappelli, T., and Padula, M. (2013). Investment in financial literacy and saving decisions, *Journal of Banking & Finance*, vol. 3, no. 8, pp. 2779-2792.
- [10] Jorgensen, B. L., and Savla, J. (2010). Financial Literacy of Young Adults: The Importance of Parental Socialization. *Family Relations: Interdisciplinary Journal of Applied Family Science*, vol. 59, no. 4, pp. 465-478.
- [11] Lusardi, A., and Mitchell, O. S. (2014). The Economic Importance of Financial Literacy: Theory and Evidence. *Journal of Economic Literature*, vol. 52, no. 1, pp. 5-44.
- [12] Mandell, L., and Schmid Klein, L. (2007). Motivation and financial literacy. *Financial Services Review*, vol. 16, pp 105-116.
- [13] OECD (2018). OECD Working Papers on Finance, Insurance and Private Pensions [Online]. September 12, 2018, Available: https://www.oecd-ilibrary.org/finance-and-investment/oecd-working-papers-on-finance-insurance-and-private-pensions_20797117
- [14] Opletalová, A. (2015). Financial Education and Financial Literacy in the Czech Education System. *Procedia - Social and Behavioral Sciences*, vol. 171, pp. 1176-1184.

- [15] Perry, V. G. (2008). Is ignorance bliss? Consumer accuracy in judgments about credit ratings. *Journal of Consumer Affairs*, vol. 42, no. 2, pp. 189-205.
- [16] Šíma, J., Beranová, M. and Navrátilová, M. (2018). Financial literacy of university students in the area of external financing. *Proceedings of the 14th International Conference Efficiency and Responsibility in Education (ERIE 2018)*. Prague, Czech Republic, pp. 394-401.
- [17] Tomášková, H., Mohelská, H., and Němcová, Z. (2011). Issues of Financial Literacy Education. *Elsevier Procedia - Social and Behavioral Sciences*, vol. 28, pp. 365-369.

TECHNICAL ANALYSIS USAGE BY THE PREDICTION OF FINANCIAL ASSETS PRICES

Miloš Bikár^{1,a,*}, Katarína Vavrová^{2,b}

¹University of Economics in Bratislava, Faculty of Business Management, Dolnozemska cesta 1,
852 35, Bratislava, Slovak Republic

²University of Economics in Bratislava, Faculty of Business Management, Dolnozemska cesta 1,
852 35, Bratislava, Slovak Republic

^amilos.bikar@gmail.com, ^bkatarina.vavrov10@gmail.com

*Corresponding author

Abstract. One of the most frequent questions of each investor is, where would move an individual asset prices. Which indicators are more suitable on short-term data decision making? The instruments of technical analyses offer answer to that key issue for the whole investment community. The technical analysis is based on the analysis of time series and the monitoring of statistical variables, such as price, its change or traded volumes, by using four basic pillars: indicators, lines, candles and shapes. The goal of this paper is to demonstrate the variability of technical analyses usage by the short-term prediction of different asset classes. Methodologically, patterns of charts and diagrams drawn according to Fibonacci sequence and Elliot waves have been used. The results show an evidence of relative accuracy of technical analyses predictions by short-term periods mainly by currency pairs, stock indices and commodities. The paper also illustrates the overview of researchers in the area suggesting which method of decision making among technical analysis and fundamental analysis has higher value for investors. The paper highlights the necessity of combining fundamental and technical analysis, as investors using both techniques achieve better performance in long-term perspectives in comparison to those depending only on one of them.

Keywords: technical analysis, patterns of charts, resistance levels, trend lines

JEL Classification: C53, E 44, G19

1. Introduction

The current economic and financial landscape has been characterised by rising asset prices driven by low interest rates, easy monetary policy and low productive investment by firms in advanced countries. In the low-growth and low-interest rate environment, equity markets become a place, where companies, banks, institutional and individual investors have found an adequate valuation of free resources (Biernacka & Sedličiková, 2012). Movements on the global financial markets are nowadays interconnected and influenced by both fundamental and behavioural or psychological effects. Technical analysis could serve as one of the tool that can help investors to anticipate what is likely to happen to prices over time by examination of past price movements and their forecasting to future by using a wide variety of charts. Determining the right timing of the investment and the trend direction is a decisive factor, when entering into long or short position. Technical analysis is applicable to stocks, indices, commodities, futures or any tradable instrument where the price is influenced by the forces of supply and

demand. Trading strategies are set regarding different technical indicators based on moving averages and volatility of the value and returns on an underlying asset. Price data refers to any combination of the open, high, low, close, volume, or open interest for a given security over a specific timeframe. The timeframe can be based on intraday (1-minute, 5-minutes, 10-minutes, 15-minutes, 30-minutes or hourly), daily, weekly or monthly price data and last a few hours or many years.

2. Conceptual Issues Interpreting Technical Analysis Usage

Conceptual views on technical analysis usage by the prediction of various financial assets differ and point out striking differences in outputs and model interpretations. A number of studies confirmed, that technical analysis could lead to a relative high efficacy and predictive modelling accuracy when making investment decisions. On the other hand, certain studies have shown that technical trading strategies have not always provided an acceptable level of profitability, which resulted in additional scepticism in terms of their application.

The study of Stankovič et al. (2015) applied selected technical indicators as features in defining predictive model based on Least Squares Support Vector Machines (LS-SVMs). They came to a conclusion, that machine learning techniques capture the non-linear models which are dominant in the financial markets in a more adequate way. Application of LS-SVM in decision making process on investing on the financial market can significantly contribute to maximization of profitability on investment. Anghelache & Trifan (2013) compared classical trading strategies based on technical analysis versus artificial intelligence techniques. The results revealed that same limitations can be determined by the second one, however, for the classical models; neither those offer the safety of the pattern variables correct selection. The human factor, characterized by experience, multiple trials, intuition, remains a part of the decision in both building the classical models, and the ones based on artificial intelligence (Minárová et al., 2015). Wong et al. (2010) analysed the role of technical analysis in signalling the timing of stock entry and exit by using two trend followers, the Moving Average, and the most frequently used counter-trend indicator, the Relative Strength Index. Using Singapore data, their results showed that the indicators can be used to generate significantly positive return. In order to construct a superior technical trading strategy that captures a more comprehensive aspect of predictability in past prices, the study of Loh (2007) proposed combining trend indicators with confirming indicators that are also based on the detection of trends in past prices. Similar studies which confirmed that technical analysis matters for asset pricing are those of Cheung et al. (2011), Isakov & Marti (2011), Sturm (2013) and Sedliačiková et al. (2015). In addition, the study of Billingsley and Chance (1996) showed that about 60% of commodity trading advisors and 30 % - 40 % of foreign exchange currency traders use technical analysis as a major or exclusive informational source in their decision-making process. Kavajecz et al. (2004) analysed the relation of technical analysis to liquidity provision. They demonstrate that support and resistance levels coincide with peaks in depth on the limit book and moving average forecasts reveal information about the relative position of depth on the book. They also showed, that these relationships stem from technical rules locating depth already in place on the limit order book.

Park and Irwin (2007) reviewed the evidence on the profitability of technical analysis. Among a total of 95 modern studies, 56 studies find positive results regarding technical trading strategies, 20 studies obtain negative results, and 19 studies indicate mixed results.

They also found that despite the positive evidence on the profitability of technical trading strategies, most empirical studies are subject to various problems in their testing procedures, e.g. data snooping, ex post selection of trading rules or search technologies, and difficulties in estimation of risk and transaction costs.

Based on recent studies, the aim of this paper is demonstrate the variability of technical analyses usage by the short term prediction of different asset classes.

3. Data and Methodology

Graphs in technical analysis are based on the mathematical basis of price movements. Adapting prices after information shocks has a spiral shape in graphical terms. The source of all spirals is the presence of a certain geometric increase. Among all the geometric growths that are found in nature, there is one that in its significance exceeds all others. This is the Fibonacci sequence, which is based on a ratio of 1,618¹. The basis of the Fibonacci sequence consist of the number 1,1,2,3,5,8,13,21,34,55 etc., where each member of the sequence is formed by the sum of the preceding two (recurrence relations). Fibonacci sequence can be expressed using the following notation:

$$F1 = F2 = 1; Fn = Fn-1 + Fn-2; n \geq 3; \quad (1)$$

At the same time, if we divide each member following, we get a value close to 0,618, whose inverted value is 1,618. The last feature of this sequence is that each second member applies to the next member for a ratio of 0,382, whose inverted value is 2,618. Based on Elliot (1946) theory, during the trend, the market generally did not fall below 61,8 % of this trend under any correction, and at the same time that the retest of the previous top or bottom was limited to 61,8 % of the length of movement from a given top or bottom. Both economists have found that the length of the corrections is determined by the gold ratio:

$$0,382 : 0,618 = 0,618 : 1 \quad (2)$$

It follows from the above finding that the corrections are not random and chaotic quantities but naturally relate to the cyclic process they are part of. Technical analysts most often add Elliott waves to the Fibonacci sequence. The strongest Fibonacci levels are 38,2 %, 50 % and 61,8 %, and these values represent very strong support and resistance limits. Professional traders can therefore assume that after a steep fall or an increase in prices, the values will be corrected and these corrections can take place on the above-mentioned values.

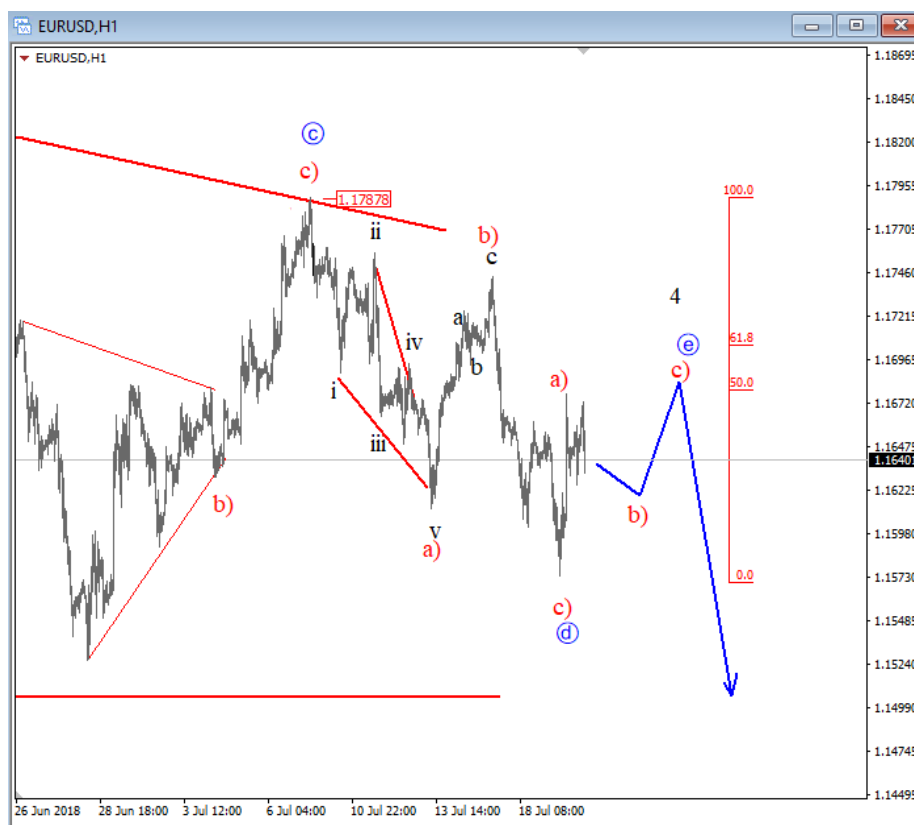
We follow the methodology of Fibonacci sequence and Elliot waves, and estimate the trend development of choosing underlying assets. In our research we have focused on currency pair USD/EUR, then stock indices S&P 500 and DAX 30, and WTI crude oil commodity. Regarding the data collection, it were used the daily time series from the Investing database. From the time perspective, we have taken the 1H 2018 market development, based on that we provide the short term technical forecast for chosen underlying assets.

¹ This sequence is named according to Leonard Pisanski, who in 1201, under the name of Fibonacci, published the famous work of Liber Abaci (The Book of Abaku).

4. Results and Discussion

In this section, the technical analyses estimates the short term prediction for the selected underlying assets. First, we have concentrated on the most traded exchange rate of USD/EUR. During the analysed and forecasted period EUR/USD is still trading slowly and sideways within a triangle pattern, but we can see it now in the final wave e or 4, which can be made by a three wave a-b-c rise that can stop around 61,8 % of Fibonacci retracement and 1.17 level. The prediction is bearish, while it's trading below 1.1787. Figure 1 reports the short term prediction of analysed currency pair.

Figure 1: Technical analysis of currency pair USD/EUR



Source: Val Global d.o.o. (2018)

Second, we have estimated the prediction of stock indices S&P 500 and DAX 30. Generally stock markets achieved the pick by the end of January 2018 after the strongest rally since the American election. Since February this year we have seen a hefty fall that point to a downturn in the global economy caused by several factors including growing credit loans, a widening fiscal deficit in the U.S., doubts over infrastructure spending plans and a trade war. After the market tumbled by 10-15 % (February-March 2018) it came to a correction and new bullish cycle. In the next period a bullish view on 10 years US notes can slow down the stock market, especially if we take a look on S&P 500 Index, which can be trading in the late stage of wave v) within an ending diagonal pattern. This has been confirmed by the research of Savin et al. (2007), those find strong evidence that the pattern had power to predict excess returns. Risk-adjusted excess returns to a trading strategy conditioned on “head-and-shoulders” price patterns are 5–7% per year. Combining the strategy with the market portfolio

produces a significant increase in excess return for a fixed level of risk exposure. Figure 2 demonstrate the July 2018 technical view and upcoming forecast.

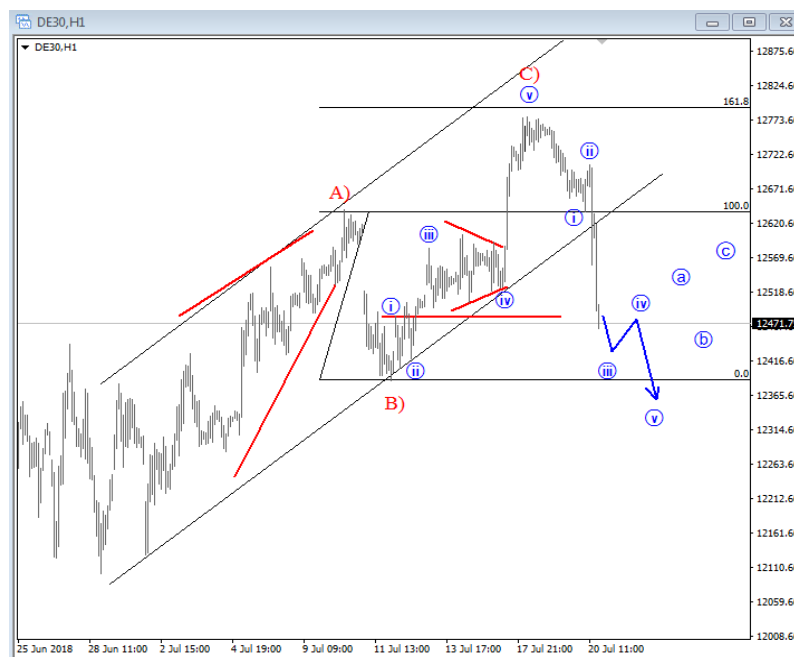
Figure 2: Technical analysis of S&P 500 stock index



Source: Val Global d.o.o. (2018)

DAX dropped sharply after a three wave A-B-C corrective rise and it's already breaking channel support line, what means a bearish reversal in coming weeks. The index has support at points 12170 and resistance at points 12860. DAX can be seen as a proxy for European economic health since the German economy accounts for almost one third of the total value of the Eurozone economy. Figure 3 demonstrate the July 2018 technical view and upcoming forecast.

Figure 3: Technical analysis of DAX 30 stock index



Source: Val Global d.o.o. (2018)

disproportionately prone to short-term stock market speculation, as this is their primary investment objective. At the same time, they have more concentrated portfolios that are more reminiscent, less willing to resist the trend reversal, choose the exposure risk with a higher proportion of non-systematic risk to the overall risk, engage in more deals, but collectively get lower returns. The studies of Karaman (2018) and Kmet'ka and Badura (2014) confirm the fact that in the period of increased volatility and uncertainty in the financial markets, the usage of technical analysis is more difficult as the market can move in both directions and the trend confirmation takes longer. By using the technical analyses, each individual investor should further monitor other several indicators for tracking trader sentiment, quarterly trading forecasts, periodical economic information according and published news and forex market development, as currency pairs has a strong influence on stock market indices (Chen, 2018).

This article investigates the technical analyses contribution by taking investment decisions on stock market trading. We focused on several underlying assets – exchange pair, stock indices and commodity, trying to point out to the variability where technical analyses instrument could be a useful tool for price movement prediction. We relied on the Elliott wave's theory and the Fibonacci sequence to simulate the development of chosen underlying assets. Our main findings can be summarized as follows: first, the technical analyses serve as a unique tool for forecasting accuracy for investors. Second, there are several situations where markets could go in both direction and is recommended to wait for a confirmation of further market movement. Third, technical analyses should always be combined with classical fundamental analyses, as key economic information have a significant influence on market directions.

Acknowledgment

The presented working paper is the output of the scientific grants VEGA n. 1/0007/16 The impact of the global economic developments and trends in the direction of the euro area economy on financial management of business entities in Slovakia.

References

- [1] Anghelache, G.V. and Trifan, A.L. (2013). Forecasting the Investors Behavior on the Capital Market in Romania: Trading Strategies Based on Technical Analysis versus Artificial Intelligence Techniques. *International Journal of Business and Social Research (IJBSR)*, vol. 3, pp. 114-121.
- [2] Biernacka, J. and Sedličiková, M. (2012). Selected ratio and bankruptcy early-warning method analysis of competitiveness of wood sector companies listed on Warsaw stock exchange. *Drvna industrija*, vol. 63, pp. 187-193.
- [3] Billingsley, R. S. and Chance, D.M. (1996). Benefits and Limitations of Diversification among Commodity Trading Advisors. *Journal of Portfolio Management*, vol. 23, pp. 65-80.
- [4] Bodie, Z., Kane, A. and Marcus, A.J. (2003). *Investments* (4th Edition), Toronto, Canada: McGraw-Hill Higher Education.
- [5] Elliott, R. N. (1946). *Natures Law: The secret of the universe*, New York, USA: Wiley Periodicals.

- [6] Chen, H. Y., Cheng, F.L. and Shin, W.K. (2016). Technical, fundamental, and combined information for separating winners from losers. *Pacific-Basin Finance Journal*, vol. 39, pp. 224–242.
- [7] Cheung, W., Lam, K.S. and Yeung, H. (2011). Intertemporal Profitability and the Stability of Technical Analysis: Evidence from the Hong Kong Stock Exchange. *Applied Economics*, vol. 43, pp. 1945-1963.
- [8] Gehrig, T. and Menkoff, L. (2006). Extended Evidence on the Use of Technical Analysis in Foreign Exchange. *International Journal of Finance & Economics*, vol. 11, pp. 327-338.
- [9] Hoffmann, A.O. and Shefrin, H. (2014): Technical analysis and individual investors. *Journal of Economic Behaviour & Organisation*, vol. 107, s. 487–511.
- [10] Isakov, D. and Marti, D. (2011). Technical Analysis with a Long Term Perspective: Trading Strategies and Market Timing Ability. *International Conference of the French Finance Association*. Montpellier, France, pp. 43.
- [11] Karaman, S.Y. (2018): Uncertainty in financial markets and business cycles. *Economic Modelling*, vol. 68, pp. 329–339.
- [12] Kavajecz, K. A. and Odders-White., E.R. (2004). Technical Analysis and Liquidity Provision, *The Review of Financial Studies*, vol. 17, pp. 1043-1071.
- [13] Kmeťko, M. and Badura, P. (2014). *Measuring of volatility of capital market*. Kunovice, European polytechnic institute, pp.145–149.
- [14] Loh, E.Y.L. (2007). An Alternative Test for Weak Form Efficiency based on Technical Analysis. *Applied Financial Economics*, vol. 17, pp. 1003-1012.
- [15] Minárová, M., Malá, D. and Sedličiková, M. (2015). Emotional intelligence of managers. *Procedia - economics and finance*. 4th World conference on business, economics and management, WCBEM, vol. 26, p. 1119-1123.
- [16] Nazário, R.T.F., Silva, J.L., Sobreiro, V.A. and Kimura, H. (2017): A literature review of technical analysis on stock markets. *The Quarterly Review of Economics and Finance*, vol. 66, pp. 115–126.
- [17] Park, C.H. and Irwin, S.H (2007). What Do We Know About the Profitability of Technical Analysis? *Journal of Economic Surveys*, vol. 21, pp. 786-826.
- [18] Savin, G., Weller, P. and Janis Zvingelis, J. (2006). The Predictive Power of “Head-and-Shoulders” Price Patterns in the U.S. Stock Market. *Journal of Financial Econometrics*, vol. 5, pp. 1-23.
- [19] Sedliačiková, M., Vacek, V. and Sopková, E. (2015). How Slovak small and medium enterprises perceive financial controlling. *Procedia - economics and finance*. 4th World conference on business, economics and management, WCBEM, vol. 26, p. 82-85.
- [20] Stankovič, J., Markovič, I. and Stojanovič, M. (2015). Investment Strategy Optimization Using Technical Analysis and Predictive Modeling in Emerging Markets. *Procedia Economics and Finance*, vol. 19, pp. 51-62.
- [21] Sturm, R. R. (2013). Market Efficiency and Technical Analysis. Can they Coexist? *Research in Applied Economist*, vol. 5, pp. 1-16.
- [22] Wong, W.K, Manzur, M. and Chew, B.K. (2010). How rewarding is Technical Analysis? Evidence form Singapore Stock Market. *Applied Financial Economics*, vol. 13, pp. 543-551.

EFFECT OF FLAT RATE INCOME TAX IN SELECTED EU MEMBER STATES ON THEIR ECONOMIC GROWTH

Patrik Böhm^{1,a,*}, Gabriela Böhmová^{2,b}

¹University of Zilina, Faculty of Operation and Economics of Transport and Communications,
Department of Quantitative Methods and Economic Informatics, Univerzitná 1, 010 26 Zilina, Slovak
Republic

²University of Zilina, Faculty of Operation and Economics of Transport and Communications,
Department of Quantitative Methods and Economic Informatics, Univerzitná 1, 010 26 Zilina, Slovak
Republic

^apatrik.bohm@fpedas.uniza.sk, ^bgabriela.bohmova@fpedas.uniza.sk

*Corresponding author

Abstract. The idea of flat income taxes is frequently supported by economists and politicians, but has never been implemented in any western liberal democracy yet. However, the introduction of a flat rate income tax has become a trend in the transition economies of Eastern and Central Europe. There are several advantages of flat income taxes over its progressive counterpart. Complicated income tax system is simplified, which is not only convenient for citizens, but a positive impact on economic competitiveness makes the country more attractive for foreign investors as well. The main counterargument of the opponents is that the introduction of the flat tax rate significantly reduces government revenue. From current EU member states, Estonia and Lithuania introduced the flat rate income tax in 1994, followed later by Latvia, Slovakia, Romania, Czech Republic, and Bulgaria. The last EU member state that so far adopted the flat rate income tax is Hungary (in 2011). However, the Czech Republic and Slovakia replaced the flat tax rate with two income tax rates in 2013 and Latvia with three income tax rates in 2018. In our contribution, we examine whether the introduction of the flat income tax rate in Hungary influenced the economic growth of the country. Using the difference-in-differences method, we demonstrate that it had a positive effect on the growth of GDP per capita. On the other hand, we investigate if the replacement of the flat tax by the progressive tax in the Czech Republic and Slovakia in 2013 negatively affected the growth of GDP per capita.

Keywords: flat rate income tax, tax reform, difference-in-differences

JEL Classification: C31, H20, H24

1. Introduction

During the 19th century, a tax system where everyone paid relatively similar taxes, has been established in most European countries. It was only after the First World War when a progressive tax was introduced as a result of the increase in government spending on social security and military expenses. Economists believed that relatively higher taxation of higher income is fair, because it does not reduce the social status of the taxpayer. Later, however, some economists and politicians have begun to criticize the progressive income tax system as

unfair because it punishes successful people with higher incomes. As a result, it demotivates them and leads them to avoid paying taxes (Blacejova, 2012).

Beyond the main aim on public expenses, the tax system can be considered as a key tool in creating a favourable area for economic growth and sustainable development (Vlad & Breyearu, 2015). One way to achieve this may be to use the progressive tax system. In seminal work of Robert Hall and Alvin Rabushka, 19% flat-rate tax system for the US was proposed (Hall & Rabushka, 1995). They argued that the implementation of the principle of fairness is not the role of tax policy, but of social policy.

In the scientific literature, there are many arguments both for and against the flat-rate taxation system, as pointed out by Ambrus (2012), Blejcova (2012) and Pántya et al. (2016). The positive factors of the flat tax system include lower complexity of tax laws, a more transparent tax system, lower administrative costs, increased tax compliance, and it may also increase labour supply and employment (Peichl, 2014). As a compound effect, it can increase economic growth. On the other side, this system is not vertically fair, it can increase the tax burden in lower wage categories while decreasing it in higher ones. Therefore, it is not surprising that experience from countries that have introduced the flat tax is not unambiguous.

1.1 Flat rate tax systems in practice

At present, a progressive tax system is being used in all developed countries. An exception is some US states, though. At federal level, the US uses the progressive tax system, but state income tax is applied in 41 states as well. In eight of them the flat income tax system is used, tax rate ranging from 3.07% in Pennsylvania to 5.5% in North Carolina (Scarboro, 2018).

In the 20 years, there has been considerable progress in the expansion of the European Union and the Eurozone, and at the same time, the process of macroeconomic harmonization is evident. However, as Rozmahel, Groch & Litzman (2014) pointed out, significant differences in the monetary and fiscal policies of European countries are evident. While the European Central Bank applies the same monetary policy measures for all countries of the European Union in accordance with the convergence criteria of the Maastricht Treaty, fiscal policies are still managed by national authorities (Vlad & Breyearu, 2015).

Most member states of the European Union use tax systems whose tax rates increase with income. In the last 20 years, however, some of the Central and Eastern European countries implemented tax reforms that lead to the flat-rate tax systems. Table 1 presents EU member states that currently have the flat rate personal income tax system. Table 2 lists EU member states that previously had the flat rate personal income tax system, but are now using the progressive tax system.

Busler (2013) analysed several different types of taxes and concluded that the single tax rate of 12% would be approximately revenue neutral in the US and would lead to higher levels of economic growth. Even though this research focuses on US income tax, author believes that the conclusions apply to other states, including developing countries, taking economic and cultural differences into account. Experts from the former socialist countries, Slovenia, Croatia and Bosnia and Herzegovina, mostly disagree with the flat tax, though (Blažić et al., 2017). With regard to their research, 59% of Croatian experts and 66% of Slovenian experts do not support the flat tax. In Bosnia and Herzegovina, currently 10% flat tax rate is used for personal income. 66% of experts in Bosnia and Herzegovina agree that more marginal

personal income tax rates should be introduced, however. It is very likely that a new rate will be introduced in Bosnia and Herzegovina's Reform Agenda 2018.

Also public is inconsistent with its attitude towards flat taxation. Although most responders in the Roberts, Hite & Bradley (1994) survey indicate the preference for progressive taxation in abstract questions, significantly different responses to concrete questions were observed.

Table 1: EU states with a flat rate personal income tax

	<i>Introduced</i>	<i>Flat tax rate (after reform)</i>	<i>Flat tax rate (year 2018)</i>
<i>Bulgaria</i>	2008	10%	10%
<i>Estonia</i>	1994	26%	20%
<i>Hungary</i>	2011	16%	15%
<i>Lithuania</i>	1994	33%	15%
<i>Romania</i>	2005	16%	16%

Source: Worldwide Personal Tax and Immigration Guide (EYGM, 2017), ECB Monthly Bulletin (ECB, 2017)

Table 2: EU states that had a flat rate personal income tax in the past

	<i>Introduced</i>	<i>Flat tax rate (year 2018)</i>	<i>Progressive tax [year]</i>
<i>Czech Republic</i>	2008	15%	2013
<i>Latvia</i>	1995	25%	2018
<i>Slovakia</i>	2004	19%	2013

Source: Worldwide Personal Tax and Immigration Guide (EYGM, 2017), ECB Monthly Bulletin (ECB, 2017)

Difference-in-differences method (DiD) was used by considerably large number of researchers for evaluation of the effects of tax reforms. Galletta & Redonda (2017), for example, evaluated the effects of the corporate income flat tax reform on businesses' investment decisions. Their research suggests that the introduction of the flat tax reform had a negative effect both on the number of establishments and on the number of employees. A weighed DiD method was applied by Duncan & Peter (2010) for evaluation of the effects of flat tax reform in Russia in 2001. Their results show that the Russian tax reform had a statistically significant influence on hours of work for men although no effect for work hours for women. The text reform also increased the probability of finding a job both for men and women.

2. Methods

There are two primary aims of this study. First, to investigate if the introduction of the flat income tax rate in Hungary in 2011 influenced the economic growth of the country. Second, to ascertain if the replacement of flat tax by progressive tax in Czech Republic and Slovakia in 2013 had negative effect on their economics. We will measure the economic growth of a country via the percentage change of GDP per capita.

In view of all that has been mentioned so far, we suppose that the introduction of the flat-rate tax system in 2011 had positive effect on the growth of GDP in Hungary. So far, however, there has been little discussion about the effect of switch from the flat-rate tax system back to the progressive-rate tax system. We investigate the influence of this effect in the case of Slovak Republic and Czech Republic. Both states used flat-rate tax systems but reinstated the progressive-rate tax systems in 2015.

2.1 Difference – in – differences

Difference-in-differences method is the statistical method frequently used in econometrics to evaluate the effects of some treatment of interest on specified dependent variable (Abadie, 2005). It is often used if the data arise from the so-called natural experiment. A natural experiment occurs when an exogenous event changes the environment in which evaluated units operate. A typical example of such exogenous event may be the change in some government policy, for example. Therefore, this method is suitable for measuring the effect of the flat-tax rate introduction on economic growth of the particular state (Angrist & Pischke, 2008).

Using linear regression model, DiD method detects the differences between outcomes in two groups: treatment group and control group. Treatment group is a group under investigation, in our case the states where tax system has changed, and control group is the group of states with no change in tax system.

The DiD regression model is of the form (Wooldridge, 2015):

$$y = \beta_0 + \beta_1 \cdot dT + \beta_2 \cdot d2 + \beta_3 \cdot d2 \cdot dB + \varepsilon \quad (1)$$

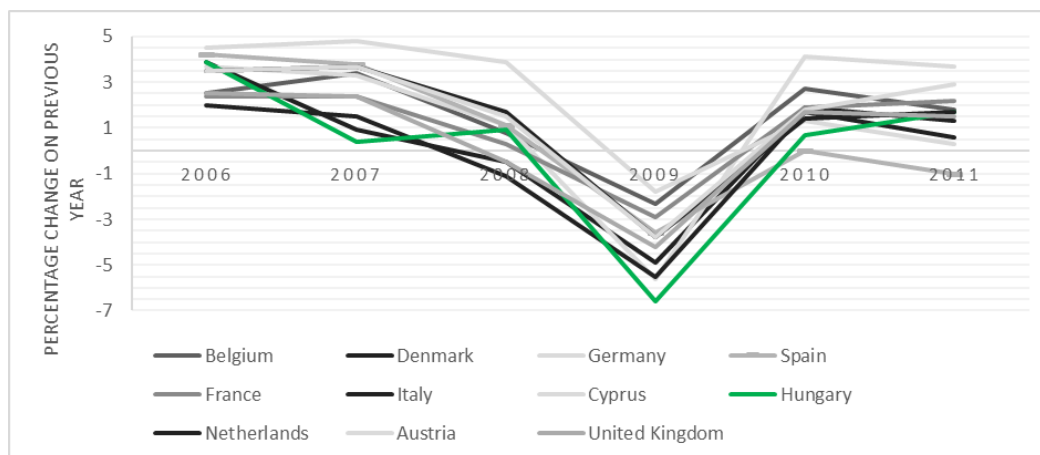
Here dummy variable dT equals unity for states in treatment group and zero for states in control group. Dummy variable $d2$ equals one for the post-treatment period and equals zero for the pre-treatment period. The y is the outcome variable of interest, the change of GDP per capita on previous year (Eurostat, 2018, A). The parameter measuring the effect of the treatment is the β_3 , the difference-in-differences estimator.

We also used three more explanatory variables for better regression model: the percentage change of labour productivity per person employed (Eurostat, 2018, C), the unemployment rate (Eurostat, 2018, B) and dummy variable *Year2009* – to take year 2009 into account, when the economic crisis most affected the economy of evaluated states (Letko, 2013).

2.2 Data – selection of control group

DiD method requires common trend assumption, that trends in both treatment and control groups are the same. In this case the GDP trend should be similar. It is often difficult to check if this assumption holds. We used the graphical method as suggested by Meriküll & Rõõm (2014). We displayed the trend of all states in Eurostat database and selected only states with GDP trend similar to the trend of treatment state (Hungary). Consequently, the treatment group was specified as: Belgium, Denmark, Germany, Spain, France, Italy, Cyprus, Netherlands, Austria, and United Kingdom. The comparison of GDP trends in treatment and control groups is shown in Figure 1.

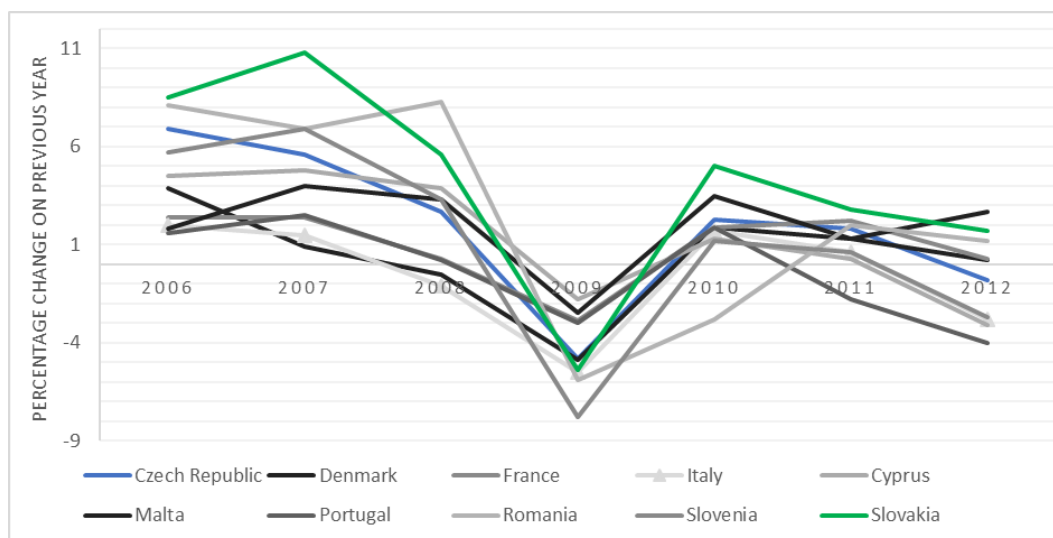
Figure 1: Real GDP growth rate of selected states in 2006 – 2011



Source: Eurostat, A (2018)

We used the same method for determination of the control group in the second part of our research. The treatment group consists of two states, Slovak Republic and Czech Republic. The control group consists of the states with similar trend of GDP. In this case, Denmark, France, Italy, Cyprus, Malta, Portugal, Romania, and Slovenia were included in the control group. The GDP trend in these states is presented in Figure 2.

Figure 2: Real GDP growth rate of selected states in 2006 – 2012



Source: Eurostat, A (2018)

3. Results and discussion

The results of the first part of our research are displayed in Table 3. The value of the coefficient of interest, *Effect*, is 2.28, which implies that the introduction of the flat-rate tax system in 2011 in Hungary had positive effect on its GDP. The P-value of the coefficient is 0.0072, which confirms that this effect is statistically significant at the level of significance 1%. On average, the introduction of the flat rate tax in Hungary caused 2.28% increase of GDP per year in comparison to the states in the control group.

Table 3: Difference-in-differences method results: Hungary, 2011

	Coefficients	SE	P-value	95% confidence interval	
				Lower	Upper
<i>Intercept</i>	2.36	0.285	0.0000	1.80	2.93
<i>Period</i>	-0.32	0.280	0.2576	-0.87	0.24
<i>Country</i>	-1.04	0.589	0.0805	-2.20	0.13
<i>Effect</i>	2.28	0.837	0.0072	0.63	3.94
<i>Labour</i>	0.70	0.108	0.0000	0.49	0.92
<i>Unemployment</i>	-0.14	0.028	0.0000	-0.19	-0.08
<i>Year2009</i>	-3.52	0.596	0.0000	-4.69	-2.34

Source: Own calculations

In the second part of our research, we investigated if the re-introduction of the progressive tax systems in Slovak Republic and Czech Republic had any effect on their GDP development. The results of DiD method used are in Table 4. We see, that the return to progressive tax system had statistically significant negative effect on the GDP growth in two evaluated states (at the level of significance 5%). On average, the increase of GDP in Slovakia and Czech Republic was lower by 1.97% compared to the states in the control group.

Table 4: Difference-in-differences method results: Czech Republic and Slovakia, 2013

	Coefficients	SE	P-value	95% confidence interval	
				Lower	Upper
<i>Intercept</i>	3.86	0.458	0.0000	2.95	4.76
<i>Period</i>	1.25	0.316	0.0001	0.62	1.88
<i>Country</i>	3.44	0.697	0.0000	2.05	4.82
<i>Effect</i>	-1.97	0.961	0.0423	-3.88	-0.07
<i>Labour</i>	0.80	0.069	0.0000	0.66	0.94
<i>Unemployment</i>	-0.42	0.052	0.0000	-0.53	-0.32
<i>Year2009</i>	-3.14	0.607	0.0000	-4.34	-1.94

Source: Own calculations

4. Conclusion

It is noteworthy that flat-tax reforms get more attention both in media and scientific research than other tax reforms. In 2007 and 2008, for example, the Polish government introduced the package of reforms that led to a significant reduction in tax wedge. The reform consisted of the introduction of the income tax credit for families with children and reductions in the disability rate of social security contributions. Regarding the Morawski & Myck (2009), these reforms brought much greater reductions in the tax burden compared to a widely discussed 15% flat tax.

Our research shows, however, that flat rate income tax has statistically significant positive impact on the growth of GDP per capita, as was demonstrated in the case of Hungary. We also showed that the return to progressive tax system had statistically significant negative effect on the GDP growth in Slovakia and Czech Republic.

References

- [1] Abadie, A. (2005). Semiparametric Difference-in-Differences Estimators. *The Review of Economic Studies*, vol. 72, no. 1, pp. 1-19.
- [2] Ambrus, A. (2012). The Advantages and Backdraws of the Flat-rate Personal Income Tax. *Journal of International Studies*, vol. 5, no. 2, pp. 47-57.
- [3] Angrist, J. D. and Pischke, J. S. (2008). *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton University Press, pp. 227–243.
- [4] Blecjova, B. (2012). Progressive or “flat” tax – economic and political dilemma. *Politická Ekonomie*, vol. 60, no. 5, pp. 649-667.
- [5] Blažić, H., et al. (2017). What tax experts in former socialist countries think about tax policy: The cases of Slovenia, Croatia and Bosnia and Herzegovina. *Economic Systems*, vol. 41, no. 4, pp. 667-693.
- [6] Busler, M. (2013). Income tax policy: Is a single rate tax optimum for long-term economic growth? *World Journal of Entrepreneurship, Management and Sustainable Development*, vol. 9, no. 4, pp. 246-254.
- [7] Duncan, D. and Peter, K. S. (2010). Does labour supply respond to a flat tax? *Economics of Transition*, vol. 18, no. 2, pp. 365-404.
- [8] ECB (2007). Flat Taxes in Central and Eastern Europe. *European Central Bank Monthly Bulletin*. [Online]. Available: https://www.ecb.europa.eu/pub/pdf/other/mb200709_focus10.en.pdf?351786d41c0e897474ce10ce41d12efd
- [9] Eurostat A, 2018. [Online]. Available <http://ec.europa.eu/eurostat/tgm/table.do?-tab=table&init=1&plugin=1&language=en&pcode=tec00115>
- [10] Eurostat B, 2018. [Online]. Available: https://ec.europa.eu/eurostat/tgm/refresh-TableAction.do?tab=table&plugin=1&pcode=tepsr_wc170&language=en
- [11] Eurostat C, 2018. [Online]. Available: <https://ec.europa.eu/eurostat/tgm/table.do?-tab=table&init=1&language=en&pcode=tipsna70&plugin=1>
- [12] EYGM (2017). Worldwide Personal Tax and Immigration Guide 2017-2018. [Online]. Available: [https://www.ey.com/Publication/vwLUAssets/Worldwide_Personal_Tax_and-Immigration_Guide_2017-18/\\$FILE/Worldwide-Personal-Tax-and-Immigration-Guide-2017-18.pdf](https://www.ey.com/Publication/vwLUAssets/Worldwide_Personal_Tax_and-Immigration_Guide_2017-18/$FILE/Worldwide-Personal-Tax-and-Immigration-Guide-2017-18.pdf)
- [13] Galletta, S. and Redonda, A. (2017). Corporate flat tax reforms and businesses' investment decisions: Evidence from Switzerland. *International Tax and Public Finance*, 24(6), 962-996. doi:10.1007/s10797-017-9446-3
- [14] Hall, R. E. and Rabushka, A. (1995). *The flat tax*. Stanford, Calif: Hoover Institution Press. [Online]. Available: <https://www.hoover.org/research/flat-tax>.
- [15] Letko, R. (2013). Rovná daň a jej vplyv na ekonomický rast [Online]. Praha, Available: <https://theses.cz/id/4p26u6/>. Vysoká škola ekonomická v Praze.
- [16] Meriküll, J. and Rõõm, T. (2014). One Currency, One Price? Euro Changeover-Related Inflation in Estonia. *Journal of Common Market Studies*, vol. 53, no. 4, pp. 822-839.

- [17] Morawski, L. and Myck, M. (2010). Klin-ing up: Effects of Polish tax reforms on those in and on those out. *Labour Economics*, vol. 17, no. 3, pp. 556-566.
- [18] Pántya, J., Kovács, J., Kogler, C. and Kirchler, E. (2016). Work performance and tax compliance in flat and progressive tax systems. *Journal of Economic Psychology*, vol. 56, pp. 262-273.
- [19] Peichl, A. (2014). Flat-rate tax systems and their effect on labor markets. *IZA World of Labor*. Available: <http://dx.doi.org/10.15185/izawol.61>.
- [20] Roberts, M. L., Hite, P. A. and Bradley, C. F. (1994). Understanding Attitudes Towards Progressive Taxation. *Public Opinion Quarterly*, vol. 58, no. 2, pp. 165.
- [21] Rozmahel, P., Grochová, L. and Litzman, M. (2014). The effect of asymmetries in fiscal policy conducts on business cycle correlation in the EU. *WWW forEurope Working Papers* series 62, WWWforEurope. [Online]. Available: <https://ideas.repec.org/p/feu/wfewop/y2014m5d0i62.html>
- [22] Scarboro, M. (2018). State Individual Income Tax Rates and Brackets for 2018. *Tax Foundation Fiscal Fact No. 576*. [Online]. Available: <https://files.taxfoundation.org/20180315173118/Tax-Foundation-FF576-1.pdf>
- [23] Vlad, C. and Brezeanu, P. (2015). European taxation – between flat and progressive tax. *Strategica: Local versus global*, pp. 528-534.
- [24] Wooldridge, J. M. (2015). Introductory econometrics: a modern approach. 5th ed. Mason, OH: South Western, Cengage Learning, 882 p.

SMALL INNOVATIVE FIRMS OF GLOBAL IMPORTANCE: APPROACHES TO PERFORMANCE EVALUATION

Tatyana Boyko^{1,a,*}, Natalya Frolova^{2,b}

¹Department of World Economy and Customs FSEI HE "Khabarovsk State University of Economics and Law", Khabarovsk, Tihookeanskaya str. 134, Russia

²Department of World Economy and Customs FSEI HE "Khabarovsk State University of Economics and Law", Khabarovsk, Tihookeanskaya str. 134, Russia

^atanbo60@mail.ru, ^bfrolova.nc@rambler.ru

*Corresponding author

Abstract. In the globalized world economy, the role of small innovative firms of global importance, the so-called "fast-growing" firms, is growing. These firms are the main generators of economic activity. There is a rating of innovation firms, which includes indicators such as firm revenue, average R & D expenses, minimum age of the company, launch of a new product, etc. However, for small innovation firms of global importance, it is necessary to establish additional indicators that allow them to evaluate their activities objectively on the external market taking into account the chosen direction. To assess the effectiveness of small innovative firms of global importance, there is no universal methodology and unified approach to indicators characterizing their effectiveness or criteria. What can be put in the basis of the methodology for assessing the effectiveness of small innovative firms of global importance? First of all, obviously, the number of countries with which the firm operates, the level of costs when working in foreign markets, the share of exports in GDP, in total exports, etc. Moreover, the choice of performance indicators should be carried out in compliance with the conditions for their satisfaction with the principles of the effectiveness of the activities of such firms and taking into account the interdependence of individual indicators. In this article, the authors consider the need to develop a methodology for assessing the performance of small innovative firms of global importance and reveal the benefits they can receive when using it.

Keywords: small innovative firms, globalization, evaluation of effectiveness

JEL Classification: I 031, F 23, F 61

1. Introduction

The globalization of the world economy encourages small innovative firms (SIF) to enter foreign markets.

Globalization is manifested primarily in the influence of its main derivatives, such as: scientific and technological progress, the activities of TNCs, the universalization of performance standards, cooperation within the global value chains.

Small innovative firms can not operate outside these processes. On the one hand, globalization has an impact on them by introducing new technologies into the activities of small innovative firms, incorporating SIF into global value chains and implementing international performance standards.

On the other hand, under conditions of increasing competition, especially the growth of large TNCs, and squeezing out small firms, the latter have to seek opportunities for survival in such a tough business environment. High-growth firms (HCF) represent a highly desirable subset of firms, which provide disproportionate economic gains, and greater insight into their determinants which is of interest to policymakers, scholars and business owners (Krasniqi, & Desai, 2016). These opportunities lie in finding out or creating key competencies of small innovative firms in the field of innovation and their subsequent entry into global markets.

In this regard, the question of SIFs' effectiveness evaluation arises in order to understand the scale of their activities as well as the existing problems, etc.

The strategy of a modern firm should be adequate to the changed business environment. In the new business ecosystem, access to resources, not ownership, is important. To solve any problem, it is necessary to learn how to attract high-quality resources from anywhere in the world. Each small innovative firm seeks to increase its share market, revenue growth, acquisition of financial stability, increase in the level of own competitiveness in General.

Small innovative firms are now required to create, retain and develop their specific resources and competencies ahead of the curve. Effective and expansive market entry is determined by key competencies.

The existing methodologies for assessing efficiency are more likely to be used to evaluate the activities of big businesses or the level of innovation in countries.

2. Methods

Let's consider the actual methodologies for assessing the performance of companies. Approaches to the evaluation of company efficiency appear mainly in assessment and ratings procedures which to a greater extent analyze the activities of large businesses both within the global scale and within a single country.

For example, there is a methodology for assessing market capitalization of the world's largest companies. It is based on the market capitalization which assesses a company by taking into account the price of stock and its total number. "Fortune" magazine annually conducts ranking of the top 500 companies worldwide as measured by total income, profit, assets, share capital, income dynamics per share for the last 10 years, total annual income of all investors, and average annual total income of investors for the last 10 years.

Boston Consulting Group (BCG) publishes an annual rating of one hundred most innovative companies in the world. Companies are ranked according to the "innovation premium", i.e. the coefficient representing the difference between their market capitalization and the net present of cash flow from the existing businesses (the algorithm for calculating the coefficient belongs to Credit Suisse HOLT).

In the European Union, the European Innovation Scoreboard methodology has been used since 2001, which involves calculation of a comparative composite innovation index for EU

countries including investment, framework conditions, innovative activity (Framework conditions, Investments, Innovation activities, and Impacts).

3. The main part

In the framework of this study, the authors propose the ranking of small innovative firms that are or will be operating on a global scale (Griffith et al., 2006).

The importance of this approach is due to a number of factors. Firstly, small innovative firms are considered an important factor in the dynamic development of entrepreneurship and a prerequisite for functioning of any economic system (Boyko & Frolova, 2016); the activities of small innovative firms are aimed at creating innovative products, their successful marketing, and opening up new market segments (Huergo & Moreno, 2011). Secondly, when entering foreign markets, small innovative firms face a number of problems associated with high level of competition from big companies (Aghion et al., 2015), different barriers created by foreign countries; inadequate legal supports and a number of others. Thirdly, such companies need state support to help them develop new markets; as well as financial support with grants, subsidies, etc.

It should be noted that the countries of Western Europe the creation of institutional environment allows such firms successfully develop. In the UK ZAPU-projects to create global innovation-the leaders. In 2013, British rule the government launched a special programme "Future Fifty" ("Future 50), which puts its her goal is the active promotion of 50 most fast-growing firms in the country. In the OS program new emphasis is placed on Concierge management, that is, a comprehensive service support research institutes, including ensuring their direct contact TA with key government agencies.

A number of countries in South-East Asia are artificially developing national innovative firms, turning them into players in the world markets. In the Republic of Korea, "global hidden Champions" are grown from the most promising Korean companies, mainly middle-level technology in the framework of programs and projects, United under the common name "Global SMEs" ("global SMEs"). A major project implemented in the Republic of Korea is the program "Next Global Champ" ("future global champion"), which is aimed at achieving the level of annual sales in sponsored companies up to \$ 100 million.

Fourthly, the relationship between innovation competencies and technological cooperation with other firms is important. At the same time, it is possible to rely on the evolutionary theory of the firm and the concept based on it, which defines the firm as a set of its competencies. This theory assumes that the learning process that accompanies the active interaction of employees, provides the company the ability to quickly create and share new knowledge (information). Active knowledge sharing can be both formalized and spontaneous. At the same time, it provides both codification and crystallization of new knowledge. The evolutionary theory of the firm emphasizes the importance of organizational competencies and coordination of economic activities of market entities. At the same time, it distinguishes between knowledge and competencies. They are of great importance when it comes to linking innovative competencies with technological collaboration with other firms in the market (Gasarov et al., 2016).

In our opinion, small innovative firms of global importance can be defined as new fast-growing firms. The latter were referred to as "fast- growing firms" or "high growth firms"

(HGFs) (Krasniqi & Desai, 2016). This definition is based on OECD's criterion of 20% of the annual rate of growth either of a company turnover or the number of its employees.

It is these firms that act as main generators of economic activity creating more than half of jobs in the developed countries. Besides, such firms are more resistant to the external environment (Hashi & Krasniqi). The data for individual gazelle companies reveal that they use special mechanisms to stay competitive in the market in the conditions of economic recession; first of all, they are trying to modernize production, get rid of unnecessary costs (but not to reduce the expenses that create profit). At the same time, a significant number of gazelles choose a strategy of creating new products and launching them on the market as well as developing new niches (Gasnov et al., 2016).

However, any small firm can choose the way by which it will be able to acquire indicators of a firm of global significance. In this case the development can take place in two directions: 1) a small innovative firm that has financial, personnel and other resources independently enters a foreign market. Determining factors may be economic and geographical position of the region, for example, neighborhood with foreign countries (Savelieva & Maydanik, 2016), the demand for products in the foreign market, limited demand in the domestic market or, vice versa, significant demand in foreign markets (Lyasnikov & Lyasnikova, 2016), expansion of the share and geography of the sales market and increase in profits, etc. (Boermans & Roelfsema, 2012); 2) a small innovative firm "grows" reaching the level of macro-values while its activities are carried out throughout the country through branches, representative offices, availability of patents and licenses (Souza & Segatto-Mendes, 2008), etc.; then a firm enters foreign markets due to the same factors mentioned above. However, the geographic coverage can be much wider as it has more powerful resources (financial, personnel, etc.).

To assess the effectiveness of companies' activities, a methodology is needed to indicate to what extent firms are global and innovative. The methodology can be based on groups of indicators including financial assets, creation of innovative products, ways to enter foreign markets, corporate social responsibility (González-Rodríguez et al., 2016), etc.

A group of financial indicators can include the cost of innovation, the amount of expenditures for R & D, the cost of licenses and patents. Measurement of innovative products creation and development includes the number of innovative products created, the number of patents and licenses received.

A group of indicators showing the global nature of small innovative firms should include the breadth of market penetration of innovative products (countries, regions); ways to enter global markets; export of innovative goods and services (Lyasnikov & Lyasnikova, 2016). It is important to assess the export potential in this group of indicators, in particular the share of innovative products sold in foreign markets, the efficiency of production of innovative export products, the share of profits from the export of innovations and a number of others.

Table 1: Indicators for assessing performance of small innovative firms of a global scale

Metric group	Index	The content of the indicator.
Financial assets	Costs of innovation	indicates the financial costs involved in SIF's innovation activity;
	Volume of R & D expenditures	establishes a threshold for an enterprise to be assigned to SIF type;
	Expenditures on licenses and patents	allows SIF to have tax breaks, simplified procedures for market entry, etc.;

Development of an innovative product	Number of innovative products created Number of patents and licenses received Innovative goods / services renewal coefficient	values the extent to which SIF is engaged in the sustainable development of product/service innovation;
Global nature of small innovative firms	Breadth of innovative products coverage (countries, regions) Ways to enter global markets. Export of innovative goods and services.	indicates the relevance of innovation; shows the extent to which SIF is globalized; reveals the geographical structure of sales.

Each indicator is assigned a specific value, the integral index is calculated. It should also be noted that in assessing the global nature of small innovative firms, profitability and profit margin are calculated. Important in this case is ranking of small innovative firms of global significance, which in aggregate should have a measure that tends to 100%.

4. Conclusion

Application of the methodology for assessing the performance of small innovative firms of global importance allows us ,on the one hand, to compare the activity of small innovative firms in different countries and, on the other hand, to understand to what extent all necessary conditions for the development of small firms have been created in different countries (Krasniqi & Desai, 2016). It is important in the analysis of activity and industry affiliation, as well as belonging to a particular industry (Grimmer et al., 2016). It is also necessary to determine the scale of activities in foreign markets when calculating the integral indicator, which will allow to draw certain conclusions about their export potential.

Accordingly, this will make it possible to improve business environment in some cases, and to create equal conditions for conducting business in others. The methodology also helps to identify the challenges that SIFs are faced with inside the country and beyond while carrying out innovative activities.

References

- [1] Aghion, P., Cai, J., Dewatripont, M., Du, L., Harrison, A. and Legros, P. (2015). Industrial Policy and Competition. *American Economic Journal: Macroeconomics*, vol. 7, no. 4, pp. 1-32.
- [2] Bergek, A. and Norrman, C. (2014). Integrating the supply and demand sides of public support to new technology-based firms. *Science and Public Policy*, vol. 42, no. 4, pp. 514-529.
- [3] Boermans, M. A. and Roelfsema, H. J. (2012). The Effects of Internationalization on Innovation: Firm-Level Evidence for Transition Economies. *SSRN Electronic Journal*.
- [4] Boyko T. and Frolova N. (2016) The question of the core competencies of small innovative companies of global significance in the innovation mesoeconomics. *Proceeding of the conference Globalization and its socioeconomic consequences*, Rajecke Teplice, Slovakia.

- [5] Gasanov EA, Boyko TS and Frolova NS (2016). Small innovative firms of meso-, macro- and global importance, features of formation and government support measures. *Economics and Entrepreneurship*, no. 12 (Part 2), pp. 82-85.
- [6] González-Rodríguez, M. R., Fernández, M. C. and Simonetti, B. (2016). Corporate Social Responsibility perception versus human values: A structural equation modeling approach. *Journal of Applied Statistics*, vol. 43, no. 13, pp. 2396-2415.
- [7] Griffith, R., Huergo, E., Mairesse, J. and Peters, B. (2006). Innovation and Productivity across Four European Countries.
- [8] Grimmer, L., Miles, M. P. and Grimmer, M. (2016). The performance advantage of business planning for small and social retail enterprises in an economically disadvantaged regio., *European Journal of International Management*, vol. 10, no. 4, pp. 403.
- [9] Hashi, I. and Krasniqi, B. A. (2011). Entrepreneurship and SME growth: Evidence from advanced and laggard transition economies. *International Journal of Entrepreneurial Behavior & Research*, vol. 17, no. 5, pp. 456-487.
- [10] Huergo, E. and Moreno, L. (2011). Does history matter for the relationship between R&D, innovation, and productivity? *Industrial and Corporate Change*, vol. 20, no. 5, pp. 1335-1368.
- [11] Krasniqi, B. A. and Desai, S. (2016). Institutional drivers of high-growth firms: Country-level evidence from 26 transition economies. *Small Business Economics*, vol. 47, no. 4, pp. 1075-1094.
- [12] Lyasnikov N.V. and Lyasnikova Y.V. (2016). International marketing activity of multinational companies in conditions of instability // MIR (Modernization, Innovation, Development), t. 7, no. 4, pp. 161-166.
- [13] Roberts, S. (n.d.). Competition Policy, Industrial Policy, and Corporate Conduct. The Industrial Policy Revolution II.
- [14] Savelieva IN, and Maydanik VI (2016). Small innovative enterprises in industry: Methodical approach to the evaluation of development opportunities Izvestiya UrGUE 1 (63) Available: <http://izvestia.usue.ru/download/63/13.pdf>
- [15] Thai, M. T. and Turkina, E. (n.d.). The theory of transition. Internationalization of Firms from Economies in Transition, pp. 3-14.
- [16] Souza, A. S. and Segatto-Mendes, A. P. (2008). The competence accumulation process in the technology transference strategy. *BAR - Brazilian Administration Review*, vol. 5, no. 2, pp. 125-138.
- [17] Top 100 largest companies in the world. Available: <https://www.pwc.com/ua/en/survey/2013/assets/pwc-top-100-rus.pdf>

FINANCIALIZATION IN A GLOBAL PERSPECTIVE OVER LAST HALF OF THE CENTURY

Mindaugas Butkus^{1,a}, Agnė Morkienė^{2,b,*}

^{1,2}Šiauliai University, P. Višinskio str. 25, LT76351 Šiauliai, Lithuania

^amindaugobutkaus@gmail.com, ^bagnesmorkienes@gmail.com

*Corresponding author

Abstract. Each country financial system is a part of global financial system. Economies of all countries become more and more globalized including their financial systems. Financialization, i.e. the process in which financial markets and their participants gaining more influence on the functioning of enterprises/companies and the framework of financial system, changes the functioning of the economic system, both at the macro- and microeconomic level. It results not just in increasing the importance of the financial sector in relation to real sector, but as well as in transferring the income from the real economy to the financial sector, contributing to the growth of income inequality and stagnant wages. This paper deals with the question concerning global aspects of financialization and its aim is twofold: (i) overviewing recent contributions in this field to define financialization, briefly narrate its genesis emphasizing on problems caused by financialization and (ii) to analyse globalization aspect of financialization over the last half of the century at country level examining whether and at what extent this aspect of globalization is spread out across different regions and income groups and how it is linked with long-run growth.

Keywords: financialization, financial globalization, economic growth

JEL Classification: G15, E44, F63

1. Introduction

Globalization is one of the most important processes that influence everyday life of our society, as well as of the world economy. Process of financialization is also becoming global, irrevocable and unstoppable throughout the world. Growing global importance of finance, financial markets, and financial institutions to the economy are typical for the financialized world economy. Financialization has brought many issues of its impacts to economic growth. There are a large number of studies dealing with financialization that confirm its impact on household borrowing (Lavoie, 2012), consumption and demand (Onaran et al., 2011), income distribution (Zalewski & Whalen, 2010), investment in ‘real’ production (Orhangazi, 2008). However, there is still confusion about the nature and dynamics of financialization’s global aspects, including its impact on the economy. This article reviews evidence on the consequences of financialization across different regions and income groups. We have come to conclusions about importance of financialization and its relationship with long-run growth. The rest of the paper is organised as follows: Section 2 presents literature review on financialization and problems caused by financialization. In section 3 we examine dynamic of financial globalization of different regions and income groups. In section 4 we present

estimation results of correlation between financial globalization and long-run growth at country level across different regions and income groups. The last section concludes the paper.

2. Theoretical background of financialization

2.1 Concept of Financialization

Although financialization is an issue of today, in scientific research, the concept of financialization is not widely analysed and so there is a need to define what it is. The origins of the term "financialization" are unclear, although it has appeared more and more in the early 1990s. However, the fundamental issue of growing finance sector and power has been around since the late 1960s. The most common definition of the term "financialization" is probably given by Epstein (2005) but in various researches, authors interpret their definition of financialization in their own way and emphasize different aspects. The concepts of financialization of different authors and organizations are presented in Tab.1.

Table 1: Concepts of Financialization

Researchers / years	Concepts
Epstein, 2005	It means the increasing role of financial motives, financial markets, financial actors and financial institutions in the operation of the domestic and international economies.
Aalbers, 2008	Housing is a central aspect of financialization. The financialization of mortgage markets demands that not just homes but also homeowners become viewed as financially exploitable.
Dore, 2008	"Financialization" is a bit like "globalization" – a convenient word for a bundle of more or less discrete structural changes in the economies of the industrialized world. As with globalization, the changes are interlinked and tend to have similar consequences in the distribution of power, income, and wealth, and in the pattern of economic growth.
Zalewski & Whalen, 2010	The changing impact of financial systems on economic prosperity is usually called financialization.
Poppe, 2011	Consumers are dependent on lending in order to maintain their standard lifestyle. This is called financialization, which, on the one hand, can increase prosperity, but on the other hand - can create increased risk and uncertainty for the borrower.
Thomson & Dutta, 2015	Financialization must be understood as radical transformation within the financial sector that has altered entire economies – from the household and the firm to the functioning of monetary systems and commodity markets.

Source: authors' contributions

The provided definitions reflect a multidimensional nature of the financialization process. Taking into account the keywords contained in the concepts provided by authors and organizations, it is possible argue that financialization involves changes in the economies and societies of the three main aspects: within the financial sector itself, within productive industry and its relation to finance, and within the 'average' household. To summarize, financialization can be defined as the domination of the financial sector, of financial institutions and financial logics upon the rest of the economy, is thus primarily marked by the massive development, innovation and complexity of the financial sector.

2.2 Problems caused by Financialization

During financialization process there are various changes in the global economy and financial markets. These changes include liberalisation of both trade and capital markets

including massive legal and illegal capital flow, a prioritisation of price stability via inflation targeting, fiscal discipline. Financialization has a major impact on households. Banking system developed a sophisticated range of financial services. The last decade has witnessed a resurgence of mortgage financing and expanding consumer credit because households go into debt to compensate for their stagnating purchasing power (Lavoie, 2012). Researchers emphasize the depressive effect of financialization on productive investment. For example, according to Orhangazi (2008), financial investment by manufacturing companies may reduce firm managers' incentives to direct funds to productive investments. Thus, increased payments to financial markets reduce available domestic funds. There was found the negative correlation between investment and financialization on US non-financial corporations from 1973 to 2003, because financial assets increased in non-financial corporation balance sheets. It is thought that financialization has negative impact on consumption and demand. The income of profits redistribution, the increase in rentier income, housing and financial asset price inflation leads decrease in consumption. Consumption also can be negatively affected by increase in profits relative to wages (Onaran et al., 2011). One more negative effect of financialization is rising income inequality (Zalewski & Whalen, 2010). Income inequality has risen in most countries and regions over the past two decades due to increasing financial openness. Researchers emphasize the impact of financialization on opportunities for credit to the private sector and foreign direct investment that causes higher economic growth (Rousseau & Wachtel, 2011, Bosworth et al., 1999; Baharumshah & Thanoon, 2006; Choong, 2012, etc.). Negative effect of financialization is evaluated through its impact on increasing private credit, interest rates, rentier profit share (Khan & Khan, 1998, Onaran et al., 2011, etc.). Tab. 2 presents the results of scientific research analysis of relationship between financialization and economic growth.

Table 2: Relationship between financialization and economic growth

Variable of Financialization	Researchers / years	Positive	Not significant	Negative
Ratio of total credit extended by the financial sector to GDP	Arcand et al., 2012	U-shaped		
Ratio of M3 to GDP	Samargandi et al., 2015	U-shaped		
Credit to the private sector	Rousseau & Wachtel, 2011	X		
FDI	Bosworth et al., 1999; Baharumshah & Thanoon, 2006; Choong, 2012	X		
FDI	Aitken et al., 1997; Mencinger 2003		X	
Interest rates	Khan & Khan, 1998			X
Consumption credit	Dos Santos, 2011			X
Rentier profit share	Onaran et al., 2011			X

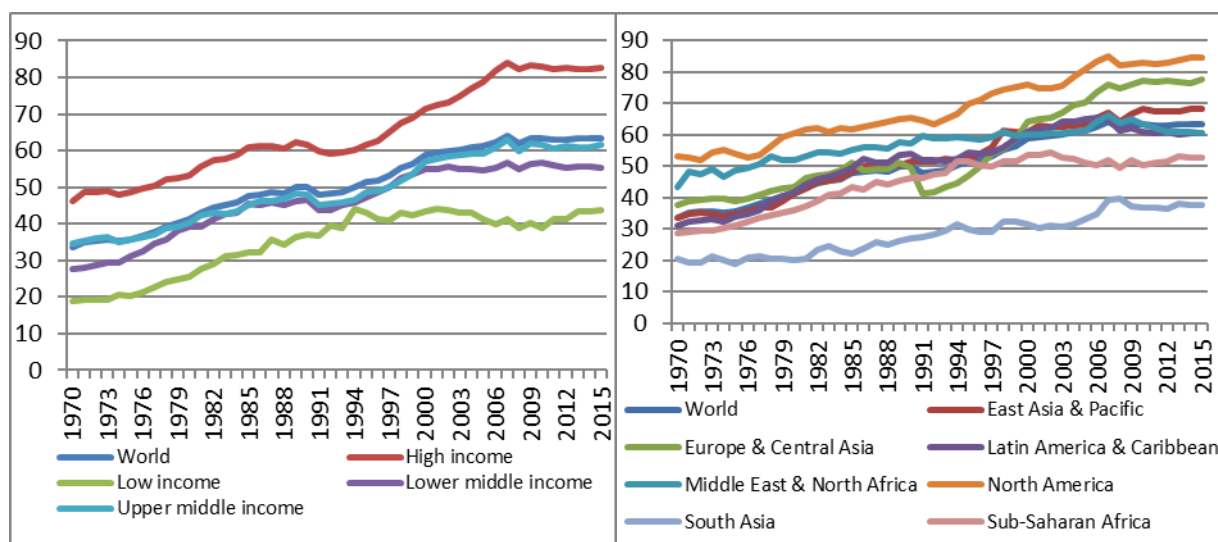
Several studies find that the relationship between economic growth and financial development is U-shaped, therefore after financial development exceeds a certain threshold level the effects are negative. As it can be seen, the findings of the studies are inconsistent and it is difficult to determine a clear causal relationship between financialization and economic growth.

3. Dynamic of financial globalization

To examine relationships between financial globalization and long-run growth, we will start by analysing dynamic of countries' financial globalization across different regions and income groups. Index of financial globalization is a part of KOF Globalization Index, which is

created by A. Dreher. The KOF Globalization Index measures the economic, social and political dimension of globalization. It is used in order to monitor changes in the level of globalization of different countries over extended periods of time. The current KOF Globalization Index is available for 185 countries and covers the period from 1970 until 2015. It consists of three major partial indexes, such as the economic globalization, the social globalization and the political globalization. The sub-domain of economic globalization covers both trade flows as well as financial flows (Dreher, 2006). *De facto* financial globalization is determined with reference to the foreign direct investment, portfolio investment, international debt, reserves and income payments. *De jure* financial globalization covers capital account openness and investment restrictions on financial flows. To quantify globalization aspect of financialization, we consider to use the *de facto* financial globalization sub-domain of economic globalization as a typical indicator. Figure 1 shows the extent of global dimension of financialization across different regions and income groups.

Figure 1: Financial Globalization across different income groups and regions in 1970 – 2015



Source: <http://globalization.kof.ethz.ch>

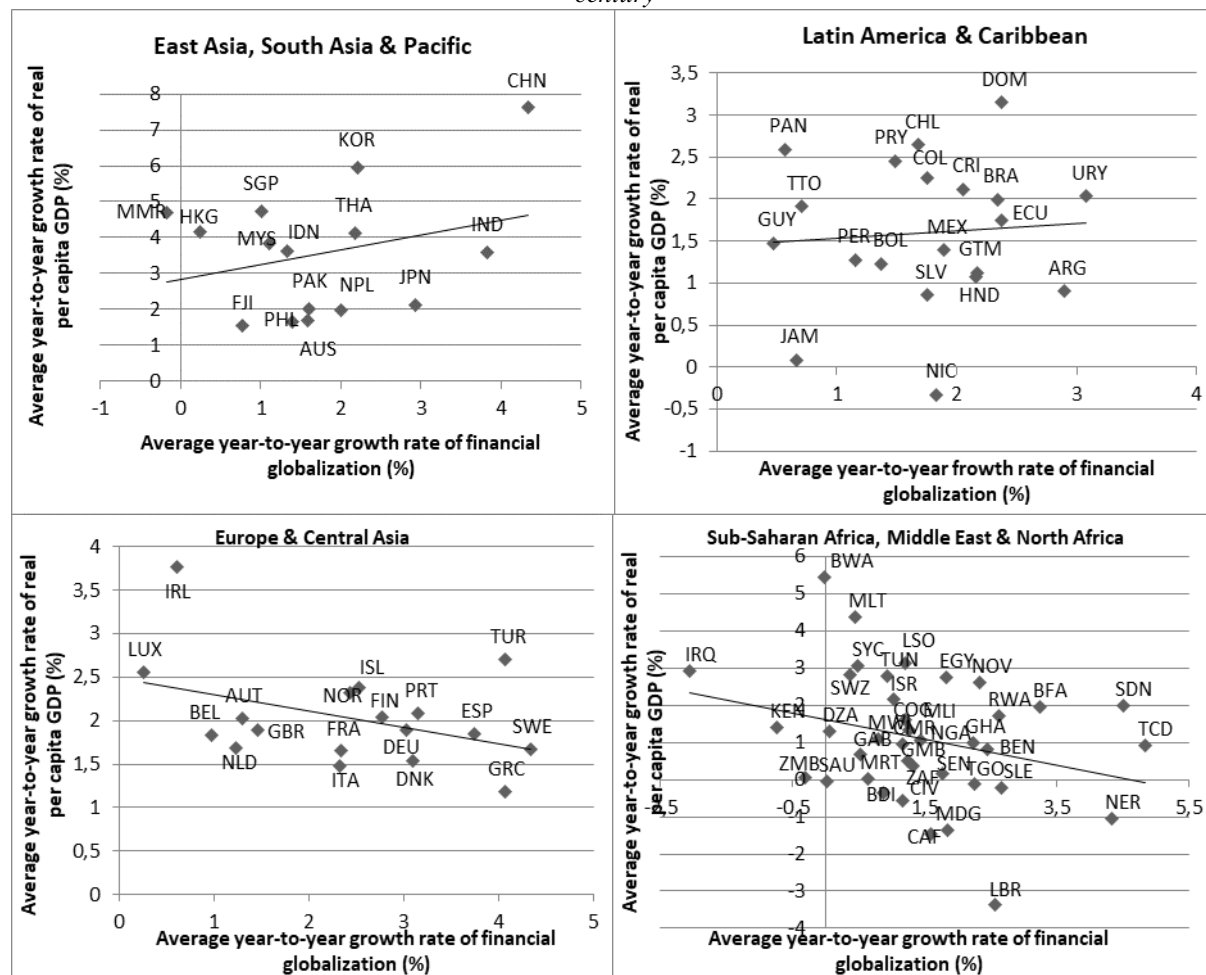
Financial sector became more global around the world (across different income groups and regions) over 1975 – 2015. Worldwide this increase was on average by 89%. One of the main reasons is that FDI to GDP increased from 0,5% in 1975 to 3,12% in 2015. It is not surprising that highest level of financial globalization over all period was in countries corresponding to high income group and the lowest level in countries corresponding to low income group. The dynamics of financial globalization was very similar for almost all groups of countries: growth of financial globalization started to slow down in 1985 and decreased in 1991. Afterwards, it picked up the increasing tendency and reached the highest level in 2007 for the reference period. These changes were conditioned by the dynamic of foreign direct and portfolio investment: foreign direct and portfolio investment share of GDP decreased in 1985 and it reached the highest level in 2007. We can exclude low income group of countries, where financial globalization has evolved in a different way: the highest level of the financial globalization was reached in 1994 and afterwards it started to decrease. The reason of it is that in 1994 international debt to GDP reached the highest level (55%). Nevertheless, it can be emphasized that over 1970-2015 financial globalization increased the most in low income group (by 129%) because all variables included in the index were growing fastest due to low

reference level. Examining financial globalization across the different regions, we see that it increased everywhere, but there were some different tendencies. The highest level of financial globalization for all period was in North America and from 1970 to 2015 it raised by 59%, because foreign direct and portfolio investment, international debt, reserves and income payments were higher than in others regions for the reference period. However, the lowest level of financial globalization remains in South Asia, because there is the lowest level of foreign direct investment – average 77% of GDP. It can be emphasized that over 1970-2015 financial globalization increased the most in East Asia & Pacific (104,24%) and Europe & Central Asia (105,16%). The breakdown of the Soviet Union lead to a drop in the index value for Europe & Central Asia in the early 1990 but after that region increased in capital account openness. In Figure 1 we see that the highest level of financial globalization in Middle East & North Africa and North America was reached in 2007. It was supported by increasing foreign direct and portfolio investment to GDP ratio.

4. Nexus between dynamics of financial globalization and long-run growth

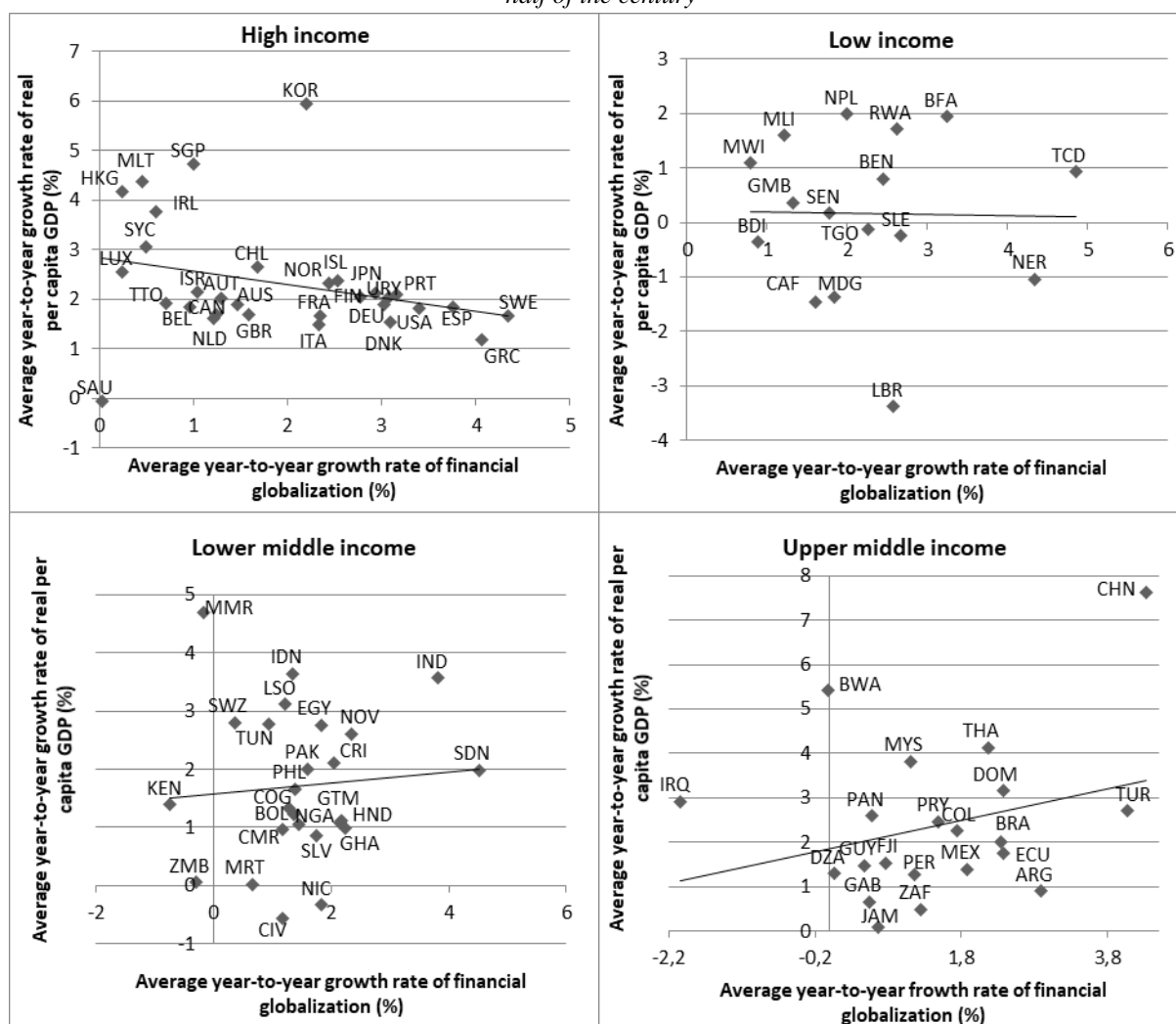
Economic growth and dynamics of financial globalization – are two specifics but potentially interrelated indicators. It can be argued that the impact of financial globalization on growth differs across countries depending on the level of income and region. Figure 2 shows relationships between dynamics of financial globalization and long-run economic growth.

Figure 2: Dynamics of financial globalization and economic growth across different regions over last half of the century



There are 4 groups of countries divided by income level. The largest one includes 31 high income countries. In all these countries growth rate of financial globalization is positive but relationship between average year-to-year growth rate of financial globalization and long-run economic growth is negative. Low income group of countries is the smallest consisting of 16 countries. In all of these countries, growth rate of financial globalization is positive, but in 7 countries of this group economic growth rates are negative, therefore there is the least close relationship between analysed indicators. In the lower middle income group we observe not very strong but positive relationship between dynamics of financial globalization and long-run economic growth. The last group is upper middle income consisting of 21 countries. There are only 2 countries with negative growth rates of financial globalization and the trend line shows the strongest positive relationship between analysed indicators.

Figure 3: Dynamics of financial globalization and economic growth across different income groups over last half of the century



However, across all regions and different income groups there is large data dissemination between countries and links between financial globalization and economic growth are weak and have no statistically significant evidence as it is shown in Tab. 3.

Table 3: Correlations between financial globalization and economic growth in the long-run

Group	High income	Low income	Lower middle income	Upper middle income	Latin America & Caribbean	East Asia, South Asia & Pacific	Europe & Central Asia	Sub-Saharan Africa, Middle East & North Africa
Pearson Correlation	-0,282	-0,017	0,084	0,286	0,079	0,290	-0,404	-0,293
Sig. (2-tailed)	0,124	0,949	0,689	0,209	0,742	0,295	0,097	0,074

Source: author's calculations

It can be thought, that in the last half of the century were different trends in and relationships between financial globalization and economic growth across different regions and income groups, so analysing nexus over very long period we found no statistically significant evidence on growth effects of financial globalization.

5. Conclusion

Financialization means the domination of the financial sector, of financial institutions and financial logics upon the rest of the economy. Based on theoretical assumptions and retrospective empirical studies, it can be argued that financialization can lead to positive, negative, statistically not significant and U-shaped impacts on countries' economic development. In empirical studies financialization is often expressed in terms of financial flows or interest rate, credit and others indicators. To examine relationships between financial globalization and long-run growth, we use index of financial globalization across different regions and income groups. We found that financial globalization increased across all regions and income groups. Examination of the impact of financial globalization on the long-run growth across has revealed that generally there is no significant impact over the long-run.

References

- [1] Aalbers, M.B. (2008). The financialization of home and the mortgage market crisis. *Competition & Change*, vol. 12, no. 2, pp. 148-166.
- [2] Aitken, B., Hanson, G.H., and Harrison, A.E. (1997). Spillovers, foreign investment, and export behaviour. *Journal of International Economics*, vol. 43 (1-2), pp. 103-132.
- [3] Arcand, J.-L., Berkes, E., and Panizza, U. (2012). Too Much Finance? International Monetary Fund, *IMF Working Paper No. 12/161*.
- [4] Baharumshah, A.Z. and Thanoon, M.A.-M. (2006). Foreign capital flows and economic growth in East Asian countries. *China Economic Review*, vol. 17, no. 1, pp. 70-83.
- [5] Bosworth, B.P., Collins, S.M., and Reinhart, C.M. (1999). Capital Flows to Developing Economies: Implications for Saving and Investment. *Brookings Papers on Economic Activity*, no. 1, pp. 143-180.
- [6] Choong, C.-K. (2012). Does Domestic Financial Development Enhance the Linkages between Foreign Direct Investment and Economic Growth? *Empirical Economics*, vol. 42, no. 3, pp. 819-834.

- [7] De Gregorio, J. and Guidotti, P.E. (1995). Financial development and economic growth. *World Development*, vol. 23, no. 3, pp. 433-448.
- [8] Dore, R. (2008). Financialization of the global economy. *Industrial and Corporate Change*, vol. 17, no. 6, pp. 1097-1112.
- [9] Dos Santos, P.L. (2011). Production and Consumption Credit in a Continuous Time Model of the Circuit of Capital. *Metroeconomica*, vol. 62, no. 4, pp. 729-758.
- [10] Dreher, A. (2006). Does Globalization Affect Growth? Evidence from a new Index of Globalization. *Applied Economics*, vol. 38, no. 10, pp. 1091-1110.
- [11] Epstein, G. (ed.) 2005. *Financialization and the World Economy*. Cheltenham and Northampton: Edward Elgar.
- [12] Khan, M.S. and Khan, A.H. (1998). Capital Flows to Developing Countries: Blessing or Curse? *The Pakistan Development Review*, vol. 37, no. 4, pp. 125-151.
- [13] Lavoie, M. (2012). Financialization, neo-liberalism, and securitization. *Journal of Post Keynesian Economics*, vol. 35, no. 2, pp. 215-233.
- [14] Mencinger, J., 2003. Does Foreign Direct Investment Always Enhance Economic Growth? *Kyklos*, vol. 56, no. 4, pp. 491-508.
- [15] Onaran, O., Stockhammer, E., and Grafl, L. (2011). Financialization, income distribution and aggregate demand in the USA. *Cambridge Journal of Economics*, vol. 35, no. 4, pp. 637-661.
- [16] Orhangazi, Ö. (2008). Financialization and capital accumulation in the non-financial corporate sector: A theoretical and empirical investigation on the US economy: 1973–2003. *Cambridge Journal of Economics*, vol. 32, no. 6, pp. 863-886.
- [17] Poppe, C. (2011). Financialisation. A Clarification of Concepts. Project Note, No. 11. Oslo: SIFO.
- [18] Rousseau, P.L. and Wachtel, P. (2011). What Is Happening to the Impact of Financial Deepening on Economic Growth? *Economic Inquiry*, vol. 49, no. 1, pp. 276-288.
- [19] Samargandi, N., Fidrmuc, J., and Ghosh, S. (2015). Is the Relationship Between Financial Development and Economic Growth Monotonic? Evidence from a Sample of Middle-Income Countries. *World Development*, vol. 68, pp. 66-81.
- [20] Thomson, F. and Dutta, S. (2015). *Financialization*. Transnational Institute, Amsterdam.
- [21] Zalewski, D. A. and C. J. Whalen (2010). Financialization and Income Inequality: A Post Keynesian Institutional Analysis. *Journal of Economic Issues*, vol. 44, no. 3, pp. 757-777.

THE USE OF MULTI-CRITERIA BENCHMARK METHOD IN A GLOBALIZED FINANCIAL ENVIRONMENT

Aneta Cugova^{1,a,*}, Martin Cepel^{2,b}

¹University of Zilina, Faculty of Operation and Economics of Transport and Communication
Department of Economics, Univerzitna 8215/1, 010 26 Zilina, Slovak Republic

²PanEuropean University in Bratislava, Faculty of Economics and Business, Tematinska 10, 851 05
Bratislava, Slovak Republic

^aaneta.cugova@fpedas.uniza.sk, ^bcepel@benzinol.com

*Corresponding author

Abstract. Models of financial forecasting are currently being explored more and more. This paper discusses the application of the internationally used TOPSIS method to provide a comprehensive picture of the suitability of using this method in the multi-criteria benchmarking process. The application of the TOPSIS method at present achieves wide-area use across the globe and, thanks to the impact of globalization, this method also belongs in the conditions of the Slovak Republic among the most frequently used methods. In this article, we prove that by applying mathematical and statistical strategies in decision-making, we can increase the probability of choosing the right decision, unlike a decision based solely on intuition. For models of multi-criteria decision-making, it is necessary to determine suitable parameters that influence the choice of the most appropriate method. The chosen method of multi-criteria decision-making is applied in the inter-company benchmark process, while using the financial analysis indicators as performance criteria. Benchmarking is part of analytical-synthetic quality management methods that provides a continuous analysis of the company position in domestic or global competitive environment. The benchmark process is applied to ten real medium-sized businesses with a staff of 100 to 200. The model is influenced by selected thirteen financial analysis indicators that tend to evaluate all components of the financial equilibrium. Using this method, we determine the resulting order of companies by eliminating the degree of subjectivity in this decision-making process, and by that, we review the reality better and more authentic.

Keywords: multi criteria benchmark, TOPSIS method, financial analysis indicators

JEL Classification: C54, D81, D70

1. Introduction

The decision making process has been carried out by mankind since ancient times. The main development occurred in 18th century in connection with the development of mathematics and economics, when attempts to formulate precisely these processes were made. In 1906, the Italian economist Vilfredo Pareto introduced the multi-criteriality aspect and formulated Pareto's optimality, describing the optimum as a state where it is not possible to increase the welfare of an individual without at the same time reducing the welfare of

someone else. (Holman et al., 2005). This has led to an exponential development in the field of multi-criteria decision making since the early 20th century. The economist Thomas L. Saaty, who is responsible for the emergence of one of the first methods of multi-criteria analysis - the AHP method that economists have begun to make use of immediately, and already in 1988 Olson's work comes out which describes the AHP method as a useful tool for multi-criteria decision-making processes (Olson, 1988).

2. Literature review

In the multicriteria decision theory the TOPSIS method developed by Hwang et al. occurs in 1933. In the article *A new approach for multiple objective decision making* it is stated that TOPSIS is an algorithm developed to solve multiple objective decision-making problems using two reference areas that make a calculation with a positive ideal solution and a calculation with a negative ideal solution. The basic principle of the method is that the chosen variant should be among the others as close as possible to the positive ideal solution and at the same time as far as possible from the negative ideal solution (Hwang et al., 1933).

With using the TOPSIS method to compare the performance of competing companies on the basis of their financial indicators, we meet in the article *Inter-company comparison using the modified TOPSIS with objective weights* (Deng et al., 2000). In this article, authors describe the process of inter-company comparison as a model of multi-criteria analysis, while the TOPSIS method, in their opinion, represents the most effective option for solving problems.

The most significant shift in the development of multi-criteria decision-making methods has taken place in recent decades, when new, stochastic and fuzzy versions have arisen. Zhang says that in recent years there has been an increasing use of the HFS (Hesitant Fuzzy Set) method in decision-making processes, which in fact reflects expert thoughts better, due to better tolerance (Zhang et al., 2017),

At present, many authors are concerned with the comparison and modification of all available methods of multi-criteria analysis and their more comprehensive explanation, while the investigated methods are applied to real decision situations. For example, Kolios is concerned with a comparative study of the multi-criteria analysis methods applied to selection of wind turbine support structures at their individual locations. Another author merged the MCDM TOPSIS and VIKOR methods and proposed a new ATOVIC classification algorithm where the criteria are replaced by the characters and the alternatives by objects (Kolios et al., 2016; Baccour, 2018).

The issue of multi-criteria decision-making is also elaborated in the conditions of the Slovak Republic. Vavrek defines the TOPSIS method as an appropriate way of evaluating the management of municipalities, as management of municipalities in Slovakia is governed by law. (Vavrek et al., 2015). In another article, he joined another area, the TOPSIS method presents as one of the possible tools for objective evaluation of the product characteristics. He conducted his research on a sample of 302 notebooks of six brands sold in three online stores. Vavrek states that the TOPSIS method represents a way of solving a multi-criteria decision-making process that is applicable in almost all areas (Vavrek & Novotova, 2017).

Another one who applied multi-criteria decision making models on Slovak market is Valaskova et al. The purpose of the application was to determine the basic characteristics of

sales, such as location, timing, sales method, etc., which suit to Slovak customers the most. The aim was to facilitate the entry of Czech traders into the Slovak market, to find out what strategy to take in order to succeed in a competitive environment (Valaskova et al., 2015). The results of using TOPSIS in any market decision-making process with several variants and criteria prove its feasibility, efficiency and a better degree of consumer satisfaction (Lu & Yuan, 2018).

The fact that multi-criteria decision-making methods are increasingly used in practice and applied to various real decision-making situations is confirmed by the fact that in 1970s the International Society on Multiple Criteria Decision Making was formed, bringing together about 1,500 professionals from around 90 countries (Koksalan et al., 2011).

3. Methodology and data

The used TOPSIS method is based on selecting such a variant, respectively, sorting the variants according to the one which is the closest to the ideal variant represented by the vectors H_1, H_2, \dots, H_k and at the same time the farthest from the worst (basal) variant represented by the vector D_1, D_2, \dots, D_k (Cisko & Klietnik, 2013).

3.1 Input parameters of the multi-criteria benchmark

Benchmarking is a process of permanent and systematic measurement and evaluation with the most competent competitors representing the leaders in the particular field (Molnar & Dupal, 2002). Definitions according to Lancaric, D. and Savov, R. identify with the Spacka's definition of benchmarking as the systematic, continuous monitoring and evaluation of the company and comparison with others, if possible with the best enterprises, in order to increase the efficiency of their own enterprise (Spacka, 2005) (Lancaric & Savov, 2012). The construction of the inter-company benchmark model build on multi-criteria decision - making has the following sequence:

- calculation and interpretation of the criteria on basis of which the decisions will be made between the different options,
- establishing preferences between criteria,
- establishing preferences between the options in terms of individual criteria and their aggregation into the overall preference and thus determining the best option;

In the model, we have selected financial analysis indicators as the criteria of decision-making process. The number of entities that come into contact with a business is often concerned with this information, just to find out the financial situation of it. According to Misankova, if a company wants to build and maintain competitive advantage it needs to evaluate its performance. The best way for performance evaluation is to use the synthetic and analytic indicators (Misankova, 2013). From a wide range of indicators, we have chosen to use the financial indicators that are often reviewed in business financial analysis (Tab 1).

Table 1: Selected financial analysis indicators

f_1 - Return On Equity	f_4 - Quick Ratio	f_7 - Total Debt Ratio	f_{10} - Net Working Capital	f_{13} - Inventory Turnover Time
f_2 - Return On Sales	f_5 - Current Ratio	f_8 - Interest Earned Ratio	f_{11} - Debtor Days Ratio	
f_3 - Cash Ratio	f_6 - Return On Assets	f_9 - Debt Of Equity	f_{12} - Fixed Assets Turnover	

Source: Constructed by author

The object for construction of the model is 10 international enterprises whose main business is construction. Each of these enterprises has a number of employees from 100 to 200. Selected businesses are designated as elements of A (a_1, a_2, \dots and a_{10}). First, we have carried out a financial analysis of these businesses and calculated individual indicators representing the criteria. For each criterion, we calculated the appropriate weight using the Saaty matrix.

3.2 Determination of preferences between criteria

A part of a model of a multi-criteria benchmark is the expression of the decision maker's preferences, which means finding out and expressing his idea of to what and thus to which the criterion he gives priority to others.

We used the Saaty matrix, which is a quantitative pairing comparison method, for estimating individual weights. First of all, we need to compare pairs of criteria, in our case the pair of financial indicators, and thus create pair comparisons and assign them a scale value of 1, 3, 5, 7, 9 or its intermediate levels (Fiala, 2003).

The Saaty matrix is typical by that it is symmetric and therefore has the same number of rows and columns. Above the diagonal, we state the preferences between individual pairs of criteria using the scale values used for this method. Data in the matrix depends on the subjective view of the investigator. In our case, the matrix is as follows:

	f_1	f_2	f_3	f_4	f_5	f_6	f_7	f_8	f_9	f_{10}	f_{11}	f_{12}	f_{13}	$\prod S_{ij}$	$b_i = [\prod S_{ij}]^{1/13} w_i = b_i / \sum b_i$
f_1	1	1	2	1	3	2	3	4	3	2	4	2	5	34560	2,23419
f_2	1	1	2	2	4	2	3	2	3	2	4	2	1	9216	2,01820
f_3	1/2	1/2	1	1	3	3	4	2	1	2	4	2	3	864	1,68223
f_4	1	1/2	1	1	4	3	4	2	4	1	2	3	4	4608	1,91341
f_5	1/3	1/4	1/3	1/4	1	3	2	2	2	3	2	3	2	6	1,14778
f_6	1/2	1/2	1/3	1/3	1/3	1	1	2	3	4	5	2	2	4,444444444	1,12158
f_7	1/3	1/3	1/4	1/4	1/2	1	1	2	3	2	4	1	2	0,333333333	0,91896
f_8	1/4	1/2	1/2	1/2	1/2	1/2	1/2	1	2	4	3	2	1	0,1875	0,87918
f_9	1/3	1/3	1	1/4	1/2	1/3	1/3	1/2	1	2	2	4	3	0,037037037	0,77606
f_{10}	1/2	1/2	1/2	1	1/3	1/4	1/2	1/4	1/2	1	2	3	3	0,01171875	0,71032
f_{11}	1/4	1/4	1/4	1/2	1/2	1/5	1/4	1/3	1/2	1/2	1	2	3	9,76563E-05	0,49149
f_{12}	1/2	1/2	1/2	1/3	1/3	1/2	1	1/2	1/4	1/3	1/2	1	2	0,000289352	0,53432
f_{13}	1/5	1	1/3	1/4	1/2	1/2	1/2	1	1/3	1/3	1/3	1/2	1	3,85802E-05	0,45760
														14,88534	1,00000

In our matrix, criterion f_1 is equivalent to criterion f_2 , with criterion f_3 at intermediate level $s_{1,3} = 2$, which is the degree between equal and weakly preferred. We do so until we compare all pairs of criteria above the diagonal. Below the diagonal, we state reciprocal (inverted) values. Next, the calculation of the simple geometric mean of the rows follow. In our case, $R (j = 1) \wedge n \pm S_{ij}$ is equal to the sum of the numbers $1 * 1 * 2 * 1 * 3 * 2 * 3 * 4 * 3 * 2 * 2 * 5 \rightarrow 34\ 560$. Then we calculate b_1 which is n - th, in our case the 13th root of this product $\sqrt[13]{(13 \& 34\ 560)} = 34\ 560^{1/13} = 2,2342$. This is how we proceed for all thirteen rows of our matrix.

Finally, we proceed to the final calculation of weighting of the criteria, first we have to calculate the sum of all b_i , which in our case means $\sum_{i=1}^n b_i = 14,8853$. The weighing

criterion is calculated as the quotient of the value of the b_i criterion and the total sum of all b_i . The weight of criterion f_1 was calculated as the quotient $b_1 / \sum b_i = 2,2342 / 14,8853 = 0,1501$, the weight of criterion f_2 as $b_2 / \sum b_i = 2,0182 / 14,8853 = 0,1356$ and we continue until $b_{13} / \sum b_i = 0,4576 / 14,8853 = 0,0307$. To check the accuracy of the weighing we can use a sum of weights that must equal 1.

3.3 Determination of preferences between variants according to individual criteria

The aim of this section is to determine the order of variants and the selection of the best one out of them by using the TOPSIS method. The first step is to construct a criterial Y matrix, consisting of lines representing variants that are the elements of the A set, and columns representing the criteria of maximization or minimization character designated by the letter f.

Y	MAX	MAX	MAX	MAX	MAX	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MAX
	f_1	f_2	f_3	f_4	f_5	f_6	f_7	f_8	f_9	f_{10}	f_{11}	f_{12}	f_{13}
a_1	0,00	0,00	0,62	1,18	1,19	0,00	0,49	1,00	1,03	1426744,00	47,56	3,65	0,42
a_2	0,09	0,07	0,86	1,67	3,34	0,06	0,31	25,53	0,44	11917466,00	44,94	1,70	93,73
a_3	0,39	0,02	0,25	1,20	1,22	0,04	0,89	4,11	9,63	5189916,00	118,15	6,58	1,94
a_4	0,10	0,01	0,45	1,90	1,90	0,04	0,51	17,11	1,10	3672087,00	42,04	53,16	0,00
a_5	0,10	0,02	0,55	1,47	1,48	0,04	0,83	0,00	5,20	3631098,00	107,25	17,52	1,25
a_6	0,18	0,00	0,40	1,03	1,04	0,01	0,96	0,00	23,99	372112,00	136,16	83,73	2,61
a_7	0,50	0,04	0,17	1,03	1,07	0,07	0,86	14,88	6,22	1511911,00	123,45	6,34	5,67
a_8	-3,56	-0,07	0,16	0,92	0,95	-0,07	0,98	-12,66	48,51	-1034023,00	220,27	4,60	8,62
a_9	0,17	0,02	0,75	1,24	1,28	0,04	0,73	235,17	2,81	5803875,00	62,94	17,79	4,55
a_{10}	-1,73	-0,08	0,07	0,90	0,98	-0,09	0,95	-9,18	18,70	-410649,00	234,91	8,83	22,83

In this construction, we assume that all criteria in the matrix are maximization. Since not all of the criteria in our matrix have the required character, all the minimization criteria must be converted to maximizing.

The next step is to construct a normalized criterial matrix R. First we calculate the square root of the sum of the second powers of all values within the criterion. In the first criterion, the value will be equal

$$\sqrt{(3,56^2 + 3,64^2 + 3,95^2 + 3,65^2 + 3,74^2 + 4,05^2 + 0^2 + 3,73^2 + 1,83^2)} = 10,8$$

Using this value, we calculate the element of the first column and the first line of the normalized criterial matrix R:

$$r_{1,1} = \frac{y'_{1,1}}{\sqrt{\sum (y_{ij})^2}} = \frac{3,56}{10,8} = 0,33 \quad (1)$$

The last matrix that we have to create in this method is the weighted criterial matrix W. Its construction is based on multiplying the elements of the normalized criterial matrix by their respective weight. Next, we determine the ideal and basal variant from the values in the weighted criterial matrix. The next step is to determine the distance of the individual variants from the ideal variant according to formula (2) and from the basal variant according to formula (3).

$$d_i^+ = \left(\sum_{j=1}^k (w_{ij} - H_j)^2 \right)^{\frac{1}{2}} \quad i = 1, 2, 3, \dots, p \quad (2)$$

$$d_i^- = \left(\sum_{j=1}^k (w_{ij} - D_j)^2 \right)^{\frac{1}{2}} \quad i = 1, 2, 3, \dots, p \quad (3)$$

$$c_i = \frac{d_i^-}{d_i^- + d_i^+} \quad (4)$$

W	MAX												
	f ₁	f ₂	f ₃	f ₄	f ₅	f ₆	f ₇	f ₈	f ₉	f ₁₀	f ₁₁	f ₁₂	f ₁₃
a ₁	0,0496	0,0366	0,0446	0,0371	0,0181	0,0184	0,0301	0,0032	0,0198	0,0066	0,0142	0,0013	0,0001
a ₂	0,0508	0,0686	0,0618	0,0525	0,0509	0,0308	0,0412	0,0088	0,0201	0,0350	0,0144	0,0006	0,0296
a ₃	0,0551	0,0457	0,0180	0,0377	0,0186	0,0260	0,0051	0,0039	0,0162	0,0168	0,0088	0,0023	0,0006
a ₄	0,0510	0,0412	0,0323	0,0598	0,0290	0,0277	0,0287	0,0069	0,0198	0,0127	0,0146	0,0185	0,0000
a ₅	0,0509	0,0457	0,0395	0,0462	0,0226	0,0262	0,0090	0,0029	0,0181	0,0126	0,0097	0,0061	0,0004
a ₆	0,0521	0,0366	0,0287	0,0324	0,0159	0,0199	0,0011	0,0029	0,0102	0,0038	0,0075	0,0291	0,0008
a ₇	0,0565	0,0549	0,0122	0,0324	0,0163	0,0328	0,0071	0,0064	0,0177	0,0069	0,0084	0,0022	0,0018
a ₈	0,0000	0,0039	0,0115	0,0289	0,0145	0,0034	0,0000	0,0000	0,0000	0,0000	0,0011	0,0016	0,0027
a ₉	0,0520	0,0457	0,0539	0,0390	0,0195	0,0277	0,0150	0,0573	0,0191	0,0185	0,0130	0,0062	0,0014
a ₁₀	0,0255	0,0000	0,0050	0,0283	0,0149	0,0000	0,0017	0,0008	0,0125	0,0017	0,0000	0,0031	0,0072
H _j	0,0565	0,0686	0,0618	0,0598	0,0509	0,0328	0,0412	0,0573	0,0201	0,0350	0,0146	0,0291	0,0296
D _j	0,0000	0,0000	0,0050	0,0283	0,0145	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0006	0,0000

The weighted criterial matrix W was formed. Under the matrix, we presented the values of the ideal H and basal D variants within each criterion. The last step of the TOPSIS method is to calculate the relative indicator marker of the distance of variants from the basal variant using formula (4).

4. Results and Discussion

By using the TOPSIS method and adhering to the established procedure of this method, we received the resulting order of the companies. We obtained the order of the enterprises based on the decreasing value of parameter ci, which represents the distance of the given variant from the basal (worst) variant. It follows that the enterprise which has reached the highest value is, according to the established criteria and the weighting assigned to them the most suitable for the decision maker (Tab. 2). We sort the variants in descending order, which in our case represents the order in the following table (Tab. 3).

Table 2: Calculated parameters of individual enterprises

	a ₁	a ₂	a ₃	a ₄	a ₅	a ₆	a ₇	a ₈	a ₉	a ₁₀
d _i ⁺	0,0931	0,0570	0,1006	0,0796	0,0894	0,1039	0,1033	0,146	0,0658	0,1399
d _i ⁻	0,0857	0,1337	0,0821	0,0947	0,0875	0,0777	0,0888	0,0089	0,1118	0,0295
c _i	0,4794	0,7010	0,4495	0,5431	0,4946	0,4277	0,4622	0,0571	0,6295	0,1741

Source: Constructed by author

Table 3: Enterprises order based on the TOPSIS method

Order	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Enterprise	a ₂	a ₉	a ₄	a ₅	a ₁	a ₇	a ₃	a ₆	a ₁₀	a ₈

Source: Constructed by author

Enterprises a_2 and a_9 hold the first two positions. The third place holds a_4 . These companies occupied the first positions mainly because the most significant indicators and therefore the highest-weighted indicators as Quick Ratio, Current Ratio or ROE achieved the highest values for these companies. Enterprise a_5 ranked fourth as the values of significant indicators showed slightly lower values than in the first three cases. The a_1 , a_7 , a_3 , and a_6 enterprises achieve very similar values for the relative indicator, with only a few hundredths difference, which suggests that also the values of the financial analysis indicators do not differ significantly and their values are average. Enterprises a_{10} and a_8 were placed on the last two places. Even when calculating the financial indicators, we could have seen significant fluctuations in the values of not only the most important but also of the less important indicators, which suggests that the companies have considerable economic problems.

Using the TOPSIS method, we see that the first three places belong to enterprises a_2 , a_9 and a_4 . When looking at financial indicators (Criteria matrix Y), we see that these enterprises have significantly higher values of important indicators, which are f_1 , f_2 , f_3 and f_4 and which are decisive for this model. By using the TOPSIS method, there would be a problem only in such a case if one of the companies in a high-weight criterion reached a significantly higher value, several times higher than other enterprises, while in the other criteria being average and not significantly better than the others. Such a high-weighted indicator would result in a high value in a normalized criterion matrix other subsequent calculations, which would place the enterprise in the front position only on the basis of one (although the most important) indicator. It means that, since the TOPSIS method works with specific values, it may happen that in some cases we get a distorted result its own way. Therefore, it is always necessary to evaluate the decision criteria first globally and then consider which method is the most appropriate in the given situation.

5. Conclusion

The resulting ranking of enterprises was partly influenced by the subjective preferences of the decision-maker and by different importance assigned to individual financial indicators. Each method uses a different approach to determining the ideal variant, which means that the results of different methods may differ from time to time, and certain deviations may occur but multi-criterial decision-making methods are nonetheless effective ways of minimizing and eliminating the degree of subjectivity in decision-making processes. That is precisely why the decision-making management should apply them in all their important decision-making situations.

References

- [1] Baccour, L. (2018). Amended fused TOPSIS-VIKOR for classification (ATOVIC) applied to some UCI data sets. *Expert Systems with Applications*, vol. 99, pp. 115-125.
- [2] Cisko, S. and Klietnik T. (2013). *Financny manazment podniku II*. EDIS, Žilina.
- [3] Deng, H., Yeh, C. and Willis, R. J. (2000). Inter-company comparison using modified TOPSIS with objective weights. *Computers & Operations Research*, vol. 27, pp. 963-973.

- [4] Fiala, P. (2003). *Modely a metody rozhodovani*. Vysoka skola Ekonomicka v Praze, Praha.
- [5] Holman, R. et al. (2005). *Dejiny ekonomickeho mysleni*. 3rd ed.. Praha: C. H. Beck, Praha.
- [6] Hwang, C–L., Lai, Y.–J. and Liu, T.–Y. (1993). A new approach for multiple objective decision making. *Computers & Operations Research*, vol. 20 pp. 889-889.
- [7] Kolios, A. Mytilinou, V. Lozano-Minguez, E. and Salonitis, K. (2016). Comparative Study of Multiple-Criteria Decision-Making Methods under Stochastic Inputs. *Energies*, vol. 9, pp. 7.
- [8] Koksalan, M, Wallenius, J. and Zionts, S. (2011). An Early History of Multiple Criteria Decision Making. *Journal of Multi-Criteria Decision Analysis*, vol. 20, pp. 87-94.
- [9] Lancaric, D. and Savov, R. (2012). *Firemne planovanie*. SPU, Nitra.
- [10] Lu, LL. And Yuan, YY. (2018) A novel TOPSIS evaluation scheme for cloud service trustworthiness combining objective and subjective aspects. *Journal of Systems and Software*, vol. 143, pp. 71-86.
- [11] Misankova, M. (2013). The use of analytic indicators for performance measurement. *Ad Alta-Journal Of Interdisciplinary Research*, vol. 3, pp. 35-37.
- [12] Molnar, P. and Dupal, A. (2003). *Manazment inovacii podniku*. Ekonom, Bratislava.
- [13] Olson, D. L. (1998). Opportunities and limitations of AHP in multiobjective programming. *Mathematical and Computer Modelling*, vol. 11, pp. 206-209.
- [14] Spacka, M. (2005). *Co je a co neni benchmarking*. Economia, Praha.
- [15] Valaskova, K. Kramarova, K. and Bartosova, V. (2015). Multi Criteria Models Used in Slovak Consumer Market for Business Decision Making. *Proceedings of 4th World Conference on Business Economics and Management (WCBEM-2015)*, Ephesus, Turkey, vol. 26, pp. 174-182.
- [16] Vavrek, R. and Novotova, J. (2017). Brand and its Impact in Analysis of Customer Decision - making Process using TOPSIS technique. *International Journal of Applied Mathematics and Statistics*, vol. 56, pp. 1-18.
- [17] Vavrek, R. Kotulic, R. and Adamisin, P. (2015). Evaluation of Municipalities Management with the Topsis Technique Emphasising on the Impact of Weights of Established Criteria. *Lex Localis – Journal of Local Self-Government*, vol. 13, pp. 249-264.
- [18] Zhang, S., Xu, Z., and He, Y. (2017). Operations and integrations of probabilistic hesitant fuzzy information in decision making. *Information Fusion*, vol. 38, pp. 1-11.

INTERNATIONAL STANDARDIZATION IN THE ECONOMIC-ENVIRONMENTAL ACCOUNTING OF BUSINESS MATERIAL FLOWS

Naqib Daneshjo^{1,a,*}, Milan Majerník^{2,b}, Gabriela Sančiová^{3,c}, Erika Dudáš
Pajerská^{4,d} and Katarína Repková Štofková^{5,e}

^{1,2,3,4}University of Economics, Faculty of Business Economy, Department of Management,
Tajovského 13, 041 30, Košice

⁵University of Žilina, Faculty of Operation and Economics of Transport and Communication,
Department of Communications, Univerzitná 8215/1, 010 15, Žilina

^adaneshjo47@gmail.com, ^bmilan.majernik@euke.sk, ^cgabriela.sanciova@euke.sk,

^derika.dudas.pajerska@euke.sk, ^ekatarina.stofkova@fpedas.uniza.sk,

*Corresponding author

Abstract. The quality of life and the quality of the environment must be perceived, whether from a globalized, regional or local, corporate or combined perspectives. Economic and environmental development activities are coordinated today by the world top socio-economic authorities. The highest priority is sustainable development, sustainable competitive production and green growth. Based on this, the results of analysis and outputs of authors' own research on the progressive forms and tools of financial, management and environmental accounting for SMEs abroad and in Slovakia are systematically summarized. The concept of a model for implementing enterprise environmental costs and returns to traditional business accounting is designed. The concept is based on the use of STN EN ISO 14052:2012 Environmental Management. Cost accounting material flow were processed at the workplace of contributors. In analyzing and evaluating environmental business costs and revenues, all the organization activities have to identify relevant costs and revenues, and these are associated with the identified environmental aspects, impacts and risks. If an organization has established and maintained a standard environmental management system (according to STN EN ISO 14001 respectively EMAS III), the use of the model in practice is significantly more effective through the EAVaR. If an organization does not operate such a certified system, an environmental audit – an initial environmental review – is required to enter into the economic and environmental operational accounting. The concept of the model was dimensioned by pilot verification under specific conditions of practice – civil engineering.

Keywords: enterprise, globalized economy, material flow, environmental profile, standardized cost accounting

JEL Classification: F64, L15, O44, Q01, Q56

1. Introduction

Unlike the traditional accounting system, environmental management accounting gives an insight into how individual sub-processes thrive on their own and not how the enterprise as a whole flourishes. This makes it possible to identify those business locations that need to be

addressed and to look for ways to improve them. Compared with the traditional accounting system, environmental accounting does not have precise rules, and hence its benefits are that it is suitable for an enterprise of any type. The system is so flexible and adaptable that individual businesses can tailor it according to its needs and the area it wants to focus on (science and research, improvement of the production process, waste management, raw material purchase, investment decision).

An important role in the system of environmental accounting is played by environmental costs and their identification. In identifying such costs, it is necessary to understand what is actually being said between such costs. In the enterprise's decision to introduce an environmental management system (EMS), it is necessary to avoid the misconception that its implementation is only associated with cost-related negative considerations and it is necessary to recognize that with the growing threat of the environmental impact of the company's activities and the increasing material and energy material flow, the potential benefit from the introduction of this system is directly proportional to the identification of the mentioned weaknesses of activities, their efficiency, with which the reduction of individual environmental costs, respectively, increasing environmental yields is related.

2. An environmental approach to business

Also, entrepreneurship that respects the principles of sustainable development (SD) is sustainable entrepreneurship. The concept of sustainable entrepreneurship was first defined in the 1980s, as the functioning of a company that uses a number of resources that can be regenerated naturally and produces the amount of waste that the Earth is capable of absorbing. The idea of this model is that no generation will live to the detriment of the quality of life of the next generations (Henri & Journeult, 2008; Janošková & Klieštiková, 2018).

The SD concept, which is built on a functioning social sphere, a strong and stable economy and healthy ecosystems, is considered as a viable solution to the negative impact of global development trends and their negative impacts on nature. In the world, the SD concept has been developing for approximately three decades. Despite the great progress achieved in most area of development, the SD concept is still applied on an international scale only in a declarative form.

At present, people are becoming increasingly aware of the topic of ensuring SD, and it is one of the priorities of the European Union's policy. However, the Council of Europe has already come up with the idea in June 1998, and thereafter launched the two-pillar EU SD model, the Cardiff initiative. This model was subsequently supplemented in 2000 by a third pillar, the so-called structural pillar or the socioeconomic pillar, at the Lisbon summit. The aim of this pillar was to achieve a link between environmental and economic policy and this also required the development and subsequent implementation of an economy based on greater competitiveness and the dynamics of findings, awareness and knowledge and the ability to achieve economic growth that we can call sustainable and will ensure a positive development of employment and social policy. (Čorejová et al., 2018)

EMS can be described as a voluntary means to link the organization's own management with access to environmental protection. This tool can be implemented in any business process area in any type of business, irrespective of the sector. The goal is to achieve both business and environmental goals. Individual EMSs of different enterprises are unique

because each enterprise prepares its EMS on the basis of its specific systems and its own programs, with the intention of achieving the objectives of environmental policy. The essence of introducing EMS into the enterprise management systems is, on the one hand, to achieve better processes and activities and thus to reduce the overall costs of the enterprise. On the other hand, they contribute to improving the environment of the society. (Stofko et al., 2016)

At present, enterprises as entry-exit systems perform their business activities in the conditions of a civilized society and are therefore willing to voluntarily accept environmental pollution commitments. This reflects the true growth rate of established and certified standardized EMS. In particular, they are organizations whose business is the production of machinery, electrical and mechanical equipment, chemical production, and pulp and paper production. However, these systems are increasingly being pursued by organizations active in public administration, education and other organizations in general. Enterprises obtain these certifications according to the STN EN ISO 14001 standard, or registration under the EMAS III scheme (Eco-Management and Audit Scheme).

3. Corporate accounting

The company's accounting information system can be identified as an indispensable means in the complex management system of each enterprise. Throughout the life cycle of each business, it is forced to make economic choices, based on factual facts from accounting information in order to be successful and competitive.

Successful businesses are now considered primarily those organizations that emphasize motivation and cost evaluation in order to ensure the overall comprehensive, efficient consumption of materials and energy, we are talking about the economic-environmental aspect. The efficiency of an enterprise's business can be identified on the basis of individual indicators for a specified period. (Bielikova & Paliderova, 2016; Gajanová et al., 2018)

4. Management accounting

Management accounting plays an important role in business processes in providing quality and complete information for corporate governance decisions. At the same time, it is not subject to state regulation in comparison with financial accounting. A specific aspect of management accounting is that it is not only focused on the actual information about the financial situation of the company, but it also focuses on individual business processes, or operations (Majerník et al., 2017).

Environmental management accounting (EMA) is an important integral part of the organization's management, whose primary concern is to identify, collect, analyze and, last but not least, report and provide information on:

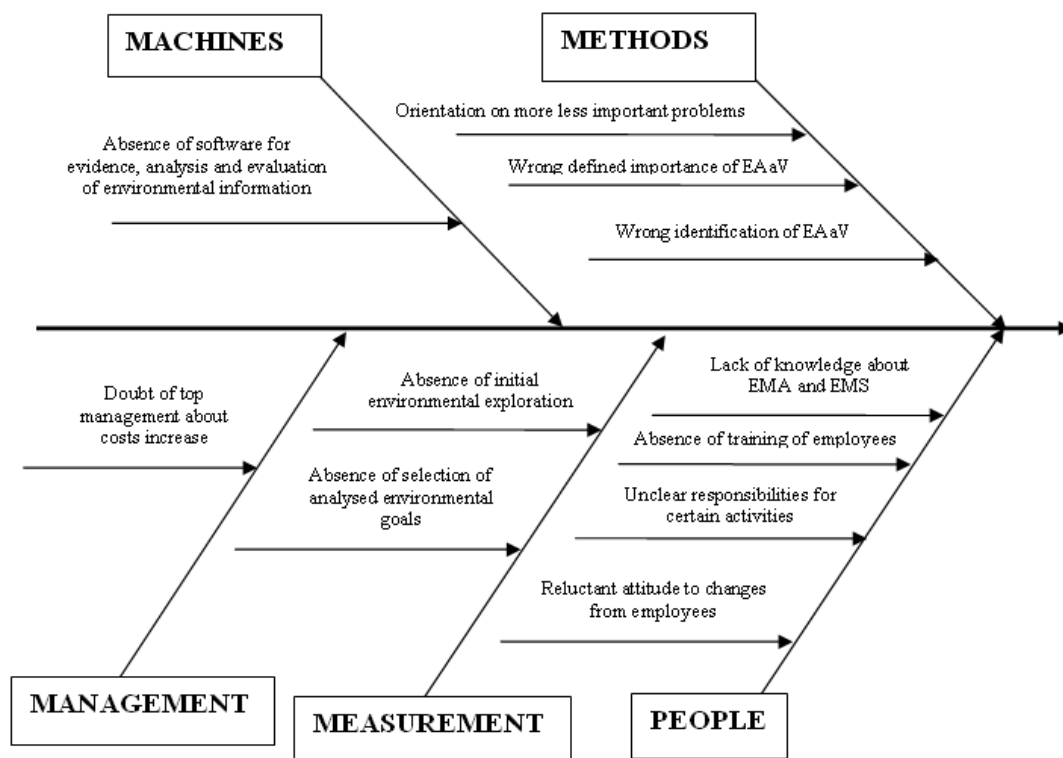
- material and energy flows,
- environmental costs,
- other value-referenced information needed to make decisions in a particular business.

Given that each enterprise, understood as an input / output system, is a specific organizational unit that has unique specifications (e.g. the production line, wastewater treatment methods, etc.), each environmental management system is seen as a unique solution.

As a guiding factor in building and implementing the EMA, on which the EMA structure of an enterprise depends, the need, the benefit of the business, and the objective pursued by the undertaking are considered to be the same (WCED, 1987)

Given the fact that EMA is a relatively new system, it is possible to identify the untapped weaknesses that the company may encounter in its implementation. These shortcomings are shown in the Ishikawa diagram (Figure 1).

Figure 1: Ishikawa Diagram - EMA weaknesses so far



Source: Own processing

5. The environmental costs in EMA

In general, however, it is necessary to point out that there is not one exact definition of environmental costs that would generally be acceptable. The reason for this is, above all, the effort to avoid a lengthy process and speculation on what will or will not be accepted as an environmental cost. Because each enterprise is responsible for defining environmental costs, it is possible to minimize any ambiguity and extent of the costs. The ideal practice for an enterprise that has chosen to implement EMA in its processes is to focus only on a certain area of monitored costs that the company is able to monitor at the very beginning of implementation (Regionálne, 2001).

Although the cost of environmental protection can be considered as a key element in the internal cost calculations of an enterprise, emphasis is placed on the other side of the coin, from which it cannot be abstracted. (Frajtova-Michalikova et al., 2015) This concerns waste which embodies such a portion of the material, that has not been processed as part of the product and it is necessary to take it into account when calculating the environmental costs of the enterprise. (Butek & Stofkova, 2016) Waste for the calculation of environmental costs

includes solid waste, waste water, air emissions and non-production output. Because of this, waste can be considered as indicators that speak of the inefficiency in production.

6. Environmental profile of the surveyed organization

The top management of an international organization active in the field of road and motorway construction SK NACE: 42110, is aware of the importance of preventing environmental damage in connection with the activities it performs, and at the same time is aware of the underlying problems it encounters, whether from consumers or the general public. In the wake of recognizing accountability towards the public and the environment itself, the top management of the company implemented certified quality management systems according to STN EN ISO 9001, environmental management, according to STN EN ISO 14 001, a system of the Occupational Health and Safety Management OHSAS 18 001 and, last but not least, set and implemented the basic principles of the policy of the Integrated Enterprise Management System (CIMA, 2000; Voluntary, 2015).

Proposal for the method of accounting for environmental costs and revenues

With regard to the business activity of the company surveyed by us, namely the realization and delivery of buildings in the fields of engineering, land, industrial and water management construction engineering, we have proposed the following during the adjustment and modification of the analytical accounts to selected synthetic accounts:

1. Account 518 – other services

- 518.006-Training (environment) of employees – internal
- 518.007 - Training (environment) of employees - external
- 518.010 - Disposal of HW (dyestuffs, dyes, pigments, paint packaging, paints, oils, etc.)
- 518.012 - Disposal of HW - administration (toners, printing accessories, etc.)
- 518.016 - Communal services - cleaning
- 518.019 - Communal services - revision of chimneys
- 518.020 - Communal services - revision of pressure vessels
- 518.013 - Chemical disposal, lubricants - central building test room
- 518.024 - Costs of external certification audit ISO 14 001 and the like.
- 518.025 - Cost of the test of technical inspection - passenger cars
- 518.026 - Examination costs of technical inspection - trucks
- 518.027 - Emission control costs - passenger cars
- 518.028 - Emission control costs - trucks
- 518.029 - Emission control costs - building mechanisms and machinery
- 518.043 - Rental of waste containers
- 518.047 - Storage - soils
- 518.063 - Costs associated with contributions to universities for science and research in the field of environment
- 518.075 - Disposal of contaminated soil
- 518.076 - Costs of the disposal of construction waste (concrete, bricks, blocks, panels, etc.)
- 518.077 - Costs of disposal of other building materials
- 518.078 - Cost of non-production output

2. *Account 538 - Other taxes and fees*

- 538.008 - Environmental Department Fees (Ministry of the Environment) for emissions
- 538.009 - Fees for dust, excessive noise
- 538.019 - Fees for the disposal of municipal waste by the Local Authority

3. *Account 545 - Other fines, penalties and interest on late payments*

- 545.004 - Fines and penalties - sanctions (environmental protection, health and safety)

The design of the individual analytical accounts has been prepared on the basis of the activities that occur during the current accounting period to the monitored entity. With this analytical account, an entity may be able to monitor in more detail the environmental costs that arise from it in connection with, for example, the protection and prevention of the environment or the research and development of the improvement of the production processes in order to reduce the burden on the environment etc. (Hyršlova, 2005; Mikušová et al., 2018). As part of the main activities connected with the subject of the business activity of the enterprise, there are not only costs but also revenues, for which we have also prepared draft analytical accounts for the selected synthetic account, as follows:

4. *Account 642 - Revenues from sales of material*

- 642.002 - Revenues from sales of scrap
- 642.003 - Revenues from sales of recycled asphalt

When designing the individual analytical accounts, we proceeded analogously, and therefore we relied on real cases that might occur during the current accounting period. Table 1 shows an illustrative sample of possible examples of environmental cost and revenue accounting based on the above-described analytical accounts.

Concept of EMA implementation in the enterprise

The performed analysis of the enterprise needed for the design of the implementation of EMA into the company system can also identify the ability to use EMA as a form of motivation in inter-enterprise management. The root of this motivation is that the organization is based on a complex accounting system that provides aggregate information on the costs and returns of an enterprise, from partial accounting systems where a particular center or performance, assign a specific load or yield. This fact is a good basis for effective enterprise management. (Zauskova & Grib, 2016)

However, in order to do this, it is necessary for traditional accounting as we know it to be extended to synthetic accounts that will provide relevant, objective and accurate environmental information for the enterprise. (Adamko et al., 2018) This breakdown allows us to monitor in more detail the environmental costs and revenues generated by specific outputs, from the input of the material to the process and its output, and thus more accurately identify any material losses that the waste represents for the enterprise and therefore the cost of non-material output. In this way, the enterprise can identify its weaknesses in which it cannot only increase its environmental revenues but also reduce its environmental costs.

Table 1: Business Environmental Costs and Income Revenue Scheme

Comprehensive view of environmental cost and revenue accounting				
Number	Accounting document	Text of the accounting case	Debit	Credit
1	DFA	Supply invoice for external cleaning services	518.016	321
2	VPD	Reimbursement in cash for external training of	211	518.007

		company employees		
3	DFA	An invoice for the disposal of construction waste	518.076	321
4	DFA	Invoice for storage of soil in the landfill	518.047	321
5	DFA	Invoice for renting waste containers	518.043	321
6	DFA	Reimbursement of the invoice for revisions - chimney services	518.009	321
7	DFA	Settlement of emission control costs - trucks	518.026	321
8	VBÚ	Reimbursement of the annual fee for air pollution by discharging emissions, based on the decision of the relevant department of the Environment	221	538.008
9	DFA	Cost of external certification audit ISO 14 001	518.024	321
10	VPD	50% of the annual subscription to the journal Enviromagazín	314	211
11	DFA	Invoice received for subscription to the journal Enviromagazín	518.064	321
12	DFA	Clearing of a paid deposit	321	314
13	VBÚ	Additional payment for the subscribed journal Enviromagazín	311	221
14	VFA	Invoice for the sale of recycled asphalt	311	642.003
15	VBÚ	Collection of accounts receivable for recycling asphalt	221	311
16	ID	Estimated unbilled cost related to the disposal of other building materials at the end of the current period	518.077	326
17	DFA	Invoice for the disposal of construction waste at the beginning of the next accounting period received	326	321
18	VBÚ	Sanction - Imposition of a fine from the Slovak Environmental Inspectorate	545.004	211

Source: Own processing

In accordance with the ISO standard for EMA, the Mode is the point where material inputs are converted into outputs, respectively in which the materials are stored. It serves to more transparently visualize on-going material flows in the enterprise and how the enterprise uses energy. As a result, any hidden costs such as waste management costs can be detected - it reveals weaknesses in which processes can be made more effective or improved.

The investigated enterprise in the production of asphalt mixes uses procedures to minimize material losses and uses both unused material released in production and recycled asphalt. However, in advanced countries, they already know more innovative methods, including the production of recycled plastic roads (Hyršlová & Vaneček, 2003).

The essence of this method lies in a mixture of millions of plastic granules made from waste. The manufacturing process is identical to the traditional procedure, but with the addition of the above-mentioned granules in a volume of 10% of the total weight of the mixture (Ministerstvo ŽP). Hence, in deeper analysis of the process under investigation, it appears that the weakest site is MU4 and the material inputs that enter this quantitative node. In further development of the given issue in the company, it is possible to focus on the development of accounting in the proposed quantitative nodes.

The cost savings saved using the proposed procedures (Table 2), based on the assumptions that:

- the average grade of first-class road is 18 cm, a second-class road 10 cm, we will work with 10 cm in the calculations,

- per 1 km of a 10 cm thick road, approximately 21,300 kg of bitumen is consumed,
- the optimal proportion of plastics in the mixture is 8%.

Table 2 Calculating cost savings using the suggested procedures

Item		Cost
Costs of waste plastics and their processing		€1.75/kg
Cost of bitumen		€3/kg
Calculation		
Cost of bitumen	21 300 kg*3 €/kg	63 900 €/km
The cost of waste plastic	(21 300kg*0.08)*1.75€/kg	2 982 €/km
The costs saved	(63 900 €/km * 0.08) – 2 982 €/km	2 130 €/km

Source: Own processing

In addition to the benefits of the proposed innovation, in the form of cost savings for the company, a road made of plastics also:

- it is more resistant to the greater weight of the means of transport,
- no potholes form as on asphalt roads,
- eliminating the standing water problem on the roads.

7. Conclusion

The top management of each enterprise is now getting into situations in everyday practice when it is necessary to make fundamental decisions about the direction in which the company is going, whether in a longer or shorter time horizon. Enterprises are becoming increasingly aware of the public and it is imperative that these decisions are not only effective, but also that their impact on the environment is considered.

To make these decisions increasingly effective in a rapidly changing, globalized competitive environment, traditional tools to support these decisions are becoming ineffective. One of the tools to promote streamlining not only of managerial decisions, but also complex processes and the sustainability of the company is also environmental management accounting.

Acknowledgment

This paper is an output of the science project KEGA 026EU-4/2018.

References

- [1] Adamko, P., Klieštík, T., Švábová, L. and Valášková, K. (2018). Financial risk measurement and prediction modelling for sustainable development of business entities using regression analysis. *Sustainability*, vol. 10, no. 7, 15 p.
- [2] Bielikova, A. and Paliderova, M. (2016). Receivables management in the global economy. *Globalization and its Socio-Economic Consequences*, Rajecke Teplice, Slovakia, pp. 183-190.
- [3] Butek, M. and Stofkova, Z. (2016). Relocalisation Trends in the Context of Globalization. *ISSGBM Int. Conference on Information and Business Management*,

- Hong Kong. Singapore: Management & Sports Inst; Notes in Management Science, vol. 61, pp. 33-38.
- [4] CIMA (The Chartered Institute of Management Accountants) (2000). *Management Accounting Official Terminology*. Praha: ASPI Publishing, 156 p.
- [5] Čorejová, T., Klieštiková, J., Král', P., Križanová, A. and Spuchl'áková, E. (2018). Subsidies to increase remote pollution? *Science and Engineering Ethics*, vol. 24, no. 2, pp. 755-767.
- [6] Frajtova-Michalikova, K. Spuchl'akova, E. and Misankova, M. (2015). Portfolio Optimization. *4th World Conference on Business, Economics and Management (WCBEM)*, Ephesus, Turkey, *Procedia Economics and Finance*, vol. 26, pp. 1102-1107.
- [7] Gajanová, Ľ., Križanová, A. and Nadányiová, M. (2018). Design of a CRM level and performance measurement model. *Sustainability*, vol. 10, no. 7, 17 p.
- [8] Henri, J-F. and Journeult, M. (2008). Environmental Performance Indicators: An Emprirical Study of Canadian Manufacturing Firms. *Journal of Environmental Management*. [online], pp.165-176, [cit. 05.02.2018]. Available: <http://www.sciencedirect.com/science/journal/03014797/87/1>.
- [9] Hyršlová, J., and Vaneček, V. (2003). *Manažerské účetnictví pro potřeby environmentálního řízení*. Praha: MTP. 163 p.
- [10] Hyršlová, J. (2005). Využití environmentálního manažerského účetnictví na podporu rozhodovacích procesů v podniku. PLANETA. [online]. Praha: Ministerstvo životního prostředí, 7/2005, 64 [cit. 06.02.2018]. Available: [http://www.mzp.cz/web/edice.nsf/32F86DDACD32D0B0C125708B001BA67A/\\$file/planeta7_web.pdf](http://www.mzp.cz/web/edice.nsf/32F86DDACD32D0B0C125708B001BA67A/$file/planeta7_web.pdf).
- [11] Janošková, K. and Klieštiková, J. (2018). Analysis of the impact of selected determinants on brand value. *Journal of International Studies*, vol. 11, no. 1, pp. 152-162.
- [12] Majerník, M., Andrejovský, P., Daneshjo, N. and Sančiová, G. (2017). *Environmentálna podniková ekonomika*. Košice: Typopress s.r.o. 250 p.
- [13] Mikušová, M., Török, A. and Brída, P. (2018). Technological and economical context of renewable and non-renewable energy in electric mobility in Slovakia and Hungary. *Computational collective intelligence*. Cham: Springer, pp. 429-436.
- [14] Ministerstvo životného prostredia SR. 2001. Národná stratégia trvalo udržateľného rozvoja. [online]. 235 p. [cit. 05.02.2018]. Available: http://hpur.vlada.gov.sk/data/files/5636_narodna-strategia-trvalo-udrzatelneho-rozvoja.pdf.
- [15] Regionálne environmentálne centrum pre krajiny strednej a východnej Európy (2001). *Trvalo Udržateľný rozvoj – Výzva pre Slovensko*. [online]. Bratislava: REC Slovensko, [cit. 02.02.2018]. Available: http://moodle.uniag.sk/pluginfile.php/10236/mod_resource/content/2/tur_sr.pdf.
- [16] Stofko, S., Soltes, V. and Stofkova, Z. (2016). Options of using the integrated management system. *Production management and engineering sciences*, pp. 267-272.
- [17] Voluntary environmental improvement plans. 2015. [online]. [cit. 28.03.2018]. Available: <http://www.epa.vic.gov.au/business-and-industry/lower-your-impact/veip>.

- [18] World Commission on Environment and Development (1987). Report of Brundtland Commission, Our common Future, Oxford University Press. Available: <http://www.un-documents.net/our-common-future.pdf>.
- [19] Zauskova, A. and Grib, L. (2016). Impact of globalization on Slovak businesses in marketing promotion of eco-innovations. *Globalization and its Socio-Economic Consequences*, Rajecke Teplice, Slovakia, pp. 2465-2072.

FINANCING AND LOANS OF THE BUSINESS ENTITIES IN THE GLOBALIZED SOCIETY

Jaroslava Dittrichová^{1,a}, Libuše Svobodová^{2,b,*} and Martina Hedvičáková^{3,c}

^{1, 2, 3} University of Hradec Králové, Faculty of Informatics and Management

^ajaroslava.dittrichova@uhk.cz, ^blibuse.svobodova@uhk.cz, ^cmartina.hedvicakova@uhk.cz

*Corresponding author

Abstract. The aim of the article is to analyze the development of the financing of business entities in the Czech Republic. The article deals with issues of individual types of loans, possibilities of financing of business entities, the amount of credits and their development as well as the currency in which the loans are provided. Literary research deals with lending in the credit market not only in the Czech Republic but also abroad. The article includes selected data on credit conditions and developments that enable users to get valuable information about developments in the credit market. The results in the main section show that the highest amount of loans has been drawn for a long period since 2009. By then, it was most borrowed for short-term loans. The least was borrowed for medium-term loans. The total amount of loans has a growing trend. As for the use of foreign resources, they also have a growing trend. At the same time, the amount of money lent abroad is increasing. As of January 1, 2018, the total funding from abroad was around 30%. Globalization also has a significant impact on sister companies of international corporations where individual transactions may be distorted by tax optimization efforts. Even the growing number of international corporations may affect the amount of foreign currency loans. Data for the main part was drawn mainly from the Czech National Bank. The results are presented in the graphs in the figures.

Keywords: comparison, development, globalization, loan, value

JEL Classification: F65, G21, M21

1. Introduction

Mezi krátkodobé a střednědobé cizí zdroje financování patří spotřebitelský úvěr, úvěr ke kreditní kartě, kontokorentní úvěr, směnečný úvěr, revolvingový úvěr, lombardní úvěr, obchodní úvěr či bankovní záruky. Mezi dlouhodobé zdroje financování poté patří hypoteční úvěr, dodavatelský a bankovní úvěr, finanční či operativní leasing. Základním zdrojem financování spotřebitelské poptávky domácností a firem živnostníků patří bankovní spotřebitelský úvěr. V České republice banky nabízejí dva základní typy: úvěry pro krátkodobé hotovostní potřeby (debetní zůstatky na běžných a kontokorentních účtech) a spotřební úvěry členěné z hlediska splatnosti na krátkodobé, střednědobé a dlouhodobé.

Regulace v oblasti spotřebitelských úvěrů zahrnuje pravidla jednání subjektů finančního trhu se spotřebiteli. Zákon o spotřebitelském úvěru byl s účinností od 1. 12. 2016 rozšířen o okruh subjektů podléhajících dohledu ČNB. V oblasti ochrany spotřebitele se regulace týká osob uvedených v § 44 odst. 1 zákona o České národní bance při výkonu činnosti, kterou tyto osoby vykonávají na základě povolení, licence nebo registrace České národní banky nebo obdobného oprávnění k působení na území České republiky uděleného zahraničním orgánem.

Podnikatelské subjekty používají v České republice jako zdroj dlouhodobého financování leasing, dlouhodobý úvěr, investiční úvěr či hypoteční úvěr. Hypotečními úvěry se autorka článku a další výzkumní pracovníci věnovali již dříve (Hedvičáková & Svobodová, 2015, 2016, 2017). World bank group (2018) hodnotí i snadnost získání úvěru pro podniky v souvislosti s „doing business“, které bylo řešeno v Svobodová & Hedvičáková (2015). Hypoteční trh je zaměřen na dlouhodobé financování. I z toho důvodu je třeba, aby byl co nejvíce stabilní (Černohorská, 2015). Kalkulátorem výpočtů bankovních služeb a i hypotečních úvěrů se zabývali Hedvičáková & Soukal (2012). Allen & Paligorova (2015) se zabývali půjčováním v Kanadě během finanční krize, kdy bylo omezeno poskytování úvěrů veřejným firmám, nikoliv soukromým firmám. Soukromým firmám půjčovaly, protože by mohly získat nadměrné výnosy. Godlewski & Sanditov (2018) zkoumají vliv sítě finančních institucí na hodnotu bankovních úvěrů s využitím údajů o syndikovaných půjčkách evropským společnostem. Zjistili, že přítomnost více centrálních vůdců v syndikátu podstatně zvyšuje reakci akciového trhu na nabídku půjček. Kim et. al. (2018) vyzkoumali, že firmy s kompetencemi IT mají tendenci mít příznivější cenové a necenové podmínky pro úvěrové smlouvy a je méně pravděpodobné, že jejich rating by se snížil, nebo aby hlásily slabé stránky vnitřní kontroly než společnosti bez reputace IT. Isywardgana & Muslih, (2018) uvedli, že prostřednictvím implementace řízení a správy bude snižovat náklady na dluh společnosti. Włodarczyk & Szturo (2018) analyzovali faktory ovlivňující dostupnost úvěrů a jejich vliv na vývoj polských MSP, jako je velikost a stáří společnosti, finanční výsledky nebo délka vztahu s bankovní institucí, stejně jako funkce charakterizující bankovní sektor. Výsledky ukazují, že v Polsku, podobně jako ostatní evropské země, mají MSP omezenější přístup k úvěrům než velké společnosti. Navíc byla prokázána výrazná závislost dostupnosti bankovních úvěrů dle velikosti společnosti, likvidity, ziskovosti a situace v bankovním sektoru. Zajímavé je i hodnocení Getting credit v rámci Doing Business dle World Group Bank (2018), kde hodnocení České republiky na základě 4 indikátorů stále kolísá. Od roku 2007 se Česká republika posunula z nejlepší, 21. pozice, na 42. příčku v roce 2018.

Buszko (2016) uvádí, že přínosy z hypotečních úvěrů v cizí měně závisí především na směnném kurzu ke dni přijetí úvěru. Hlavním závěrem výzkumu je, že hypoteční úvěry v cizí měně jsou poměrně přínosné, ale představují významné potenciální riziko pro ekonomickou bezpečnost polských domácností i celého bankovního systému. (Beckman, Stix, 2015) zkoumali, zda je poptávka po úvěrech v cizích měnách způsobena nedostatečnou znalostí o riziku měnového kurzu vyplývajícího z těchto úvěrů. Využívali průzkumy z osmi zemí střední a východní Evropy, které poskytují informace o znalostech agentů o riziku měnového kurzu. Výsledky ukazují, že většina respondentů si je vědoma toho, že depreciace zvyšuje splátky úvěrů. Dále bylo zjištěno, že znalosti o kurzovém riziku mají silný vliv na výběr měny úvěru. Z úhlu pohledu bankovní instituce danou problematiku zkoumala i Pawlowska (2018), která prezentovala, že úvěry v cizí měně byly ziskové především pro dceřiné společnosti zahraničních bank. Dále uvedla pozitivní korelaci mezi kontextem mateřských bank a ziskovostí jejich přidružených podniků zejména během světové finanční krize. Musa et. al. (2016) uvádí, že vypuknutí globální finanční a hospodářské krize představovalo vnější šok, který vážně ohrožuje existenci MSP v Evropské unii. MSP byly postiženy rychlým poklesem poptávky po zboží a službách a zpřísněním úvěrových podmínek. Vzhledem k zhoršujícímu se přístupu k úvěrům byly MSP nuceny používat alternativní zdroje financování, jako jsou rezervy nebo samofinancování.

2. Metody a cíl článku

Cílem článku je analyzovat situaci na trhu úvěrů v České republice, které byly poskytnuty nefinančním podnikatelským subjektům v letech 1993 - 31.7. 2018 v jejich hodnotách podle délky splatnosti, měny i dle výše úvěru.

Při zpracování článku byly použity primární a sekundární zdroje. Data z úvěrové scény byla získána od České národní banky a od Evropské centrální banky. Údaje z České národní banky byly vždy používány v období, jak jsou prezentovány Českou národní bankou. Mezi sekundární zdroje patří webové stránky, odborná literatura, informace shromážděné z odborných časopisů, diskuze a účast na odborných seminářích a konferencích. Poté bylo nutné vybírat, kategorizovat a aktualizovat dostupné relevantní informace ze shromážděného publikovaného materiálu, aby mohly být poskytnuty základní znalosti o vybraném tématu.

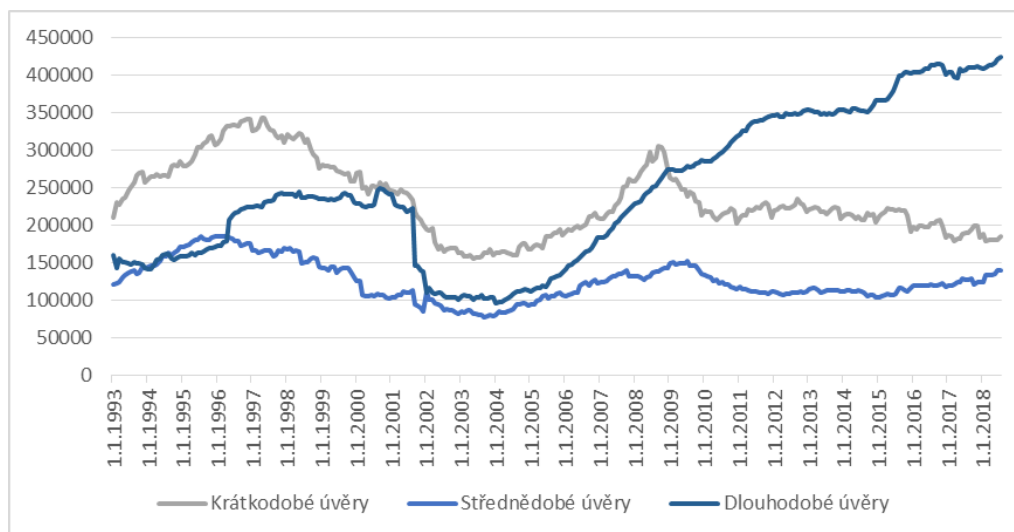
3. Výsledky

Šetření úvěrových podmínek a vývoje spotřebitelských úvěrů umožňuje získat uživatelům (centrální bance, bankám, finančním zprostředkovatelům) cenné informace o vývoji na spotřebitelském úvěrovém trhu. Informace kvalitativního charakteru získává např. ČNB v rámci šetření formou strukturovaného dotazníku přímo od reprezentativního vzorku bank působících na českém úvěrovém trhu, které participují na tomto šetření. (ČNB, 2018a) V posledním šetření bank na vývoj úvěrových podmínek v průběhu druhého čtvrtletí 2018 jsou uvedeny níže. Dle výsledků šetření ČNB (2018a) a ECB (2018) poptávka po úvěrech rostla ve všech segmentech vyjma úvěrů domácnostem na bydlení. U podniků byl růst poptávky po úvěrech ovlivněn zejména financováním fixních investic, stejně jako fúzemi a akvizicemi. Ve směru růstu poptávky po spotřebitelských úvěrech působí zlepšená důvěra domácností a snížená úroveň klientských úrokových sazeb. Ve třetím čtvrtletí 2018 banky neočekávají změnu úvěrových standardů u podnikových ani spotřebitelských úvěrů, avšak očekávají jejich zpřísnění u úvěrů na bydlení. Poptávka po podnikových úvěrech se dle bank ve třetím čtvrtletí 2018 zvýší, zatímco poptávka po úvěrech na bydlení poklesne. Banky neočekávají změnu poptávky u spotřebitelských úvěrů.

3.1 Objemy úvěrů nefinančním podnikatelským subjektům

Graf 1 (obr. 1) prezentuje výsledky úvěrů a pohledávek vůči nefinančním podnikům v České republice v korunách. Data byla ve statistických údajích České národní banky k dispozici od 1.1.1993 do 31.7.2018. V grafu jsou prezentována data za jednotlivé roky. Nejstabilnější trend zaznamenaly úvěry a pohledávky střednědobé. Zároveň se až na roky 1995-1996 jedná o nejméně využívaný produkt z porovnávaných řešení. Krátkodobé úvěry do jednoho roku byly do roku 2009 nejvíce používaným nástrojem. Nejvíce peněz bylo pomocí tohoto nástroje půjčeno v letech 1996-1997, kdy si podnikatelé půjčili 350 miliard CZK. Poté začal jejich objem klesat až do roku 2004. Od roku 2005 začal objem opět narůstat až do roku 2009 a od roku 2010 kolísá spíše s klesajícím trendem. Co se týče dlouhodobých úvěrů, zaznamenávaly největší výkyvy a změny. Jejich obliba rostla do roku 2001, a poté významně poklesla. Do roku 2005 zůstávaly na podobné úrovni. Změna však nastala v roce 2006, kdy začaly úvěry tohoto typu opět více růst. V letech 2011 až 2015 spíše stagnovaly a poté až do 1.1.2018 stále rostly.

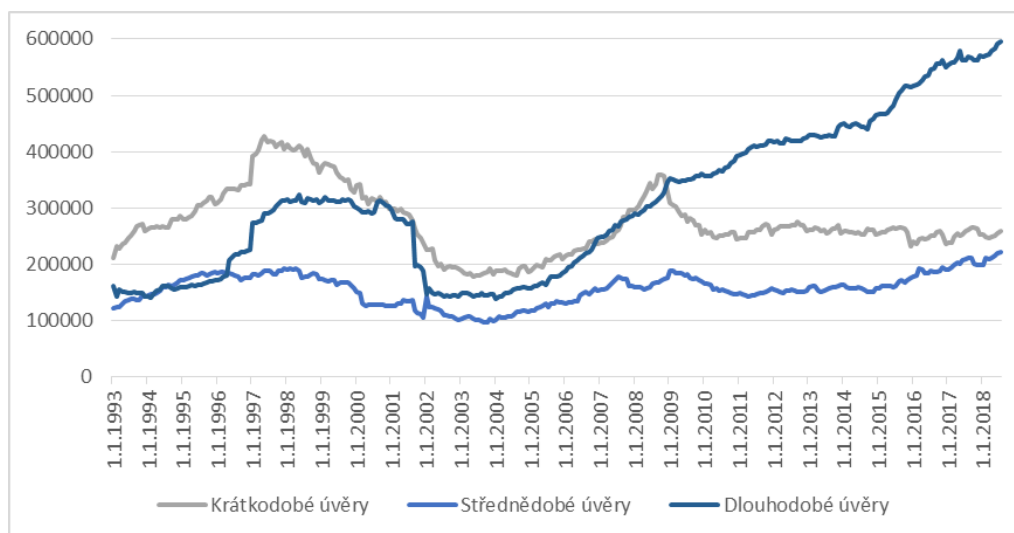
Figure 1: Nefinanční podniky – úvěry dle doby splacení (v CZK)



Source: vlastní zpracování na základě (ČNB, 2018b)

Do 31.12.1996 nebyly v tabulce zaznamenávány úvěry v zahraniční měně. Rozdíly byly zaznamenány až od roku 1997. V roce 2018 bylo 180 miliard z dlouhodobých zdrojů, které jsou nejvíce využívány zahraniční měnou. Graf (obr. 2) má podobné trendy os a trendy jako v předchozím grafu. Dlouhodobé úvěry opět zaznamenaly od roku 2009 vyšší hodnoty před krátkodobými úvěry a střednědobými úvěry. Není to překvapující, protože dlouhodobé úvěry jsou obvykle spojeny s vyšší částkou úvěru než krátkodobé nebo střednědobé úvěry.

Figure 2: Nefinanční podniky – úvěry dle doby splacení (v CZK + zahraniční měna)

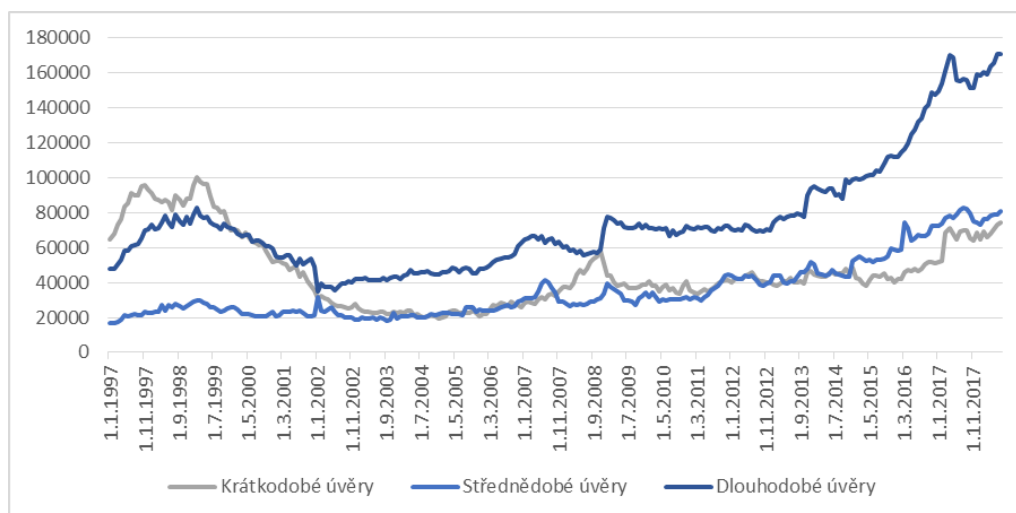


Source: vlastní zpracování na základě (ČNB, 2018b)

V další části (obr. 3) bude porovnáno, v jaké výši byly poskytovány úvěry v zahraničních měnách a také procentuální rozložení úvěrů v CZK a v zahraničních měnách (obr 4). Data v cizích měnách jsou v statistických datech ČNB uváděna od 1.1.1997. Z toho důvodu jsou data porovnávána od 1.1.1997 po nejnovější data. V roce 2018 byly dlouhodobé zdroje financovány cizí měnou v hodnotě přes 171 miliard. Ty jsou od roku 2002 pro financování s cizí měnou využívány v nejvyšší hodnotě. Rekord v půjčené hodnotě byl zaznamenán k 31.7., kdy bylo v zahraničních měnách půjčeno více, než 326 mld. Kč, z toho bylo 171 mil. na dlouhodobé

úvěry. Zlom nastal v roce 2002, kdy do roku 2002 dosahovaly krátkodobé a střednědobé úvěry vyšších hodnot než dlouhodobé úvěry. Zajímavé jsou i trendy. Zatímco dlouhodobé a střednědobé úvěry poskytnuté v zahraniční měně mají rostoucí trend, krátkodobé ho mají za sledované období klesající.

Figure 3: Nefinanční podniky – úvěry dle doby splacení (zahraniční měna)

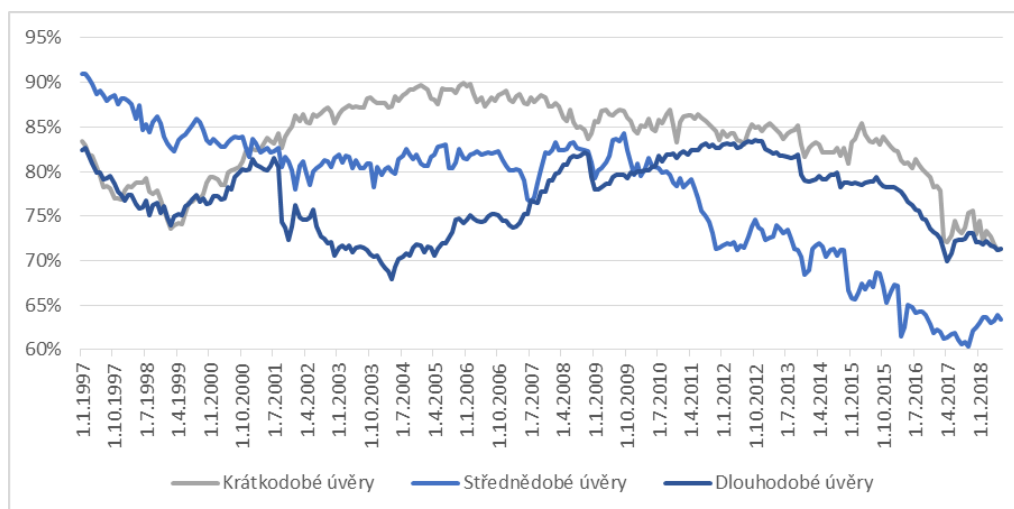


Source: vlastní zpracování na základě (ČNB, 2018b)

3.2 Porovnání úvěrů nefinančním podnikatelským subjektům dle měny

V případě, že se zaměříme na podíl financování v CZK a v zahraničních měnách, je z grafu v obr. 4 patrné, že podíl financování zahraniční měnou ku CZK vzrostl z roku 1997 z 14 % na 31 % k 31.7.2018. V některých sledovaných obdobích v roce 2017 byl podíl až 32%. I přesto, že střednědobé úvěry byly v roce 2017 procentuálně nejméně využívány v porovnání mezi CZK a zahraniční měnou, od 31.7.2010 je jejich procentuální podíl a rozdíl největší.

Figure 4: Nefinanční podniky – porovnání úvěrů dle doby splatnosti, procentuální podíl mezi CZK a zahraniční měnou

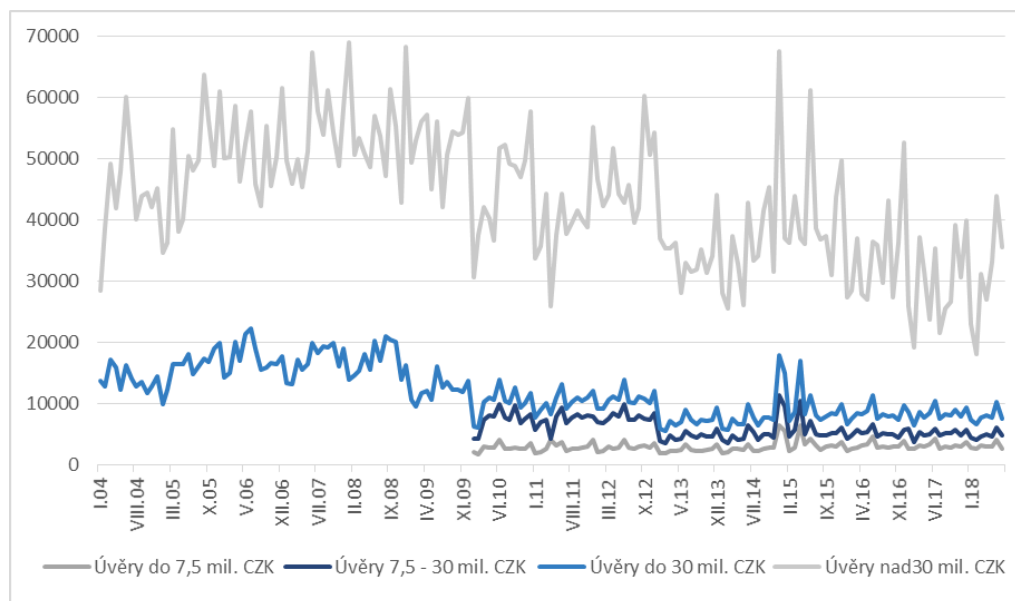


Source: vlastní zpracování na základě (ČNB, 2018b)

2.3 Porovnání úvěrů nefinančním podnikatelským subjektům dle výše úvěru, nové obchody

V případě, že se zaměříme na úvěry dle částky, nejvíce bylo půjčeno u úvěrů nad 30 mil. CZK a u úvěrů do 30 mil. CZK, obr. 5. S půjčenou částkou souhlasí i další umístění. Nejmenší celková částka byla půjčena u úvěrů, které mají hodnotu do 7,5 mil. CZK. U dvou nejnižších kategorií byla data zveřejněna až od 1.1.2010.

Figure 5: Nefinanční podniky – porovnání úvěrů dle výše úvěru, nové obchody



Source: vlastní zpracování na základě (ČNB, 2018c)

Z dat ČNB (ČNB, 2018c) je patrné, že nejvíce využívaným nástrojem nových obchodů jsou kontokorentní úvěry, revolvingové úvěry a kreditní karty. Česká národní banka zvláště vykazuje kontokorentní úvěry, které hrají v dané skupině nejvýznamnější roli. Z dat je patrné, že od roku 2010 nenastaly žádné významné výkyvy v kontokorentních úvěrech.

4. Conclusion

Dle dat z České národní banky (2018b) je patrné, že podnikatelské subjekty v posledních letech využívaly pro financování cizím kapitálem v největší míře úvěry dlouhodobé následované úvěry krátkodobými a střednědobými, viz obr 1. Je zajímavé sledovat vývoj na trhu a sledování financování v jednotlivých krajích pomocí úvěrových produktů. Financování podnikatelských subjektů významně ovlivňuje rozvoj a inovace ve firmách, protože spotřebitelské a hypoteční úvěry obvykle představují investice do dlouhodobého majetku. Hypoteční úvěry mají oproti spotřebitelským výhodou nižších úrokových sazeb. Nevýhodou je zajištění nemovitosti a větší administrativní zátěž. K zajištění nemovitostí nemusí v některých případech dojít, např. při poskytnutí americké hypotéky. S tím ale obvykle souvisí i vyšší úroková sazba a následně RPSN. Ostatní dlouhodobé úvěry nebo střednědobé úvěry závisí na vyjednávání mezi společnostmi a bankovními institucemi. Mezi další nejčastěji používané produkty společností patří kontokorentní úvěry, které jsou klasifikovány jako krátkodobé či střednědobé financování. Nové obchody s úvěry podle hodnoty úvěru zaznamenaly od ledna 2004 nejvyšší hodnotu úvěrů více než 30 mil. Kč a úvěry od 7,5 mil. Kč do 30 mil. Kč. V

souvislosti s nárůstem zahraničního obchodu roste podíl financování cizí měny v České republice a také hodnoty tohoto druhu financování rostou.

Vonnak (2018) analyzovala situaci v Maďarsku, kdy porovnávala faktory přispívající k horšímu výkonu úvěrů dlužníků v cizí měně ve srovnání s dlužníky v místní měně. Bylo zjištěno, že denominace cizí měny může výrazně zhoršit výkonnost úvěru, zatímco výběr také významně přispívá k selhání. Na jedné straně si samy o sobě méně úvěruschopné firmy vypůjčily v cizí měně a během krize šoky v cizích měnách dále oslabily úvěrové výkony.

V další fázi průzkumu by mohly být hledány korelace mezi výší půjček, hodnocením podnikatelského prostředí, možnosti získat úvěr dle „doing business“ a „getting credit“ (World Group Bank, 2018), úrokovými sazbami, ale i např. s HDP.

Acknowledgement

Příspěvek byl zpracován v rámci specifického výzkumu „Vyhodnocování investic v rámci konceptu Průmysl 4.0“ a interního grantového projektu „Podpora pedagogické práce, technického vybavení a komunikace s odborníky“ na Univerzitě Hradec Králové, Fakultě informatiky a managementu. Při zpracování článku děkujeme za pomoc Ing. Martinu Královi.

References

- [1] Act No. 6/1993 Coll. on the Czech National Bank.
- [2] Allen, J. and Paligorova, T. (2015). Bank loans for private and public firms in a liquidity crunch. *Journal of Financial Stability*, vol. 18, pp. 106–116.
- [3] Beckmann, E. and Stix, H. (2015). Foreign currency borrowing and knowledge about exchange rate risk. *Journal of economic behavior & organization*, vol. 112, pp. 1-16.
- [4] Busko, M. (2015). Profits and Risks of Foreign Exchange Mortgage Loans: Case of Poland. *14th Conference of the Eurasia-Business-and-Economics-Society*, Barcelona: Spain, pp. 129-145.
- [5] Czech National Bank (2018a). Bank lending survey, April 2018. Available: http://www.cnb.cz/miranda2/export/sites/www.cnb.cz/cs/uverove_setreni/download/2018_q2_BLS.pdf
- [6] Czech National Bank (2018b). Time series database – ARAD Statistical data, Monetary and financial statistics, Banking statistics (commercial banks), Loans, Client, Non-financial. Available: https://www.cnb.cz/cnb/STAT.ARADY_PKG.PARAMETRY_SESTAVY?p_sestuid=1787&p_strid=AABBAG&p_lang=CS
- [7] Czech National Bank (2018c). Time series database – ARAD, Statistical data, Monetary and financial statistics, Monetary statistics, Interest rates of MFIs, New business - refinanced loans. Available: https://www.cnb.cz/cnb/STAT.ARADY_PKG.PARAMETRY_SESTAVY?p_sestuid=27372&p_strid=AAABC&p_lang=EN
- [8] Černohorská, L. (2015). Impact of Financial Crisis on the Stability Banking Sectors in the Czech Republic and Great Britain. *Procedia Economics and Finance*, vol. 26, pp. 234-241.

- [9] Godlewski, Ch. J. and Sanditov, B. (2018). Financial Institutions Network and the Certification Value of Bank Loans. *Financial management*, vol. 47, no. 2, pp. 253-283.
- [10] Hedvičáková, M. and Svobodová, L. (2017). Mortgages for individuals, businesses and municipalities in the Czech Republic. *Proceedings of the 15th International Scientific Conference on Hradec Economic Days 2017*. Hradec Králové, Czech Republic, pp. 279-286.
- [11] Hedvičáková, M. and Svobodová, L. (2016). Development and the Current Situation of the Mortgages for the Czech Households. *Proceedings of the International Scientific Conference of the European Financial Systems (EFS 2016)*. Brno, Czech Republic, pp. 234-241.
- [12] Hedvičáková, M. and Soukal, I. (2012). Retail core banking services costs optimization. *Procedia Technology*, vol. 1, pp. 177-182.
- [13] European Central Bank (2018). The euro area bank lending survey, first quarter of 2018. Retrieved from: <https://www.ecb.europa.eu/stats/pdf/ecb.blssurvey2018q2.en.pdf>
- [14] Isynuwardgana, D. and Muslih, M. (2018). Corporate Governance and Cost of Debt. *Advanced science letters*, vol. 24, no. 4, pp. 2690-2692
- [15] Kim, J.B., Song, B.Y. and Stratopoulos, T.C. (2018). Does Information Technology Reputation Affect Bank Loan Terms? *Accounting Review*, vol. 93, no. 3, pp. 185-211.
- [16] Musa, H., Strokova, Z. and Musova, Z. (2016). Financing of Slovak small and medium sized enterprises in globalising environment. *Proceedings of the 16th International Scientific Conference on Globalization and its Socio-Economic Consequences*, Rajcke Teplice, Slovakia, pp. 1458-1465.
- [17] Pawlowska, M. (2018). International Banking and Bank Performance: The Case of Poland. *Problemy zarzadzanie-management issues*, vol. 16, no. 2, pp. 74-95.
- [18] Svobodová, L. and Hedvičáková, M. (2016). Mortgage Loans in the Regions of the Czech Republic. *Proceedings of the International Scientific Conference on Region in the Development of the Society*. Brno, Czech Republic, pp. 948-957.
- [19] Svobodová, L. and Hedvičáková, M. (2015). Doing Business in the Countries of Visegrad Group. *Procedia Economics and Finance*, vol. 34, pp. 453-460.
- [20] Svobodová, L. (2013). Trends in the number of bankruptcies in the Czech Republic. *Proceeding of the International Scientific Conference on Hradec Economic Days 2013 - Economic Development and Management Region*. Hradec Králové, Czech Republic, pp. 393-399.
- [21] Vonnak, D. (2018). Why do firms default on their foreign currency loans? The case of Hungary. *Journal of International money and finance*, vol. 86, pp. 207-222.
- [22] Włodarczyk, B. and Szturo, M. (2018). The impact of credit availability on small and medium companies. *Entrepreneurship and sustainability issues*, vol. 5, no. 3, pp. 565-580.
- [23] World Group Bank (2018). Doing business. Available: <http://www.doingbusiness.org/>

SLOVAK GENERATIONAL ACCOUNTS

Domonkos Tomáš^{1,a,*}, Jánošová Miroslava^{2,b}

^{1,2}Institute of Economic Research, Slovak Academy of Sciences, Slovakia

^atomas.domonkos@savba.sk, ^bmiroslava.dolinajcova@savba.sk

*Corresponding author

Abstract. The research presented in this paper aims to evaluate the Slovak pension system from the perspective of inter-generational re-distribution of fiscal burden. We aim to answer the question, how different settings of the Slovak multi-pillar pension system affects the net transfers of currently living generations and future generations. The methodology applied is the framework of Generational Accounting. Since the reform in 2005, the Slovak pension system is based on a state operated first pillar and a private second pillar. The initial share of mandatory pension contributions assumed an allocation of fifty percent to the first and fifty percent to the second pillar. Total old age pension contributions are eighteen percent out of gross wage. Therefore, nine percent was transferred to the first and nine to the second pillar. Later this distribution was changed by a law expecting fourteen percent to the state run pillar and four percent to the private pillar. This law, however, expects gradual increase of contributions to the second pillar from four to six percent on the expense of the contributions to the first pillar. Another important feature of the Slovak pension system is the retirement age. It is currently determined taking into account the average life expectancy. The entire increase of life expectancy is translated into the working life. Our scenarios focus on two parameters of interest: (i) the share of mandatory contributions to the first and to the second pillar and (ii) changes of the retirement age.

Keywords: Slovak pension system, generational accounting, multi-pillar pension

JEL Classification: D64, H55, H64

1. Introduction

The recent demographic forecasts of the population, in many developed countries, draw the attention to the issue of ageing population.² This naturally raises apprehension of the sustainability of future pension funding. Therefore this issue became a popular topic discussed among policy practitioners and the general public. Central and Eastern European (CEE) countries are no exception in this regard.³ Many of the CEE countries already reacted to the unfavourable development of their population's demographic structure by introducing new pension schemes or reforming the already existing ones.

A multi-pillar pension system consisting of three pillars was established in Slovakia in 2005. The first pillar is based on a Pay-As-You-Go (PAYG) principle, i.e. current pension

² Usually accompanied by increasing number of people in retirement age, increasing dependence index, decreasing birth rate and prolonged age of survival.

³ For example Sobotka (Sobotka, 2011) says in his study that post-communist countries in the CEE region already face a declining birth rate.

insurance contributions are used to finance current old age pension requirements. The second pillar is to some extent an optional system, and it is in fact a personal old-age pension saving account. The third pillar is a supplementary pension saving and therefore it is considered as a solely voluntary pillar. We ignore the third voluntary pillar in the calculations.

Generational accounts (GA) introduce the age dimension to the revenues and expenditures (the budget) of the general government. Therefore, it allows identifying which age cohort is a net contributor or a net beneficiary. If one generation make a gain on the expense of another generation, we are talking about intergenerational injustice.

GA was developed by Auerbach, Gokhale and Kotlikoff (Auerbach et al., 1992, 1994). Later, this method became an official application in the US and Norway, where it was used to prepare annual budgets. This methodology is suitable for analysing the long-term impact of policy changes on the distribution of public funds among generations. Therefore, it is appropriate to evaluate intergenerational redistribution and national pension systems. The main purpose of the pension insurance scheme is to provide people with pension entitlement (retired or a disabled persons) their pensions from social security contributions mostly paid by people in the productive age. Kotlikoff (Kotlikoff, 1995, 1997) in his paper's states that so far, 19 countries have constructed or are currently constructing generational accounts. Since the mid- 1990s and late 2000 GA has been applied to the analysis of various public policy measures, not solely targeting pension policy reforms.

Application of the GA can be found in the work of Kröger and Ejzenberg (Kröger & Ejzenberg, 2012). The authors applied this method to the cost-benefit analysis of in vitro fertilization. Gál, Simonovits and Tarcali (Gál et al., 2001) used the GA in their study while analysing the Hungarian pension reform, which was a multi-pillar pension scheme. Gál, Törzsök, Medgyesi and Révész (Gál et al., 2005) and Gál, Gergely, Medgyesi (Gál et al., 2011) in their document provide a detailed methodological instruction to the GA in the context of the Hungarian public finances. Issues of generational accounts can be found also in the work of Bommier, Lee, Miller, Zuber (Bommier et al., 2010). The authors in their publication provide analyses problem that public transfer programs in industrial countries are thought to benefit the elderly through pension and health care programs at the expense of the young and future generations. Application of the GA also can be found in work of Lee, McCarthy, Sefton (Lee et al., 2017). The authors used data from National Transfer Accounts, for calculate FGAs for the United States. Application of GA for Netherlands can be found in the work of Heeringa and Bovenberg (Heeringa & Bovenberg, 2012) authors in this paper shows that keeping generational accounts of the Dutch pay-as-you-go pension scheme constant since the introduction of this scheme in 1957 in the face of subsequent demographic changes would have required a gradual increase of the entitlement age. The first study for UK about application of the GA was published by Cardarelli et al. (Cardarelli et al., 1998, 2000). Dybczak (Dybczak, 2006) in his article handled the first version of GA for the Czech Republic. In Slovakia the Council for Budgetary responsibility was the first publishing the Slovak GA. The CBR (CBR, 2015) in their study compares the status of existing and future cohorts. They tend to publish their results on an annual basis.

The aim of our work is to discuss the development of the Slovak multi-pillar pension system from the perspective of intergenerational accounts. The results presented in this conference paper are preliminary results from our GA developed at the Institute of Economic Research of the Slovak Academy of Sciences.

2. Data and Methodology

The GA is extensively discussed e.g. by Auerbach, Gokhale and Kotlikoff (Auerbach et al., 1992, 1994), therefore we provide only the key equations and the conceptual idea of this methodology. The main intention of the GA is to calculate net tax profiles for individual age cohorts. If the GA is forward and backward looking, then all particular age cohort can be compared. The GA presented in this paper is only forward looking, therefore, it does allow comparing net taxes for the last-born generation and the future generations. The forward looking version of GA is the usually applied, mostly due to complications associated with collecting data from the past. By definition, the intertemporal budget constrain is as follows:

$$\sum_{k=t-D}^t N_{t,k} (1+r)^{-(k-t)} + \sum_{k=t+1}^{\infty} N_{t,k} = \sum_{s=t}^{\infty} G_s (1+r)^{-(s-t)} - W_t^g \quad (1)$$

where:

$\sum_{k=t-D}^t N_{t,k}$ – the net taxes of existing generation;

$\sum_{k=t+1}^{\infty} N_{t,k}$ – the net taxes of future generation (discounted);

D – the number of years a representative agent can live;

k – is the birth year of the cohort under investigation;

t – is the base year;

r – is the discount rate;

$\sum_{s=t}^{\infty} G_s$ – stands for government consumption expenditure in year s ;

W_t^g – denotes the government's net wealth in year t .

The term $N_{t,k}$ is further defined as:

$$N_{t,k} = \sum_{s=\max(t,k)}^{k+D} T_{s,k} P_{s,k} (1+r)^{-(s-\max(t,k))} \quad (2)$$

where:

$T_{s,k}$ – the average net tax payment in year s of a representative agent of the generation born in year k ;

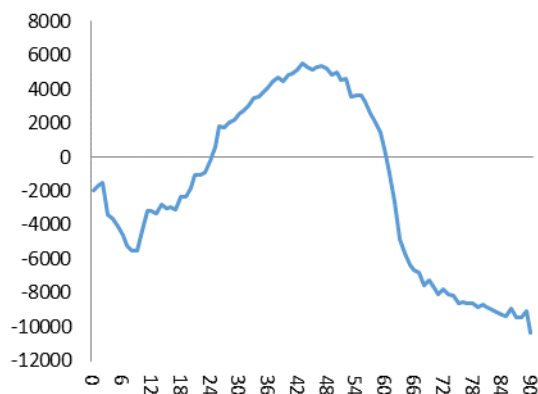
$P_{s,k}$ – the number of living cohort members in year s of cohort born in year k .

Constructing the GA is a data-intensive procedure. Among the most important data are demographic projections. We rely on the projections of the Demographic Research Center of INFOSTAT.⁴ Macro level data used are the ESA2010 F1-F8 accounts, government expenditures according to COFOG99 and government revenues according to the National Tax List. Additionally micro-level data necessary while constructing the accounts are personal income tax data (from Financial Administration), social and health insurance data (from Social Insurance Authority), value added tax estimates, alcohol tax and tobacco tax (from Household Budget Survey), old-age pension (from Social Insurance Authority), health

⁴ We thank to Boris Vaňo from the Demographic Research Center of INFOSTAT for providing us long-run population projections.

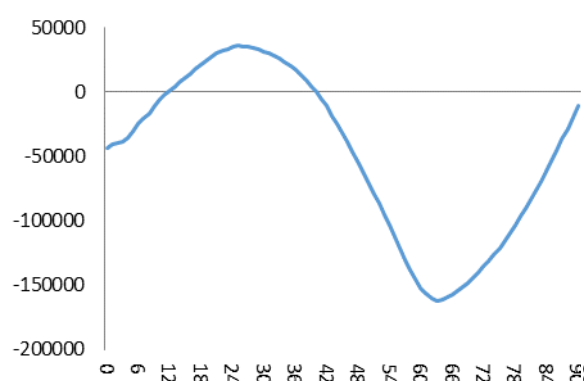
spending (from Ministry of Healthcare), education expenditures (from the Ministry of Education). We were able to distribute 71.5 % of the revenues and 54.3 % of the expenditures.

Figure 1: Cohort-specific p. c. net taxes for 2015 - baseline scenario



Source: Authors' calculations

Figure 2: Cohort-specific cumulative p. c. net taxes for 2015 - baseline scenario



Source: Authors' calculations

From a budgetary perspective, young generations tend to be net recipients similarly to the elderly. Young generations receive transfers mostly for education, health care and public goods. Elderly mainly receive transfer such as old-age pensions, health care and public goods. Public goods are (e.g. defence, road infrastructure) equally distributed between the age cohorts. In the Slovak case, age cohorts ranging from 24 up until 60 are net contributors.

3. Results and Discussion

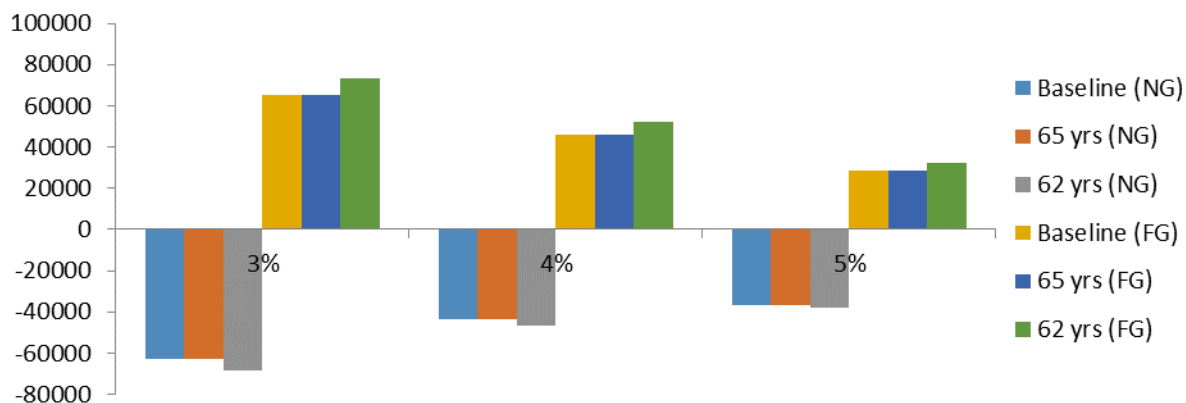
GA is not a dynamic modelling framework which converges to a new equilibria steady state after an external shock. In fact, it relies on the comparison of the cumulative lifetime net taxes of a particular cohort (usually the last born cohort) born in year t and the net taxes of the future generations. Its main benefit is in simplicity, however, from an applied perspective this is offset by high data requirements. Although, this approach has several drawbacks, it is often applied to explain the effects of policy measures on the intergeneration redistribution of public inflows and outflows. We considered three different discount rates (3%, 4% and 5%) and we set the growth rate equal to 1,5%. We considered two main scenario streams which are further divided into sub-scenarios as follows:

- a. Changing the retirement age
 - i. demographic projection and statutory rule - baseline
 - ii. fixing the retirement age at 62 from 2015
 - iii. allowing for automatic increases up to 65
- b. various set-ups of the 2nd-pillar
 - i. increase to 6 p.p. until 2024 - baseline
 - ii. 4 p.p. since September 2012
 - iii. 9 p.p. since 2005

While evaluating the scenarios we compared the net taxes of the new born generation to the future generations. In case the last born generation is a net recipient and the future generations

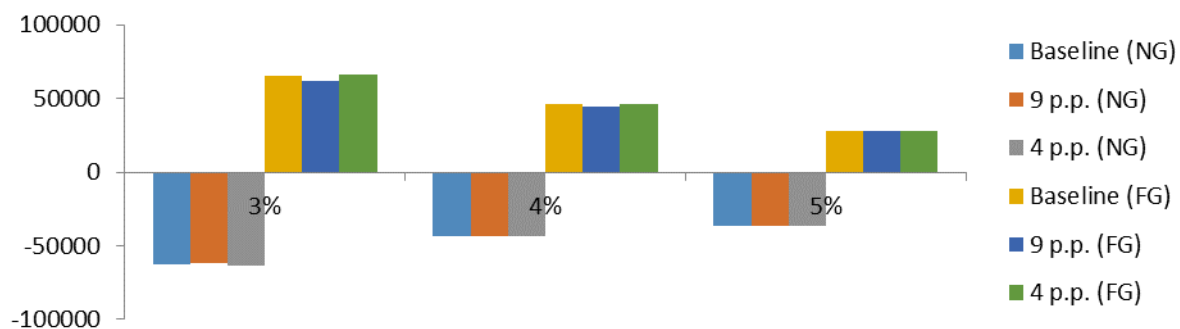
are contributors then the greater the differences between the net taxes of these generations the greater fiscal burden will be on the shoulders of the future generations.

Figure 3: Net taxes of generation born in 2015 vs. net taxes of future generations – retirement age scenarios



Source: Authors' calculations

Figure 4: Net taxes of generation born in 2015 vs. net taxes of future generations – 2nd-pillar scenarios



Source: Authors' calculations

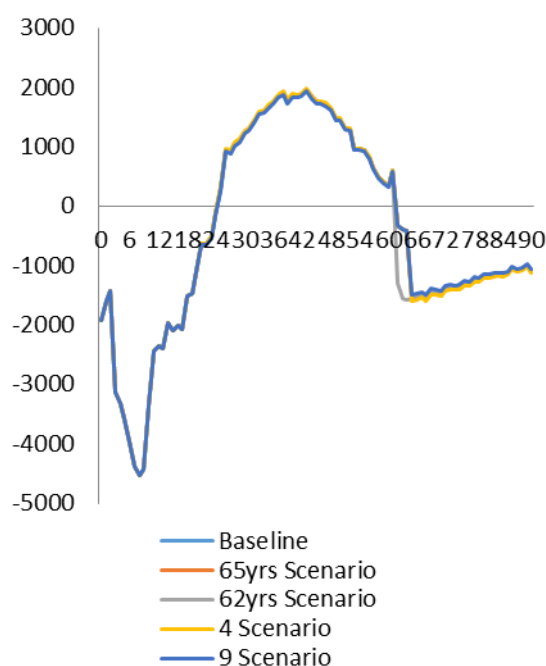
Regardless of the simulations, all particular scenarios including the baseline shows relatively large differences in the net taxes of the future generations compared to the last born generation. The greater the discount factor the smaller the net taxes are. Even though, the discount factor significantly affects the volume of net taxes, all particular scenarios show rather similar development. Therefore, we will not comment the volume of the net taxes but rather discuss the direction of the changes caused by the changing parameters of the system.

The first two scenarios assumed fixing the upper threshold of the retirement age first at 65 years of age and second on 62 years of age. The law currently in force assumes a gradual increase of the retirement age determined according to the life expectancy in Slovakia (reported by the Slovak Statistical Authority). While comparing the 65 years threshold with the gradual system, our results do not show significant differences in terms of intergenerational fairness. It has negligible effects on the net taxes of newborn generation as well as the future generation. However, the case of 62 years threshold when compared to the gradual system shows slightly different development. The last born generation's net taxes

decrease, therefore, they became higher net recipients then in the baseline scenario. On the other hand, their gains are to be paid by the future generations.

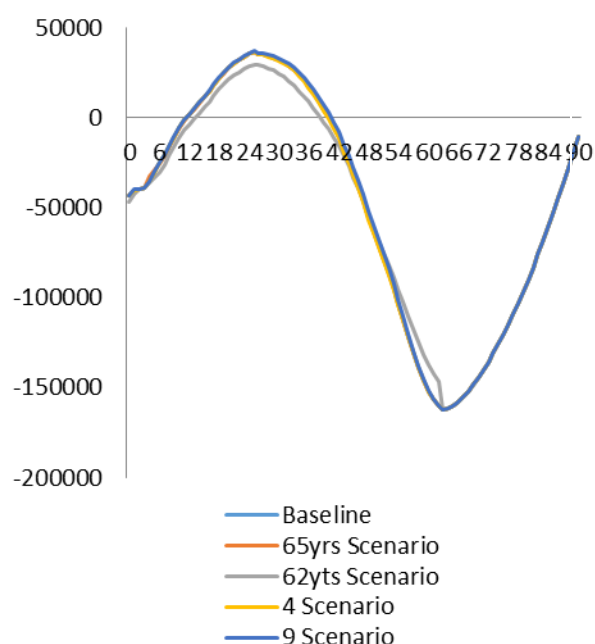
The second group of scenarios assumes changes in the settings of the second pillar. The baseline scenario describes the system as it is currently set, this means that the contribution of to the second pillar is gradually increasing by 0.25 p.p. per year until it equals to 6%. The first alternative scenario assumes, that the system operates as it was initially designed. This means, that the contribution of the savers is 9% to the first pillar and equally 9% to the second pillar. In this case, the burden of the future generation is lower than in the baseline scenario. This decrease is however transferred to the last born generations. This making the pension system slightly more balanced from an intergeneration fairness viewpoint. The third scenario assumes that the contribution of the savers is 14 % to the state operated pillar and 4% to the second private pillar. This scenario has almost no effects on the results from an intergenerational fairness perspective.

Figure 5: Cohort-specific p. c. net taxes for 2015



Source: Authors' calculations

Figure 6: Cohort-specific cumulative net taxes for 2015 across five scenarios



Source: Authors' calculations

4. Conclusions

The Slovak pension system and its reforms often attract the attention of policy practitioners as well as the general public. It is rather difficult to come up with a one universal design of the system which can fit the needs of all agents acting in it. However, it is undeniable, that Slovakia is facing an aging population and it should be even more severe in the future. Therefore, it is in particular important to discuss this issue and try to perform at least minor changes which can mitigate the expected unfavourable effects of this development. The preliminary results of our GA calculations showed that the reform of the single PAYG system

to a multi pillar design and the currently applied gradual increase of retirement age will likely transfer the burden of the upcoming ageing to currently living generations and therefore decreasing the fiscal burden future generations might face.⁵ On the other hand, the decreased level of contributions to the private pillar in favour of the transfers to the public pillar had reverse effects and transferred certain part of the future fiscal burden to the shoulders of the future generations while making the currently living generations better off.

Acknowledgment

This work was supported by the Slovak Research and Development Agency Grant APVV-14-0787.

References

- [1] Auerbach, A., Gokhale, J. and Kotlikoff, L.J. (1992). Generational Accountig – a New Approach to Understanding the Effects of Fiscal-Policy on Saving. *Scandinavian Journal of Economics*, vol. 94, no. 2, pp. 303-318.
- [2] Auerbach, A., Gokhale, J. and Kotlikoff, L.J. (1994). Generational Accountig – a Meaningful Way to Evaluate Fiscal-Policy. *Journal of Economic Prespectives*, vol. 8, no. 1, pp. 73-94.
- [3] Bommier, A., Lee, R., Miller, T. and Zuber, S. (2010). Who Wins and Who Loses? Public Transfer Accounts for US Generations Born 1850 to 2090. *Population and Development Review*, vol. 36, no. 1.
- [4] Cardarelli, R., Sefton, J. and Kotlikoff, L.J. (1998). Generational Accounting in the UK. National Institute of Economic and Social Research.
- [5] Cardarelli, R., Sefton, J. and Kotlikoff, L.J. (2000). Generational Accounting in the UK. *Economic Journal*, 110, F547-574.
- [6] Dybczak, K. (2006). Generational accounts in the Czech republic. *Finance a Uver-Chech Journal of Ecnomics and Finance*, vol. 56, no. 7-8, pp. 298-317.
- [7] Gál, R., Medgyesi, M., Révész, T. and Törzsök, A. (2005). Generational accounts in Hungary, 1992-2001. *Working Papers. Ministry of Finance*. Available: <http://www.pm.gov.hu>
- [8] Gal, R., Gergely, V. and Medgyesi, M. (2011). *National Transfer Accounts in Hungary: contribution asset and returns in a pay-as-you-go pension scheme*. Population ageing and the Generational Economy: Global Perspective. Publisher: EDWARD ELGAR PUBLISHING LTD.
- [9] Gál, R. I., Simonovits, A. and Tarcali G., (2001). Pension Reform and Generational Accounts. World Bank. *Social Protection Discussion Papers 0127*.

⁵ We draw this conclusion from the finding, that the greater the contribution to the second pillar the lower the fiscal burden future generations might face. Therefore, it is reasonable to assume, that a scenario with zero contribution to the private pillar and 18 % to the public pillar will transfer the burden on the future generations.

- [10] Heeringa, W. L. and Bovenberg, A. L., (2012). Generational Impacts of Demographic Changes in Pay-as-you-go Pension Schemes: Measurement and Application to the Netherlands. *Economist-Netherlands*, vol. 160, no. 1, pp. 1-16.
- [11] Kotlikoff, L. J. (1995). Applying Generational Accounting to Developing Countries. *IED Discussion Paper no. 67*, Boston University.
- [12] Kotlikoff, L. J., (1997). Reply to Diamond's and Cutler's reviews of generational accounting. *National Tax Journal*, vol. 50, no. 2, pp. 303-314.
- [13] Kroeger, G. B. and Ejzenberg, D. (2012). The fiscal outcome of artificial conception in Brazil-creating citizens in developing countries., *Human Reproduction*, vol. 27, no. 1, pp. 142-145.
- [14] Lee, R., McCarthy, D., Sefton, J. et al., (2017). Full Generational Accounts: What Do We Give to the Next Generation? *Population and Development Review*, vol. 43, no. 4.
- [15] Sobotka, T. (2011). Fertility in Central and Eastern Europe after 1989: Collapse and Gradual Recovery. *Historical Social Research-Historische Sozialforschung*, vol. 36, no. 2, pp. 246-296.

INTERNATIONAL IMPACT OF FINANCIAL SYSTEMIC RISKS. A DYNAMIC ANALYSIS WITH TIME DELAY

Liliana Eva Donath^{1,a}, Mihaela Neamtu^{2,b,*} and Gabriela Mircea^{3,c}

¹West University of Timisoara, Faculty of Economics and Business Administration, Romania

²West University of Timisoara, Faculty of Economics and Business Administration, Romania

³West University of Timisoara, Faculty of Economics and Business Administration, Romania

^aliliana.donath@e-uvv.ro, ^bmihaela.neamtu@e-uvv.ro, ^cgabriela.mircea@e-uvv.ro

*Corresponding author

Abstract. The aim of the paper is to explain the evolution of financial cycles and their feedback causality with systemic risks. Since the mitigation of systemic risks and preventing their contagion on the international financial markets became a priority for the national and international financial authorities, a number of macro-prudential policies were considered to achieve the financial stability that, on a long run, trigger positive externalities for the entire society. The hypothesis of the research is that there is an appropriate time to implement counter-cyclical measures when the trajectories of the cycles converge to the asymptotically stable equilibrium point. If the system reacts with a time delay than the oscillations in the system persist. The envisaged results show that risks can be controlled to a certain extent, but there is also a residual risk that cannot be controlled because of behavioural factors, noise, rumours, etc. Financial cycles are approached from a theoretical perspective using a mathematical model that involves the occurrence value, the analyzed value and the controlled value of the risk in the current state of market. The time delay is introduced and based on Hopf bifurcation theory, the conditions for stability and bifurcations are given. Numerical simulations verify the theoretical findings and the conclusions outline a future possible continuation of the research.

Keywords: systemic risks, counter-cyclical measures, residual risks, time delay, positive externalities

JEL Classification: C61, C63, E44

1. Introduction

Under favourable circumstances, financial institutions and their clients start underestimating risks associated with their investment and business decisions, leading, over the cycle, to accumulated systemic risks that eventually translate in an outburst of crises. In addition, spreading negative economic and financial news trigger systemic jumps spread on regional and international markets, impacting investors' behaviour (Chen et al., 2018). The intensity of jumps is also time related: credit and real estate prices changes were much swifter during pre-globalisation, while the decline of the financial assets' prices (*i.e.* shares) is more intense during globalisation, inducing almost immediate contagion, but through specific mechanisms have the ability to bounce back towards equilibrium. These findings are

consistent with previous studies that conclude that capital markets adjust at a higher speed during globalisation due to extended arbitrage possibilities and financial liberalisation (Backaert & Harvey, 2010). On the other hand, international financial networks may contribute to the amplification of economic fluctuations that, eventually, lead to financial distress and economic disorder often associated with the pro-cyclic character of the financial system (Danielsson et al., 2004). To be noted that though riskiness increases in all group of countries, emerging countries have experienced a lesser effect of the crisis (Danisoglu, et al., 2018). Under these circumstances, macro-prudential policies have emerged to prevent built up imbalances (Borio, 2005) that spill over on the global market.

The hypothesis of the research is that there is an appropriate time to implement counter-cyclical measures when the trajectories of the cycles converge to the asymptotically stable equilibrium point. If the system reacts with a time delay than the oscillations in the system persist. The envisaged results show that risks can be controlled to a certain extent, but there is also some residual risk that escapes decision makers because of behavioural factors, noise, rumours, etc. The paper is structured as follows: Section 2 *Financial systemic risks and international contagion*, Section 3 *Mathematical model and stability analysis*. The remainder of the paper is dedicated to *Conclusions and policy lessons*.

2. Financial systemic risks and international contagion

The main objective of financial stability analysis, from a prevention perspective, is the timely identification of the marginal contribution of the financial environment to the accumulation of systemic risks. Since financial markets operate in global networks, propagation mechanisms of risks are extensively studied to identify the transmission channels of spill-over. (Caporin et al, 2017). Consequently, contagion depends on the vulnerability or stability of individual institutions (Figure 1), but also on other determinants such as the financial industry concentration, risk taking, interdependencies and network structures, thus grouping countries in transmitters or receivers of shocks (Shahzad et al., 2018).

Figure 1: The contribution of financial institutions' health on contagion



Source: Fraït & Komárková, 2011

The connections between individual institutions can act as channels through which the shocks or the contagion is transmitted. Contagion is, thus, situated at the heart of the transversal systemic risk. Unless there is reliable, correct information, a financial institution is not, *per se*, able to judge the effect of its financial behaviour on other institutions. For the same reason, it is not able to safeguard its own operations against the negative impact induced by other counterparts. Consequently, unless a financial institution is able to effectively or speculatively protect itself against the misbehaviour of other institutions it will bear the risk of

the respective financial network. Nevertheless, whether negative shocks are transmitted or absorbed within the financial network entirely depends on the financial cycle phase. The contagion within the financial system is described within a contagion matrix that includes institutions, markets and infrastructure and their main interactions. The main sources of contagion are given in Figure 2.

Figure 2: Main sources of contagion

		Contagion to		
		Institutions	Markets	Infrastructure
Contagion from	Institutions	credit risk exposures, shareholder links, contingent credit lines, access to key financial infrastructure	market makers for derivatives, provision of credit support through CDSs, fire sales of assets	operational disturbances
	Markets	investment losses in the trading and available-for-sale portfolio, losses through the revenue channel, problems with funding and liquidity management	information channel - sudden loss of confidence	margin calls (financial asset prices may come under pressure)
	Infra-structure	delays in incoming and outgoing payments complicating liquidity management	operational isturbances in system can negatively affect market turnover and distort price formation	supporting services, technical links and connected ICT systems can spread disruptions

Source: Dijkman, 2010

3. Mathematical model and stability analysis

In Zhang et al. (2013), the risk management process in the financial market is given by:

$$\begin{aligned}
 \dot{R}(t) &= mU(t) - R(t) - n(R(t) - dU(t)V(t)) \\
 \dot{U}(t) &= rR(t) - U(t) - R(t)V(t) \\
 \dot{V}(t) &= R(t)U(t) - V(t) + kV(t)
 \end{aligned} \tag{1}$$

where R , U and V represent the occurrence value of the risk, the analysed value of the risk and the controlled value of the risk in the current market, respectively. The value of the risk controlled by the analyses is $U(t)V(t)$, the value of the risk controlled by its occurrence is $R(t)V(t)$ and $U(t)R(t)$ stands for the value of the analysed risk by occurrence. The positive real parameters m , n , d and r represent the analysis of the risk efficiency, the risk satisfaction rate, the controlled risk efficiency and the transmission rate of previous risk, respectively. The real parameter k is the distortion coefficient of risk control.

In (Zhang et al., 2013), for $m=n+1$, $nd=1$ the conditions for the stability and bifurcation of system (1) are found.

In the present paper, system (1) is considered and the time delay $\tau > 0$ is introduced, thus:

$$\begin{aligned}
 \dot{R}(t) &= -p_1R(t) + p_2U(t) + p_3U(t)V(t - \tau) \\
 \dot{U}(t) &= rR(t) - U(t) - R(t)V(t - \tau) \\
 \dot{V}(t) &= R(t)U(t) - V(t) + kV(t - \tau)
 \end{aligned} \tag{2}$$

where $p_1=l+n$, $p_2=m$, $p_3=nd$, $V(t-\tau)$ is the previous controlled value of the risk, $U(t)V(t-\tau)$ is the previous value of the risk controlled by analysis and $R(t)V(t-\tau)$ is the previous value of the risk controlled by occurrence.

Using the theory (Hale & Lunel, 1993), (Hasard et al., 1981) system (2) is analysed. The equilibrium point of system (2) can be found by solving the algebraic system:

$$\begin{aligned} -p_1x_1 + p_2x_2 + p_3x_2x_3 &= 0 \\ rx_1 - x_2 - x_1x_3 &= 0 \\ x_1x_2 - (1-k)x_3 &= 0 \end{aligned} \quad (3)$$

In the financial market, the three state variables x_1, x_2, x_3 are nonnegative, so that positive solutions are required.

If the conditions:

$$\begin{aligned} s &= (p_2 - p_3r)^2 - 4p_3(p_1 - p_2r) > 0, \\ p_1 - p_2r &< 0, \\ k &< 1, \end{aligned} \quad (4)$$

hold, then $E(x_{10}, x_{20}, x_{30})$ is the positive equilibrium point, where

$$x_{10} = \sqrt{\frac{(1-k)x_{30}}{r-x_{30}}}, \quad x_{20} = x_{10}(r-x_{30}) \quad (5)$$

and x_{30} is the positive solution of the equation $p_3x^2 + (p_2 - p_3r)x + p_1 - p_2r = 0$.

It can be noticed that the controlled value of the risk at equilibrium point must be less than the transmission rate of previous risk.

By linearizing system (2), the Jacobian matrix at E is given by:

$$J = \begin{pmatrix} a_{11} & a_{12} & b_{13}e^{-r\tau} \\ a_{21} & a_{22} & b_{23}e^{-r\tau} \\ a_{31} & a_{32} & a_{33} + b_{33}e^{-r\tau} \end{pmatrix} \quad (6)$$

where

$$\begin{aligned} a_{11} &= -p_1, \quad a_{12} = p_2 + p_3x_{30}, \quad b_{13} = p_3x_{20}, \\ a_{21} &= r - x_{30}, \quad a_{22} = -1, \quad b_{23} = -x_{10}, \\ a_{31} &= x_{20}, \quad a_{32} = x_{10}, \quad a_{33} = -1, \quad b_{33} = k. \end{aligned}$$

The characteristic equation is given by:

$$\lambda^3 + a_2\lambda^2 + a_1\lambda + a_0 - (b_2\lambda^2 + b_1\lambda + b_0)e^{-\lambda\tau} = 0 \quad (7)$$

where

$$\begin{aligned} a_2 &= -(a_{11} + a_{22} + a_{33}), \quad a_1 = (a_{11} + a_{22})a_{33} - a_{12}a_{21} + a_{11}a_{22} \\ a_0 &= -a_{11}a_{22}a_{33} + a_{12}a_{21}a_{33} \\ b_2 &= b_{33}, \quad b_1 = -b_{33}(a_{11} + a_{22}) + a_{31}b_{13} + a_{32}b_{23} \\ b_0 &= b_{33}a_{11}a_{22} + a_{21}a_{32}b_{13} + a_{12}a_{31}b_{23} + a_{12}a_{21}b_{33} \end{aligned}$$

The analysis of equation (7) is done using the method from Wang et al., (2013). If there is no delay, equation (7) becomes:

$$\lambda^3 + (a_2 + b_2)\lambda^2 + (a_1 + b_1)\lambda + b_0 = 0 \quad (8)$$

According to Routh-Hurwitz criterion, if the parameters satisfy the conditions:

$$a_2 + b_2 > 0, \quad a_1 + b_1 > 0, \quad b_0 > 0, \quad (a_2 + b_2)(a_1 + b_1) > b_0 \quad (9)$$

then, the equilibrium point $E(x_{10}, x_{20}, x_{30})$ is locally asymptotically stable.

When the system is in a stable state, the market risk is in a controllable range and can be adjusted within a certain margin that will not influence normal economic activities (Zhang et al. 2013).

If there is delay, $\tau > 0$, the perturbation of parameter τ causes the stationary state to change from stable to unstable, then a Hopf bifurcation occurs and the orbits of system (2) oscillate. In order to investigate the existence of the Hopf bifurcation, let $\lambda = i\omega$, ($\omega > 0$) be a root of (7). A positive root is needed for the following equation:

$$x^6 + (a_2^2 - 2a_1 - b_2^2)x^4 + (a_1^2 + 2b_0b_2 - b_1^2)x^2 - b_0^2 = 0. \quad (10)$$

because $-b_0^2 < 0$, equation (10) has a positive root ω_0 . Therefore, the critical value of the delay that causes the change of stability can be obtained:

$$\tau_0 = \frac{1}{\omega_0} \left[\arccos \frac{A(\omega_0)}{B(\omega_0)} + 2n\pi \right], \quad n = 0, 1, 2, \dots \quad (11)$$

where

$$\begin{aligned} A(\omega_0) &= -a_2\omega_0^2(b_2\omega_0^2 - b_0) + \omega_0b_1(a_1\omega_0 - \omega_0^3) \\ B(\omega_0) &= (b_2\omega_0^2 - b_0)^2 + \omega_0^2b_1^2 \end{aligned} \quad (12)$$

To prove that τ_0 is a Hopf bifurcation it is shown that if a root of equation (7) is $\lambda = \lambda(\tau)$, then

$$\operatorname{Re} \left(\frac{d\lambda(\tau)}{d\tau} \Big|_{\tau=\tau_0, \lambda=i\omega_0} \right) \neq 0 \quad (13)$$

By taking the derivative with respect to τ of equation (7), the following results:

$$\left(\frac{d\lambda(\tau)}{d\tau} \right)^{-1} = - \frac{(-3\lambda^2 + 2a_2\lambda + a_1)e^{\lambda\tau} - (2b_2\lambda + b_1)}{\lambda(b_2\lambda^2 + b_1\lambda + b_0)} - \frac{\tau}{\lambda} \quad (14)$$

$$\operatorname{Re} \left(\left(\frac{d\lambda(\tau)}{d\tau} \right)^{-1} \Big|_{\tau=\tau_0, \lambda=i\omega_0} \right) = \frac{A_1A_2 + B_1B_2}{\omega_0(A_2^2 + B_2^2)} \neq 0 \quad (15)$$

where:

$$\begin{aligned}
 A_1 &= (a_1 - 3\omega_0^2)\cos(\omega_0\tau_0) + 2a_2\omega_0\sin(\omega_0\tau_0) - b_1, \\
 B_1 &= 2a_2\omega_0\cos(\omega_0\tau_0) - (a_1 - 3\omega_0^2)\sin(\omega_0\tau_0) - 2b_2\omega_0, \\
 A_2 &= \omega_0 b_1, \quad B_2 = \omega_0 b_2 - b_0, \\
 \cos(\omega_0\tau_0) &= \frac{(a_2\omega_0^2 - a_0)(b_2\omega_0^2 - b_0) + (a_1\omega_0 - \omega_0^3)\omega_0 b_1}{B_2^2 + A_2^2} \\
 \sin(\omega_0\tau_0) &= \frac{(a_1\omega_0 - \omega_0^2)(b_2\omega_0^2 - b_0) - (a_2\omega_0^2 - a_0)\omega_0 b_1}{B_2^2 + A_2^2}
 \end{aligned} \tag{16}$$

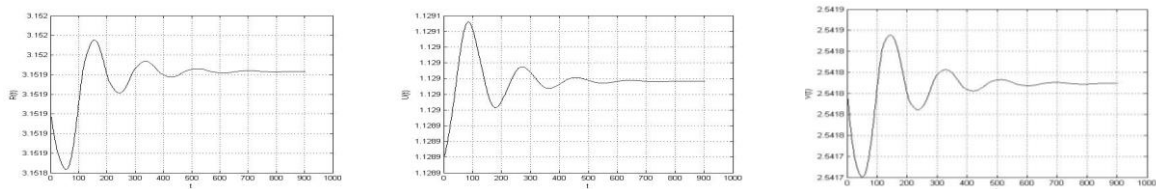
The above analysis can be summarized as follows:

Proposition. Suppose that (4) and (9) hold, than the equilibrium point E is locally asymptotically stable if $\tau < \tau_0$. In addition, if (13) holds, then for $\tau = \tau_0$ system (2) exhibits a Hopf bifurcation at the equilibrium point.

3.1 Numerical Simulation

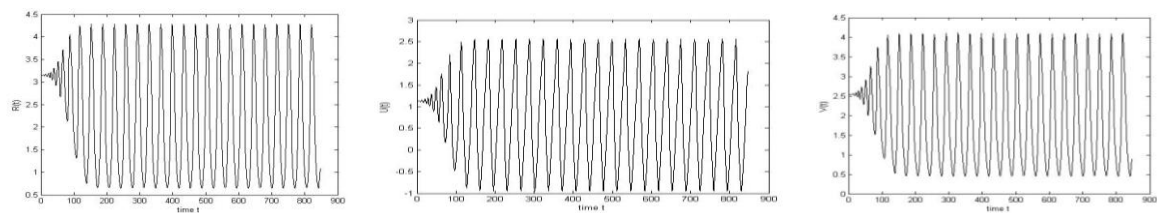
For the numerical simulations, the Matlab software is used and the following parameters were considered: $p_1 = 0.8$, $p_2 = 0.2$, $p_3 = 0.8$, $r = 2.9$, $k = 1.4$. The equilibrium of system (2) is for $R_0 = 3.15$, $U_0 = 1.12$, $V_0 = 2.54$. If there is no delay, conditions (9) are satisfied and the equilibrium point is locally asymptotically stable. The orbits of the occurrence value of the risk ($t, R(t)$) the analysed value of the risk ($t, U(t)$) and the controlled value of the risk ($t, V(t)$) in the current state of the market can be seen in Figure 3.

Figure 3: Trajectories of system (2) converge to the asymptotically stable equilibrium point, when there is no delay.



Using formula (11) $\tau_0 = 0.4$ is obtained. For any $\tau_0 < 0.4$ the equilibrium point (3.15, 1.12, 2.54) is locally asymptotically stable. If $\tau_0 = 0.4$ then a Hopf bifurcation occurs and, in this case, the orbits of the occurrence value of the risk, ($t, R(t)$) the analysed value of the risk ($t, U(t)$) and the controlled value of the risk ($t, V(t)$) in the current state of the market are represented in Figure 4.

Figure 4: Trajectories of system (2) are periodical for the critical value of time delay $\tau_0 = 0.4$.



4. Conclusions and policy lessons

In the aftermath of crises, various tools have been used either to solve or prevent the occurrence of other episodes financial markets' vulnerabilities. According to the results of the study that are in line with other findings in literature, the transmission channels of risks' spill over information seem to be the most important in tracing contagion (Debarys et al., 2018). As a result, some financial institutions were allowed to fail; others received aids to prevent contagion (Papanikolaou, 2018). It is arguable though, whether the decision to prevent failure has been effective, most of the aids recipients being confronted, further on, with inadequate level of capital, lack of liquidity and risky assets, high sensitivity to market, etc. The manner the recent financial crisis had unfolded (its depth, length, the inability of the markets to restore investors' credibility, etc.) raised intense discussions concerning the need for macro-prudential policy tools to mitigate the build-up of systemic risk in the financial system and to enhance the resilience of financial institutions. Moreover, macro-prudential policies still lack a social purpose dimension they should serve (Baker, 2018) that remains a further issue that needs argumentation as a prevention of future crises.

The paper argues that, since financial markets function in international networks and, thus, are subject to contagion, national macro prudential (counter-cyclical) policies and early warning tools, together with international surveillance, are more efficient in preventing spill-over since they produce long term, more sustainable effects. The financial systemic risk is describes, in the paper, by a nonlinear dynamic system with three variables. The stability analysis of the positive equilibrium point is provided and the time delay is introduced as a bifurcation parameter. The Hopf bifurcation is studied, arguing that, in certain conditions of the parameters of the model, a family of periodic solutions bifurcates from the equilibrium point when the bifurcation parameter τ passes through a critical value τ_0 . Therefore, it is possible to find the most appropriate point in time until when counter-cyclical measures should be implemented in order to flatten the cyclical spikes and stabilize the financial system, thus mitigating further contagion on international financial markets. In addition, it is proved that if policy measures are taken with a time delay than the oscillations become permanent and the systemic risk persists. The model shows that risks can be controlled only when timely measures are taken, but there is an uncontrollable margin that often may hinder the counter-cyclical measures implemented by the authorities. The residual, uncontrollable risk is a consequence of the behaviour stance of the actors inducing asymmetric information, adverse selection and moral hazard that will subject for further research. Bounded rationality, bounded selflessness and bounded willpower are the main determinants of non-quantifiable risks, since intermediaries on the financial market are subject to over-optimism or pessimism, are framed, often react heuristically (by the rule of the thumb), engaging in suboptimal investments. Further on, another line of study refers to noises and rumours that influence the financial market and can be captured by a stochastic mathematical model as in (Mircea et al., 2011).

References

- [1] Baker, A. (2018). Macroprudential regimes and politics of social purpose. *Review of International Political Economy*, vol. 25, no. 3, pp. 293-316.

- [2] Bekaert, G. and Harvey, C.R. (2002). Emerging markets finance. *Journal of Empirical Finance*, vol. 10, pp 3 – 55.
- [3] Borio, C. (2005). Monetary and Fiancial Stability: So Close and Yet So Far. *National Institute Economic Review*, vol. 192, no. 1, pp. 84-101.
- [4] Caporin, M., Pelizzon, L., Ravazzolo, F. and Rigobon, R. (2018). Measuring sovereign contagion in Europe. *Journal of Financial Stability*, vol. 34, pp. 150-181.
- [5] Chen, K., Vitiello L., Hyde, S. and Poon, S.H. (2018). The reality of stock market jumps diversification. *Journal of International Money and Finance*, vol. 86, pp. 171-188.
- [6] Danielsson, J., Shin, H. S. and Zigrand, J.P. (2004). The impact of risk regulation on price dynamics. *Journal of Banking & Finance*, vol 28, no. 5, pp 1069-1087.
- [7] Debarsy, N., Dossougoin, C., Ertur, C. and Gnabo, J.Y. (2018). Measuring sovereign risk spillovers and assessing the role of transmission channels: A spatial econometrics approach. *Journal of Economic Dynamics & Control*, vol. 87, pp. 21-45.
- [8] Danisoglu, S., Guner, Z.N. and Haciomeroglu, H.A. (2018). International evidence on risk taking by banks around the global financial crises. *Emerging Markets Finance and Trade*, vol. 54, no. 9, pp. 1946-1962.
- [9] Dijkman, M. (2010). A Framework for Assessing Systemic Risk. *Policy Research Working Paper 5282*. World Bank.
- [10] Frait, J. and Komárková Z. (2011). Financial stability, systemic risk and macroprudential policy. *Financial Stability Report 2010/2011*, Czech National Bank.
- [11] Hale, J.K. and Lunel, S.V. (1993). Introduction to Functional Differential Equations. *Applied Mathematical Sciences Series*, vol. 99, Springer.
- [12] Hassard, B.D., Kazarinoff N.D. and Wan, Y.H. (1981). Theory and Applications of Hopf Bifurcation. *London Mathematical Society Lecture Note Series*, vol.41, Cambridge University Press, Cambridge, UK.
- [13] Mircea, G., Neamțu, M. and Opriș, D. (2011). Uncertain, stochastic and fractional dynamic systems with delay. Applications, Saarbrucken, Germany: Lambert Academic Publishing.
- [14] Papanokolau, N.I. (2018). To be bailed out or to be left to fail? A dynamic competing risks analysis. *Journal of Financial Stability*, vol. 34, pp. 61-85.
- [15] Shahzad, S.J.H., Hernandez, J.A., Rehman, M.U., Al-Yahyaee, K.H. and Zakaria, M. (2018). A global network topology of stock markets: Transmitters and receivers of spillover effects. *Physica A* 492, pp. 2136-2153.
- [16] Zhang, X.D., Liu, X.D., Zheng Y. and Liu, C. (2013). Chaotic behavior analysis and control for a financial risk system. *Chinese Physics.B*, vol. 22, no. 3.
- [17] Wang Z., Zhao H. and Kong X. (2013). Delayed feedback control and bifurcation analysis of an autonomy system. Abstract and Applied Analysis [On line]. Id 167065, Available: <https://www.hindawi.com/journals/aaa/2013/167065/>

FINANCIAL DISTRESS MODELLING IN SLOVAK COMPANIES: DECISION TREES APPROACH

Marek Durica^{1,a,*}

¹University of Zilina, Faculty of Operation and Economics of Transport and Communications,
Department of Quantitative Methods and Economic Informatics, Univerzitná 1, 010 26 Zilina, Slovak
Republic

^amarek.durica@fpedas.uniza.sk

*Corresponding author

Abstract. International relationship among different economics has increased the speed and importance of cooperation among companies. On the other hand, globalisation also increased international competition among these economics and also companies that operates in these economics. Therefore, early recognition of the threat of corporate financial distress is very important and worldwide discussed. Over the last decades, many financial distress prediction models have been created all over the world. Mostly, these models are not very useful for Slovak companies because of their lower accuracy. For creation of financial distress prediction models, many statistical and data mining methods are used. Due to the advantages, many types of decision trees are often used in this field. The goal of our research is to create and to evaluate a selected decision trees (CHAID, Exhaustive CHAID, CART and QUEST) based models that predict financial distress of Slovak companies. An overview of the most used types of decision trees is also provided. To the model formation and also its evaluation, data of more than 100 000 real Slovak companies were used. The data contains financial ratios calculated using financial statements from 2015 to 2016 obtained from database Amadeus - a database of comparable financial information for public and private companies across Europe. To evaluate the models, standard metrics (confusion matrix, etc.) are used.

Keywords: Decision tree, financial distress, prediction model, CHAID, CART

JEL Classification: G17, C52, C53

1. Introduction

Tvorba modelov predikcie finančných ťažkostí spoločností patrí v posledných desaťročiach medzi veľmi diskutované témy. Včasná predikcia hroziacich finančných problémov je samozrejme dôležitá pre spoločnosti samotné, ale tiež pre všetky zainteresované strany a dokonca aj pre ekonomiky krajín. Spoločná predikcia finančných ťažkostí umožňuje manažérom spoločností včas iniciovať nápravné opatrenia s cieľom eliminovať prípadné finančné straty alebo dokonca odvrátiť hroziaci bankrot. (Kliestikova et al., 2017).

Na vytváranie modelov predikcie finančných ťažkostí sú používané rôzne štatistické a dataminingové prístupy. Najpožívanejšie štatistické prístupy v tejto oblasti sú viacrozmerná diskriminačná analýza (MDA) a logistická regresia (Logit). (Kral & Janoskova, 2016) Ide o prístupy, ktoré boli použité už pri vytváraných prvých všeobecne uznávaných predikčných

modeloch. Altman v roku 1968 vyvinul známy model Z-skóre založený na MDA a v roku 1980 Ohlson publikoval prvý bankrotný model typu Logit. Často diskutovanou nevýhodou týchto metód je ich parametrickosť a splnenie pomerne nerealistických predpokladov. Tieto nevýhody nie sú problémom rôznych dataminingových postupov používaných pre predikciu finančných ťažkostí. Ide najmä o umelé neurónové siete, genetické algoritmy a rozhodovacie stromy. Tieto metódy nie sú parametrické a vyžadujú splnenie predpokladov, ktoré sú vo väčšine prípadov splnené. Navyše tiež dosahujú vyššiu predikčnú schopnosť. (Kliestik et al., 2017)

Cieľom tohto príspevku je vytvorenie predikčného modelu pre slovenské spoločnosti pomocou vybraných rastových algoritmov generujúcich rozhodovací strom. Použité budú algoritmy CHAID, Exhaustive CHAID, CART a QUEST. Modely by mali odrážať špecifiká slovenskej ekonomiky, pretože na ich tvorbu sú použité reálne údaje viac ako 100 000 slovenských spoločností z rokov 2015 a 2016. Výsledné modely sú vytvorené na predpovedanie finančných ťažkostí rok vopred a dosahujú vysokú predikčnú schopnosť. Preto existuje potenciál, že sa tieto modely môžu stať bežne používanými nástrojmi na predpovedanie finančných ťažkostí slovenských firiem.

Štruktúra príspevku je nasledovná. V Úvode je uvedený stručný prehľad aktuálnej literatúry v rámci riešenej problematiky. Popisu použitých údajov a postupov je venovaná Metodológia. Výsledky popisujú základné charakteristiky vytvorených predikčných modelov. Tieto výsledky sú diskutované v časti Diskusia. V Závere sú sumarizované získané výsledky.

1.1 Stručná rešerš

V posledných rokoch sú v oblasti tvorby predikčných modelov veľmi často používané viaceré dataminingové metódy, príp. ich kombinácie. Rozšírené je najmä použitie podporných vektorových strojov, umelých neurónových sietí a rozhodovacích stromov typu CART, C4.5, CHAID, atď. Samotní ekonómovia a manažéri spoločností používajú najmä modely založené na rozhodovacích stromoch. Tieto modely sú relatívne ľahko interpretovateľné a uplatniteľné. Ostatné metódy často generujú modely v forme tzv. čiernych skriniek, výsledné modely nie je možné interpretovať a preto sú tieto modely v praxi stále pomerne málo využívané a to aj napriek tomu, že zvyčajne dosahujú veľmi vysokú predikčnú schopnosť.

Použitím metód strojového učenia založených na umelej inteligencii výrazne pokročil aj vývoj metód predpovedania finančných ťažkostí. Technika umelých neurónových sietí je použitá napr. v práci Jones et al., 2017. Z ďalších metód hĺbkovej analýzy dát zahŕňajú sú používané najmä rozhodovacie stromy (Liu & Wu, 2017; Zieba et al., 2016) a metóda podporných vektorov (Alaminos et al., 2016; Zhao et al., 2017).

Prvým predikčným modelom, ktorý bol vytvorený použitím rastového algoritmu (konkrétne algoritmu CART) generujúceho rozhodujúci strom, bol model publikovaný v práci Frydman et al. (1985). Už použitie tohto pionierskeho modelu umožnilo lepšie predikovanie finančných problémov spoločností v porovnaní s existujúcimi všeobecne akceptovaných modelmi typu MDA a Logit. Odvtedy bolo v tejto oblasti pomocou tejto techniky vytvorených mnoho modelov.

Algoritmy C5.0, CART a CHAID generujúce rozhodovací strom boli použité na implementáciu modelu predpovede finančných ťažkostí pre spoločnosti kótované na taiwanskom trhu (Chen, 2011). Modely pre taiwanské spoločnosti boli publikované aj v roku

2018 (Jan, 2018). Na ich tvorbu boli použité viaceré postupy – CART, CHAID, QUEST algoritmy a ich kombinácie. Tieto postupy, príp. ich kombinácie boli na tvorbu predikčných modelov použité v mnohých ďalších prácach (Chen, 2016; Kvesic, 2013; Delen et al., 2013). Hodnoty 25-tich finančných ukazovateľov 155 európskych bánk za roky 2006 - 2012 boli použité na vytvorenie modelu predpovede finančných ťažkostí pre poľské a slovenské banky (Brozyna et al., 2016). Irimia-Dieguez et al. (2015) porovnávajú modely typu CART a Logit.

Na Slovensku boli predikčné modely vytvárané len v ostatných dvoch desaťročiach. Gurcik (2002) vytvoril pomocou MDA model pre poľnohospodárske spoločnosti, ktorý sa aj dnes používa na predpovedanie finančných ťažkostí slovenských podnikov v rôznych odvetviach. (Siekelova et al., 2017) Slovenský model typu Logit predstavil napr. Gulka (2016). Kovacova & Klietnik (2017) vyvinuli modely pre predpovedanie bankrotu slovenských firiem pomocou metódy Logit a Probit a poskytli porovnanie celkovej predikčnej schopnosti týchto modelov. Mihalovic v roku 2016 publikoval dva predikčné modely pre slovenské firmy, jeden vytvorený pomocou MDA a druhý pomocou Logitu. Karas & Reznakova (2017) vyvinuli CART model pre slovenské spoločnosti pôsobiace v stavebníctve. Gavurova et al. (2017) vyvinuli nový model pre slovenské spoločnosti pomocou rozhodovacích stromov. (Valaskova et al., 2018)

2. Metodológia

Prezentované sú modely predikcie finančných ťažkostí v špecifických ekonomických podmienkach Slovenskej republiky. Modely sú vytvorené pomocou vybraných algoritmov generujúcich rozhodovací strom. Konkrétne ide o algoritmy CHAID, Exhaustive CHAID, CART a QUEST. Tieto prístupy k tvorbe predikčných modelov boli vybrané z dôvodu ich sľubných empirických výsledkov (napr. Karas & Reznakova, 2017). Boli použité údaje o viac ako 100 000 skutočných slovenských spoločnostiach získané z databázy Amadeus. Ako nezávislé premenné boli použité premenné klasifikujúce spoločnosť podľa ich ekonomickej činnosti (premenná *NACE*), ich veľkosti (*SIZE*), a kraja ich pôsobnosti (*NUTS3*), ale najmä hodnoty 37 finančných ukazovateľov vypočítaných z reálnych finančných výkazov z roku 2015 (Tabuľka 1).

Table 1: Zoznam použitých finančných ukazovateľov

ID	Metóda výpočtu	ID	Metóda výpočtu
X1	tržby z prevádzkovej činnosti / aktíva	X20	výsledok hospodárenia / tržby z prevádzkovej činnosti
X2	obežné aktíva / krátkodobé záväzky	X21	dlhodobé záväzky / aktíva
X3	výsledok hospodárenia / vlastné imanie	X22	(cash) / krátkodobé záväzky
X4	výsledok hospodárenia / aktíva	X23	(zásoby + pohľadávky z obchodného styku - krátkodobé záväzky z obchodného styku) / tržby
X5	(zásoby + pohľadávky z obchodného styku - krátkodobé záväzky) / aktíva	X24	obežné aktíva / krátkodobé záväzky
X6	prevádzkový hospodársky výsledok / aktíva	X25	(obežné aktíva - zásoby) / krátkodobé záväzky
X7	(dlhodobé záväzky + krátkodobé záväzky) / aktíva	X26	zisk pred zdanením / aktíva
X8	obežné aktíva / aktíva	X27	rentabilita vlastného kapitálu
X9	krátkodobé záväzky / aktíva	X28	ukazovateľ finančnej samostatnosti podniku
X10	obežné aktíva / tržby z prevádzkovej činnosti	X29	zisk pred zdanením / prevádzkové výnosy
X11	zásoby / tržby z prevádzkovej činnosti	X30	čistý obežný majetok

ID	Metóda výpočtu	ID	Metóda výpočtu
X12	tržby z prevádzkovej činnosti / aktíva	X31	zásoby + pohľadávky z obchodného styku - krátkodobé záväzky z obchodného styku
X13	obežné aktíva / krátkodobé záväzky	X32	výsledok hospodárenia / tržby z prevádzkovej činnosti
X14	výsledok hospodárenia / vlastné imanie	X33	dlhodobé záväzky / aktíva
X15	výsledok hospodárenia / aktíva	X34	(cash) / krátkodobé záväzky
X16	(zásoby + pohľadávky z obchodného styku - krátkodobé záväzky) / aktíva	X35	(zásoby + pohľadávky z obchodného styku - krátkodobé záväzky z obchodného styku) / tržby
X17	prevádzkový hospodársky výsledok / aktíva	X36	obežné aktíva / krátkodobé záväzky
X18	(dlhodobé záväzky + krátkodobé záväzky) / aktíva	X37	(obežné aktíva - zásoby) / krátkodobé záväzky
X19	cash flow / tržby z prevádzkovej činnosti		

Source: Autor

V roku 2016 bol na Slovensku zavedený pojem *spoločnosť v kríze*. Spoločnosť je v tomto zmysle v kríze, ak celková suma bežných záväzkov spoločnosti je vyššia ako hodnota obežných aktív, pomer vlastného kapitálu k pasívam je menší ako 0,04 (táto hodnota bola platná v roku 2016) a spoločnosť skončila hospodárenie so stratou. Na základe tohto kritéria a údajov z roku 2016 boli spoločnosti rozdelené do dvoch skupín: prosperujúce spoločnosti a neprosperujúce spoločnosti (spoločnosti v kríze). Z celkového množstva 104 452 spoločností bolo 23 184 (22,2%) neprosperujúcich spoločností a 81 268 (77,8%) prosperujúcich spoločností.

Na vytvorenie predikčných modelov je použitých viacero rozhodovací strom generujúcich algoritmov. Algoritmy CHAID a Exhaustive CHAID sú často používané algoritmy na modelovanie nominálnych a ordinálnych výstupných premenných. Tieto algoritmy generujú nebinárne stromy a na samotné vetvenie a určenie počtu vetiev sa používa chí-kvadrát test dobrej zhody. Exhaustive CHAID je algoritmus navrhnutý na odstránenie niektorých nedostatkov algoritmu CHAID.

Asi najpoužívanším rozhodovací strom generujúcim algoritmom (nielen v oblasti tvorby predikčných modelov) je CART. Tento algoritmus generuje binárny strom a na vetvenie jednotlivých uzlov používa Giniho index. Efektívnosť algoritmu CART je primárne zabezpečená jeho prerezávacím mechanizmom, ktorý je sofistikovanejší ako v prípade algoritmu CHAID. Maximálny strom je skonštruovaný tak, aby pokračoval procesom rozdeľovania uzlov pokiaľ je to možné. Algoritmus potom odvodí niekoľko vnorených podstromov postupnými prerezávacími operáciami, porovnáva ich, a potom vyberie ten, ktorý má najnižšiu možnú mieru chybovosti meranú krížovou validáciou.

Možným problémom algoritmu CART, je tendencia uprednostňovať tie premenné, ktoré majú najväčší počet kategórií a z tohto dôvodu má niekedy nie práve najvyššiu spoľahlivosť. Vtedy je lepšie použiť strom, ktorý je rýchlejší a „nezaujatý“, ako napríklad QUEST. Tento strom pracuje len s nominálnou výstupnou premennou, je binárny ako CART a má s ním spoločné niektoré vlastnosti (spracovanie chýbajúcich hodnôt, atď.). Algoritmus QUEST využíva na vetvenie v jednotlivých uzloch ANOVA F-test a chí-kvadrát test. Premenné s viacerými triedami sa zlúčia do dvoch „super-tried“, aby získali binárne rozdelenia, ktoré sa určujú pomocou kvadratickej diskriminačnej analýzy. Vytvorený maximálny strom je prerezaný rovnakým spôsobom ako v prípade algoritmu CART.

Generovanie rozhodovacieho stromu bolo v prípade všetkých štyroch algoritmov zastavené, ak bolo dosiahnuté aspoň jedno zo zastavovacích kritérií. Uzol sa ďalej nevetví a stáva sa koncovým (terminálovým) uzlom, ak obsahuje menej ako 100 prípadov, alebo ak by jeho optimálne vetvenie viedlo k vytvoreniu uzla obsahujúceho menej ako 50 prípadov, alebo by bola dosiahnutá maximálna hĺbka stromu. Maximálna hĺbka bola nastavená na maximálne 3 úrovne vetvení v prípade algoritmov CHAID a Exhaustive CHAID a 5 úrovni vetvení pre algoritmy CART a QUEST. Vygenerované rozhodovacie stromy boli následne automaticky prerezané z dôvodu jednoduchosti modelu a ich potenciálneho preučenia sa.

Klasifikačná schopnosť predikčných modelov sa najčastejšie hodnotí pomocou klasifikačnej tabuľky, ktorá sumarizuje absolútne a relatívne početnosti správne a nesprávne klasifikovaných prípadov. Klasifikačná schopnosť modelu môže byť precenená v prípade, že na jeho overovanie boli použité tie isté dáta ako na vytvorenie modelu. Preto boli dáta náhodne rozdelené na tzv. tréningovej vzorky (náhodne vybraných 80% údajov), na ktorej sa generuje samotný model, a na testovaciu vzorku (zvyšných 20% údajov), ktorá sa použije na výpočet predikčnej schopnosti modelu.

3. Výsledky

Pomocou popísaných dát a postupov boli vytvorené 4 modely predikcie finančných ťažkostí slovenských spoločností. Tabuľka 2 sumarizuje základné charakteristicky týchto predikčných modelov.

Table 2: Zoznam použitých finančných ukazovateľov

Algoritmus (Model)	CHAID	Exhaustive CHAID	CART	QUEST
Zoznam prediktorov	X10, X28, X22, X36, X13, X12, X01, X02, X19, X07, X30, X21, X09, X04, X31, X23, X27, X05	X10, X28, X36, X09, X32, X25, X27, X22, X06, X19, X07, X04, NUTS3, X08, X30, X02, X24, X35, X23, X37, X01, X31, X15, X12	X10, X30, X29, X15, X32, X25, X02, X26, X06, X13, X19, X07, X31, X05, X09, X36, X35, X27, X14, X23, X20, X33, X17, X08, X04, X21, X24, X16, X01, X28, X18, X12, X11, X22, X37, SIZE, NACE	NACE, X19, X31, X05, X23, X14, X28, X27, X02, X25, X30, X26, X15, X10, X09, X13, X07, X32, X22, X36, X33, X17, X29, X04
Počet všetkých uzlov	175	218	29	27
Počet koncových uzlov	122	153	15	14
Hĺbka stromu	3	3	5	5
Správna klasifikácia prosperujúcich podnikov	95,77%	95,41%	94,81%	97,24%
Správna klasifikácia neprosperujúcich podnikov	88,76%	88,58%	88,42%	34,91%
Celková klasifikačná schopnosť	94,16%	93,88%	93,41%	83,30%

Source: Autor

Všetky modely okrem modelu vytvoreného algoritmom QUEST dosiahli vysokú predikčnú schopnosť okolo 94%. Táto vysoká predikčná schopnosť odzrkadľuje percento správnej klasifikácie prosperujúcich podnikov. Pre prax je dôležité najmä správne identifikovanie hroziacich finančných problémov, t.j. správna klasifikácia neprosperujúcich podnikov, ktorá je tiež vysoká na úrovni takmer 89%. Z tohto pohľadu môžeme konštatovať, že model typu QUEST je prakticky nepoužiteľný nakoľko správne klasifikoval menej ako 35% neprosperujúcich podnikov.

Veľkou výhodou predikčných modelov generovaných rozhodovacími stromami je ich relatívne jednoduchá interpretácia a aj implementácia. Z pohľadu zložitosti a v kontexte predikčnej schopnosti má oproti ostatným modelom navrch model typu CART. Tento model síce pracuje s najväčším počtom vstupných premenných, ale oproti modelom typu CHAID a Exhaustive CHAID má omnoho jednoduchšiu štruktúru. Z celkového počtu 29 uzlov je 15 uzlov terminálových, čo znamená, že má len 14 neterminálových uzlov, ktoré predstavujú pravidlá typu „ak-tak“. Tieto pravidlá sú vlastne samotným klasifikačným algoritmom. Z vytvorených modelov je model typu CART jednoznačne najvýhodnejšou alternatívou.

4. Diskusia

V ostatných rokoch bolo vytvorených viacero slovenských predikčných modelov využitím rôznych bežne používaných metód. Gulka v roku 2016 vytvoril predikčný Logit model s presnosťou menej ako 80%. Logistickú regresiu na modelovanie finančných ťažkostí použili aj Kovacova & Klietnik (2017). Tento model klasifikuje spoločnosti s predikčnou schopnosťou 86,6%. Mihalovičom (2016) vyvinuté predikčné modely majú klasifikačnú schopnosť 64,4% (MDA model), resp. 68,6% (Logit model). Všetky uvedené modely dosahujú nižšiu presnosť klasifikácie ako prezentované modely typu CHAID, Exhaustive CHAID a CART s celkovou predikčnou schopnosťou až takmer 94%.

Aj v špecifických podmienkach slovenskej ekonomiky bolo pomocou techniky rozhodovacích stromov vytvorených niekoľko modelov predikcie finančných ťažkostí. Gavurova et al. (2017) vytvorili modely predvídajúce finančné ťažkosti pomocou rozhodovacieho stromu CHAID s celkovou presnosťou až 87%. Aj v tomto prípade je predikčná schopnosť našich modelov vyššia a to približne 7%.

V roku 2017 Karas & Reznakova publikovali dve verzie modelu predpovede finančných ťažkostí pre slovenské spoločnosti vytvorené pomocou algoritmu CART. Pre neprosperujúce spoločnosti je presnosť klasifikácie týchto modelov až 94,9%, resp. 91,5%. Avšak iba 61%, resp. 62,6% prosperujúcich spoločností bolo správne zaradených. V porovnaní s našimi modelmi je teda situácia presne opačná. Naše modely lepšie klasifikujú prosperujúce spoločnosti (až takmer 95% týchto spoločností bolo správne klasifikovaných). Presnosť klasifikácie našich modelov pre neprosperujúce spoločnosti je takmer 85%. Celková presnosť našich modelov je však vyššia až o takmer 30% (skoro 94% oproti 65,6%).

5. Conclusion

Napriek obrovskému množstvu existujúcich zahraničných ale aj domácich predikčných modelov doteraz neexistuje všeobecne uznávaný model predikujúci finančné ťažkosti, ktorý by zohľadňoval špecifické ekonomické podmienky Slovenskej republiky. Možné vyplnenie

tejto medzery prinášajú prezentované predikčné modely vytvorené pomocou rozhodovacích stromov typu CHAID, Exhaustive CHAID a CART. Model vytvorený algoritmom QUEST je na predikciu finančných ťažkostí slovenských spoločností nevhodný. Modely boli vytvorené pomocou reálnych údajov viac ako 100 000 slovenských spoločností za roky 2015 a 2016. Ako neprosperujúce boli uvažované tie spoločnosti, ktoré spĺňali podmienky inštitútu spoločnosť v kríze za rok 2016.

Získané modely (najmä CART) sú ľahko interpretovateľné a tiež implementovateľné. Modely boli vyhodnotené analýzou klasifikačnej tabuľky pre prípady z testovanej vzorky (20% všetkých údajov). Konečné modely majú vysokú presnosť klasifikácie až takmer 94%.

Na druhej strane by sa výsledky mohli líšiť v závislosti od použitých údajov. Okrem toho by mal byť navrhovaný model testovaný v nasledujúcich rokoch, aby sa zistila možnosť vytvorenia modelu finančných ťažkostí všeobecne akceptovateľného v podmienkach slovenskej ekonomiky.

References

- [1] Alaminos, D., Del Castillo, A., Fernandez, M.A. (2016). A Global Model for Bankruptcy Prediction. *PLoS ONE*, vol. 11, no. 11.
- [2] Altman, E.I. (1968). Financial Ratios. Discriminant Analysis and the Prediction of Corporate Bankruptcy. *The Journal of Finance*, vol. 23, no. 4, pp. 589-609.
- [3] Brozyna, J., Mentel, G., Pisula, T. (2016). Statistical methods of the bankruptcy prediction in the logistics sector in Poland and Slovakia. *Transformations in Business & Economics*, vol. 15, no. 1, pp. 93-114.
- [4] Chen, M. (2011). Predicting corporate financial distress based on integration of decision tree classification and logistic regression. *Expert Systems with Applications*, vol. 38, no. 9, pp. 11261-11272.
- [5] Chen, S. (2016). Detection of fraudulent financial statements using the hybrid data mining approach. *SpringerPlus*, vol. 5, no. 89.
- [6] Delen, D., Kuzey, C. and Uyar, A. (2013). Measuring firm performance using financial ratios: A decision tree approach. *Expert Systems with Applications*, vol. 40, no. 10, pp. 3970-3983.
- [7] Gavurova, B., Janke, F., Packova, M., Pridavok, M. (2017). Analysis of Impact of Using the Trend Variables on Bankruptcy Prediction Models Performance. *Ekonomicky casopis*, vol. 65, no. 4, pp. 370-383.
- [8] Gulka, M. (2016). Predictive Model of Corporate Failure in the Slovak Business Environment. *Forum statisticum Slovaca*, vol. 12, no. 1, pp. 16-22.
- [9] Gurcik, L. (2002). G-index - the financial situation prognosis method of agricultural enterprises. *Agricultural Economics*, vol. 48, pp. 373-378.
- [10] Irimia-Dieguez, A., Blanco-Oliver, A., Vazquez-Cueto, M. (2015). A Comparison of Classification/Regression Trees and Logistic Regression in Failure Models. *Procedia Economics and Finance*, 2015, vol. 26, pp. 23-28.
- [11] Jan, C. (2018). An Effective Financial Statements Fraud Detection Model for the Sustainable Development of Financial Markets: Evidence from Taiwan. *Sustainability*, vol. 10, no. 2, 513.

- [12] Jones, S., Johnstone, D. and Wilson, R. (2017). Predicting Corporate Bankruptcy: An Evaluation of Alternative Statistical Frameworks. *Journal of Business & Accounting*, vol. 44, no. 1-2, pp. 3-34.
- [13] Karas, M., Reznakova, M. (2017). Predicting the Bankruptcy of Construction Companies: A CART-Based Model. *Engineering Economics*, vol. 28, no. 2, pp. 145-154.
- [14] Kliestik, T., Siekelova, A. and Misankova, M. (2017). Financial Health Prediction of Company's Business Partners Based on Selected Quantitative and Qualitative Indicators. *Journal of Economics, Business and Management*, vol. 5, no. 3, pp. 143–147.
- [15] Kliestikova, J., Misankova, M. and Kliestik, T. (2017). Bankruptcy in Slovakia: international comparison of the creditor's position. *Oeconomia Copernicana*, vol. 8, no. 2, pp. 221-237.
- [16] Kovacova, M., Kliestik, T. Logit and Probit application for the prediction of bankruptcy in Slovak companies. *Equilibrium*, vol. 12, iss. 4, pp. 775-791.
- [17] Kral, P. and Janoskova, K. (2016). Evaluation of prediction ability of bankruptcy prediction models applying logistic regression (LOGIT). *Lecture notes in management science*, vol. 66, pp. 21-26.
- [18] Kvesic, L. (2013). Application of Decision Trees in Credit Scoring. *Ekonomski Vjesnik*, vol. 26, no. 2, pp. 382-389.
- [19] Liu, J. and Wu, C. (2017). A gradient-boosting decision-tree approach for firm failure prediction: An empirical model evaluation of Chinese listed companies. *The Journal of Risk Model Validation*, vol. 11, no. 2, pp. 43-64.
- [20] Mihalovic, M. (2016). Performance Comparison of Multiple Discriminant Analysis and Logit Models in Bankruptcy Prediction. *Economics & Sociology*, vol. 9, no. 4, pp. 101-118.
- [21] Ohlson, J. (1980). Financial ratios and the probabilistic prediction of bankruptcy. *Journal of Accounting Research*, vol. 18, no. 1, pp. 109-131.
- [22] Siekelova, A., Kliestik, T., Svabova, L., Androniceanu, A. and Schonfeld, J. (2017). Receivables Management: The Importance of Financial Indicators in Assessing the Creditworthiness. *Political Journal of Management Studies*, vol. 15, no. 2, pp. 217-228.
- [23] Valaskova, K., Kliestik, T., Svabova, L., Adamko, P. Financial Risk Measurement and Prediction Modelling for Sustainable Development of Business Entities using Regression Analysis. *Sustainability*, vol. 10, no. 7, 2144.
- [24] Zhao, D., Huang, C.Y., Wei, Y., Yu, F.H., Wang, M.J. and Chen, H.L. (2017). An Effective Computational Model for Bankruptcy Prediction Using Kernel Extreme Learning Machine Approach. *Computational Economics*, vol. 49, no. 2, pp. 325-341.
- [25] Zieba, M., Tomczak, S.K. and Tomczak, J.M. (2016). Ensemble boosted trees with synthetic features generation in application to bankruptcy prediction. *Expert Systems with Applications*, vol. 58, pp. 93-101.

EVALUATING THE FINANCIAL PERFORMANCE OF FIRMS IN RELATION TO THE LEGAL FORM OF ENTERPRISE IN THE ASPECT OF THE GLOBAL ECONOMY

Marek Dvořák^{1,a,*}, Jiří Mach^{2,b} and Pavla Hošková^{3,c}

¹Dept. of Management, FEM CULS Prague, Czech Republic

²Dept. of Economics, FEM CULS Prague, Czech Republic

³Dept. of Statistics, FEM CULS Prague, Czech Republic

^aDvorak.post@gmail.com, ^bmach@pef.czu.cz, ^choskova@pef.czu.cz

*Corresponding author

Abstract. Globalization is causing significant changes in business conditions in Slovakia. The manifestation of considerable globalization is the liberalization of trade and the integration of entities into larger entities with a significantly international environment of internal culture. If the firm wants to maintain its long-term competitiveness, it cannot trust only its current performance, but needs to systematically look for new opportunities to increase its position on the market. One of the possibilities is to evaluate the performance of firm through the results of time series analysis of financial indicators. Financial analysis can be used to identify key factors that affect the performance of firms in international business. The aim of the article is to evaluate changes in the structure and financial performance of firms in the Slovak Republic in relation to the chosen legal form of business in the period 2011-2016. The basis for the analysis was selected business entities divided by SK-NACE. The analysis as well as the results are presented in the form of outputs of mutual comparison. For evaluation of the financial performance of firms, we chose some indicators, focusing on assessing the ability to meet short-term liabilities and for expressing revenue and profit generation. In order to verify the assumption of the relationship between the financial results of the firms and the chosen legal form of business, we apply the combination of the adjusted methods. The results of the analysis show that the legal form of the business entity and its financial position are very closely related.

Keywords: Legal Form of Business, Financial Indicators, Economic Performance, Global Economy

JEL Classification: G 32, M 21, D 22

1. Introduction

Globalizácia vytvára pre Slovenské podniky nový rozmer konkurenčného prostredia, ktorý podniky núti myslieť perspektívne, pri využívaní konkurenčných výhod, s ohľadom na hrozby plynúce z medzinárodnej súťaže. Medzinárodná hospodárska súťaž v cestovnom ruchu a v poľnohospodárstve je čoraz globálnejšia. Jej dopad je zaujímavý v hotelierstve. Ako uvádzajú Severová & Svoboda (2014) v odvetviach, kde sa uplatňujú rastúce výnosy z rozsahu, je platné, že tak heterogénnosť tovaru, ktorú daná krajina produkuje, a rozsah jej

výroby, sú ovplyvnené veľkosťou trhu. Podľa Yu et al. (2014) hotely hľadajú nové spôsoby rastu a zákazníci majú viac možností na výber. Globalizácia by mohla viesť k nevýrazným hotelovým obrazom, kde sú hotely podobné, bez ohľadu na to, kde sa nachádzajú. Mohli by stratiť svoju miestnu jedinečnosť a autenticnosť. Z pohľadu miestnej jedinečnosti a lokálnej úspešnosti uvádzajú Bednárová et al. (2009), že podnik, ktorý chce dlhodobo prosperovať, musí opustiť stratégiu krátkodobej lokálnej úspešnosti. Je dôležité, aby v cestovnom ruchu a poľnohospodárstve spoločnosti uplatňovali postupy environmentálneho manažmentu a postupy spoločenskej zodpovednosti podnikov. V prípade mestského poľnohospodárstva podľa Sanye-Mengual et al. (2018) sociálno-kultúrne ekosystémové služby sú vnímané cennejšie ako environmentálne. Podľa Bagur-Femenias et al. (2015) praktiky udržateľnosti majú priamy a významný vplyv na konkurencieschopnosť spoločností a na finančné výsledky spoločností.

Globalizácia viedla k dlhodobým globálnym a vnútorným nerovnováham a spôsobila v rozvinutých krajinách hlboké problémy. Ako ďalej uvádzajú Janáček & Janáčková (2018) globalizácia vo vyspelých krajinách poničila, veľmi zmenšila a niekde skoro zlikvidovala významné segmenty primárnych, ale hlavne sekundárnych sektorov ekonomík. Výrazne ovplyvňuje podnikanie spoločností hospodárska politika krajiny. Vo svojej štúdii Demir & Ersan (2018) uvádzajú, že výnosy tureckých spoločností cestovného ruchu zrejme závisia od domácej a medzinárodnej ekonomickej neistoty. Je veľmi dôležité, aby podniky s dostatočným predstihom dokázali reagovať na zmeny. Podľa Lesákovéj (2016) malé a stredné podniky čelia kritickej otázke, ako reagovať na zmeny spôsobené procesom globalizácie. Ako uvádza Kovanda (2011) každý ekonóm, ktorý obhajuje tú či onú teóriu, ten či onen model, by sa mal na prvom mieste zoznámiť so svetonázorom, ktorý tvorí ich zázemie. V článku použité hodnotenie „ex post“ nám pomáha lepšie pochopiť okolnosti vývoja a prognózovať výrazné zmeny napríklad v obchodných podmienkach, ktoré globalizácia spôsobuje, a ktorými ovplyvňuje podnikanie na Slovensku. Našu pozornosť sme v príspevku upriamili na podnikanie v poľnohospodárstve ako podnikanie so silnou podporou štátu a podnikanie v cestovnom ruchu ako rozvíjajúce sa odvetvie slovenskej ekonomiky s dopadom na regionálny rozvoj. Cestovní ruch je jedným z najvýznamnejších odvetví svetovej ekonomiky a predstavuje významný faktor regionálneho rozvoja (Balážová et al., 2007). Cestovný ruch hrá pre regionálny rozvoj neodmysliteľnú úlohu. Generuje príjmy miestnych ekonomík. Na cestovnom ruchu sú závislé i ostatné sektory národnej ekonomiky (Varvažovská, 2014). V cestovnom ruchu zohráva kľúčovú úlohu koncepcia moderného riadenia rizík. Analýza rizík podľa Tsai & LinLiu (2017) prináša úžitok vládam, majiteľom turistických zariadení, poisťovacím spoločnostiam a finančným inštitúciám, ale tiež pomáha pri efektívnom riadení rizika pochádzajúceho z prírodných katastrof vo vzťahu k cestovného ruchu. Vlády v častej miere dotujú ponúkané produkty poľnohospodárskeho poistenia. V kontexte rozvinutých ekonomík to uvádzajú napríklad Smith & Glauber (2012), ktorí ďalej skúmali vývoj poľnohospodárskych poistných produktov, ekonomiku trhu dopytu a ponuky poľnohospodárskych poistných trhov. Je dôležité, aby sa neopakovala na trhu situácia, keď poskytovatelia spotrebiteľských financií na trhu s úvermi boli nelikvidní. Ako uvádzajú Benmelech et al. (2017) zásahy zamerané na zastavenie nelikvidity na krátkodobých úverových trhoch mohli pomôcť obmedziť skutočné účinky krízy. V prípade poľnohospodárskych podnikov slovenská poľnohospodárska politika poskytuje silnú podporu poľnohospodárskym podnikom Ciaian et al. (2001).

2. Metodika

V posledných desaťročiach sa na identifikáciu zdrojov hospodárskeho rastu v jednotlivých krajinách použili rôzne ekonomické prístupy Pokrivčák & Záhorský (2016). Martinez-Victoria & Sanchez-Val (2018) analyzovali vplyv priestorového faktora, lokalizácie a interakčných efektov medzi agropotravinárskymi podnikmi v Španielsku. Uvádzajú, že agropotravinárske firmy sú ovplyvnené priestorovými faktormi, s rozdielmi medzi družstvami a firmami vlastnenými investormi. Cieľom príspevku je hodnotenie vybraných zmien v štruktúre a finančnej výkonnosti podnikov podnikajúcich v poľnohospodárstve, lesníctve a rybolove a podnikov podnikajúcich v ubytovacích a stravovacích službách v období rokov 2011 – 2016 v prostredí zmien podnikania a hospodárskeho rastu na Slovensku. Pre hodnotenie finančnej výkonnosti vybraných podnikateľských subjektov bolo zúžené analyzované obdobie na roky 2014, 2015 a 2016. Východiskovou databázou údajov pre hodnotenie finančnej výkonnosti sú údaje z publikácie Stredné hodnoty finančných ukazovateľov ekonomických činností v Slovenskej republike vydanou CRIF - Slovak CreditBureau, s.r.o., Bratislava a údaje zo Štatistického úradu SR. Rozdielny počet analyzovaných subjektov databázy CRIF oproti počtu subjektov uvedených Štatistickým úradom SR je spôsobený vylúčením podnikateľských subjektov v dôsledku kontrol účtovných závierok. Pre hodnotenie finančnej výkonnosti podnikov boli zvolené 4 ukazovatele:

- celková likvidita: L3 (ukazovateľ schopnosti uhrádzať krátkodobé záväzky),
- obrat aktív: OA (ukazovateľ schopnosti využívať svoj majetok),
- hrubá rentabilita aktív: HRA (ukazovateľ schopnosti získať hrubý zisk z viazaného majetku),
- prevádzková rentabilita tržieb: PRT (podiel výsledku hospodárenia hospodárskej činnosti a tržieb z realizácie).

Porovnávame medián ukazovateľov rady hodnôt usporiadaných podľa veľkosti ukazovateľov L3, OA, HRA, PRT zastúpených v súbore. To nám dáva možnosť získať komplexnejší obraz o rozložení hodnôt v analyzovanom súbore podnikov.

Table 1: Vývoj počtu podnikateľských subjektov podľa vybraných právnych foriem v poľnohospodárstve, lesníctve a rybolove a podnikov v ubytovacích a stravovacích službách za roky 2011-2016 podľa CRIF – Slovak CreditBureau, s.r.o.

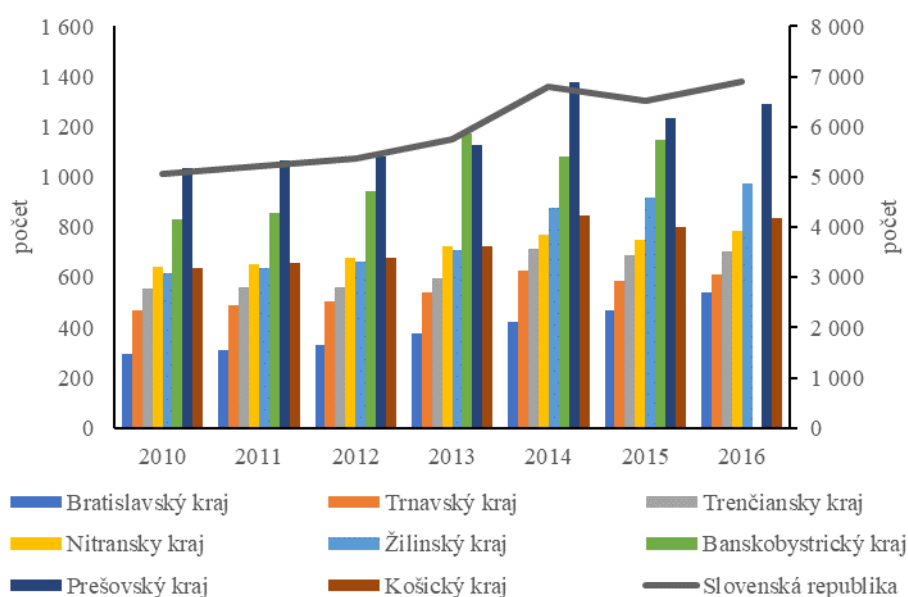
Rok	Podniky v poľnohospodárstve, lesníctve a rybolove (PPLR)							
	š.p.	a.s.	s.r.o.	FO v OR	ostatné FO	družstvá	iné subjekty	Spolu
2011	5	90	1 568	4	70	412	426	2 575
2012	4	103	2 104	4	80	488	1 057	3 840
2013	3	103	2 538	10	88	512	1 008	4 263
2014	4	108	2 661	22	87	522	1 517	4 921
2015	4	112	2 906	31	100	540	1 756	5 449
2016	5	98	3 078	35	103	511	1 825	5 655
Rok	Podniky v ubytovacích a stravovacích službách (PUSS)							
	š.p.	a.s.	s.r.o.	FO v OR	ostatné FO	družstvá	iné subjekty	Spolu
2011	2	73	3 155	10	109	6	14	3 369
2012	1	74	3 752	6	127	5	17	3 982
2013	2	81	4 543	11	147	7	16	4 807
2014	4	90	4 682	18	141	5	15	4 955
2015	3	90	5 129	15	174	3	14	5 428
2016	2	93	5 146	17	168	4	12	5 442

Source: *vlastné spracovanie podľa elektronickej databázy Stredné hodnoty finančných ukazovateľov ekonomických činností za roky 2011 až 2016, Vzhľadom na vykazovanie štatistického úradu a iných údajov predpokladáme, že nami uvedené údaje sú použiteľné pre ďalšie analýzy. Skratky a značenie: š.p. – štátne podniky, a.s. – akciové spoločnosti, s.r.o. – spoločnosti s ručením obmedzením, FO v OR – fyzické osoby zapísané v obchodnom registri. ostatné FO, PPLR – Podniky v poľnohospodárstve, lesníctve a rybolove (PPLR), PUSS – podniky v ubytovacích a stravovacích službách. Pozn.: Iné subjekty zahŕňajú verejné obchodné spoločnosti, k.s., európske zoskupenia hospodárskych záujmov, európske spoločnosti, spoločenstvá vlastníkov pozemkov, bytov a pod., zahraničné osoby – PO so sídlom mimo územia SR, a od roku 2014 aj obecný podnik, združenia (zväz, spolok, klub ...), organizačné jednotky združení a záujmové združenia PO.*

3. Výsledky a diskusia

Podľa databázy CRIF (Tab. 1) vzrástol celkový počet podnikov podnikajúcich v poľnohospodárstve, lesníctve a rybolove z 2 575 na 5 665, teda registrujeme viac ako zdvojnásobenie počtu podnikateľských jednotiek rovnako registrujeme v sledovanom období aj nárast počtu podnikov v ubytovacích a stravovacích službách z 3 369 na 5 442 a to o 62%. Hlavné zmeny v štruktúre právnej formy sú badateľné v prípade PPLR a to v s.r.o. a v iných subjektoch.

Figure 1: Vývoj počtu podnikov v poľnohospodárstve, lesníctve a rybolove podľa ekonomických činností na Slovensku



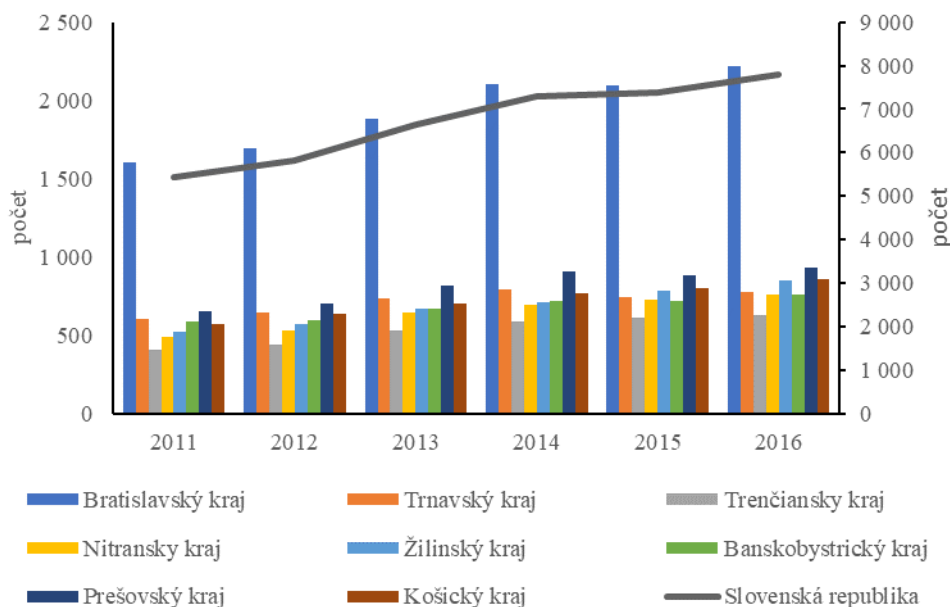
Source: ŠÚ SR, vlastné spracovanie

V PUSS je hlavná zmena v právnej forme podnikania spoločnosť s ručeným obmedzením. Pri takto vykazovaných zmenách si však treba uvedomiť minimálne dve obmedzenia: že tento rast môže byť spôsobený aj zavedením povinnosti zverejňovať účtovnú závierku podnikateľského subjektu (prírastok počtu spracovaných subjektov) ako aj skutočnosťou, že v rámci poskytovanej databázy prebieha vecná a logická kontrola správnosti účtovných závierok (úbytok počtu spracovaných subjektov).

V každom prípade nám táto databáza poskytuje dostatočné informácie na to, aby sa dokázalo zhodnotiť, či najviac rastúci počet podnikateľských subjektov v určitej právnej forme zodpovedá jej efektívnemu výberu postavenému na finančnej výkonnosti podnikov reprezentujúcich nimi vybranú právnu formu Moravčíková & Dvořák (2018).

Pri porovnaní vývoja údajov zo ŠÚ SR, počet všetkých PPLR na Slovensku (Graf 1) a PUSS (Graf 2) rozdelených podľa právnych foriem je vidieť celkový rastúci trend.

Figure 2: Vývoj počtu podnikov v ubytovacích a stravovacích službách podľa ekonomických činností na Slovensku



Source: ŠÚ SR, vlastné spracovanie

Dominuje z pohľadu výberu právnej formy spoločnosť s ručením obmedzením a lokalizácia je hlavne v regióne Bratislavského kraja. Zmena trendu v roku 2015 v porovnaní s rokom 2014 je zaujímavá z dôvodu rastúceho HDP Slovenska v kombinácii legislatívnych zmien týkajúcich sa zvyšovania minimálnej mzdy, ktorá sa v roku 2015 zvýšila na úroveň 380 € (jednalo sa o medziročné zvýšenie minimálnej mzdy v porovnaní s rokom 2014 o 7,95%) a ovplyvnila podnikanie PPLR a PUSS.

Table 2: Vybrané ukazovatele, jednotlivé právne formy sekcie PLR, roky 2014 až 2016, medián

Ukazovateľ / Rok	a.s.	s.r.o.	FO v OR	ost. FO	družstvá	iné subj.
L3 (koef) (Rok 2014)	1,28	1,22	2,40	1,65	1,52	4,09
OA (koef) (Rok 2014)	0,37	0,51	1,61	0,75	0,40	0,72
HRA (%) (Rok 2014)	0,41	1,48	3,53	1,24	0,46	19,15
PRT (%) (Rok 2014)	3,74	4,84	5,44	5,03	3,73	29,69
L3 (koef) (Rok 2015)	1,13	1,30	4,57	1,84	1,55	4,69
OA (koef) (Rok 2015)	0,36	0,50	1,20	0,66	0,38	0,73
HRA (%) (Rok 2015)	0,05	1,68	3,77	1,49	0,23	26,34
PRT (%) (Rok 2015)	0,77	5,37	7,57	4,96	2,20	38,65
L3 (koef) (Rok 2016)	1,05	1,32	1,79	2,27	1,71	4,77
OA (koef) (Rok 2016)	0,40	0,52	1,29	0,63	0,37	0,66
HRA (%) (Rok 2016)	0,75	2,17	5,27	2,42	0,80	22,75
PRT (%) (Rok 2016)	5,12	5,89	5,55	8,80	4,00	38,65

Source: vlastné spracovanie podľa Stredné hodnoty finančných ukazovateľov ekonomických činností za roky 2014 až 2016. Poľnohospodárstvo, lesníctvo a rybolov sa uvádzajú pod skratkou PLR.

Table 3: Vybrané ukazovatele, jednotlivé právne formy sekcie USS, roky 2014 až 2016, medián

Ukazovateľ / Rok	a.s.	s.r.o.	FO v OR	ost. FO	družstvá	iné subj.
L3 (koef) (Rok 2014)	0,75	0,87	1,94	2,78	0,4	1,66
OA (koef) (Rok 2014)	0,15	1,33	1,53	1,13	0,12	0,57
HRA (%) (Rok 2014)	-0,24	0,00	4,62	2,73	-10,27	16,53
PRT (%) (Rok 2014)	-9,16	0,45	2,76	4,04	-87,46	22,66
L3 (koef) (Rok 2015)	0,67	0,98	3,26	4,07	0,09	0,9
OA (koef) (Rok 2015)	0,17	1,31	1,37	1,11	0,14	0,75
HRA (%) (Rok 2015)	-0,53	0,00	15,18	3,98	-16,14	11,7
PRT (%) (Rok 2015)	-2,66	1,12	6,88	6,27	-111,56	20,62
L3 (koef) (Rok 2016)	0,75	0,99	5,64	2,99	0,11	0,66
OA (koef) (Rok 2016)	0,18	1,29	1,35	1,36	0,07	1,63
HRA (%) (Rok 2016)	0,00	0,11	4,92	4,66	-7,84	25,83
PRT (%) (Rok 2016)	-0,61	1,71	5,69	6,04	-7,33	9,01

Source: vlastné spracovanie podľa Stredné hodnoty finančných ukazovateľov ekonomických činností za roky 2014 až 2016. Ubytovacie a stravovacie služby sa uvádzajú pod skratkou USS.

Na základe hodnôt uvedených v tabuľke 2 a v tabuľke 3 si môžeme lepšie predstaviť postavenie jednotlivých právnych foriem z pohľadu finančnej výkonnosti v nami analyzovanom súbore podnikov. Pre vybrané ukazovatele je žiaduca tendencia rastu s dôrazom na ukazovatele rentability. V podnikoch sekcie PLR a sekcie USS majú najlepšie hodnoty mediánov vybraných ukazovateľov iné subjekty, teda verejné obchodné spoločnosti, k. s., európske zoskupenie hospodárskych záujmov, európske spoločnosti, spoločenstvá vlastníkov pozemkov, zahraničné osoby – právna forma so sídlom mimo územia SR. Hodnotenie sa opiera o výslednice dosahovaných hodnôt ukazovateľov rentability, ktoré dosahovali iné subjekty. Práve v ukazovateľoch hrubej rentability aktív sa premietajú ostatné vybrané ukazovatele hodnoteného obdobia. Z nášho hlbšieho výskumu vyplýva, že právna forma podnikateľského subjektu a jeho finančná situácia sú veľmi úzko prepojené.

4. Conclusion

V sledovanom období registrujeme výrazné zmeny v podnikoch sekcie poľnohospodárstvo, lesníctvo a rybolov v ukazovateľoch rentability. Z vývoja a nášho výskumu predpokladáme, že stav v roku 2014 bol vyvolaný prípravou podnikov na zmenu sadzby dane z príjmov a na možnosť využívania daňovej licencie. Z pohľadu vlastníckej štruktúry je najviac zastúpená právna forma s.r.o. a iné subjekty. Z pohľadu vlastníckej štruktúry, je v podnikoch sekcie ubytovacie a stravovacie služby dlhodobo najrozšírenejšia právna forma podnikania s.r.o., s jednoznačným podielom na celkovom počte subjektov - takmer 95 %. Na základe hodnotenia finančnej výkonnosti v tabuľke 3 vykazuje najlepší vývoj vo vybraných ukazovateľoch počas sledovaného obdobia právna forma FO v OR paradoxne jej zastúpenie v celkovom počte podnikoch sekcie ubytovacie a stravovacie služby je minimálne.

References

- [1] Bagur-Femenias, L., Marti, J. and Rocafort, A. (2015). Impact of sustainable management policies on tourism companies' performance: the case of the metropolitan region of Madrid. *Current Issues in Tourism*, vol. 18, no. 4, pp. 376-390.

- [2] Balážová, E., Papcunová, V. and Jarábková, J. (2007). *Cestovný ruch a samospráva*. Nitra: Slovenská poľnohospodárska univerzita.
- [3] Bednárová, L., Liberko, I. and Weiss R. (2009). Benchmarking v riadení podnikov. *Acta Montanistica Slovaca*, vol. 14, no. 1, pp. 86–91.
- [4] Benmelech, E., Meisenzahl, R.R. and Ramcharan, R. (2017). The real effects of liquidity during the financial crisis: Evidence from automobiles. *Quarterly Journal of Economics*, vol. 132, no. 1, pp. 317-365.
- [5] Ciaian, P., Qineti, A., Sojkova, Z., Kabat, L. and Hanova, M. (2001). European integration: The case of agricultural farms in Slovak Republic. *Ekonomický Časopis*, vol. 49, no. 2, pp. 330-357.
- [6] CRIF – Slovak CreditBureau, s.r.o. (2015). Stredné hodnoty finančných ukazovateľov ekonomických činností v Slovenskej republika za rok 2014. [online]. [cit. 2018-02-02].
- [7] CRIF – Slovak CreditBureau, s.r.o. (2016). Stredné hodnoty finančných ukazovateľov ekonomických činností v Slovenskej republika za rok 2015. [online]. [cit. 2018-02-02].
- [8] CRIF – Slovak CreditBureau, s.r.o. (2017). Stredné hodnoty finančných ukazovateľov ekonomických činností v Slovenskej republika za rok 2016. [online]. [cit. 2018-02-02].
- [9] Demir, E. and Ersan, O. (2018). The impact of economic policy uncertainty on stock returns of Turkish tourism companies, *Current Issues in Tourism*, vol. 21, no. 8, pp. 847-855.
- [10] Janáček, S. and Janáčková, S. (2018). Hrozba sekulární stagnace. *Politická ekonomie*, vol. 66, no. 1, pp. 116–135.
- [11] Kovanda, L. (2011). Ekonomie budoucnosti: čtyři možné scénáře. *Politická ekonomie*, vol. 59, no. 6, pp. 743-758.
- [12] Lesáková, Ľ. (2016). Implementation of small Business act initiative in small and medium Enterprises in Slovakia. *Proceedings of 16th International Scientific Conference "Globalization and Its Socio-economic Consequences"*. Ražecké Teplice, Slovakia, pp. 1179-1186.
- [13] Martinez-Victoria, M. and Sanchez-Val, M.M. (2018). Spatial determinants of productivity growth on agri-food Spanish firms: a comparison between cooperatives and investor-owned firms. *Agricultural Economics*, vol. 49, no. 2, pp. 213-223.
- [14] Moravčíková, E. and Dvořák, M. (2018). Zmeny v štruktúre a finančnej výkonnosti podnikov cestovného ruchu v regiónoch SR. In Klímová, V., Žitek, V. (eds.) *XXI. mezinárodní kolokvium o regionálních vědách*. Sborník příspěvků. Brno: Masarykova univerzita, pp. 541–548.
- [15] Pokrivčák, J. and Záhorský, T. (2016). Economic growth and its determinants across CEE countries. *International Scientific Days 2016. The Agri-Food Value Chain: Challenges for Natural Resources Management and Society*. Nitra: SUA in Nitra, pp. 956-963. Available: <http://www.slpk.sk/eldo/2016/dl/9788055215037/files/12/pokrivcak-et-al.pdf>.

- [16] Sanye-Mengual, E., Specht, K., Krikser, T., Venni, C., Pennisi, G., Orsini, F. and Gianquinto, G.P. (2018). Social acceptance and perceived ecosystem services of urban agriculture in Southern Europe: The case of Bologna, Italy. *PLoS One*, vol. 13, no. 9.
- [17] Severová, L. and Svoboda R. (2015). Competition of Companies in International Tourism Sector in the Czech Republic. *Proceedings from IX. International Conference on Applied Business Research (ICABR 2014)*, Brno, Czech Republic, pp. 998-1014.
- [18] Smith, V.H. and Glauber, J.W. (2012). Agricultural Insurance in Developed Countries: Where Have We Been and Where Are We Going? *Applied Economic Perspectives and Policy*, vol. 34, no. 3, pp. 363-390.
- [19] Tsai, CH. and LinLiu, SC. (2017). Slopeland disaster risk management in tourism. *Current Issues in Tourism*, vol. 20, no. 7, pp. 759-786.
- [20] Varvažovská, P. and Jarkovská, M. (2014). Regional Food as Expression of Identity and Sustainability in Regional Development. *Proceedings from International Scientific Conference: Marketing Identity 2014: Explosion of Innovations*. Trnava, Slovakia, pp. 1339-5726.
- [21] Yu, Y., Byun, W.H. and Lee T.J (2014). Critical issues of globalisation in the international hotel industry,. *Current Issues in Tourism*, vol. 17, no. 2, pp. 114-118.

TAX LICENSE IN THE SLOVAK AGRICULTURAL LEGAL ENTITIES

Alexandra Ferenczi Vaňová^{1,a,*}, Renáta Krajčírová^{2,b}, Martin Mariš^{3,c},
Jozef Bojnanský^{4,d} and Petra Ďurkáčová^{5,e}

^{1,2,4,5}Slovak University of Agriculture in Nitra, Faculty of Economics and Management,
Department of Accounting, Tr. Andreja Hlinku 2, 949 76 Nitra, Slovak Republic

³Slovak University of Agriculture in Nitra, Faculty of European Studies and Regional Development,
Department of Regional and Rural Development, Tr. Andreja Hlinku 2, 949 76 Nitra, Slovak
Republic

^aalexandra.ferenczi@uniag.sk, ^brenata.krajcirova@uniag.sk, ^cmartin.maris@uniag.sk,
^djozef.bojnansky@uniag.sk, ^epetradurkacova@gmail.com

*Corresponding author

Abstract. The term of tax license was introduced in the Slovak tax legislation in 2014 and represents minimum corporate income tax in the SR. The corporate income tax considers significant source of public finance and essential tool of budget revenue increase also in the EU developed countries. The selected sample of legal entities represents 2,572 business companies interested in the agricultural and forest industries registered within the territory of the SR. According to our empirical research, nearly 90% of legal entities paid the tax license in 2016. Despite this fact, the obligation to pay the tax license was cancelled from 2018. On the other hand, it is a positive approach towards global business environment which effects the tax burden of the companies. The paper presents relations between the corporate income tax and the examined variables in 2016. The variables were selected in respect of the conditions related to the obligation to pay the tax license. Relation between the corporate income tax and the total amount of turnover as well as relation between the total amount of assets and the total amount of turnover resulted in positive correlation. Business assets constitute the increase of the total amount of turnover which includes revenue generated from all business activities of the companies. It can be concluded that the relation between the corporate income tax and the total amount of assets resulted in negative correlation, i.e. the increase in the corporate income tax leads to the decrease in corporate assets.

Keywords: tax license, corporate income tax, turnover, assets, legal entities

JEL Classification: H25, K34, M21

1. Introduction

The institute of tax license has been applied on 1 January 2014 based on the Act no. 595/2003 Coll. on Income Tax as amended (hereinafter referred to as “Income Tax Act”). Tax license presents the minimum amount of corporate income tax only relating to legal entities (taxpayers). The obligation to pay a tax license is mandatory for a taxpayer in each taxable period for which he has obtained a lower tax obligation than is the set amount of tax license or tax loss respectively who generate zero tax obligation. Baštincová (2016) states that the taxes essentially influence the economic behaviour and decision making of legal entities,

mainly as regards the corporate income tax. Despite the general recognition that taxes are generally a strong policy tool for assessing the macroeconomic impact of the country's alternative tax policies, taxes are often weakened by restrictions on tax revenue measurement (Andrejovská & Puliková, 2018). Tománek (2016) assess the evolution of tax sharing between the state budget and the budgets of municipalities in the Czech Republic. Lipková et al. (2017) concludes that the income tax system in the Slovak Republic is more effective, less costly and more socially just than the income tax system of the Czech Republic. The globalization of economic activity and the growing importance of multinational corporations have far-reaching consequences for national tax policies. Differences and incompatibilities between the national systems of corporate income taxation distort investment, complicate the tax system and give rise to conflicts between taxpayers and tax authorities as well as between tax authorities of different countries (Devereux & Fuest, 2010). According to Košovská & Váryová (2016) the Slovak Republic with its entry to the European Union has adopted and implemented the legal norms related to the accounting and tax issues which is fully in accordance with the directives of the European Union. However, many EU member countries refuse to give up their tax sovereignty, which would become considerably limited because of the harmonization of direct taxes (Feranecová et al., 2017). State tax policy affects business entity choice decisions (Luna & Murray, 2010). In the global practice, the use of taxation is the most widely-practiced way of supporting business activity. However, its effectiveness is discussible, which can be seen in the different approaches to fiscal policy depending on the country (Tumanyants, 2016). Income taxes present the quantitative and significant source of income in public budgets as well as a crucial tool of increasing tax income to state budget of each developed state. Despite this fact, based on the Amendment of the Income Tax Act relating to the obligation to pay a minimum amount of corporate income tax, the obligation to pay a tax license since 1 January 2018 has been cancelled.

Following the above, the objective of the article is to assess the tax license, as the minimum corporate income tax and its relations with the selected variables in the agricultural and forest legal entities registered in the territory of the Slovak Republic in the year 2016.

2. Methods

The article deals with possible relations between the corporate income tax and the total amount of turnover and the total amount of assets. The assessed variables are selected in view of the conditions to which the obligation to pay a tax license by legal entities. Except it, this condition relates to classification of companies in the size groups as well as conditions related to obligation to verify the financial statements by audit according to the Slovak accounting legislation. The total amount of turnover and the total amount of assets are reviewed.

The selected sample of companies includes 2,572 legal entities provided business in agricultural and forest sector in the Slovak Republic in the year 2016. Data sources represent the information from the Finstat database (www.finstat.sk) which include the data from the individual financial statements of particular legal entities, i.e. from the balance sheets, the profit and loss accounts and the notes.

The sample represents 2,572 observations, thus $n = 2,572$. For the relation examination we opted for partial correlation coefficients as a measure of the degree of linear association

between two variables (Hendl, 2012). For the three-variable model, where

X_1 = corporate income tax,

X_2 = total amount of turnover and

X_3 = total amount of assets we define:

$r_{12.3}$ = partial coefficient between Y and X_2 , holding X_3 constant

$r_{13.2}$ = partial coefficient between Y and X_3 , holding X_2 constant

$r_{23.1}$ = partial coefficient between X_2 and X_3 , holding Y constant

These partial correlations can be obtained from the simple or zero-order, correlation coefficients as follows:

$$r_{12.3} = \frac{r_{12} - r_{13}r_{23}}{\sqrt{(1-r_{13}^2)(1-r_{23}^2)}} \quad (1)$$

$$r_{13.2} = \frac{r_{13} - r_{12}r_{23}}{\sqrt{(1-r_{12}^2)(1-r_{23}^2)}} \quad (2)$$

$$r_{23.1} = \frac{r_{23} - r_{12}r_{13}}{\sqrt{(1-r_{12}^2)(1-r_{13}^2)}} \quad (3)$$

For testing the significance of the population partial correlation coefficient we use standard t – test under the zero hypothesis $H_0: \rho = 0$ and alternative hypothesis $H_A: \rho \neq 0$. Further, we calculate the value of the test statistic using following formula:

$$t = \frac{r\sqrt{n-3}}{\sqrt{1-r^2}} \quad (4)$$

In addition, we use the resulting test statistic to calculate the p-value. The p-value is determined by referring to t – distribution with $n - 3$ degrees of freedom.

3. Results and Discussion

Tax license is considered to be a minimum corporate income tax after deduction of allowances and tax credit paid abroad which are obliged to be paid in a taxable period by each legal entity. Tax license for each taxable period was paid by each legal entity in the Slovak Republic in case his tax obligation calculated in a tax return was lower than the amount of tax license set by the Income Tax Act or in case that he disclosed a tax loss respectively zero tax obligation in the tax return. Such a taxpayer paid a tax license depending on the registration as value added taxpayers and acquired annual turnover. Both, before mentioned conditions (Table 1) were reviewed as at the last date of taxable period. The annual turnover of taxpayer presents the sum of total revenues from all performed activities for a particular taxable period in accordance with the Act no. 479/2009 Coll. on State Administration Authorities in the Area of Taxes and Fees as amended. The VAT payer is a legal entity pursuant to the conditions set

by the Act no. 222/2004 Coll. on Value Added Tax as amended (hereinafter referred to as “VAT”).

Based on the parliamentary proposal of the Amendments of the Income Tax Act and its simultaneous approval by the National Council of the Slovak Republic the obligation to pay a tax license has been cancelled since 1 January 2018 regardless the quantitative influence analysis of such a legal amendment to the budget of public administration in the Slovak Republic. The state budget of the Slovak Republic will be lower for tax incomes arising from the title of set minimum corporate income tax in the time of non-payment of tax licenses.

Table 1: The amount of tax license

Taxpayer (legal entity)	Tax license in EUR
Is not a VAT payer with annual turnover ≤ 500,000 EUR	480
Is a VAT payer with annual turnover ≤ 500,000 EUR	960
Regardless the registration as a VAT payer with annual turnover > 500,000 EUR	2,880

Source: Own processing based on the Income Tax Act

The Supreme Audit Office of the Slovak Republic (hereinafter referred to as “NKÚ SR”) (2017) states the manner of tax authority in the collection of tax licenses of legal entities which dealt with the collection of tax licenses from legal entities to the income of state budget for the years 2014 and 2015 state that 79,498 legal entities established for the purposes of entrepreneurship with the activity that they did not file the income tax return for the taxable periods 2014 and 2015 caused the lack of income in the state budget in the minimum amount 38.1 mil. EUR and when they did not return a tax license enacted by the Income Tax Act to the state budget in a minimum value 480 EUR. In the year 2015 it presents the failure in the amount 18.1 mil. EUR, and in the year 2016 the failure was in the amount 20.1 mil. EUR. The before mentioned calculation derive from the assumption that all entrepreneurs were obliged to file a tax return.

The annual comparison of development of the collection of corporate income tax to the income of the state budget based on the data submitted by the Financial Administration of the Slovak Republic presents Figure 1. Corporate income tax presents a crucial source of tax income collected to the state budget of the Slovak Republic.

Based on the results of our empirical research nearly 90% of legal entities included in the assessed companies paid tax in the amount of tax license in the year 2016 and regardless the amount of total annual turnover and registration as a VAT payer. Only nearly 10% of companies from the selected legal entities doing business in agriculture and forestry sector in the Slovak Republic calculated corporate income tax from accounting profit which is adjusted by items which increase respectively decrease it. The amount of income tax depends mainly on the disclosed tax base of a taxpayer.

In connection to the before mentioned issue the variables were selected which are presented by the corporate income tax, the total amount of turnover and the total amount of assets disclosed in individual financial statements of assessed companies.

According the methodology, initially we examined partial correlation coefficients in respect of the review the intensity of the relations between the examined variables. We found that:

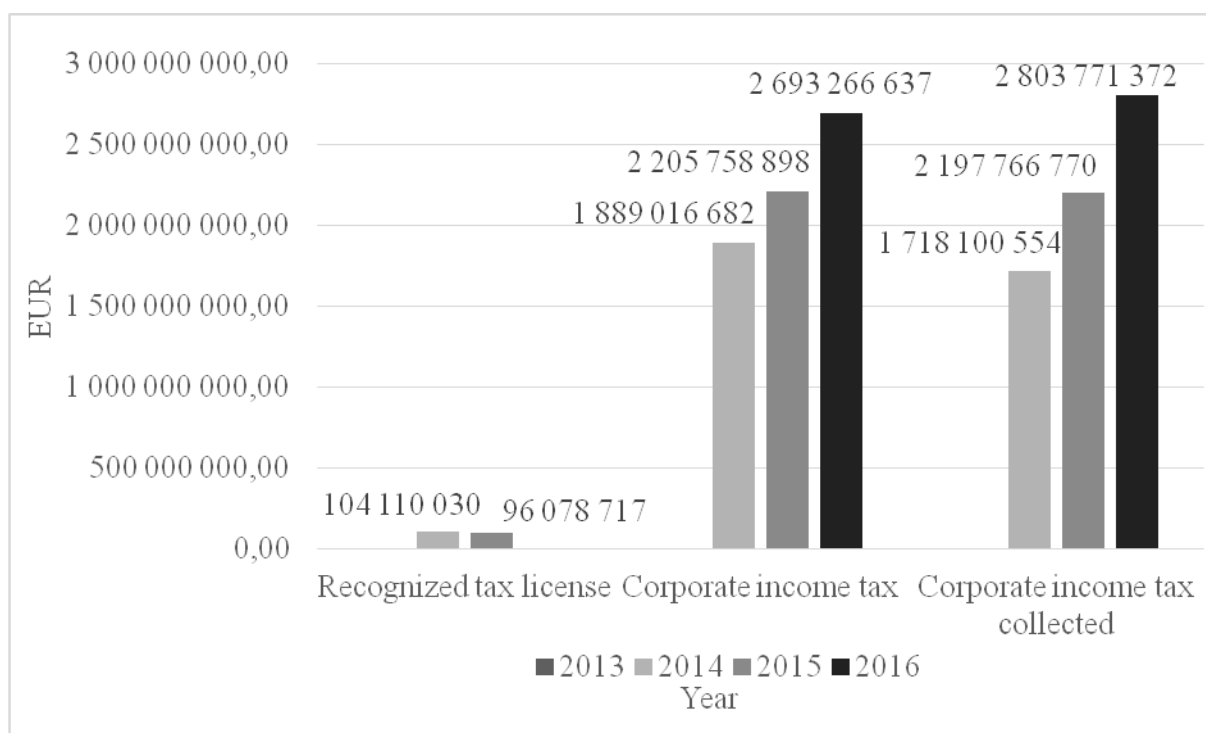
$r_{12.3} = 0.347$ and its coefficient partial determination $r_{12.3}^2 = 0.12$

$r_{13.2} = -0.224$ and its coefficient partial determination $r_{13.2}^2 = 0.05$

$r_{23.1} = 0.966$ and its coefficient partial determination $r_{23.1}^2 = 0.93$

According to our results the intensity between the dependent variable (corporate income tax) Y and independent variables X_2, X_3 (total amount of turnover, total amount of assets) we can consider to “small to average”, furthermore the association between the X_1 (corporate income tax) and X_3 (total amount of assets) is negative, thus the higher levied corporate income tax means drop in the total amount of assets. The relation between the independent variables X_2 (total amount of turnover) and X_3 (total amount of assets) is exceptional strong, what is reasonable, and expected.

Figure 1: Corporate income tax and its collection



Source: Own processing based on final report NKÚ SR

The corporate income tax and the total amount of turnover, as well as the total amount of assets and the total amount of turnover significantly correlate. It means that between the mentioned variables the direct dependence was identified. The existence and sustainability of legal entities is conditioned by the total amount of assets and its structure. This is confirmed also by Satsuk & Koneva (2016), Tóth et al. (2014). Assets can be considered as the assumption for obtaining of revenues deriving from activities which are subject of company's business activities. These revenues which are subject of corporate income tax present the part of achieved company's accounting result. The positive net result for the tax period is one of own source of company's assets achieved from business activities.

The corporate income tax and the total amount of turnover positively correlate. It means that the amount of the corporate income tax directly increase with the increase in the total amount of company's turnover. The corporate income tax is conditioned by the disclosed net

profit which includes revenues and simultaneously by the transformation of such a profit into corporate income tax base as well as valid corporate income tax rate in a particular taxable period. The calculated corporate income tax is influenced mainly by the calculated income tax base. The corporate income tax and the total amount of assets negatively correlate. A higher corporate income tax decreases the total amount of company's assets.

Table 2 identifies the results of the test of significance of population partial correlation coefficients for each respective pair of variables.

The t – test shows statistically significant relationship between each pair of variables, in despite of rather weak partial correlation coefficients ($r_{12.3}$, $r_{13.2}$). Thus we should reject the zero hypothesis and accept an alternative hypothesis on given significance at the level $\alpha = 0.05$. It means that the recognized results between selected variables are statistically significant.

Table 2: Results of the test of significance of population partial correlation coefficient

Partial correlation coefficient – r	t – statistics	p - value
$r_{12.3} = 0.347$	18.794	<0.0000001
$r_{13.2} = -0.224$	- 11.652	<0.0000001
$r_{23.1} = 0.966$	189.14	<0.0000001

Source: Own calculation based on data from the Finstat database

4. Conclusion

The obligation to pay a tax license related to all legal entities (commercial companies established pursuant to the Commercial Code, cooperative, state companies, organizational units of foreign legal entity and permanent establishments of foreign legal entities) whose income is subject to tax in the Slovak Republic. In accordance with the Ministry of Finance of the Slovak Republic the application of tax licenses should be one of the measurements in the fight against tax evasions and tax fraud (Ölvecká, 2016). Tax license depended on the amount of annual turnover achieved by a taxpayer and its registration as a VAT payer as at the last date of taxable period. Vernarský (2015) supposes that enactor approached towards the criteria of turnover and the taxpayer status in the sphere of VAT due to a simple control and verification of meeting or non-meeting of these criteria. In our opinion, the amount of turnover is not a criterion due to a simple control. Following our recognized results, it can be stated that the total amount of turnover affects the amount of the corporate income tax. Furthermore, it has been confirmed that the statistically significant correlation is recognized within the assessed variables namely the corporate income tax and the total amount of turnover and the total amount of assets. Effective since 1 January 2018 the institute of tax license has been cancelled. The Supreme Audit Office of the Slovak Republic (2017) states that within the verification of tax administrator manner in the process of securing the recovery of tax arrears it has been found out that tax arrears from the title of non-payment of corporate income tax submitted in the amount of tax license for the taxable period of the years 2014 and 2015 relevant and negatively influenced incomes of state budget of the Slovak Republic in the years 2015 and 2016. According to the before mentioned, we are of the opinion that, in the assessed legal entities the corporate income tax in the year 2016 was paid in the amount of tax license by nearly 90% of legal entities. In our opinion, that the amendment of legal regulation

will have a negative impact on the budget of public administration in the Slovak Republic as regards the decrease in the number of legal entities obliged to pay a tax license. Vančurová & Láchová (2014) consider that the disadvantage of corporate income tax is presented by the fact that revenues record large conjunctural fluctuations. Even the portion of corporate income tax in the total tax revenues decreased in the last decades, it still creates approximately 10% of tax income in the Czech Republic. On the other hand, we believe, it is a positive approach towards entrepreneurship environment as the cancellation of tax license effected the total corporate income tax burden of legal entities. Gyurián & Kútina (2016) determine that total tax burden of taxpayers is the most sensitive part of economic policy for business environment. The quality of the business environment is also significantly influenced by administrative and legislative business rules which mean additional costs for businesses.

Acknowledgment

This paper is an output of the science project VEGA no. 1/0666/17 with the title “Impact of Integration and Globalization on Business Risk in Slovak Agriculture”.

References

- [1] Andrejovská, A. and Puliková, V. (2018). Tax revenues in the context of economic determinants. *Montenegrin journal of economics*, vol. 14, no. 1, pp. 133-141.
- [2] Baštinčová, A. (2016). *Účtovníctvo a dane právnických osôb. (Accounting and corporate income tax.)* Bratislava: Wolters Kluwer, s.r.o.
- [3] Devereux, M. P. and Fuest, C. (2010). Corporate income tax coordination in the European Union. *Transfer: European Review of Labour and Research*, vol. 16, no. 1, pp. 23-28.
- [4] Feranecová, A., Manová, E., Meheš, M., Stašková, S. and Blaščák, P. (2017). Possibilities of harmonization of direct taxes in the EU. *Investment Management and Financial Innovations*, vol. 14, no. 2, pp. 191-199.
- [5] Gyurián, N. and Kútina, A. (2016). The assessment of the impact of selected tax system elements on choosing a business form in Slovak Republic. *Conference proceedings RELIK 2016: Reproduction of human capital (mutual links and connections)*, pp. 124-133. Praha, Czech Republic. Available: <http://relik.vse.cz/insection/55>.
- [6] Hendl, J. (2012). *Přehled statistických metod. (Overview of statistical methods.)* Praha: Portál.
- [7] Košovská, I. and Váryová, I. (2016). Impact of globalization to the specifics of biological assets measurement in SR in the context of legal arrangements of SR and international legal arrangements. *Proceedings of 16th International Scientific Conference Globalization and Its Socio-Economic Consequences*, Zilina, Slovakia, pp. 996-1004.
- [8] Lipková, Ľ., Grešš, M. and Poncarová, A. (2017). Tax systems in the Czech Republic and the Slovak Republic: comparison with an emphasis on income tax. *Economic Annals-XXI*, vol. 165, no. 5/6, pp. 47-51.

- [9] Luna, L. and Murray, M. N. (2010). The effects of state tax structure on business organizational form. *National Tax Journal*, vol. 63, no. 4, pp. 995-1022.
- [10] Najvyšší kontrolný úrad Slovenskej republiky (2017). Záverečná správa Postup správcu dane pri výbere daňových licencií právnických osôb. (Final report of the Supreme Audit Office of the Slovak Republic The administrator manner as regards the collection of tax licenses of legal entities.) Bratislava: Najvyšší kontrolný úrad Slovenskej republiky. Available: <https://www.nku.gov.sk/documents/10157/2741e3ff-3eae-49f0-85ba-5458339cf2ad>.
- [11] Ölvecká, V. (2016). The analysis of tax license consequences on global business environment. *Proceedings of 16th International Scientific Conference Globalization and Its Socio-Economic Consequences*, Žilina, Slovakia, pp. 1604-1612.
- [12] Satsuk Tatiana P. and Koneva Olga V. (2016). Financial models of taxation systems: Identification approaches. *Proceedings of 16th International Scientific Conference Globalization and Its Socio-Economic Consequences*, Žilina, Slovakia, pp. 1956-1963.
- [13] Tománek, P. (2016). Influence of evolution of the tax revenues to the sharing of tax revenues of the state budget and municipal budgets. *Theoretical and Practical Aspects of Public Finance 2016*, Praha, Czech Republic, pp. 107-111.
- [14] Tóth, M., Lančarič, D., Piterková, A. and Savov, R. (2014). Systematic risk in agriculture: a case of Slovakia. *Agris on-line papers in economics and informatics*, vol. VI, no. 4, pp. 185-193.
- [15] Tumanyants, K. (2016). The impact of tax rate on activity of small enterprises: International experience and Russian case. *Proceedings of 16th International Scientific Conference Globalization and Its Socio-Economic Consequences*, Žilina, Slovakia, pp. 2245-2251.
- [16] Vančurová, A. and Láchová, L. (2014). *Daňový systém ČR 2014. (Czech tax system 2014.)* Praha: 1. VOX, a. s.
- [17] Vernarský, M. (2015). Daňová licencia v slovenskom právnom poriadku. (Tax licence in the Slovak law.) *Daňové právo vs. daňové podvody a daňové úniky*, pp. 333-343. Košice, Slovakia. Available: https://www.upjs.sk/public/media/1084/Zbornik_46_2.pdf.
- [18] Zákon č. 222/2004 Z.z. o dani z pridanej hodnoty v znení neskorších predpisov. (Act no. 222/2004 Coll. on Value Added Tax as amended.)
- [19] Zákon č. 479/2009 Z.z. o orgánoch štátnej správy v oblasti daní a poplatkov v znení neskorších predpisov. (Act no. 479/2009 Coll. on State Administration Authorities in the Area of Taxes and Fees as amended.)
- [20] Zákon č. 595/2003 Z.z. o dani z príjmov v znení neskorších predpisov. (Act no. 595/2003 Coll. on Income Tax as amended.)

GLOBALIZATION IN FOREIGN TRADE MEASURED BY VALUE ADDED – EXAMPLE OF V4 AND EU-28

Małgorzata Fronczek^{1,a,*}, Katarzyna Czech^{2,b*}

¹University of Economics in Katowice, 1 Maja 50, 40-287 Katowice, Poland

²University of Economics in Katowice, 1 Maja 50, 40-287 Katowice, Poland

^amalgorzata.fronczek@ue.katowice.pl, ^bkatarzyna.czech@uekat.pl

*Corresponding author

Abstract. Modern production organization, involving its fragmentation on a global scale, causes that the value of exported goods consists of both domestic and foreign value added. In consequence, the estimation of the level of globalization in foreign trade of particular countries based on the measures that use gross exports does not reflect the reality. The article is an attempt at the estimation of the level of globalization in trade of the EU-28 and the V4 countries, based on the concept of measuring trade with value added. The analysis applies the export ratio, containing the domestic and foreign component, and the Herfindahl Index to assess the geographical dispersion of exports. The study presents the analysis leading to the conclusion that an increasing export ratio implies the increased level of globalization in foreign trade of the researched countries. In addition, the foreign component in exports also grew, which indicates a higher level of globalization that might be inferred from the traditional estimation. The analysis of export disparity/dispersion confirmed the increased globalization levels for the EU-28 as well as for Poland and Czechia. The remaining V4 countries reported a rise in the level of globalization in trade for the years 2000-2010, while the years 2010-2014 saw a fall in this area.

Keywords: trade in value added, export ratio, globalization, Visegrad Group, H-Index

JEL Classification: F100, F120, F140

1. Introduction

Growing globalization reinforces mutual dependencies between the actors of the modern world economy. The multidimensional nature of globalization and the change it has been undergoing for the last 20 years have made it necessary to develop new measures accounting for the complexity of the process. Trade is the oldest form of relationships between the actors of global economy, but the modern organization of production requires a reviewed approach to this phenomenon.

The fragmentation of production processes is characteristic of modern economies and it leads to the increasing foreign value in exported goods and services. It led to the creation of a new concept of measuring trade in value added. The determination of the export ratio (export/GDP) needs to consider this fact. If the export ratio is interpreted as the measure of the “domestic” contribution into creating GDP, the new concept of measuring foreign trade displays this question in a different light. This paper is the attempt to present the extent of

both components, domestic and foreign, included in exports which created the GDP of the V4 countries in comparison with the EU-28. The analysis is also complemented with the estimates of another globalization indicator in the area of trade, the Herfindahl Index, to show the geographical dispersion of the exports of the researched countries.

The purpose of this paper is to present the level of globalization in foreign trade of the V4 countries in comparison with the European Union (28 countries). The simple indicator – the export ratio – was selected for the study, but the analysis was reviewed basing on the new concept of measuring trade. The study uses the data from the World Input-Output Tables (WIOT) and UNCTAD. The analysis comprises the export of goods in the years 2000-2014.⁶

2. Trade in value added – literature review

Modern production organization is characterized by sharing the production processes between the entities from the different countries (Johnson & Noguera, 2012, A). They are specialized in conducting the specific stages of production, using the imported intermediates. In effect many authors say about global value chains and fragmentation the production in the international scale (Johnson et al., 2011; Hummels et al., 2001; Ng, 2010). It causes that the value of exported goods consists of both domestic and foreign value added (Foster-McGregor & Stehrer, 2013; Matoo et al., 2013).

It is commonly agreed that the pioneer of research aiming to determine domestic value in exported products was W. Leontief, who created the input-output model to analyze the interdependencies between different branches of an economy as early as in the 1930s, while in the 1960s he authored further publications that are considered the foundation of the new concept of measuring world trade based on value added content (Leontief, 1936; Leontief, 1953; Leontief & Strout, 1963; Leontief, 1986). At the turn of the 21st century, his concept was used to produce estimates of the actual domestic content in the value of exported goods and services (Trade, 2012).

In the subsequent years, attempts were undertaken to develop methods for estimating value added in the trade of particular countries. The results of various authors showed that the share of domestic content on exported products decreased (e.g. Johnson & Noguera, 2012, B; Stehrer et al., 2012; Koopman et al., 2008; Dean et al., 2008; Wang et al., 2009; Daudin et al., 2011; Su, 2014; Lee & Cheong 2015).

3. Foreign value content in the gross export of goods in the EU-28 and V4 countries

In the years 2000-2014 the foreign component in the EU exports of goods rose from nearly USD 572 billion to USD 1830 billion (Table 1). This trend was also reported in the Visegrad Group countries. In Czechia the foreign component in exports rose from USD 7.4 bn to almost USD 70 bn, in Hungary – from USD 1.8 bn to USD 54.5 bn, in Slovakia – from USD 2.6 bn to USD 36.7 bn, and in Poland– from USD 9.8 bn to USD 66 bn.

⁶ The rate of exports was estimated based on WIOT data classified according to ISIC rev. 4 (it was assumed that goods were in parts: 01-39), whereas the Herfindahl Index was estimated based on UNCTAD data.

Table 1: Gross exports and foreign value content in gross exports of goods of UE-28 and V4 countries (in bn USD).

Countries	2000		2005		2010		2014	
	Ex	FVex	Ex	FVex	Ex	FVex	Ex	FVex
EU-28	2 002.5	572.0	3 356.8	1 035.8	4 167.7	1 529.5	4 844.8	1 829.6
Czechia	20.4	7.4	67.4	28.8	112.0	52.4	140.8	69.8
Hungary	21.5	11.8	54.9	28.9	79.8	46.5	93.5	54.5
Poland	35.1	9.8	86.7	26.0	129.6	49.8	173.2	66.1
Slovakia	6.2	2.6	24.9	12.6	50.3	27.3	63.2	36.7

Source: [WIOT], own estimation.

In 2000, it accounted for 28.6 % of the value of goods exported by the EU, while in 2014 – 37.8%. The content of foreign value in V4 exports also increased (Table 2). In Poland, it stood below the EU average level (27.8%), to grow slightly above the EU-28 average in 2014 (38.1%). In the other V4 countries it was considerably higher than the EU-28 average. The foreign value content in exported goods was the highest in Hungary. In 2000, it was 55%, while in 2014 it exceeded 57%. In Czechia and Slovakia it stood at a similar level. In 2000 it was 36% in Czechia and 33% in Slovakia, whereas in 2014 it reached almost 50% and 58% respectively.

Table 2: Share of the foreign value content in gross exports of goods of EU-28 and V4 countries (in %).

Countries	2000	2005	2010	2014
EU-28	28.6	30.9	36.7	37.8
Czechia	36.3	42.8	46.8	49.6
Hungary	54.9	52.6	58.3	58.3
Poland	27.8	30.0	38.4	38.1
Slovakia	33.0	50.7	54.2	58.0

Source: [WIOT], own estimation.

The data presented in Table 2 may imply that the foreign value content in the exports of smaller countries is higher.⁷ Additional estimates, conducted for all the 28 EU member states, confirmed that, in the researched period of time, a moderate or significant negative relationship existed between GDP and foreign value content in the exports of the EU countries (from -0,43 to -0,63).⁸ This means that the countries with lower GDP (i.e. the countries with smaller/less developed economies) had higher foreign value content in exports.

4. Export ratio in UE-28 and V4 countries

The export ratio is one of the globalization measures in the area of foreign trade that is on the list developed by OECD. The higher the export ratio, the higher the globalization rate. It is also interpreted as the measure of the extent of exports in the creation of GDP in a given country. Since, however, there is foreign content in the value of exports, it is worthwhile to determine to what extent it contributes to a given country's GDP. Table 3 presents the results of the estimates for the export ratio for goods and its domestic and foreign component in the UE-28 and the V4 countries.

⁷ This relationship was already identified by G. Daudin, Ch. Riffart, D. Schweisguth (Daudin et al., 2011).

⁸ Measured with the Spearman correlation coefficient (because the dependency is not linear). The relationship was statistically significant at the 95% confidence level.

Table 3: Export ratio in EU-28 and V4 countries (in %).

Countries	2000			2005			2010			2014		
	Ex ratio	DV comp.	FV comp.	Ex ratio	DV comp.	FV comp.	Ex ratio	DV comp.	FV comp.	Ex ratio	DV comp.	FV comp.
EU-28	24.1	17.2	6.9	24.8	17.2	7.7	26.2	16.6	9.6	27.9	17.4	10.5
Czechia	34.4	21.9	12.5	51.4	29.4	22.0	56.1	29.9	26.3	71.0	35.8	35.2
Hungary	49.5	22.3	27.1	53.1	25.2	27.9	67.0	27.9	39.0	73.8	30.8	43.0
Poland	21.4	15.5	5.9	29.8	20.9	9.0	29.2	18.0	11.2	33.8	20.9	12.9
Slovakia	31.4	18.0	13.4	53.5	26.4	27.1	58.0	26.5	31.4	64.9	27.2	37.6

DV comp. – domestic component

FV comp. – foreign component

Source: [WIOT], own estimation.

In 2000, in the EU-28 the average export ratio for goods stood at 24.1%, 17.2% of which was the domestic component and 6.9% – the foreign component. In 2014, it was higher, reaching 27.9%, 17.4% of which was the domestic component and 10.5% – the foreign component.⁹

The export ratio for goods in the majority of the Visegrad Group countries was higher than the EU-28 average. In 2000, it was 34.4% in Czechia (the foreign component contributed 12.5% of GDP), 31.4% in Slovakia (the foreign component: 12.5%), and 49.5% in Hungary (the foreign component contributed 27.1% of GDP). Poland's export ratio at 21.4% was lower than the average and the foreign component contributed 5.9% of GDP. In 2014, in all the countries in the study, the export ratio was higher – it was 71% in Czechia, 64.9% in Slovakia, 73.8% in Hungary, and 33.8% in Poland. At the same time, the contribution of the foreign component to GDP grew considerably. It increased to 35.2% in Czechia, 43% in Hungary, 37.6% in Slovakia (where it was higher than the contribution of the domestic component to GDP), and 12.9% in Poland.

Literature proposes a view that the export ratio is higher in smaller countries (due to the limited size of domestic demand producers have to seek market opportunities abroad), but the empirical results of the studies conducted by a number of researchers vary.¹⁰ More precise estimates carried out for the 28 EU member states do not unequivocally confirm the accuracy of this assumption with reference to these countries. In the years 2000-2014 the coefficient of correlation between GDP and the export ratio for the EU-28 ranged from -0.04 to -0.18, which means a weak negative relationship, but it was never statistically significant for the researched period of time.¹¹

⁹ The export ratio calculated here is slightly inflated due to the fact that the value of exports includes also re-exports. The error, however, is not large, because the size of re-exports in the research period stood at 3.7-5% of gross exports in the EU, 0-5% in Czechia, 0.6-3.3% in Hungary, 0.3-0.6% in Poland, and 0.6-6% in Slovakia. Table 4 shows the export ratio adjusted for re-exports in brackets. Unfortunately, due to the lack of specific data, it is impossible to estimate its domestic and foreign components. Own estimation based on *WIOT*.

¹⁰ Compare: (Olson et al., 2017; *Measuring*, 2005]

¹¹ Measured with the Spearman coefficient of correlation. The results imply that the closeness of the data may be coincidental. Own estimation based on *WIOT*.

5. Geographical dispersion of exports in the V4 countries

In the analysis of the dispersion of exports, the level of globalization was measured with the Herfindahl Index.¹² Based on the conducted analysis, it can be stated that the EU-28 saw an increase in the geographical dispersion of exports in the years 2000-2014, which indicated growing globalization in trade in the relevant period. The similar trend was observed in Poland and Czechia. Slovakia's and Hungary's globalization rate grew significantly from 2000 and 2010, only to drop slightly after 2010. On the other hand, a much lower export concentration ratio, so the higher level of globalization, was reported in the EU-28 compared to the V4 countries, which is shown in Table 4. Slovakia, in turn, had the highest geographical diversification of exports, which indicates its widest extent of globalization in trade within the Visegrad Group.

Table 4: Herfindahl Index EU-28 and V4 countries in years 2000-2014

Countries	2000	2005	2010	2014
EU-28	0.056	0.051	0.047	0.045
Czechia	0.0184	0.138	0.128	0.127
Hungary	0.164	0.112	0.088	0.098
Poland	0.146	0.103	0.094	0.090
Slovakia	0.126	0.107	0.080	0.087

Source: [UNCTADstat], own estimation.

It is also worthwhile to compare the number of countries that have a recognizable share in the exports (at least 0.1%) of the analyzed group of countries. The analysis shows that this figure is the highest for the EU-28 and it grew significantly in the researched period of time. In the V4 countries, on the other hand, an increase in the number of countries with a recognizable share in their exports occurred in the years 2000-2005, then the number steadily fell until 2010, only to recover and continue to grow up to 2014, most considerably in Slovakia and Hungary, which is illustrated by the data in Table 5. As the fall concerns the years 2010-2014 only, it is impossible to determine whether its nature is permanent.

Table 5: The number of countries whose share in the exports of the EU-28 and V4 countries exceeds 0.1% in years 2000-2014

Countries	2000	2005	2010	2014
EU-28	64	67	71	73
Czechia	51	52	50	53
Hungary	47	52	51	56
Poland	54	55	53	56
Slovakia	39	43	41	47

Source: [UNCTADstat], own estimation.

Another interesting list is the list of countries whose share in exports is of greatest significance for the EU-28 and V4. The most important export directions for the EU-28 are the largest EU economies (Germany, France, Italy, Spain) and the Netherlands, while from outside Europe – the USA, China and Russia. Export partners important for V4 are the countries within the group and the largest EU economies (Germany, France, Italy, the UK,

¹² The Herfindahl Index is usually used as the measure of market concentration (Brezina et al., 2016, Matsumoto et al., 2012). However it can be also used as the measure of the dispersion in foreign trade. Estimates were made based on the Herfindahl Index and the methodology presented in the OECD manual (*Measuring*, 2005). Unctadstat data were used (UNCTADstat).

Spain) and the Netherlands, as well as Russia and the USA. Year by year, China is also gaining in importance as an export partner for the V4 countries.

6. Conclusion

In the years 2000-2014, foreign content in the exports of goods of the researched countries grew visibly. It was also determined that – in the case of those countries – it was negatively correlated with GDP. The smaller an economy (lower GDP), the higher foreign value added in a country's exports.

Based on the export ratio estimates conducted as part of this study, it can be stated that the level of globalization in foreign trade in the researched countries increased. The analysis of export dispersion, on the other hand, confirmed an increased globalization level for the EU-28 as well as for Poland and Czechia. The remaining Visegrad Group countries experienced an increase in the level of globalization in trade in the years 2000-2010 followed by a decrease in the years 2010-2014.

The results of the study imply that the level of globalization in the economies of the researched countries is, in reality, higher than it might be inferred from the classic interpretation (i.e. without accounting for foreign value added in exports). On the one hand, it is indicated by an increasing export ratio (reflecting still stronger sales-related connections with other economies), on the other hand, the foreign component in GDP is also growing (which can be interpreted as strengthening production-related connections with other economies). This tendency is also demonstrated in increased trade dispersion (which shows the geographical extent of export partners).

References

- [1] Brezina, I., Pekar, J., Cickova, Z. and Reiff M. (2016). Herfindahl-Hirschman Index Level of Concentration Values Modification and Analysis of Their Change. *Central European Journal of Operations Research*, vol. 24, no. 1, pp. 49-72.
- [2] Daudin, G., Rifflart, Ch. and Schweisguth, D. (2011). Who Produces for Whom in the World Economy? *Canadian Journal of Economics*, vol. 44, no. 4, pp. 1403-1437.
- [3] Dean, J., Fung, K.C. and Wang Z. (2008). How Vertically Specialized is Chinese Trade? *Bank of Finland, Institute for Economies in Transition, OFIT Discussion Papers*, No 31. [Online]. Available: http://www.suomenpankki.fi/bofit_en/tutkimus/tutkimusjulkaisut/dp/Documents/dp3108.pdf
- [4] Foster-McGregor, N. and Stehrer R. (2013). Value added content of trade: A comprehensive approach. *Economic Letters*, vol. 120, no. 2, pp. 354-357.
- [5] Hummels, D., Ishii, J. and Yi, K. (2001). The nature and growth of vertical specialization in world trade. *Journal of International Economics*, vol. 54, pp. 75–96.
- [6] Johnson, R. C. and Noguera, G. (2012, A). Proximity and Production Fragmentation. *American Economic Review*, vol. 102, no. 3, pp. 407-411.

- [7] Johnson, R. C. and Noguera, G. (2012, B). Accounting for Intermediates: Production Sharing and Trade in Value-Added. *Journal of International Economics*, vol. 86, no. 2, pp. 224-236.
- [8] Johnson, R., Bems, R. and Yi, K.-M. (2011). Vertical Linkages and the Collapse of Global Trade. *American Economic Review, Papers and Proceedings*, vol. 101, no. 1.
- [9] Koopman, R., Wang, Z. and Wei, S.-J. (2008). How Much of Chinese Exports is Really Made in China? Assessing Domestic Value-Added when Processing Trade is Pervasive. *NBER Working Paper*, no. 14109. [Online]. Available: <http://www.nber.org/papers/w14109>
- [10] Lee, C.-S. and Cheong, I. (2015). Value-Added Exports and the Decomposition of Exports in Korea Trade. *Journal of Korea Trade*, vol. 19, no. 4, pp. 43-61.
- [11] Leontief, W. (1936). Quantitative Input-Output Relations in the Economic System of the United States". *Review of Economics and Statistics*, vol. 18, no. 3, pp. 105-125.
- [12] Leontief, W. (1953). *The Structure of American Economy 1919-1939. An Empirical Application of Equilibrium Analysis*. Oxford University Press.
- [13] Leontief, W. (1986). *Input-Output Economics*. Oxford University Press (second edition). [Online]. Available: <https://books.google.pl/>
- [14] Leontief, W. and Strout, A. (1963). *Multiregional Input-Output Analysis. I Structural Interdependence and Economic Development*. St-Martin's Press, New York, pp. 119-150. [Online]. Available: <http://www.jstor.org/stable/139580>
- [15] Matsumoto, A., Merlone, U. and Szidarovszky, F. (2012). Some notes on applying the Herfindahl-Hirschman Index. *Applied Economic Letters*, vol. 19, no. 2, pp. 181-184.
- [16] *Measuring Globalisation. OECD Handbook on Economic Globalisation Indicators* (2005). OECD.
- [17] Ng, E. (2010). Production Fragmentation and Business-cycle Comovement. *Journal of International Economics*, vol. 82, no. 1, pp. 1-14.
- [18] Olson, M., Pilcher, S. and Whitman, N. (2017). *Empirical Analysis of the relationship between exports and GDP*. [Online]. Available: <https://smartech.gatech.edu/bitstream/handle/1853/51636/final.pdf>
- [19] Stehrer, R., Foster, N. and de Vries, G (2012). Value Added and Factors in Trade: A Comprehensive Approach. *The Vienna Institute for International Economic Studies Working Papers*, no. 80. [online]. <http://www.wiiw.ac.at/value-added-and-factors-in-trade-a-comprehensive-approach-dlp-2591.pdf>
- [20] Su, Ch. (2014). The Analysis of Value-added Exports of China's High-Tech Manufactures. *Advances in Social and Behavioral Sciences*, vol. 6 (part 2), pp. 209-221.
- [21] *Trade in Value Added : Developing New Measures of Cross-Border Trade* (2013). Ed. A. Mattoo, Z. Wang, S.-J. Wei, World Bank Group, Washington DC. [Online]. Available: <http://documents.worldbank.org/curated/en/2013/01/18821638/trade-value-added-developing-new-measures-cross-border-trade>

- [22] *Trade in Value-Added: Concepts, Methodologies and Challenges (joint OECD-WTO note)* (2012). [Online]. Available: www.oecd.org/sti/ind/49894138.pdf
- [23] UNCTADstat (2017). [Online]. Available: <http://unctadstat.unctad.org/EN/>
- [24] Wang Z., Powers W. and Wei S.-J. *Value Chains in East Asian Production Networks: an International Input-Output Model Based Analysis*. EcoMod2009, No. 21500091. [online]. Available: <http://www.ecomod.net/sites/default/files/document-conference/ecomod2009/903.pdf>
- [25] WIOT. World Input-Output Tables (2017). [Online]. Available: <http://www.wiod.org/release16>

ANALYSIS OF THE COST-EFFECTIVENESS OF IMPLEMENTING A NEW METHOD OF PROTECTING RAILWAY BUFFER HEADS

Wojciech Gamon^{1,a,*}

¹WSB University, Poland

^awgamon@wsb.edu.pl

*Corresponding author

Abstract. Currently, on the rail vehicle market across the world, there is a visible trend of lengthening service life between maintenance activities and reducing the number of preventive treatments between them. Currently, an increasing number of vehicles, especially new constructions in almost every country in the world where railway operates, are subjected only to maintenance and repair activities at precisely defined time intervals, assuming no user intervention. The times in which the driver of the railway vehicle was able to make small repairs on the route were going to become a thing of the past. The maintenance-free trend seems to be justified from an operational and economic point of view, as well as for safety reasons. As part of the work carried out by the author, has been proposed a new method for protecting railway buffers heads against abrasive wear resulting from operation, which allows to completely give up periodic maintenance operations involving the application of grease by an employee to the working surface of buffer head. This solution, based on a durable covering of the surface of the buffer head with a material with favourable tribological properties (aluminum bronze) using laser cladding methods, is characterized by a number of advantages. The article attempts to make a comprehensive analysis of the costs of introducing a new solution for use by railway undertakings and was made an attempt to compare the long-term costs of the solution which is currently in use and a new method of protecting buffers heads.

Keywords: buffer head, cost effectiveness

JEL Classification: L62, O14, R41, L61

1. Introduction

Nowadays, the trend of minimizing the costs of using technical measures is noticeable around the world, especially in reducing costs incurred by employees by replacing them (and their processes), where possible with automated solutions. Due to the continuous development of technology, working out new technologies and materials etc., this trend is understandable and seems to be a natural consequence of technical progress.

It is no different in the case of transport and technical means used within it (vehicles, infrastructure, control systems etc.). Manufacturers and, above all, users try to reduce the life-cycle cost of products and maximally extend the intervals between inspections/repairs, and limit their scope to a minimum that guarantees the assumed level of safety. These objectives are implemented primarily through the implementation of new technologies (eg maintenance-free timing systems for internal combustion engines in motor vehicles, VRLA batteries in cars

and motorcycles (Albers et al., 2010), (Galad et al., 2016)) and materials (eg increasingly frequent use of composites, which are lighter and often a longer-lasting equivalent of replaced materials (Pickering et al., 2016)).

It is similar in the case of rail transport, in which new technologies and materials allow to increase the durability of the used elements and devices, and thus to reduce costs and operation, and to provide more maintenance-free operation. An example of this type of solutions can be new composite materials used as pantograph sliders providing more favorable operating parameters, such as eg friction coefficient (Ma et al., 2018). Another example is the use of modern technologies that ensure proper suppression of collision energy of moving rolling stock used in railway buffers. New types of collision absorbers allow to significantly improve the safety of rail transport and increase its maintenance-free operation (Meran & Mugan, 2018).

An extremely important condition for the use of new technologies and materials, in addition to increasing safety, is their economic profitability. It is natural that materials and technologies currently used in technology (including transport) are a compromise between the desired parameters and the economic profitability of their use. In everyday life, we find plenty of evidence to support this thesis.

In the further part of the article, an attempt was made to make an initial analysis of the economic profitability of using a new method of protecting railway buffer heads against abrasive wear, by covering them, in a permanent manner, with a layer of aluminum bronze using the laser cladding method.

2. New method of protecting railway buffer heads

Currently, in the case of railway vehicles equipped with a classic screw coupling and buffers (the most popular structure in the world in the case of freight rolling stock), railway buffer heads allow transmission of longitudinal, transverse and vertical forces acting on the train in motion. Through their contact during the operation (in two adjacent vehicles in a train), it is possible to ensure smoothness and proper driving of train running, in particular when crossing through curves and switches. Due to the almost continuous contact of the railway buffer heads with each other, they are subject to abrasive wear, eliminating their normative curvature, which ensures safety and proper handling of the wagons.

Therefore, methods are used to reduce abrasive wear, and thus extend the service life of railway buffer heads for costly replacement. The currently used solution is based on periodic covering of the working surface of the buffer head with graphite grease Fig. 1. whose function is to minimize the frictional force occurring between the buffer heads during their cooperation, thus slowing down their abrasive wear. However, this solution is imperfect for many reasons, and its main drawback, apart from the safety issues associated with the necessity of manually performing lubrication activities near the rolling stock, is its periodicity. Buffer heads must be periodically covered with grease, which requires the involvement of a sufficient number of employees to perform this operation. This fact causes additional costs related to both the work of employees and the stoppage of rolling stock. Among other things, this is the reason why an alternative to the current solution has been searched.

Figure 1: Buffer head covered with grease



For this purpose, a number of tests were carried out (Gamon, 2015; Sitarz et al., 2017, A; Gamon, 2017; Sitarz et al., 2017, B), whose aim was to select and check the solution without the numerous disadvantages of the method currently used, based on periodic covering of the buffer heads with grease. The result of the conducted research was the selection of an optimal solution from the operational point of view, based on the creation of a durable aluminum bronze cover on the buffer head, using the laser cladding method. Fig.2.

Figure 2: Buffer head covered with layer of bronze



The laser cladding method is successfully used in various technical areas, including transport and rail transport (Freiße et al., 2016; Wang et al., 2010; Tao et al., 2018). As a technology enabling both the regeneration of parts of machines and equipment as well as the production of durable covers with favorable properties (eg chemical corrosion resistance, etc.). However, bronzes (including aluminum bronzes) have been used for many years as metallic sliding materials and are successfully used in many areas of technology, including transport (Equey et al., 2011; Ibrahim et al., 2018; Viňáš et al., 2018).

Conducted metallographic, station and operational tests (wagons equipped with buffer heads covered with bronze were subjected to more than one year of observed operation) showed that the new solution allows to eliminate almost all the disadvantages of the solution based on the use of grease. In addition, the new cover showed particularly advantageous tribological parameters, desirable in the area of cooperation of two buffer heads. The most important advantage, however, is undoubtedly the maintenance-free operation of new solution. It is assumed that once applied cover (in a permanent way) of aluminum bronze, will provide approx. 3-4 years of operation without the need for any maintenance or repair in the area of the railway buffer head. This means that there will be no need to involve railway undertaking employees whose task will be to periodically cover the buffer heads with grease, and consequently there will be no operational downtime due to this. It should be noted that in order to grease the railway buffer head in the trainset, it must first be disconnected from the adjacent vehicle to provide access the employee to both vehicle headstocks. After performing the application of grease, the vehicle can be formed back into the trainset. It is natural, therefore, that a simple operation of relubrication of buffer heads requires the involvement of a large number of employees, resources and time.

3. Analysis of the costs of the new solution

Despite particularly advantageous operating properties of the new approach, it is understood that it is not the possibility of wider application in rail transport if it would have significantly higher costs than the solution currently in use. In a further part of the work, it was therefore necessary to analyze the costs of the new solution in order to determine if it has a chance to be put into operation. Therefore, at the beginning it was necessary to determine the cost of the solution currently in use. It is a very difficult task, because the cost of current solutions is generated almost exclusively by the necessity of the application of grease to the buffer heads. The grease itself is a negligibly low cost, therefore it was not taken into account in further analyzes. Therefore, the focus was only on costs related to the work of people responsible for covering the buffer heads with grease and resulting from train stops and the necessity of forming and dismantling vehicles. While the first of the above-mentioned costs is possible to estimate (it can be taken the rate per man-hour of an employee and set the time needed to cover a certain number of buffer heads with grease), in the case of expenses incurred for maneuvering vehicles to allow access to the headstocks on which buffers are located is definitely more complicated. It should be taken into account that there are situations in which access to buffer heads is possible without moving vehicles (eg when performing other maintenance operations, putting the vehicles individually on the side). Additional difficulties in estimating costs result from the fact that vehicles are not always formed into the same trainset. This means that the individual vehicles in one train usually do not require lubrication at the same time. Therefore, the lubrication is usually carried out during routine maintenance activities carried out in the workshops and in the case when vehicles are staying on sidings, when it is possible and there is relatively free access to the headstocks. Therefore, the creation of a model that allows to determine the universal cost of performing the lubrication of buffer heads is impossible. Individual railway undertakings operating vehicles in a different way and with a different frequency will incur very different costs of the described buffer service. Therefore, it should be assumed that each railway undertaking, when considering the implementation of a new method of securing buffer heads (the bronze layer) will have to independently assess the costs of the current solution, for a specific operational

case. It is worth noting, however, that the decision made by the rail carrier will probably not be limited only to economic aspects, as the newly proposed solution has other advantages, such as increased safety, no negative impact on the environment etc.

Therefore, the article only presents an analysis of the costs of a new solution based on information from companies dealing with technologies of cladding. The inquiries concerned the laser cladding service on the surface of the railway buffer head in the form of a circle with a radius of 150 mm (working area of buffer head), using CuAl9Fe3 aluminum bronze powder (selected as the most favorable during the tests), with a thickness of approx. 2 mm. The inquiries concerned, respectively, carrying out the process for 2, 100 and 1000 buffer heads. The data received was averaged and presented in Table 1.

Table 1: The price for performing laser cladding service on buffer heads

Price of the service for one piece (equivalent in EUR)		
2 buffer heads	100 buffer heads	1000 buffer heads
ca. 465	ca. 140	ca. 105

The high cost of the cladding service for two pieces of buffer heads results from the need to analyze technical documentation, select the right process parameters, design a laser control robot, perform technological tests, etc. This cost is therefore not subject to further analysis, as none of the possible contractors will be interested in covering the bronze of such a small number of buffer heads. The costs significant from the point of view of the operator (railway undertaking) are thus around EUR 120 per piece. It should be noted that the given prices will be able to be further reduced due to possible negotiations and asking a larger number of potential service providers. This means that the railway undertaking should expect a cost of around EUR 100 for one buffer head covered with aluminum bronze coating, in the process of laser cladding. As mentioned before, it is impossible to combine this amount with the costs currently incurred, due to the fact that it is impossible to estimate them. However, it should be borne in mind that the use of the new solution allows for the complete resignation of employees' commitment to the dangerous process of periodic grease application.

Due to the small amount of bronze applied once to the surface of the buffer head - about 1 kg of material - and the low cost of the aluminum bronze powder itself (oscillating within over a dozen euros), it seems worth considering a solution based on the implementation of the described technology by enterprises specialized in production or repairs of rolling stock. Such a solution would obviously involve a one-time investment in a laser (eg laser diode) enabling carrying out the laser cladding process, however extending the scope of services by repair facilities to cover the buffer heads with bronze could bring significant benefits due to the potential group of interested undertakings of this type of service - vehicles periodically go to repair plants in which a number of activities are carried out, including those related to buffers. Similar interest in the new technology can show companies producing railway buffers or their heads, since the modification of their production process by covering them with a layer of bronze on the final stage, do not constitute a major technological challenge - could, however, significantly affect the demand for modified buffers, due to the fact the probable tendency of railway undertaking for a slightly larger investment in the element, while the possibility of completely giving up its service.

4. Conclusions

The use of new materials and technologies in industry (eg the use of composites, graphene), including transport, is a natural consequence of technological development. They allow increasing security, providing higher quality services or, finally, reducing the involvement of the human factor (unreliable) in individual processes. The use of any new technology or material must be profitable also from an economic point of view - the potential benefits must outweigh the potential higher cost.

The article attempts to provide an preliminary analysis of the cost of a new solution to protect the railway buffers heads against an abrasive wear and resination from an imperfect solution currently used. The solution based on covering the buffer head with the aluminum bronze layer by the method of laser cladding is much more complicated and at first glance, it is more expensive than periodic covering it with the grease that is currently performed all over the world. However, after the analysis presented in the article should be considered whether potentially higher costs in the first period of life of the product (railway buffer head), will not bring tangible benefits over time. Interested railway undertakings and other operators of rail vehicles should analyze whether the amount of approx. 100 EUR to cover the buffer head with bronze is a high price for the possibility of completely abandoning the need for periodic greasing of buffers heads by employees. In addition to the financial aspects, the most important issue - safety - deserves additional attention - because the use of maintenance-free buffer heads allows for the resination of the employee's presence between the rolling stock, reducing the risk of accidents that happened in the railway's history more than once.

References

- [1] Albers, J., Meissner, E. and Shirazi, S. (2010). Lead-acid batteries in micro-hybrid vehicles. *Journal of power sources*, vol. 196, no. 8, pp. 3993-4002.
- [2] Equey, S., Houriet, A. and Mischler, S. (2011). Wear and frictional mechanisms of copper-based bearing alloys. *Wear*, vol. 273, no. 1, pp. 9-16.
- [3] Freiße, H., Langebeck, A., Köhler, H., Seefeld, T. and Vollertsen, F. (2016). Investigations on dry sliding of laser cladded aluminum bronze. *Manufacturing Review*, vol. 3, no. 13.
- [4] Galad, M., Spanik, P., Cacciato, M. and Nobile, G. (2016). Comparison of common and combined state of charge estimation methods for VRLA batteries. *Electrical Engineering*, vol. 99, no. 4, pp. 1233-1244.
- [5] Gamon, W. (2015). Movement analysis of cooperating railway buffer heads. *Achives of Transport*, vol. 33, no. 1, pp. 4-15.
- [6] Gamon, W. (2017). Operational Research of Wear of Railway Buffers Heads Covered with Aluminum Bronze. *Logistics and Transport*, vol. 36, no. 4, pp. 63-68.
- [7] Ibrahim, M., Samad, M. A., Al-Athel, K., Arif, A. F. and Olalekan, N. (2018). Evaluation of Tribological Properties of Thermally Sprayed Copper and Copper Alloy Coatings. *Arabian Journal for Science and Engineering*, vol. 43, no. 9, pp. 4899-4910.

- [8] Ma, S., Xu, E., Zhu, Z., Liu, Q., Yu, S., Liu, J. and Jiang, Y. (2018). Mechanical and wear performances of aluminum/sintered-carbon composites produced by pressure infiltration for pantograph sliders. *Powder Technology*, vol. 326, pp. 54-61.
- [9] Meran, A. P. and Muğan, A. (2018). Design and analysis of a hydraulic–elastic railcar buffer. *Proceedings of the Institution of Mechanical Engineers, Part F: Journal of Rail and Rapid Transit*, vol. 232, no. 7, pp. 1994-2005.
- [10] Pickering, KL., Efendy, MGA. and Le, TM., (2016). A review of recent developments in natural fibre composites and their mechanical performance. *Composites part A-applied science and manufacturing*, vol. 83, pp. 98-112.
- [11] Sitarz, M., Kurc-Lisiecka, A. and Gamon, W. (2017). Napawanie laserowe tarcz zderzaków kolejowych brązem alumirowym. *Stal, Metale & Nowe Technologie*, vol. 9-10, pp. 80-84.
- [12] Sitarz, M., Kurc-Lisiecka, A. and Gamon, W. (2017). Surface Analysis of Railway Buffers Heads Covered with Bronze Using Laser Cladding. *Archives of Foundry Engineering*, vol. 17, no. 2, pp. 89-94.
- [13] Tao, X., Zhang, S., Zhang, C., Wu, C., Chen, J. and Abdullah, A. O. (2018). Effect of Fe and Ni contents on microstructure and wear resistance of aluminum bronze coatings on 316 stainless steel by laser cladding. *Surface and Coatings Technology*, vol. 342, pp. 76-84.
- [14] Viňáš, J., Vrabel, M., Greš, M., Brezina, J., Sabadka, D., Fedorko, G. and Molnár, V. (2018). Restoration of Worn Movable Bridge Props with Use of Bronze Claddings. *Materials*, vol. 11, no. 4, pp. 459.
- [15] Wang, H. Z., Wang, Z. P., Lu, Y., Li, Y. F. and Tian, G. Q. (2010). Study on Friction and Wear Properties of Plasma and Laser Coatings of Aluminium Bronze Powder. *Advanced Materials Research*, vol. 148-149, pp. 621-627.

FINANCING OF FOREST ECOSYSTEM SERVICES IN CONDITIONS OF GLOBALIZATION

Iveta Hajdúchová^{1,a}, Blanka Giertliová^{2,b,*} and Rastislav Šulek^{3,c}

^{1,2,3}Technical University in Zvolen, Faculty of Forestry, Department of Forest Economics and
Management, T. G. Masaryka 24, SK-96053 Zvolen, Slovak Republic

^ahajduchova@tuzvo.sk, ^bgiertliova@tuzvo.sk, ^csulek@tuzvo.sk

*Corresponding author

Abstract. Megatrends affect the future of all aspects of society. Such megatrends currently include globalization, commercialization and environmentalism. Globalization has had an impact not only on the world forest industry, but also on the forms of land use, such as recreation and tourism, that are becoming socially more important. The article deals with the possibilities of financing the forest ecosystem services and the green growth measuring and recording through accounting. However, in this case globalization has brought new opportunities for investments. The article classifies the forest ecosystem services from a commercial, economic and financial aspect, and points to the specifics of financing ecosystem services in condition of globalization on the example of the state owned enterprise Lesy SR. Based on the achieved results, in the article are formulated main recommendations with aim to support ecosystem services. It is in particular focused on providing sufficient financial sources in form of the refundable and non-refundable foreign sources of financing, a consistent recording of the costs incurred to secure ecosystem services, as well as a requirement for their subsequent financial compensation. The proposed solutions include the creation of a system of assessing the positive impact of forest ecosystem services on population health as well as a system for measuring the extent of their utilization. At the same time, it is necessary to secure their financing by non-repayable financial sources, the volume of which will depend on the area and on the quality of forest ecosystem services implementation.

Keywords: green accounting, forest ecosystem services, financing of ecosystem services, globalization

JEL Classification: Q23, Q56, F64

1. Introduction

Forests create inevitable part of the human existence. Recently, people perceive forests as an ecosystem that shall protect them from the global climate changes. Thus, the other than production forest functions are becoming more and more important. Bearing in mind ecosystem approach, all forest functions, or forest ecosystem services, shall be divided into four groups – into provisioning, cultural, regulating and supporting services. Cultural, regulating and supporting services are even more important than the provisioning services as these services are life-important for men as well as for nature and forests themselves. Especially, the social, cultural and aesthetic value of these services is extremely important.

Obviously, not all ecosystem services are marketable and, moreover, not all those marketable ones bring revenues to the forest enterprises. The public perceives especially the cultural services that are used by the tourism organisations, even though these services might be the marketable ones – forest enterprises provides cultural services; however, they do not receive relevant revenues (except for the case of commercial hunting tourism). It is thus critical to recognise that ecosystem goods and services are valued (in the broader sense) differently by multiple stakeholders located in multiple geographies, from the local to the regional and global levels, and that these values may not necessary be captured by market prices alone (Kosoy & Esteve, 2010). An individual or a community may value a particular ecosystem for its beauty, the historical socio-ecological relations it inherently represents, the biodiversity it contains, or the importance it may have for future generations, among others. This is not to say, of course, that all goods and services provided by this ecosystem cannot be traded, but rather that the monetary valuation of all or some of its components may not be accepted (Bennett, et al., 2009). Because of this, it is necessary to pay attention to the provision of financial sources to cover the costs of the forest ecosystem services. This need is even more acute as the forestry subsidies constantly decreased until 2014 (33,43 mils. EUR in 1990 and 19,32 mils. EUR in 2014) while the share of protection and special-purpose forests providing regulating and supporting services constantly increased (25,5 % in 1990 and 28,10 % in 2014).

The classification of forests functions and their evaluation is the topic of a number of papers by foreign and domestic authors (Šišák et al., 2016; Kupčák, 2010; Stanturf, 2014). The possibilities of integration of forest ecosystem services into market mechanism together with their financing using payments for ecosystem services are dealt by Šálka, 2012; Paluš, et al., 2011; Jarsky et al., 2014; Simo – Svrcek, et al., 2017; Martin-Ortega & Waylen, 2018.

2. Objective and methodology

The objective of this paper is to analyse possibilities of forest ecosystem services financing using liabilities and equity as well as the potential payments for ecosystem services. For such analysis, the monitoring and measurement of the efficiency of tools within the so-called green initiatives is needed. We used an example of the state forest enterprise Lesy SR during the period of years 2010 – 2016. The methods of comparative and trend statistical analyses together with the methods of financial analyses have been used. Considering the green accounting, we have analysed:

- indicators of environmental productivity and productivity of resources (considering the relations between efficiency of natural resources use and production and consumption based on the share of timber supplies and timber harvesting, growing stocks and timber harvesting as well as development of average timber prices),
- indicators of natural capital stocks (needed for the analyses of the quantity and quality of natural resources resulting from their use according to the forest regeneration),
- indicators of environmental quality of life (they explain direct and indirect effect of the environment on the human health – here the costs of provision of recreational forest services have been quantified),
- indicators of political response and economic measures (they have been analysed using the payments of taxes to the state budget in comparison to the revenues originating from different subsidy funds).

The conclusions are based on the synthesis of quantitative financial analyses with the analyses of the green growth indicators.

3. Forest ecosystem services financing

The financial sources are divided into different categories – in the case of liabilities, according to the time, into current and long-term liabilities. Considering the relations between the enterprise and its environment, the internal and external financial sources can be distinguished.

To finance production as well as non-production forest functions, all types of financial sources may be used – the main criterion for their selection shall be their repayment that is closely connected to their efficiency and risk. The production forest functions bring revenues, thus the financial sources needed for their provision are returnable, in contrast to the non-production forest functions that need to be financed using public sources. Other differences in the process of forest functions financing results from the definition of optimal structure of financial sources (share of liabilities and equity resulting from the enterprise assets structure, price, risk and availability of financial sources) as well as from the definition of optimal volume of financial sources that the enterprise is able to provide by sales and subsidies.

The own sources of the enterprise financing include profit, capital funds and equity itself. The profit shall be perceived as the difference between revenues and costs. As all forest ecosystems services, except for the provisioning ones, do not generate revenues, these services need to be subsidized by the revenues from the provisioning forest ecosystems services. Consequently, the costs of production forest functions are covered by the smaller portion of the potential financial sources. Moreover, exploitation of production forest functions is limited within the protection and special-purpose forests, especially due to the higher material intensity resulting from the ecological measures.

It is obvious, that we shall formulate basic theoretical rules for the financing of forest ecosystem services that shall also serve as the basis for the financial practice. Based on the general financial rules developed by several local as well as international authors (Holécý, 1999, Erel et al., 2015; Weitzman, 2000, Borner, et al., 2017), they can be described as follows:

1. Revenues originating from the wood production shall be used to cover the costs of wood production, i.e. the costs of silvicultural and logging activities. The potential profit shall be used to rationalize these activities and to develop possibilities of wood production.
2. Part of those forest ecosystem services that are commercially attractive (recreational or therapeutical services) shall be financed by the revenues of those market subject that use them (e.g. hotels). However, an agreement on profit distribution needs to be concluded here – such condition is rather problematic nowadays. Thus, the forest enterprises shall provide such services directly by themselves.
3. Regulative and supportive services will not bring revenues even in the future, however, the society wants them to be provided (biodiversity, soil protection, carbon sequestration). In this case, the state shall finance such services.

Capital funds together with the profit funds are only rarely used for the forest enterprise financing – the reason is either extremely low profit (or even zero profit) that is generally used to cover the reserves for silvicultural activities or to contribute to the budget of the forest

owners in the form of the special rent. Such rents create non-systematic financial items as their amount is randomly stated according to the volume of profit, while they should be planned and calculated more carefully for longer periods, especially in the case of timber market recession when the possibility to create own financial sources is significantly lowered.

Changes of the enterprise equity have to be undertaken in harmony with the valid Business Code, resp. Law on State Enterprise. If the enterprise wants to use increased equity for provision of forest ecosystem services, the share on equity of original owners needs to be increased (the owner structure will remain the same) or new owners need to enter the enterprise (in this case, the owner structure will be changed and, thus, the original owners need not dispose of decision making majority).

The possibility to use liabilities is affected by the efficiency of their use and the total level of indebtedness, which, in the case of the state enterprise Lesy SR, has been during the last six years at the level of 8,4 %. Thus, potential use of liabilities should not be a problem. However, if additional credits are used for ecosystem services other than the provision ones, the problems with the credit repayment may occur. Moreover, when providing cultural, regulating and supporting services, even provisioning services are limited in the case when the forest area is heavily recreationally used, either during winter when forest roads are used as the cross-country skiing tracks or during summer when forest roads are used as the cycling and jogging tracks. In this case, the costs of forest roads maintenance might be significantly higher and the forest enterprise economic effectiveness decreases.

The external non-refundable financial means, provided for the state enterprise Lesy SR, reached the level of 5 852 thousand EUR in 2011, but only 194 thousand EUR in 2016. These amounts are still significantly lower than the amount of direct taxes levied (Fig. 1). This difference is even higher if the levied taxes are increased by the social security fees and by the contributions offered to municipalities for road maintenance and anti-flood measures (Fig. 2).

Figure 1: Public sources creation and use

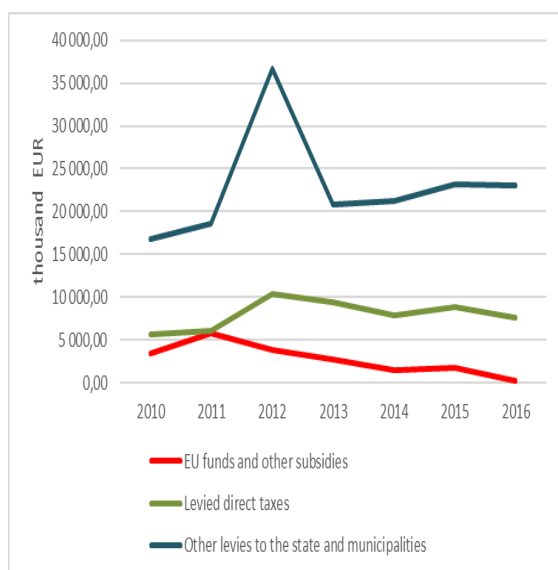
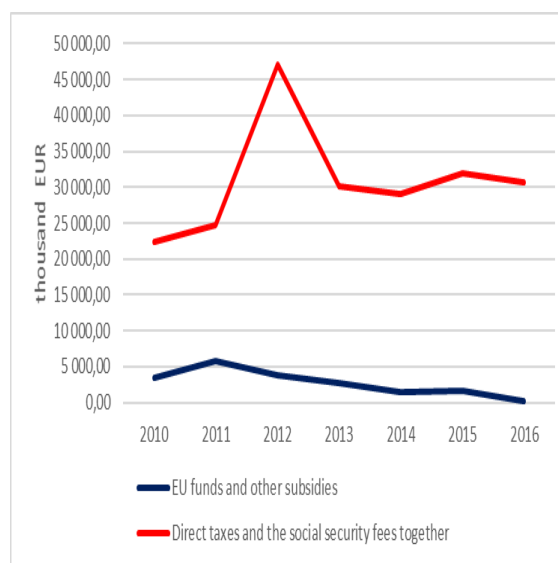


Figure 2: State budget taxes and subsidies



4. Forest ecosystem services from the accounting and tax point of view

The mentioned problems and specifics of forest ecosystem financing are also reflected in the system of financial accounting, with special emphasis either on the process of tax expenditures recognition in the case of income tax or on the process of deductible items application in the case of value added tax (Giertliová et al., 2017; O'Brien & Bringezu, 2017). Due to the fact that only expenditures for providing and maintenance of revenues shall be recognized as the tax expenditures, the illegitimate income shortening, or illegitimate excessive value added tax deduction may occur, leading to the illegitimate tax shortening. On the other hand, the forest enterprise has to pay whole portion of property tax levied on production forest land even in the case when they also use this forest land at least partially for provision of public beneficial services.

While the amount of forestry subsidies reached 11,7 mil. EUR in 2014, next year, in 2015, it reached level of 58 mil. EUR – this amount was higher than the amount of levied taxes (nearly 55 mil. EUR in 2015). The income tax reached 14, 87 mil. EUR and the property tax reached 8,35 mil. EUR. Thus, for the first time since 1990, forestry marked negative balance against the state budget (the result would be the same even if the value added tax is taken into account as it does not represent any real tax burden).

The issue of legitimization of costs needed for provision of forest ecosystem services should contribute not only to the prevention of tax evasion, but also to the transparent use of financial sources leading to the improved evaluation of forest ecosystem services. Analysing costs of the state enterprise Lesy SR, we have identified items affecting annual economic results that need to be paid by own sources as they do not bring any revenues (tab. 1).

Table 1: Costs of property management and public relations

	2010	2011	2012	2013	2014	2015	2016
Costs of property settlement	1,07	1,08	0,03	0,02	0,06	0,03	0,44
Water flows management – torrent control	0,43	0,34	0,20	0,17	0,18	0,21	0,19
Anti-flood measures and damage elimination	0,08	2,52	0,72	0,24	0,15	0,14	0,21
Museum of Forestry and Wood Technology Zvolen	0,28	0,27	0,29	0,30	0,36	0,39	0,36
European bison keeping Topoľčianky	0,04	0,03	0,03	0,07	0,04	0,04	0,06
Horse keeping Muráň	0,49	0,47	0,54	0,63	0,51	0,47	0,66
Park management	0,06	0,04	0,08	0,09	0,12	0,08	0,04
Public relations	0,26	0,34	0,37	0,33	0,30	0,31	0,31
Forestry open-air museum	0,10	0,10	0,09	0,09	0,13	0,13	0,13
Together	2,79	5,20	2,36	1,94	1,87	1,80	2,39

Source: Lesy SR, š.p.

The mentioned amount is just informative, due to already discussed reasons. Still, such amount is non-realizable for small areas of municipal and non-state forests and there is not any systematic solution. If the state is not able to provide subsidies for provision of recreational services, the mentioned costs shall be recognized as the tax expenditures under the condition that the enterprise justifies them. In such case, the subsystem of financial accounting aimed at the evidence of assets, revenues and costs, connected to the provision of forest ecosystem services, shall be used.

The indicators of green growth may be also used for the analysis of efficiency and effectiveness of wood handling. In this case, we have used indicators of share of timber supplies on total harvesting and share of growing stocks on total harvesting. Effectiveness of timber trade have been assessed using the average prices of timber assortments. Results are shown in tab. 2.

Table 2: Indicators of environmental productivity and productivity of resources

Indicator	Unit	2011	2012	2013	2014	2015	2016
Share of timber supplies on total harvesting	%	91,31	94,77	93,04	90,68	97,92	97,29
Share of growing stocks on total harvesting	%	7,60	8,19	7,62	10,62	7,56	7,04
Average prices of coniferous assortments	€m ⁻³	54,29	55,43	57,07	54,46	53,83	50,75
Average prices of broadleaved assortments	€m ⁻³	43,31	43,05	44,25	43,83	43,23	44,77

Source: Lesy SR, š.p.

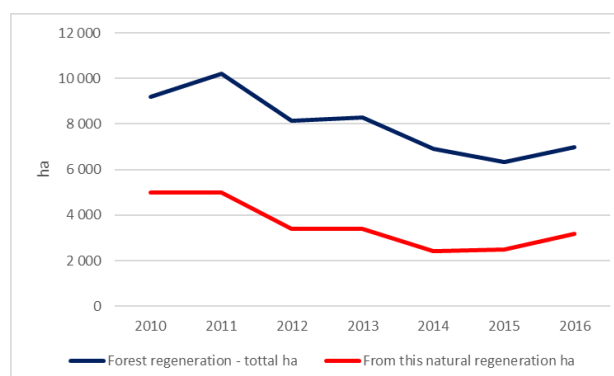
The table shows that the share of timber supplies increased until 2012. The highest average prices were reached in 2013 when the share of timber supplies started to decrease. It means that these indicators develop in harmony with the market principles – higher prices lead to lower amount of supplies and to decreased demand and vice versa.

The indicators of natural capital supplies have been analysed using the indicators of forest regeneration development (Fig. 3). Also, the share of silvicultural costs on timber sales have been discussed (tab. 3).

Table 3: Indicators of natural capital supplies

Indicator		2011	2012	2013	2014	2015	2016
Share of silvicultural costs on sales	%	10,65	9,50	9,35	9,82	9,43	9,27
Share of reserves on profit after taxation	%	38,50	34,76	86,17	65,84	89,38	85,73

Figure 3: Forest regeneration development (ha)



The positive trend of forest regeneration (i.e. growth of natural capital) was evident in 2011 when the regeneration increased from 9 178 ha to 10 216 ha. Then, until 2015, the development of forest regeneration was negative, considering both natural as well as artificial regeneration – the regeneration decreased to the level of 6 325 ha (decrease by 38 %). In 2016, the area of regeneration again increased to the level of 6 979 ha – however, this is still by 32 % less than in 2011. Considering the year of 2011, the decreasing trend is also evident when the share of silvicultural costs on sales is analysed (even if the difference is 1,15 – 1,3 % only). In 2014, minimal increase occurred, however, the value was still lower than in 2011. Then, in 2015 and 2016, the share of silvicultural costs on sales again decreased.

5. Conclusion

The current stage of development of production and consumption activities, processes and services is strongly marked by their environmental aspect and compliance with the manners and the principles of sustainable development (Majernik, et al., 2017). One of the main recent problems is to determine what assets (forest roads, paths, establishments) shall be used for commercial and non-commercial activities. The non-commercial activities need to be identified and their financing from both the public sources using the state orders as well the private sources using the subjects consuming non-commercial services of forest enterprises (e.g. recreational establishments) need to be secured. The financing of commercial activities shall be secured by an increased share of liabilities (returnable investments) that need to be used in order to increase the labour productivity and effectiveness of realized commercial activities, such as the accommodation services, lifts and cable cars. Subsidies shall be perceived as the supplementary source only – they shall be used for provision of those forest ecosystem services that do not accumulate the revenues while there is still the public interest to provide them (e.g. educational activities). In order to provide transparent financing, it is necessary to identify revenues (sales, compensations, subsidies) and costs (repairs, maintenance) that are needed for sustainable provision of forest ecosystem services within the independent sub-system of financial accounting – so-called green accounting. The system of evaluation of positive effect of forest ecosystem services for human well-being as well as the system of measurement of the rate of their use shall create an integral part of the proposed measures. Subsequently, it is necessary to provide the effective financing of forest ecosystem services by general subsidies according to the area of forest land and intensity of provision of forest ecosystem services. The amount of subsidies shall be decreased in those forests than are not used by the general public and, in contrary, it shall be increased if the forests are intensively used. At the same time, it is necessary to look for further resources to finance the ESS, including at the transnational level. Examples are the current trends towards the commodification of primary production through global carbon markets, itemisation results from the separation of such biological function from existing forests or from future planted trees and forested areas (Kosoy & Esteve, 2010). This function becomes represented and measured through biomass content and growth models which translate it into tons of carbon dioxide stored in trees (at present or in the future) and which result tradable in markets and comparable to emission reductions achieved through energy-related projects.

Acknowledgment

The authors are grateful for the support of the Scientific Grant Agency of the Ministry of Education, Science, Research and Sport of the Slovak Republic, and the Slovak Academy of Sciences, VEGA No. 1/0688/16 “Economic and legal conditions of sustainable public access to forests”, and KEGA 013TU Z-4/2018 “Innovation methods in Teaching of Financial Management”

References

- [1] Bennett, Elena M., Peterson, Garry D. and Line J. Gordon. (2009). Understanding relationships among multiple ecosystem services. *Ecology letters*, 12.12, pp. 1394-1404.

- [2] Börner, J., Baylis, K., Corbera, E., Ezzine-de-Blas, D., Honey-Rosés, J., Persson, U. M. and Wunder, S. (2017). The effectiveness of payments for environmental services. *World Development*, vol. 96, pp. 359-374.
- [3] Erel, I., Myers, S. C. and Read Jr, J. A. (2015). A theory of risk capital. *Journal of Financial Economics*, vol. 118, no. 3, pp. 620-635.
- [4] Ernstson, H. and Sörlin, S. (2013). Ecosystem services as technology of globalization: On articulating values in urban nature. *Ecological Economics*, vol. 86, pp. 274-284.
- [5] Holécý, J. (1999). Bezriziková výnosová miera projektov hospodárenia na lesnej pôde a jej interpretácia. *Journal of Forest Science*, vol. 45, pp. 496-506.
- [6] Jarský, V., Sarvašová, Z., Dobšínská, Z., Ventrubová, K. and Sarvaš, M. (2014). Public support for forestry from EU funds–Cases of Czech Republic and Slovak Republic. *Journal of forest economics*, vol. 20, no. 4, pp. 380-395.
- [7] Kosoy, N. and Esteve C. (2010). Payments for ecosystem services as commodity fetishism. *Ecological economics*, vol. 69, no. 6, pp. 1228-1236.
- [8] Kupčák, V. (2010). Kategorizace lesů a její ekonomické aspekty. Zprávy lesnického výzkumu, vol.. 2010, no. Speciál, pp. 105-113.
- [9] Majerník, M. et al. (2017). Evaluation of „Green“ business growth and economy in Slovakia using international indicators. *Globalization and its Socio-Economics Consequences 17th international scientific conference*, Rajecké Teplice, Slovakia, pp. 1451 - 1459.
- [10] Martín-Ortega, J. and Waylen, K. A. (2018). PES What a Mess? An Analysis of the Position of Environmental Professionals in the Conceptual Debate on Payments for Ecosystem Services. *Ecological Economics*, vol. 154, pp. 218-237.
- [11] O'Brien, M. and Bringezu, S. (2018): European Timber Consumption: Developing a Method to Account for Timber Flows and the EU's Global Forest Footprint. *Ecological Economics*, vol. 147, pp. 322-332.
- [12] Paluš, H. Et al. (2011). Trh s lesníckymi službami. Zvolen: Technická univerzita vo Zvolene, s. 45.
- [13] Stanturf, J. A., Palik, B. J. and Dumroese, R. K. (2014). Contemporary forest restoration: a review emphasizing function. *Forest Ecology and Management*, vol. 331, pp. 292-323.
- [14] Šálka, J. (2012). Problém zlyhania trhu s úžitkami verejnoprospešných funkcií lesov. Integrácia úžitkov verejnoprospešných funkcií lesov do trhového mechanizmu – teórie a zahraničné skúsenosti. Technická univerzita vo Zvolene. s. 13-26.
- [15] Šimo-Svrček, S., Paluš, H., Parobek, J. and Šupín, M. (2017). The importance of utilisation of wood as a renewable material in the context of the green economy. *Globalization and its socio-economic consequences, 17th international scientific conference*, pp. 2377-2384.
- [16] Sisak, L., Riedl, M. and Dudík, R. (2016). Non-market non-timber forest products in the Czech Republic. *Land Use Policy*, vol. 50, pp. 390-398.
- [17] Weitzman, M. L. (2000). Economic profitability versus ecological entropy. *The Quarterly Journal of Economics*, vol. 115, no. 1, pp. 237-263.

EFFECTIVENESS OF MODERN TOOLS USED BY FINANCIAL ADMINISTRATION IN TERMS OF GLOBALIZATION TRENDS IN ACCORDANCE WITH THE IMPLEMENTATION OF EU DIRECTIVES AND FORTHCOMING CHANGES IN TAX LEGISLATION IN THE CZECH REPUBLIC

Jana Hakalová^{1,a,*}, Marcela Palochová^{2,b} and Yvetta Pšenková^{3,c}

¹Jana Hakalová, Department of Accounting and Taxes, VŠB-Technical University of Ostrava, Faculty of Economics, Sokolská třída 33, 702 00, Ostrava 1, Czech Republic

²Marcela Palochová, Department of Accounting and Taxes, VŠB-Technical University of Ostrava, Faculty of Economics, Sokolská třída 33, 702 00, Ostrava 1, Czech Republic

³Yvetta Pšenková, Department of Accounting and Taxes, VŠB-Technical University of Ostrava, Faculty of Economics, Sokolská třída 33, 702 00, Ostrava 1, Czech Republic

^ajana.hakalova@vsb.cz, ^bmarcela.palochova@vsb.cz, ^cyvetta.psenkova@vsb.cz

*Corresponding author

Abstract. This article is focused on selected aspects of modern tools used by the Financial Administration and their effectiveness in terms of globalization trends in accordance with the implementation of European Union directives and forthcoming changes in tax legislation in the Czech Republic. Contemporary tools of financial administration, which have been in place since 2016, include mainly VAT control report and the VAT summary report (both relating to business entities in positions of VAT payers) as well as the electronic registration of sales, which aimed at balancing the business environment in the Czech Republic, and other tax measures. The article presents not only the identification of related areas, which have been positively influenced by introducing these modern tools in the years 2016-2018, but also the definition of some negative impacts that significantly affect business entities. Every year, the Czech accounting and tax legislation undergoes a number of significant changes which bring the Czech legislation closer to the European concept. The article draws attention to this issue in connection with the forthcoming tax concept for the period of 2020-2030, which is being prepared by the Ministry of Finance of the Czech Republic and it is also connected with the financial accounting and reporting. The conclusion then lists upcoming changes in the taxation in terms of Czech tax legislation as well as new concepts and approaches while respecting European legal norms and all related present and expected changes.

Keywords: taxes, tax institutes, financial administration tools, harmonization, business entity.

JEL Classification: H25, K22, K34, M41, M48

1. Introduction

The system of taxation in the Czech Republic (hereinafter CR) represents a comprehensive summary of all taxes that are defined and collected in CR. Its formation dates back to 1992 when the Tax System Act, which forms the basis of the system of taxation in the Czech and Slovak Republics, was enacted. At present, there are 15 types of taxes established in CR. According to primary classification they are divided into direct and indirect taxes. Direct taxes are further broken down into income and property taxes, and indirect taxes into general and selective taxes. The Tax Administration of CR deals with the administration of all the aforementioned taxes. Tax administrators are responsible for the registration, discovery and (re)assessment of administrative offences, tax audits, etc. (Raizlová, 2018). In 2016, two key tools that influenced the collection of taxes were introduced. The first was the introduction of the VAT Control Report, the purpose of which is elimination of “carousel” transactions and the assertion of VAT deductions based on false invoices. Value added taxes are among the most harmonised from the point of view of European legal regulations, unlike, for example, property taxes (for details, see Šíroký et al., 2016). The second instrument was the introduction of the Electronic Record of Sales (ERS) [in Czech: Elektronická evidence tržeb (EET)], the purpose of which is to prevent tax evasion related to the reduction of revenues from sales and balance the business environment for all entrepreneurs. This article focuses on selected aspects of these advanced tools applied by the Czech Tax Administration and the evaluation of the effectiveness thereof on the basis of the VAT Control Statement and ERS, both of which were introduced in harmony with European legal norms and globalisation processes. In addition, this paper looks at expected changes in the area of taxation that relate to financial accounting and reporting.

2. Contemporary tools of the Czech Tax Administration

Among the advanced tools the Tax Administration introduced in 2016 are the electronically submitted VAT Control Report and ERS. While the VAT Control Report only concerns the payers of indirect taxes, namely the value added tax, ERS represents an extensive on-line project where all entrepreneurs provide their transaction data. The expectation is that in the future, ERS will include approximately 600 thousand entrepreneurs and that about 30 million transactions will be registered on a daily basis. It was obvious from the start that ERS could not be imposed on all entrepreneurs at the same time. It is for this reason that the implementation of ERS was split, based on the classification of economic activities (CZ-NACE), into the following four stages:

- Stage 1 – as of 1 December 2016 – accommodation and catering services;
- Stage 2 – as of 1 March 2017 – retail and wholesale trade;
- Stage 3 – the remaining economic activities such as freelance professions, transport, agriculture;
- Stage 4 – selected trades and production activities.

2.1 VAT Control Report

The VAT Control Report came into force as of January 2016. The VAT Control Report is regarded as a so-called special tax statement. It is not intended to be a regular value added tax return or summary statement, but is in fact, in connection with the reverse charge mechanism, a replacement for the independent “Extract from the Register for VAT Purposes”. The VAT Control Statement is imposed on entrepreneurs who are VAT payers. It represents efforts to eliminate tax evasion, specifically through the prevention of the misuse of excessive value added tax deductions, carousel transactions, frauds and should also help to detect risky entrepreneurs. The European Union supports the implementation of such instruments that prevent potential tax evasion and fraud that is emerging in relation to increasing globalisation. In addition, the VAT Control Statement should contribute to the more effective collection of taxes. According to estimates of the Tax Administration, CR loses up to CZK 80 billion in revenue every year due to VAT related fraud. The principle of the VAT Control Report is very easy. The entitlement to a VAT deduction by a liable VAT payer is only acknowledged after the received taxable performance is matched with the same realized taxable performance in the database. This means that the VAT Control Report must contain all details that are included in the VAT return for the given period. This test prevents the Tax Administration from paying out VAT deductions that are unjustified. The VAT Control Report should be able to detect even the slightest deviations. Only VAT payers, both natural persons and legal entities, are obliged to submit the VAT Control Report. Legal entities have to submit the VAT Control Report every month, whilst natural persons, depending on what type of a payer they are, on a monthly or quarterly basis. The VAT Control Report must be filed electronically within 25 days from the end of the taxable period.

2.2 Electronic Record of Sales (ERS)

ERS is regulated by Act No. 112/2016 Coll. on the registration of revenues from sales. The first wave of ERS started in December 2016. The second wave involving retail and wholesale trade began in March 2017. The implementation dates for the third and fourth waves are not currently known on the grounds of the judgement of the Constitutional Court of the Czech Republic of 12 December 2017. ERS includes detailed statistical and analytical checks of items, amounts, documents, etc. on the basis of the on-line registration of transactions. The purpose of ERS is the prevention of tax evasion through the reduction of revenues from sales received in cash. The reduction of revenues from sales was achieved by either posting of lower incomes in accounting or cash books than the actual amounts or by not recording incomes for tax purposes at all. ERS has no impact on accounting or tax regulations. It purely represents independent and transparent evidence. ERS is simply a system for the on-line registration of revenues from sales, whereby the details of every cash transaction are submitted to the Tax Administration of CR. It works on the basis of the registration of every single transaction, whereby the customer receives a receipt with a unique fiscal identification code (FIC). Through this code the Tax Administration confirms acceptance of the receipt. The principle of how ERS functions is provided in Table 1.

Table 1: The principle of how ERS functions

1.	The trader enters the respective transaction into the electronic cash register
2.	The electronic cash register sends the information on the transaction to the Tax Administration server

3.	FIC code is generated
4.	FIC code is sent back to the electronic cash register
5.	The trader prints the receipt that includes the FIC code
6.	The receipt is given to the customer

Source: internal materials

The liability to register revenues from sales in electronic form is imposed on income tax payers, both natural persons and legal entities. ERS is focused on registered revenues from sales of the VAT payer. The amount of revenue is not limited by law. To have the revenue from a sale registered, it must concern a payment that fulfils formal requirements and also constitutes so-called qualifying income. Qualifying income for a natural person who is liable for income tax refers to revenues from the self-employment activities they undertake. Qualifying income for a legal entity that is liable for income tax refers to revenues from the business activities they undertake.

A natural person who is an income tax payer may take advantage of a tax discount of CZK 5,000 on the registration of revenues from sales in accordance with Section 35 bc of the Income Tax Act. This discount may be deducted in the taxable period in which the first electronic registration of revenues from sales was executed. Any similar discount is not allowed to be claimed by legal entities.

3. Evaluation of the effectiveness of the selected tools employed by the Tax Administration

The research into this subject revealed three major impacts. VAT deductions have decreased among monthly and quarterly VAT payers (see Table 2). The overall amount of collected value added tax and direct taxes, especially income tax imposed on natural persons and legal entities, has increased.

Table 2: Overview of tax liability and VAT deductions on the part of VAT payers

	Monthly VAT payers (CZK billions)		Quarterly VAT payers (CZK billions)	
Year	Tax liability	VAT deduction	Tax liability	VAT deduction
2015	606.7	291.1	36.9	13.4
2016	614.5	280.3	36	11.4
2017	636.9	284.6	34.2	11.3

Source: Tax Administration (2018) – internal materials

Table 2 provides an overview of the total tax liability and VAT deductions for monthly and quarterly VAT payers (in CZK billions). The data in the table reveals that compared to 2015, a decrease in VAT deductions was recorded for both monthly and quarterly VAT payers in 2016. While VAT deductions among monthly VAT payers decreased by CZK 10.8 billion, VAT deductions among quarterly VAT payers decreased by CZK 2 billion, whereby VAT deductions in 2017 did not even touch the level recorded in 2015. The tax liability itself has also changed significantly. Whereas the tax liability on the part of monthly VAT payers is growing, the trend among quarterly VAT payers is slightly decreasing. The VAT Control Report that was introduced in CR at the beginning of 2016 has been operating successfully for three years already. Its primary purpose is to check whether the taxable persons participating in the given transaction adhered to their duty to pay output tax on the executed taxable

performance and also whether a deduction from input tax can be applied. From the data presented in Table 2 it is evident that the implementation of the VAT Control Report has resulted into a significant increase in VAT returns. The year 2016 was not only revolutionary in CR due to the decrease in VAT deductions applied by VAT payers, but also in terms of the collection of other taxes. The most significant increases in tax revenues not only came in the form of value added tax, but also in the form of income taxes. The implementation of the VAT Control Report made VAT payers report both the output tax on the executed taxable performance and the input tax imposed on the received taxable performance. This fact manifested itself not only in higher VAT payments, but also in an increase in revenues or income, and last but not least, in a decrease in costs or expenses reported by taxable persons. VAT revenues for 2016 amounted to CZK 349.5 billion (see Table 3). Compared to the previous year, tax revenues increased by CZK 17.9 billion, i.e. by 5.4%.

Table 3: Overview of VAT collection by the Tax Administration of the Czech Republic

Year	Collection of VAT (in CZK billions)
2012	278.05
2013	308.30
2014	322.66
2015	331.56
2016	349.46

Source: Tax Administration (2016) – internal materials

Based on data published in the Annual Report of the Tax Administration of CR, the total revenue from income tax imposed on legal entities for 2016 amounted to CZK 156.4 billion (see Table 4), which represents a year-on-year increase of CZK 18.26 billion, which is 13.2% more than in 2015. In 2016, the amount of income tax raised through legal entities reached its highest level in the last eight years. However, it is not possible to attribute this positive change only to the implementation of the VAT Control Report and ERS. Also, economic growth across the majority of Czech economic sectors should be taken into account. In 2016, total income tax revenues from natural persons on the basis of self-employment amounted to CZK 6.85 billion (see Table 4), which represents an increase of CZK 4.36 billion compared to 2015, i.e. 174.17%. In 2016, the amount of income tax raised through natural persons reached its highest level in the last five years. Contributory factors to the collection of this amount of tax were the introduction of a solidarity tax, a decrease in the tax deduction, as well as the introduction of the VAT Control Report and the first wave of ERS.

Table 4: Overview income tax revenues from natural persons and legal entities in the Czech Republic

Year	Income tax revenues from legal entities (in CZK billions)	Income tax revenues from natural persons (in CZK billions)
2012	126.46	3.26
2013	113.05	2.68
2014	123.18	1.13
2015	138.14	2.49
2016	156.40	6.85

Source: Tax Administration (2016) – internal materials

4. Upcoming changes to financial reporting and taxation in the period 2020 – 2030

The Ministry of Finance of CR is working on a brand-new concept for accounting and tax legislation. In light of globalisation and European Union requirements for the harmonisation of financial reporting, amendments to the Accounting Act and related decrees and standards can be expected. The distortion of financial reports or non-publication may indicate a corruption conduct or hide the poor financial position of companies and may also indicate attempts to evade paying taxes (for details, see McGee & Tušan, 2008; Tušan, 2014). On the part of the State, this concerns the stricter application of the International Accounting Standards (IAS) and International Financial Reporting Standards (IFRS). IFRS are a set of standards, which are issued by the International Accounting Standards Board, governing the compilation and presentation of all financial statements (Hakalová et al., 2014). The IAS/IFRS are largely focused on the output of an accounting – financial statement (Krajňák, 2014). There is currently a debate among legislators and experts as to whether IFRS can also be applied to the assessment of the income tax base of legal entities. Tax harmonisation is an essential part of European integration. For this reason as well, the accession of the Czech Republic into the European Union meant a significant change in tax policy (Krajňák & Krzikallová, 2016). Among the advantages of the application of IFRS to the assessment of the income tax base is, for example, the reduction of administrative expenses incurred by tax payers, in particular major financial institutions (as mentioned also by Blechová et al., 2013).

The principal changes under the new concept for the Income Tax Act will include the simplification of tax legislation, improvements to the stability of fiscal neutrality and the maintenance thereof, as well as amendments to the act to make it more user friendly, etc. Under the new concept, tax payers will be allowed to do self-assessments and overpaid taxes will be returned to the taxable persons sooner. In the field of income tax imposed on natural persons, the concept of super gross salary and the solidarity tax should be cancelled as of 1 January 2019. However, such planned changes will not be implemented with immediate effect, but by 2020. Instead of super gross salary, the assessment of the income tax base for natural persons will be based on a gross salary. In relation to the aforementioned, the implementation of a progressive tax rate of 19% for income up to CZK 1.5 million and of 24% for income exceeding this limit is expected. The proposed income tax rate of 19% represents a decreased tax burden. In addition to the cancellation of the super gross salary concept, the Ministry of Finance of the Czech Republic also proposes cancelling the so-called solidarity tax imposed under Section 16a of the Income Tax Act, whereby relevant income is subjected to a newly introduced second tax rate of 24%, which corresponds to the today's effective rate (Ministry of Finance of CR, 2018).

4. Conclusion

Tax audits are one of the methods within the framework of tax procedures that allows the State to contribute to the specification of tax liabilities imposed on taxable persons (Bielíková and Chlebikova, 2015). The VAT Control Report and ERS as tax checking tools have become widely discussed topics in CR. Entrepreneurs state that the implementation of these tools has resulted in a higher administrative burden, an increase in costs and a loss of privacy. However, data for 2016 released by the Tax Administration reveals that the VAT Control Report

contributed to an increase in value added tax revenues and a reduction in VAT deductions worth CZK 10-12 billion. The VAT Control Report has also resulted in the identification of approximately 9,000 unreliable VAT payers. One year after the launching of ERS, the Tax Administration concluded that VAT revenues for the period from January to December 2017 had increased (see Table 2 of this paper). Although the full financial impact of the introduction of ERS will only become evident in the years to come, the Tax Administration expects that after the activation of all stages the benefit to the state coffers will amount to CZK 18 billion annually.

However, it should be noted that the implementation of the VAT Control Report and ERS has also increased the administrative burden of the Tax Administration. The approved budget for 2016 reveals that the institute employs 16,120 people, an increase of 354 employees compared to 2015. In 2016, the average gross salary of one employee at the Tax Administration was CZK 32,418. Based on the aforementioned data, the increased costs incurred by the Tax Administration amounted to approximately CZK 184.5 million. The new concept that is being prepared with regards to financial reporting and taxes for the period 2020–2030 should introduce completely new approach that respects the conditions defined by the European Union, whilst taking into account the mutual relationship that exists between financial reporting and taxes. On the other hand, the application of IAS/IFRS is associated with higher accounting quality than the application of domestic standards (as also mentioned by Barth, 2005). Persistent globalisation and the need to harmonise create permanent pressure to synchronize not only in the field of accounting and financial reporting, but also in the area of taxation (Hakalová et al., 2017). This move clearly contributed to the acceptance of IAS/IFRS in many parts of the world (Ding et al., 2007) as global standards (Redmaye & Laswad, 2013).

References

- [1] Act No. 563/1991 Coll., on accounting, as amended.
- [2] Act No. 586/1992 Coll., on income tax, as amended.
- [3] Barth, E. M., Landsman, R. W. and Lang, H. M. (2005). International Accounting Standards and Accounting Quality. *Journal of Accounting Research*, vol. 46, no. 3, pp. 467-498.
- [4] Bielíková, A. and Chlebková, D. (2015). Tax inspection of the tax on personal income in the global economy. *15th International Scientific Conference Globalization and Its Socio-Economic Consequences*. Žilina, Slovak Republic, pp. 33-38.
- [5] Blechová, B., Janoušková, J. and Sobotovičová, Š. (2013). Analysis of the Relationship between Financial and Tax Accounting in the Czech Republic in the Context of EU Legislation. *Proceedings of the 8th International Conference on Accounting and Management Information Systems (AMIS)*. Bucharest, Romania, pp. 783-797.
- [6] Ding, Y., Hope, O., Jeanjean, T. and Stolowy, H. (2007). Differences between Domestic Accounting Standards and IAS: Measurement, Determinants and Implications. *Journal of Accounting and Public Policy*. vol. 26, no. 1, pp. 1-38.
- [7] Finanční správa, 2018. Available: <http://www.financnisprava.cz/cs/dane/analyzy-a-statistiky/udaje-z-danovych-priznani/DPH>

- [8] Finanční správa, 2016. Available: http://www.financnisprava.cz/assets/cs/prilohy/fs-vysledky-cinnosti/VZ_FS_2016.pdf
- [9] Hakalová, J., Palochová, M. and Pšenková, Y. (2017). Globalization Trends in Financial Accounting and Taxation of Business Entities in Compliance with the Implementation of EU Directives and Upcoming Recodification of Tax Legislation in the Czech Republic. *17th International Scientific Conference Globalization and Its Socio-Economic Consequences*. Žilina, Slovak Republic, pp. 613-620.
- [10] Hakalová, J., Pšenková Y. and Losová, M. (2014). First-time Adoption of International Financial Reporting Standards for Business Corporations Based in EU Member State that Are Issuers of Securities Admitted to Trading on Regulated Market. *International Conference on European Integration*. Ostrava, Czech Republic, pp. 192–201.
- [11] Krajňák, M. (2014). IAS/IFRS as One of the Tools of Accounting Harmonization in the European Union. *International Conference on European Integration*. Ostrava, Czech Republic, pp. 372–381.
- [12] Krajňák, M. (2015) Development of an Effective Tax Rate and other Selected Indicators of Personal Income Tax in Years 1993-2014. *7th International Scientific Conference on Finance and Performance of Firms in Science, Education and Practice*. Zlín, Czech Republic, pp. 738-752.
- [13] Krajňák, M. and Krzikallová, K. (2016). Application of Decision Analysis at Trading of Goods in the Selected European Union Member State, *International Conference on European Integration*. Ostrava, Czech Republic, pp. 497–506.
- [14] McGee, W. R. and Tušan, R. (2008). *The Ethics of Tax Evasion: A Survey of Slovak Opinion*, New York: Springer Science+Business Media, pp. 575-601.
- [15] MF ČR (2018). Tisková zpráva [online]. [cit.2018-02-09]. Available at: <http://www.mfcr.cz/cs/aktualne/tiskove-zpravy/2018/zruseni-superhrube-mzdy-snizi-odvodovou-31006>.
- [16] Raizlová, A. (2018). *Evaluation of Efficiency of Modern Instrument in Financial Administration*. Diploma thesis, VŠB-TU Ostrava.
- [17] Redmayne, B. N. and Laswad, F. (2013). An Assessment of the Impact of IFRS Adoption on Public Sector Audit Fees and Audit Effort – Some Evidence of the Transition Costs on Changes in Reporting Regimes. *Australian Accounting Review*, vol. 23, no. 64, pp. 88-99.
- [18] Široký, J., Krajčová, J. and Hakalová, J. (2016). The Taxation of Agricultural Land with the Use of Multi-Criteria Analysis. *Agricultural Economics - Zemědělská ekonomika*, vol. XVII., no. 5, pp. 197-204.
- [19] Tušan, R. (2014). Comparison of Slovak Accounting Regulation and International Financial Reporting Standards in the Area of Accounting and Recognition of Emission Rights. *Proceedings of International Multidisciplinary Scientific Geoconferences*. Albena, Bulgaria, pp. 87-94.

EVALUATION OF FINANCIAL PERFORMANCE OF THE LOCAL SELF - GOVERNMENT IN CONDITIONS OF SLOVAKIA IN CONTEXT OF GLOBAL CHANGES

Radomíra Hornyák Gregáňová^{1,a,*}, Viera Papcunová^{2,b} and Dana Országhová^{3,c}

¹Slovak University of Agriculture in Nitra, Faculty of Economics and Management, Department of Mathematics, Trieda Andreja Hlinku 2, 949 76 Nitra, Slovakia

²Constantine the Philosopher University in Nitra, Faculty of Natural Sciences, Institute of Economy and Management, Trieda Andreja Hlinku 1, 949 74 Nitra, Slovakia

³Slovak University of Agriculture in Nitra, Faculty of Economics and Management, Department of Mathematics, Trieda Andreja Hlinku 2, 949 76 Nitra, Slovakia

^aradomira.greganova@uniag.sk, ^bvpapcunova@ukf.sk, ^cdana.orszaghova@uniag.sk

*Corresponding author

Abstract. The consequence of globalization at the political level in Slovakia was the creation of local and regional self-government in the process of decentralization of public administration. The base of decentralization was, on the one hand, to bring self-government closer to the citizens and on the other hand, changes in the financing of self-governments. The aim of this paper is to evaluate the financial performance of the municipalities in Slovakia in the context of global changes. Financial parameters, which are evaluated, present the quality of financial management of the municipalities and results of them may be used by municipal council as the argument of the preparing decision about efficient use of funds to ensure the quality of life of the population in municipalities. These indicators will be evaluated in the time period 2008 - 2016. The underlying data for analysis were obtained from the Ministry of Finance of the Slovak Republic from the state final account. Article evaluates all the municipalities in Slovakia (it is the cumulative assessment). Data on individual parameters represent the time series. For the analysis, we used MS Excel tool for modelling by trend lines. The results of the analysis of selected financial indicators show the negative of fiscal decentralization and the high dependency of municipalities on the state budget, although the aim of fiscal decentralization was to increase the financial autonomy of municipalities.

Keywords: financial performance, financial management, municipality, municipal budget

JEL Classification: H71, E42, H27

1. Introduction

The public sector in most countries is going through deep restructuring, trying to provide improved services while tackling the associated fiscal problems. This is also linked to the performance monitoring which it plays an important role in the current reform efforts. Public management is realized in the context of the events taking place in society and in the real social and economic, political and cultural conditions, so the public management cannot be isolated from society (Mayne, 2017; Ershova et al., 2016). The financial sustainability of self -

local government is typically represent as being a question of finding the optimum scale and structure for the cost-efficient delivery of vital local public services. From consolidated local government units are expected to benefit from greater economies of scope in the context of the theory of local government restructuring. By contrast, organization theories notes that the management of structural change generates additional costs until such time as the new structures are being implemented – something that could take many years (Rhys, 2015).

Bernatska (2018), Jakubek & Tej (2015) note, that in the process of budget management, there is formation of budget, its subsequent fulfilment and control of budget discipline. Also Moreno – Enguix et al. (2017) states that no less important part of the budget is the control system. Internal control system influences the budget result in the sense that the Local Governments with weaknesses in their internal control system during crisis periods have a lower budget result. It follows that the higher the level of internal control, the higher the budget results. Local government that are more self-financing are less dependent on the vicissitudes of government fiscal policy – something that is especially important during the period, when state government reduce incomes for local governments (Rhys, 2013). Grossi et al. (2016), Andrejovská & Glova (2018) however, point to the fact that generally, we cannot expect that a budgeting process to be a mechanistic and economically rational system that replaces the political process of making choices about financial policies and resources. Performance budgets offer mostly some potential for facilitating informed about political and managerial choices. Hajilou et al. (2018), Dušek (2017) note that financial problems of municipalities are the consequence from government decisions as well as inadequate subsidies from the state for municipalities. As far as efficiency gains, in order to provide public goods and services, financial decentralization and shifting assignment of financial responsibilities to local level is assumed to be the better option for efficiency gains provided services because the local governments best to know local needs and priorities. They confirm this too Arifi & Ganiu (2017) who say that the process of managing of municipalities, first and foremost represents an economic rather than political challenge, referring to the fact that the leaders of local government units are elected to manage the relevant institutions in order to meet inhabitants' needs and requirements.

2. Objective and methods

The aim of this paper is to evaluate the financial performance of the municipalities in Slovakia in the context of global changes. We analyse also the total general government expenditure as a share of GDP issued at local government level in EU member countries over the years 2008 - 2016. Expenditures of government institutions are defined in ESA2010 in paragraph 8.100 and Chapter 20 with a reference to the list of items: intermediate consumption, gross capital formation, employee remuneration, other taxes on production, subsidies, property income, ordinary taxes on pensions, property and other benefits, social benefits other than social transfers in kind, transfers - purchased market output, other current transfers, changes in pension entitlements, capital transfers and net transactions in non-produced assets.

Financial parameters provide information about the financial management of the municipalities. The object of the paper were cumulative data of municipalities in Slovak republic (2 890 municipalities). The data sources for the individual indicators were obtained from the Ministry of Finance of Slovak Republic and from the Statistical Office of the Slovak

Republic. For the analysis, we chose the following financial indicators of the authors Vomočil et al. (2007), which we modify them on Slovak condition:

$$p_1 = \frac{\text{current incomes of municipalities}}{\text{current expenditures of municipalities}}$$

Parameter points to the quality of the financial management of the municipality. The authors note that, if the parameter is steadily more than one, it means that current budget is in surplus and the financial situation of municipality is good. Parameter value greater than 1, allows municipalities to use the current budget surplus to financing its commitments.

$$p_2 = \frac{\text{non - tax incomes of municipalities}}{\text{total incomes of municipalities}}$$

According to the authors, if the value of indicator going to be higher, municipalities will be to feel the lower need to borrow financial resources.

To describe the time series, we will use a linear function given by the formula $y = b_0 + b_1 t$, where t represents a time independent variable in the range $t = 1, 2, \dots, n$. Estimating the parameters for the linear trend is done using the least squares method. In the presented results with graphs we used the MS Excel processor tools to estimate the mentioned parameters. It follows from the basic properties of linear function that if the value of parameter b_1 is positive, it is a growing linear trend. If the value of parameter b_1 is negative, it is a decreasing linear trend.

3. Results and Discussion

Financial sustainability is necessary for allowing local governments to have enough autonomy. At the local level, financial sustainability represents the long-run capability of a local government to consistently meet its financial responsibilities. It reflects the adequacy of available incomes to ensure the provision of the services which the public demands (Fisher, 2007, Vavrek, 2015). The level of financing of local government in the individual EU member countries depends on the model of public administration in the country. Tab. 1 shows that, in the period 2008 - 2016, expenditures for local government represent average 11% GDP. Germany issued for local self-government almost three times more expenditures than is the average of EU 28. In the analyzed period even recorded a slight increase of these expenditures (in 2008 it was 32.1% of GDP and in 2016 it was 34.8% of GDP). Italy, on the other hand, gives more funds for the local government, but there has been a slight decrease of these funds over the analysed period (in 2008 it was 15.1% of GDP and in 2016 it was 14.3% of GDP). Grossi et al. (2016) note municipalities in Italy and Germany have a multipurpose focus and enjoy some autonomy from the state. Local governments in the two countries differ significantly with regard to their constitutions, the tasks and responsibilities of politicians (mayor and city council), their electoral systems, and their degree of financial autonomy but also concerning the reform style (more bottom-up with few central government interventions in Germany, vs. stronger government interventions in Italy) but the fiscal stress at the local level is equally strong in both countries. Almost two times more than EU average is spent for local government in Finland and Sweden. By contrast, less than 2% of GDP is spent by Cyprus and Malta.

The development of expenditures in the individual Member States was different in the analyzed period. In most of the Member States, compared to 2008 and 2016, there was a slight decrease of these expenditures.

Table 1: Total General Government Expenditure, Local Government (% GDP)

	2008	2009	2010	2011	2012	2013	2014	2015	2016
EU (28 countries)	11.3	12.1	11.9	11.6	11.6	11.4	11.2	11.0	10.8
Austria	8.1	8.7	8.6	8.2	8.3	8.5	8.5	8.5	8.5
Belgium	6.8	7.4	7.2	7.4	7.6	7.6	7.4	7.2	7.1
Bulgaria	7.1	8.2	7.2	6.6	6.6	7.9	9.0	10.4	6.9
Croatia	12.1	12.5	11.9	11.4	11.8	12.1	12.6	12.1	11.7
Cyprus	1.7	1.9	2.0	2.1	1.8	1.5	1.6	1.6	1.4
Czech Republic	11.6	12.9	12.7	12.3	11.3	11.4	11.5	11.3	10.2
Denmark	32.1	35.8	35.8	35.6	35.9	35.5	35.3	34.9	34.8
Estonia	10.8	11.2	9.8	9.3	9.7	9.9	9.3	9.4	9.4
Finland	20.0	22.3	22.4	22.6	23.4	23.8	23.8	23.2	22.6
France	11.2	12.0	11.5	11.5	11.7	11.9	11.8	11.4	11.2
Germany	7.3	7.9	7.9	7.7	7.6	7.7	7.8	7.8	8.0
Greece	3.6	4.1	3.8	3.1	3.3	3.6	3.3	3.4	3.5
Hungary	11.3	11.9	12.5	11.4	9.2	7.5	7.8	7.8	6.0
Ireland	7.0	6.2	5.4	4.8	4.2	3.6	2.9	2.2	2.2
Italy	15.1	16.5	15.7	14.9	14.9	15.0	14.7	14.5	14.3
Latvia	11.8	12.6	12.0	10.8	9.9	10.2	10.0	9.3	9.5
Lithuania	9.2	10.7	11.1	10.0	9.3	8.3	7.9	7.8	7.8
Luxembourg	4.9	5.6	5.2	5.0	5.0	5.0	4.8	4.5	4.9
Malta	0.5	0.6	0.6	0.7	0.8	0.7	0.6	0.5	0.4
Netherlands	14.8	16.4	16.2	15.5	15.1	14.2	13.9	14.3	13.8
Poland	14.1	14.5	15.0	14.0	13.3	13.1	13.3	12.8	12.9
Portugal	7.1	7.5	7.4	6.8	6.2	6.6	6.0	5.9	5.7
Romania	9.5	9.6	9.6	10.3	9.6	9.2	9.0	9.7	9.0
Slovakia	6.1	7.3	7.3	6.8	6.4	6.4	6.7	7.4	6.6
Slovenia	9.0	9.8	9.8	9.4	9.5	9.7	9.8	8.9	8.2
Spain	6.5	7.1	7.1	6.8	5.9	5.9	6.1	6.0	5.8
Sweden	23.6	24.9	23.9	24.2	24.7	25.0	24.9	24.6	25.0
UK of GB and NI	12.4	13.3	13.1	12.3	12.6	11.2	10.7	10.5	10.0

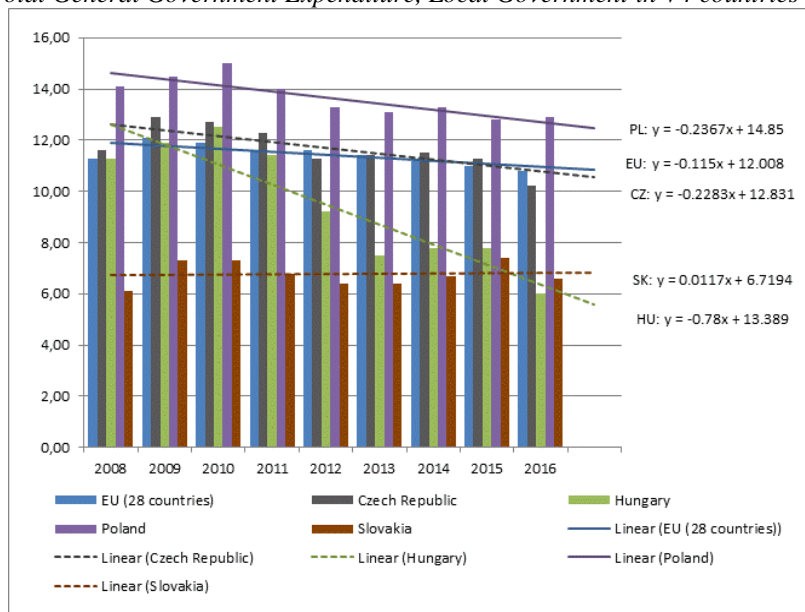
Source: Statistical Office of the Slovak Republic, own processing

Nevertheless Navarro – Galera et al. (2016) note that in Spain, as in other European Union countries, public sector incomes and expenditures have increased significantly in the recent years as a result of the increased functions undertaken and the expanding role of the public sector in economic activity. They also note that in the case of Spanish municipalities, a great part of this deficit has been generated by the difference between the increase in expenditure and the decrease of revenue that has been a consequence of the ‘property bubble’.

Compared Slovak republic with the EU average, it spends half of the funds on local government (EU in 2008 it was 11.30 % GDP, Slovak Republic in 2008 it was 6.10 % GDP; EU in 2016 it was 10.80 % GDP, Slovak Republic in 2016 it was 6.60 % GDP). The trend of total general government expenditure on local government is in all V4 countries and even in the EU 28 with the exception of Slovak republic declining. The Slovak Republic has a balanced trend of total general government expenditure on local government. Czech Republic and Poland spent almost the same amount of funds each year, although in the comparable years 2008 and 2016 there was a slight decrease of these funds in both countries. Surowka (2017) notes that local government units (municipalities – gminas, districts – poviats and voivodeships) are an important part of the public finance sector in Poland because they are

responsible for funding more than 30% of public tasks in Poland. The basics of financial management are determined by legal regulations which thus define the scope of their activities and affect the state of financial resources at their disposal. We can see a significant decrease of funds in Hungary, where the decline in 2016 compared to 2008 was 53.09% (Fig.1).

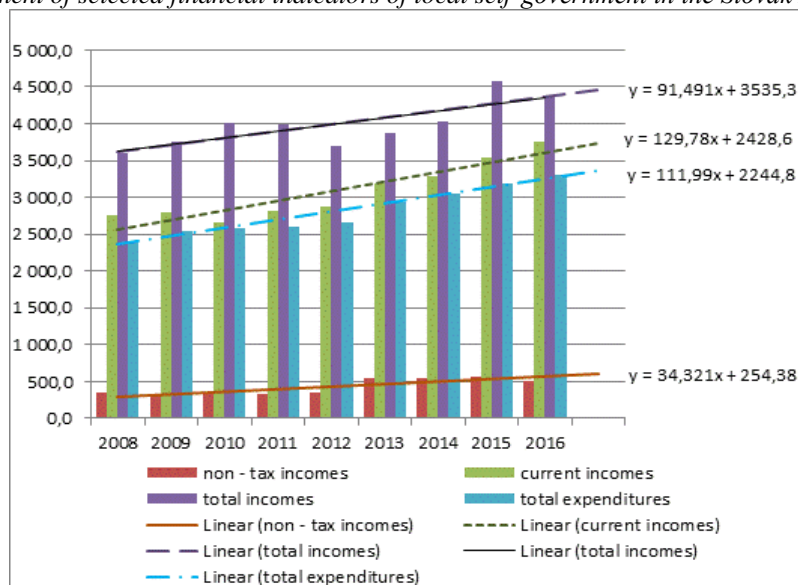
Figure 1: Total General Government Expenditure, Local Government in V4 countries (% GDP)



Source: Statistical Office of the Slovak Republic, own processing

Non - tax incomes of municipalities constitute own incomes, which consist mainly of incomes from the use and ownership of property as well as administrative fees which in the analyzed period showed a fluctuating trend (Fig.2). Compared to 2008 and 2016, this incomes increased by 48.23%. The current municipal incomes represent own incomes as well as share taxes, which come from the state budget. With the exception of 2009, we are watching an annual increase of these incomes. Compared to 2008 and 2016, this increase was 35.88%.

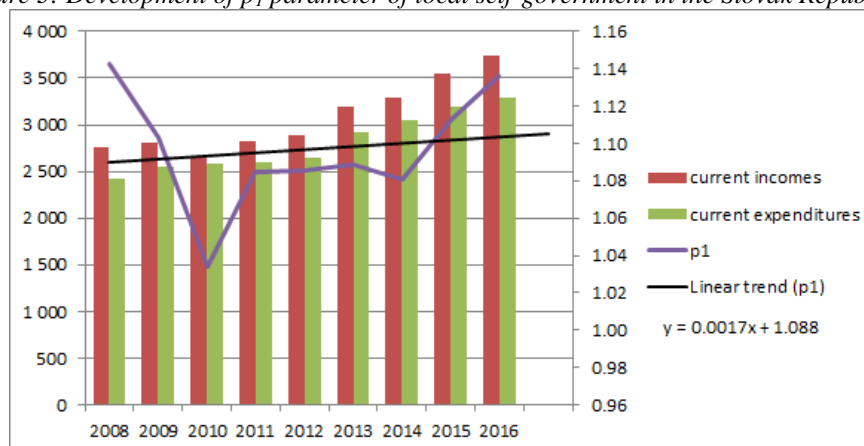
Figure 2: Development of selected financial indicators of local self-government in the Slovak Republic (mil. €)



Source: Ministry of Finance of the Slovak Republic, own processing

Schoeman (2011) analysed financial performance in terms of own incomes and sustainability of local municipalities in South Africa on the base of the selected indicators: gross value added, incomes collected from own sources, debtors outstanding, the ageing of debt and dependency on grants are considered. Based on the results of the analysis, he states that a big number of municipalities do not comply with the requirement that a “reasonable” amount of current expenditures should be financed by means of own resources. Total incomes include the current incomes and capital incomes and showed a fluctuating trend. To a greater extent, these fluctuations are caused by capital incomes, which they do not have to be annually and in the same volume compared to current incomes. Compared to 2008 and 2016, total incomes grew by 21.70%. Total municipal expenditures present current and capital expenditures and they expenditures increased each year during the analyzed period. In 2008, compared with 2016, this increase was 36.60% and we follow their growing trend.

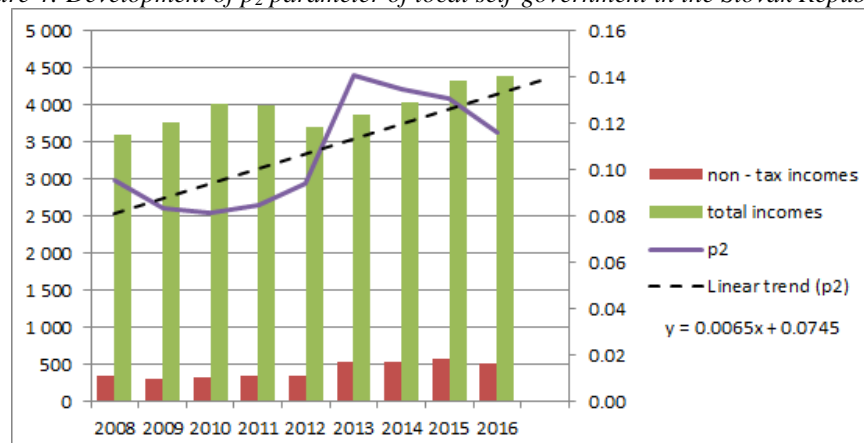
Figure 3: Development of p_1 parameter of local self-government in the Slovak Republic



Source: Ministry of Finance of the Slovak Republic, own processing

Parameter p_1 presents the quality of the financial management of the municipality (Fig.3). During the analyzed period each year, this indicator reached more than 1, which indicates the good financial situation of Slovak municipalities and it is possible to follow its growing trend. This situation is also significantly influenced by legislation. Act No. 583/2004 Coll. on the financial rules of the local government states that the current budget must be make as a balance or surplus.

Figure 4: Development of p_2 parameter of local self-government in the Slovak Republic



Source: Ministry of Finance of the Slovak Republic, own processing

The parameter p_2 during the analyzed period showed a fluctuating trend (Fig. 4). In 2009, it declined slightly in comparison with 2008. In the next three years it reached value 0.08. In 2012 and 2013 it grew and in the next two years it has settled on value 0.13. Compared to 2008 and 2016, parameter grew slightly. If the value of parameter going to be higher, municipalities will be to feel the lower need to borrow financial resources. Based on the calculated values of the individual indicators, we created a data matrix. Individual rows in the matrix represent vector of chosen financial parameters of financial management of the municipalities (Fig.5).

Figure 5: Data matrix of selected financial parameters of municipalities in the Slovak Republic

	p_1	p_2
2008	1.14	0.10
2009	1.10	0.08
2010	1.03	0.08
2011	1.08	0.08
2012	1.09	0.09
2013	1.09	0.14
2014	1.08	0.13
2015	1.11	0.12
2016	1.14	0.12

Source: own processing

4. Conclusion

Although that fiscal decentralization has been carried out in all EU countries which the aim was to increase the financial autonomy of local government, the results of analysis show that on average, within the EU-28 they spend average 11% of GDP for local government. But in the period 2008 - 2016 EU countries as well as in the V4 countries, with the exception of Slovak republic, we can see the declining trend of these expenditures by the state for local government. Generated data matrix can be part of feed-forward neural networks, which are used to classify creditworthiness of municipalities. At present, Slovak municipalities use limited mathematical and statistical models to assess their financial situation. Often, time-consuming analyses as well as software inaccessibility are predominantly barriers to their application. Mutual comparison of municipalities through financial indicators creates precondition for municipalities to make more efficient use of their financial resources.

Acknowledgment

This paper is an output of the science project VEGA No.1/0407/18 “Measuring performance of the local self – government.”

References

- [1] Andrejovská, A. and Glova, J. (2018). Changes in the evolution of the VAT rates and its impact on the economic level of European countries. *21 st International Colloquium on Regional Sciences. Conference Proceedings*, Brno, Czech Republic, pp. 254 – 261.

- [2] Arifi, A. and Ganiu, B. (2017). Local Fiscal Optimality in FYROM – the Case of Municipality of Tetovo. *EBEEC Conference Proceedings the Economies of Balkan and Eastern Europe Countries in the Changed World*, Split, Croatia, pp. 42-58.
- [3] Bernatska, N. (2018). Formation of Modern Model of Budget Management Based on Methods of Public Administration. *Baltic Journal of Economic Studies*, vol. 4, pp. 39-48.
- [4] Dušek, J. (2017). Evaluation of Development of Cooperation in South Bohemian Municipalities in the Years 2007-2014. *European Countryside*, vol. 9, pp. 342-358.
- [5] Ershova, I., Deviatilova, A. and Emelyanov, S. (2016). International Public Management of Social and Economic Systems. *Globalization and its Socio-Economic Consequences, 16th International Scientific Conference Proceedings*, PTS I-V. Žilina, Slovak Republic, pp. 442-448.
- [6] Fisher, R. C. (2007). *State and Local Public Finance*, 3rd ed. Thomson - South Western.
- [7] Grossi, G., Reichard, Ch. and Ruggiero, P. (2016). Appropriateness and Use of Performance Information in the Budgeting Process: Some Experiences From German and Italian Municipalities. *Public Performance & Management Review*, vol. 39, pp. 581–606.
- [8] Hajilou, M., Mirehei, M., Amirian, S. and Pilehvar, M. (2018). Financial Sustainability of Municipalities and Local Governments in Small-Sized Cities; a Case of Shabestar Municipality. *Lex Localis - Journal of Local Self-Government*, vol. 16, pp.77 – 106.
- [9] Jakubek, P. and Tej, J. (2015). Reform of financial administration in the Slovak Republic: reviews of participants. *Economic Annals-XXI*, vol. 5, pp. 33-36.
- [10] Mayne, J.W. (2017). *Monitoring Performance in the Public Sector. Future Directions from International Experience*, 1.st ed. New York, USA
- [11] Moreno-Enguix, M. del R., Gras - Gil, E. and Hernández – Fernández, J. (2017). An Explanation of Management of Local Governments in Spain Based on the Structure of the Internal Control System. *Annals of Economics And Finance*, vol. 18, pp. 393 – 410.
- [12] Navarro - Galera, A., Rodríguez-Bolívar, M.P., Alcaide-Muñoz, L. and López-Subires, M. D. (2016). Measuring the financial sustainability and its influential factors in local governments. *Applied Economics*, vol. 48, pp. 3961-3975.
- [13] Rhys, A. (2013). Local Government Amalgamation and Financial Sustainability: The Case of England and Wales. *Public Finance and Management*, vol. 13, pp. 124 – 141.
- [14] Rhys, A. W. (2015). Vertical consolidation and financial sustainability: evidence from English local government. *Environment and Planning C: Government and Policy*, vol. 33, pp. 1518 – 1545.
- [15] Schoeman, N. J. (2011). *Fiscal Performance and Sustainability of Local Government in South Africa — an Empirical Analysis*, Working Papers 201104, University of Pretoria, Department of Economics.
- [16] Surowka, K. (2017). Financial Problems of the Functioning of Local Governments Units in Poland. *Enterprise and Competitive Environment*. Brno, Czech Republic, pp. 833 – 843.
- [17] Vavrek, R. (2015). Disparity of Evaluation of Municipalities on Region and District Level in Slovakia. *Hradecké ekonomické dny 2015*. Hradec Králové, Czech Republic, pp. 315-321.
- [18] Vomočil, M., Hájek, P. and Olej, V. (2007). Modelování bonity obcí pomocí dopředných neuronových sítí. [online] Available: <https://dspace.upce.cz/bitstream/10195/32192/1/CL659.pdf>

TRADING OF INTERNATIONAL FINANCIAL MARKETS BASED ON TECHNICAL ANALYSIS IN CONDITION OF GLOBALIZATION

Jan Chutka^{1,a,*}

¹University of Zilina, The Faculty of Operation and Economics of Transport and Communications,
Department of Economics, Univerzitná 1, 010 26 Zilina, Slovakia

^ajan.chutka@fpedas.uniza.sk

*Corresponding author

Abstract. The internationalisation and globalisation of doing business, especially in trading of international financial markets, brings whole new range of opportunities, methods and also challenges. Today's global market in the process of globalization offers many different financial instruments and ways how to trade them. One of the most important benefits of globalization itself is worldwide connection between individual participants of different markets. Due to the impact of globalization, individual markets are more and more connected and create associations and specific groups. Today, we can talk about modern worldwide financial market. Trading of international markets also include many specific aspects. With connection of markets and modernization also came modern way how to predict future price movements. The very common and controversial is technical analysis. Several studies have been published in the last 55 years exploring technical analysis. However, there is a lack of research consolidating the available knowledge about technical analysis. This paper is focused on the summarization of the significant research that has contributed to the development of this field and also on the application of swing trading system at chosen financial instruments based on technical analysis. Our paper contributes to the existing literature on technical analysis by presenting results of swing trading system based on technical analysis.

Keywords: market, international financial markets, technical analysis, brokerage, trading

JEL Classification: G11, G15, G17

1. Introduction

Every financial markets trader is aiming for a long-term and stable creation of regular profits. A very important tool that helps traders to achieve their objectives is a complex trading system based on relevant theoretical and logical fundamentals. The trading systems themselves and their structure have been developing together with process of globalization, development of financial markets, the methodology of price movement forecasting as well as the development of IT and Internet. Nowadays we can see a whole range of profitable trading systems, often based on different and sometime conflict claims. In the paper we focused on application of strictly specified swing trading system at chosen financial instruments and technical analysis fundamentals. This trading system is strictly based on technical fundamentals and consist of four main parts. Each of them helps to generate stable and long-term profits.

2. Theoretical background of technical analysis

A huge number of studies have inferred that predicting financial markets especially predicting concrete price movements is a very difficult task (Teixeira & Oliveira, 2010; Zielonka, 2004). The complexity of the financial market make it a complicated system associated with a considerable number of factors such as political events, quarterly earnings reports, market news, international influence and conflicting trading ideas and systems (Ticknor, 2013). However, some techniques to predict future price movements were developed, for instance, technical and fundamental analysis (Vanstone & Finnie, 2009).

Technical analysis is very common and extended tool and participants of many different financial markets use technical analysis demonstrable (Schulmeister, 2009), however, there is not substantial support given by academics (Brock et al., 1992; Menkhoff, 2010; Menkhoff & Taylor, 2007; Mitra, 2011; Zhu & Zhou, 2009). This fact was also confirmed by Lo, Mamaysky, and Wang (2000) in their famous paper, “Foundations of Technical Analysis: Computational Algorithms, Statistical Inference, and Empirical Implementation”. Main difference between fundamental and technical analysis is that fundamental analysis utilizes economic factors to estimate the intrinsic values of financial instruments and technical analysis relies on historical data especially on price charts of financial instruments and volume (Chavarnakul & Enke, 2009; Teixeira & Oliveira, 2010).

Technical analysis has been understood as a set of tools that allow predicting future returns of financial assets by studying past market data, mostly stock price and volume (Park & Irwin, 2007; Yamamoto, 2012; Zhu & Zhou, 2009). Recent studies have combined traditional and technical trading rules with intelligent techniques and statistical models (Bisoi & Dash, 2014; Wei et al., 2011; Ticknor, 2013; Kazem et al., 2013). Some of these techniques are neural networks, fuzzy systems, evolutionary computations and genetic algorithms. These techniques can be used along with technical trading rules and techniques to form a trading system that can predict the future price movements direction using past data like price and volume (Gorgulho et al., 2011).

3. Importance of trading systems for trading of international markets

The one of the basic rule of a successful investor or trader is creating a complex investment or trading system. We can define it as a set of behaviours, methods, rules, and processes that can help the trader to efficiently and profitable implement the trading process itself. The type of strategy chosen depends on the desired profitability and the level of risk that the particular trader is willing to accept. In contrast to passive buy and hold strategies, active business strategies are focused on the right timing of entry and exit positions to maximize profit from the transaction. Unfortunately, no strategy can guarantee unlimited profitability.

Trading based on the tested strategy greatly eliminates the impact of the trader's emotions, which may cause deviations from the set rules within the business strategy. The most negative impacts of emotions are the late conclusion of the loss trade (realization of a higher than the determined loss in the strategy) or, on the other hand, the early conclusion of the profit position (realization of a lower profit than determined in the strategy). Creating a trading system, setting money management and real trading is not an absolute trivial matter process. The basis of every successful business is the business plan itself (Bachratý, 2012).

4. Settings and rules of swing trading system

The name "swing" is derived from one of the primary logical bases on which this trading system is built, namely on the correct timing of market entry searches at the price levels of the potential endpoint of the secondary trend. The system itself consists of four main parts. Each one of these part define parameters of individual trades:

- Market entry areas
- Money management
- Market entry
- Management of positions and market exit

4.1 Market entry areas

This part of trading system contains rules that help identify the price levels of the financial instruments that we want to trade with, as well as the direction of the likely future price development of the financial instruments, according to which we will place the relevant orders in the market. The first basic rule that applies to the trading system is:

- The searching of market entry will be performed at prescribed, precisely defined price levels and a predetermined likely direction of the price development of the financial instrument.

Trading system for identifying the appropriate price levels uses support and resistance (S/R) theory. The reason why to search market entries only at S/R price levels is based on the theory of technical analysis. If we know the price level at which the trend of price development has reversed in the past, and according to the theory of technical analysis, we know that history is repeating, and according to logical reasoning, we come to the conclusion that if the price of the financial instrument reaches the level where it has occurred in the past to turn trend, traders will tend to respond to this price level in a useful way. We can then use this response to our advantage as a basic tool for predicting future price movements of financial instruments.

4.2 Money management

We consider money management as the most important aspect which determines if the business system will be profitable in long-term. The money management has several main roles in our trading system:

- Survival
- Small losses
- Stable profits

Market survival means that the trader will not lose his capital during trading. However the trader's goal is not just survive, but long-term generating of consistent profits and appreciation of their business capital. No trading system is 100% successful. One of the goals that money management seeks to achieve is that each realized loss should be adequate to the amount of

the trading account. This goal is most likely to be achieved by merchants by setting a percentage of the absolute amount of the current balance in the trading account in advance.

4.3 Market entry

If we have successfully identified the price levels we want to trade and the price is close to us, we will systematically look for ways to effectively enter the market. The way we chose in our research are price patterns.

The task of the specific patterns (formations) is to enable the trader to timely enter the market as accurately as possible, allowing him to effectively quantify the volume of the specific trade in order to keep the limits of the money management. The ideal situation the trader tries to capture through the entry formations is the moment when the primary, secondary and tertiary trend is unified. The quality of the input itself indicates the profit potential of the entire trading system. We will search for the entry formats from the lowest possible time frame, which will give us higher profit potential.

4.4 Management of positions and market exit

The last very important part of the business system is the management of positions and their exits. In general, we can say that we can exit from the losing (if the price has not matched our forecast) or profit position (if we correctly predict the future development of the price of the financial instrument). For our trading system, we've determined that market exit will always be based on predefined limit orders:

- SL (Stop Loss) order in the chart, which immediately terminates the position at the pre-defined price in case of unfavourable price development (we realize a loss)
- TP (Take Profit) order in the price chart that immediately terminates the position at a predefined price in case of a favourable development (we make a profit).
- Manual execution at market execution only in crisis and unexpected situations when SL or TP execution failed.

5. Application and results

After the exact definition of the individual variables, the actual data gathering phase, ie the actual trading activity according to a predetermined swing trading system, occurs on predetermined financial instruments, through a pre-selected trading account provided by a particular broker and selected business software and the specified amount of capital.

5.1 Time interval of application

For the sake of systematic application of the trading system, it is necessary to precisely define the time period when we will implement the trading activity itself. For research purposes, we set this time for eight calendar months from 1.2.2017 and 30.5.2017. The reason why we chose a given time period is that the data we receive during the next 8 calendar months will provide us with relevant database and the length of that period will guarantee a sufficient number of trades. Another advantage of the chosen research execution time is the fact that the ability of the business system to adapt to changing market conditions will be demonstrated.

5.2 Broker

Defining and selecting specific financial instruments to be traded is closely related to the selection of the brokerage company. First of all, based on publicly available information, we need to select a specific brokerage company to open a merchant account and trade it on the financial markets. This choice is largely critical because of the very important role of a brokerage company in the trading process. In general, we can assert that a brokerage company acts in the process of trading as an intermediary between the trader and the financial market itself. Based on a survey of brokerage companies operating in our territory, we have decided for XTB dm a.s. This brokerage company based in Warsaw offers a wide range of financial instruments that meet our requirements for the actual trading activity. This company owns branches in more than 10 countries, including the Slovak and the Czech Republic, and is regulated by the Polish Financial Supervision Commission of the KNF. XTB client's capital dm a.s. is stored in a separate account that is earmarked from XTB's own resources.

To conduct the trading activity itself, we have decided, after careful consideration, for instruments from all three major financial markets, commodity, stock and foreign exchange market. The reason is that the data thus obtained will tell us about the degree of complexity and applicability of the trading system across markets.

5.3 Results

The trading results according to a precisely defined swing system in the period from 1.2.2017 to 30.9.2017, through the PRO demo account provided by XTB dm a.s. through the Meta Trader 4 trading platform and at the basic amount of the trading capital 20 000 € are as follows.

Table 1: The results of swing trading system applied during defined time period

Gross loss (€)	35 975,66
Gross profit (€)	99 167,09
Absolute drawdown (€)	939,54
Maximal drawdown (€)	4978,45
Number of short positions	125
Number of long positions	45
Percentage of profitable short positions (%)	58,40
Percentage of profitable long positions (%)	44,44
Number of profitable positions	93
Number of loss positions	77
Percentage of profitable positions (%)	54,71
Percentage of loss positions (%)	45,29
Most profitable position (€)	18 350,53
Most losing trade (€)	1 712,27
Number of the longest loss-making series	6
Number of the longest profit-making series	6
Total number of trades	170
Maximal drawdown (%)	13,74
Average profit of profitable position (€)	1 066,31
Average loss of losing position (€)	467,22
Total profit (€)	63 191,43
Percentage evaluation of trading capital (%)	315,96

Source: processed by author

6. Conclusion

Based on collected relevant data during trading time, we can safely assert that the trading system can consistently generate profits at the set parameters. The trading system managed to generate a profit of 63 191,43 € for a specified period with an initial trading capital of 20 000 €. In relative terms, the original capital was grown by 315,96%. During the trading period, we have realized 170 trades based on the trading system, of which 93 were profitable and 77 were loss-making. In the overall results we showed a positive risk reward ratio (1:3), which shows that the average loss in absolute terms amounted to 467,22 € and the average profitable trade was 1 066,31 €. The average risk reward ratio is approximately 1:2,3, which almost corresponds to its 1:3 set height. On the basis of these results, we can assume that with the prolonged trading time the real risk reward ratio will be closer to its established value. One of the attributes we consider as inadmissible is the maximum drawdown. The drawdown reached 13,74%. This feature tells us how much the maximum loss we have lost during trading.

On the basis of the results obtained, we can conclude that further research on the swing trading system should aim at eliminating unacceptable aspects such as the drawdown amount. In order to eliminate this indicator's height, we recommend that we should incorporate into the trading system a tool that effectively assesses the maximum amount of potential loss of a business and the likelihood of the position being lost.

References

- [1] Bachratý, M. (2012). *Forex: dobrodružstvo vývoja stratégie*. Fxmprofit s.r.o., Slovenská Republika.
- [2] Bisoi, R. and Dash, P. (2014). A hybrid evolutionary dynamic neural network for stock market trend analysis and prediction using unscented Kalman filter. *Applied soft computing*, vol. 19, pp. 41-56.
- [3] Brock, W., Lakonishok, J. and Lebaron, B. (1992). Simple technical trading rules and the stochastic properties of stock returns. *Journal of finance*, vol. 47, pp. 1731-1764.
- [4] Chavarnakul, T. and Enke, Ch. (2009). A literature review of technical analysis on stock markets. *Neurocomputing*, vol. 72, pp. 3517-3528.
- [5] Gorgulho, A., Neves, R. and Horta, N. (2011). Applying a GA kernel on optimizing technical analysis rules for stock picking and portfolio composition. *Expert systems with applications*, vol. 38, pp. 14072-14085.
- [6] Kazem, A., Sharifi, E., Hussain, F.K., Saberi, M. and Hussain, O.K. (2013). Support vector regression with chaos-based firefly algorithm for stock market price forecasting. *Applied soft computing*, vol. 13, pp. 947-958.
- [7] Lo, A.W., Mamaysky, H. and Wang, J. (2000). Foundations of technical analysis: Computational algorithms, statistical inference, and empirical implementation. *Journal of Finance*, vol. 55, pp. 1705-1765.
- [8] Menkhoff, L. (2010). The use of technical analysis by fund managers: International evidence. *Journal of Banking & Finance*, vol. 34, pp. 2573-2586.

- [9] Menkhoff, L. and Taylor, M. P. (2007). The obstinate passion of foreign exchange professionals: Technical analysis. *Journal of economic literature*, vol. 45, pp. 936-972.
- [10] Mitra, S.K. (2011). How rewarding is technical analysis in the Indian stock market? *Quantitative Finance*, vol. 11, pp. 287-297.
- [11] Park, C.-H. and Irwin, S.H. (2009). A reality check on technical trading rule profits in the U.S. futures markets. *Journal of Futures markets*, vol. 30, pp. 633-659.
- [12] Schulmeister, S. (2009). Profitability of technical stock trading: Has it moved from daily to intraday data? *Review of Financial Economics*, vol. 18, pp. 190-201.
- [13] Teixeira, L.A. and Oliviera, A.L.I.D. (2010). A method for automatic stock trading combining technical analysis and nearest neighbor classification. *Expert systems with applications*, vol. 37, pp. 6885-6890.
- [14] Ticknor, J.L. (2013). A Bayesian regularized artificial neural network for stock market forecasting. *Expert systems with applications*, vol. 40, pp. 5501-5506.
- [15] Vanstone, B. and Finnie, G. (2009). An empirical methodology for developing stockmarket trading systems using artificial neural networks. *Expert systems with applications*, vol. 36, pp. 6668-6680.
- [16] WEI, L.-Y. et al. (2011). A hybrid model based on adaptive-network-based fuzzy inference system to forecast Taiwan stock market. *Expert systems with applications*, vol. 38, pp. 13625-13631.
- [17] Yamamoto, R. (2012). Intraday technical analysis of individual stocks on the Tokyo Stock Exchange. *Journal of Banking & Finance*, vol. 36, pp. 3033-3047.
- [18] Zhu, Z. and Zhou, G. (2009). Technical analysis: An asset allocation perspective on the use of moving averages, *Journal of Finance economics*, vol. 92, pp 519-544.
- [19] Zielonka, P. (2004). Technical analysis as the representation of typical cognitive biases. *International Review of Financial Analysis*, vol. 13, pp. 217-225.

TAX HAVENS IN THE EUROPEAN UNION, THEIR IDENTIFICATION AND USE BY THE MULTINATIONALS

Vít Jedlička^{1,a,*}, Michal Kuběnka^{2,b}, Josef Novotný^{3,c} and František Sejkora^{4,d}

^{1,2,3,4}University of Pardubice, Faculty of Economics and Administration, Czech Republic

^avit.jedlicka@student.upce.cz, ^bmichal.kubenka@upce.cz, ^cjosef.novotny@upce.cz,

^dfrantisek.sejkora@upce.cz

*Corresponding author

Abstract. Tax avoidance is currently an important topic and tax havens play a key role in it. Globalisation brings more possibilities of international tax planning therefore the importance of tax havens has increased even rapidly. Although they are called tax havens, the tax legislation is not the most important indicator of better taxation conditions. Multinationals can reach lower effective tax rate by separate agreement with governments therefore it is important to analyse also other indicators. This contribution focuses on the European Union and tax havens, which are member countries of this organization. Data used as variables within selected method address disproportion of some economic indicators in tax havens. As a method, cluster analysis was selected because it is able to separate the group of tax havens. Results show that there is significant difference between EU countries. Five EU countries are identified as tax havens: Luxembourg, Ireland, Netherlands, Malta and Cyprus. These countries report significantly larger flows of foreign direct investments and larger importance of intellectual property or financial sector in their economics. Especially the position of Luxembourg can be named as strong tax haven. On the other hand, the other EU countries have relatively close position to each other in terms of selected variables. Overall, tax havens report asymmetric in several economic indicators, which address international profit shifting and investment activity.

Keywords: tax haven, tax competition, tax avoidance, European Union

JEL Classification: M41, H26, F23

1. Introduction

In these days, tax avoidance activities are very common especially for multinational groups. It is important to say that tax planning activities are fully legal in most of the times, so the company can take the opportunity of using tax havens and gain a competitive advantage. On the other hand, multinationals without use of tax planning can have worse position on the market. Globalisation causes increasing number of multinational companies and more possibilities in tax avoidance process.

When it comes to tax planning, needs of the groups can vary one from the other. The way, how the tax avoidance is implemented in company's structure, can be also different. Therefore, the countries, which are active in tax competition and want to attract multinational companies, are focused on different aspects of legislation. It is obvious that tax planning

scheme is influenced by home country of company, also the field and structure of assets is important. From this perspective it is important to know the position of countries in tax competition, respectively to know the role of tax havens.

This article aims the situation of tax havens in the EU. Next chapter is dedicated to the current state of knowledge related to this topic. The following part is focused on methods and data which are used within this contribution. Results are discussed after their presentation in the following chapter. The last part is dedicated to the conclusion.

2. Literature review

It is important to mention, that differences between countries in tax systems and level of taxation are based also on historical development and are understandable. On the other hand, there are a lot of countries which act differently. They want to attract multinational corporations to not only invest there but also use their legislation to reduce their tax liabilities. Several institutions deal with tax havens and try to convince their governments to change their behaviour. These actions come from conviction that the tax competition at the current level is harmful.

To understand tax competition, it is important to know what drive companies' location change or setting a special subsidiary for tax avoidance. Paper from Jones & Temouri (2016) is focused on the determinants of companies' tax planning activities which are connected with tax haven's subsidiaries. Their results show that the statutory tax rate in company's home country does not have significant effect on setting a new subsidiary in tax haven. One of the most important results indicates that companies with higher tendency to have tax haven subsidiary also belong to sectors with "*high technology manufacturing*" or "*sectors with high level of intangible assets*" (Jones & Temouri, 2016). This is an important fact for both sides: for governments of tax havens and for multinational organizations.

Tax haven utilization is also the subject of interest of study from Richardson & Taylor (2015). Results of their regression model, which is based on data from U.S. multinationals, show several important dependences related to tax havens. First of all, companies, which have a lot of multinational operations or use transfer pricing, utilize tax havens in broad scope (Richardson & Taylor, 2015). Another key finding can be described as importance of intangible assets because multinational companies with larger amounts of e.g. intellectual property tend to use the tax havens (Richardson & Taylor, 2015).

Study from Klassen et al. (2017) is focused on companies' activities in tax planning. Their study shows that companies focusing on minimizing tax liabilities have much lower (by more than six percentage points) effective tax rates than companies with adoption of tax compliance (Klassen et al., 2017). Greater tax savings are reported by companies with "*higher foreign income, tax haven use, and R&D activities*" (Klassen et al., 2017). This is another study, which mention intellectual property presence as a factor, which is important for tax planning activities.

German companies and their utilization of tax havens are in the centre of interest of Gumpert et al. (2016). Results of their study show that most of the German companies do not have a tax haven subsidiary (Gumpert et al., 2016). Overall, tax havens for tax avoidance are used especially by large multinationals often with extensive research activities, through which tax planning takes place (Gumpert et al., 2016). They also find difference between sectors.

Manufacturing companies tend to invest in tax havens due to the level of their taxation. On the other hand, taxation does not have significant importance for the investment in tax havens by service firms (Gumpert et al., 2016).

Another study is focused on multinational companies with activities in India (Janský & Prats, 2015). Their results show that the companies with connection to tax havens have lower tax liabilities (Janský & Prats, 2015). Overall, profit shifting use companies which can lower their effective tax rate by this strategy. So, when it has been set up a link between tax haven subsidiary and non-tax haven one, the companies would utilize this connection. This study shows that presence of tax havens does not affect only countries in European Union or USA but also other countries, in this case India. Utilization of tax havens is not the topic only for big economies. It is also discussed e.g. in the Czech Republic. Novotný & Kruml (2015) highlight the increasing number of Czech companies with link to tax havens. They also point out the fact, that the outflow of capital from the Czech Republic belongs to one of the highest (Novotný & Kruml, 2015).

Study covering differences in utilization of tax havens between private and public listed companies is from Jaafar & Thornton (2015). Jaafar & Thornton (2015) show that both types of companies utilize tax havens to decrease their effective tax rates. On the other hand, these effects (lowering effective tax rates) are more extend in the case of private companies (Jaafar & Thornton, 2015). This is interesting problem because public become one of the most important stakeholders and its view on tax havens can affect corporate decision making. Dyreng et al. (2016) even mention public pressure and its relation to tax avoidance of companies. Their results show that publicly listed firms facing public pressure from stakeholders (Dyreng et al., 2016). Overall, opinion of public can influence the way and the extent how firms avoid paying taxes, especially when it comes to large multinational companies.

Identification of tax havens is complicated because every country, organization or company has different view on the attributes of tax havens. Therefore, there are many studies with different set of tax havens. Ireland is often included between EU tax havens (Chardonnet & Langerock, 2017). On the other hand, some authors discuss if Ireland is so rightly called. Tobin & Walsh (2013) show that there are several reasons for not calling Ireland a tax haven. They explain that there is no typical feature of tax haven like *“no or nominal tax, lack of transparency, unwillingness to exchange information”* (Tobin & Walsh, 2013).

There are also studies which are focused on Caribbean tax havens. One of them deals with Cayman Islands and their position in tax competition (Fichtner, 2016). For this study is important that he mentions specific position of Cayman Islands which is similar to the Luxembourg one (Fichtner, 2016). All that means that their governments tend to attract large financial institutions for which they offer reduction on their effective tax rates. Aubry and Dauphin (2017) show that Luxembourg is the most important EU tax haven for banks. Luxembourg looks like a tax haven with strong importance for financial sector.

One of the latest actions comes from the European Union, which creates a list of tax haven, known as blacklist (European Commission, 2018). In these days, there are only nine countries from the whole world on this list (European Commission, 2018). It is important to say that this list basically addresses third countries therefore none from the EU countries can appear on it. This fact is the subject of study made by organisation Oxfam (Chardonnet & Langerock, 2017). Their results show that four countries from the EU does not follow one of the basic

assumptions of not to be a tax haven: “*Fair taxation*” (Chardonnet & Langerock, 2017). This group of countries consists of Ireland, Luxembourg, Malta and the Netherlands. This study shows that the problem of tax havens is much broader than the EU’s blacklist presents. Another Oxfam study is from Berkhout (2016). This study also identifies world’s tax havens based on information about legislation and economic indicators. Results of this study show that also the position of Cyprus is close to the other EU tax havens (Berkhout, 2016). Both Oxfam’s studies use some economic attributes of the countries to identify if they are tax havens. FDI (Foreign Direct Investment) flows can be seen as one of the important indicators (Chardonnet & Langerock, 2017). Higher level of FDIs (with taking into account the size of the economy) shows excessive international activity connected with the country. These flows indicate fact that multinational companies use this country for international transaction in broader scope than it is assumed based on the size of its economy. Higher level of exports can be another factor of tax haven (Chardonnet & Langerock, 2017). Larger exports can indicate transfer pricing strategies because services and goods can be used for profit shifting.

As literature show, there are a lot of indicators which can be connected with tax havens. Some of them come from legislation, some of them from economic activity. The aim of this contribution is identification of EU tax havens based on other assumption than tax legislation.

3. Data and methodology

Cluster analysis is selected as a method used within this contribution. This analysis can identify groups of countries, for which are typical similar values in selected variables. In this case, clustering is selected for identification of tax havens. For the type of selected cluster analysis, Ward’s method and Euclidean distance are used.

Table 1: Table description (TNR 10pt., italics)

Variable	Source
Inward FDI (% of GDP)	Eurostat (2018, B)
Outward FDI (% of GDP)	Eurostat (2018, C)
Receipts for the use of intellectual property (% of GDP)	Own calculations based on: The World Bank (2018, A); (2018, B)
Insurance and financial services (% of service exports)	The World Bank (2018, C)
Financial Secrecy Index (FSI)	Tax Justice Network (2018)
Export of goods and services (% of GDP)	Eurostat (2018, A)

Source: Authors

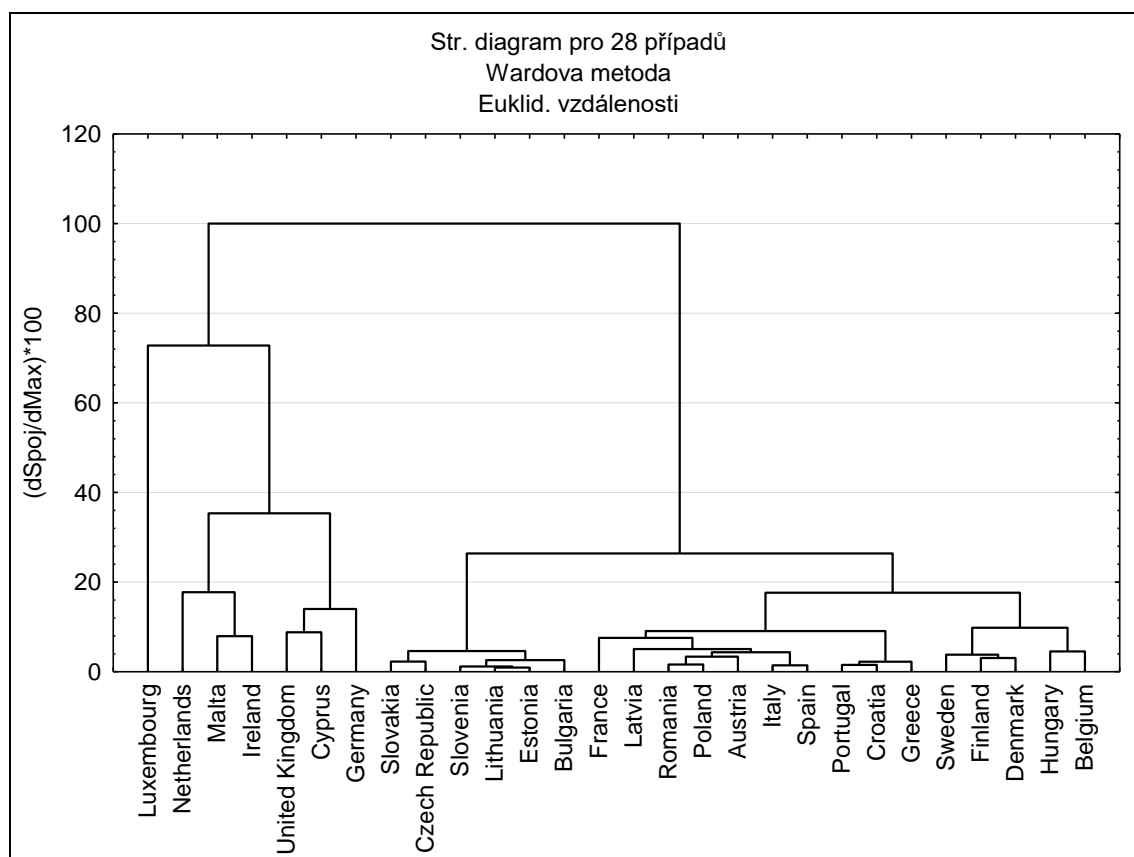
For the identification of tax havens in EU, it is used several variables based on the current research. Selected variables are presented in Table 1. As the cluster analysis requires, all data are standardized.

4. Results and discussion

Dendrogram is selected as a presentation form of cluster analysis’ results and they are shown by Figure 1. Dendrogram indicates that there are 3 clusters in the half of clustering. The first one is represented by only one country: Luxembourg. Position of Luxembourg is very important because this country has high value in most of the selected variables. Luxembourg can be identified as tax haven with very strong position. The second cluster is presented by countries with closer position to Luxembourg than to the other countries. These

countries can be identified as tax havens with the exception of Germany. Values of the most of variables for Germany do not significantly differ from the other countries but the level of FSI is very high therefore this assignment to the cluster of tax havens. The position of the United Kingdom is also questionable but its values for financial sector indicates that the position in the financial market is closer to the tax havens than to the rest of the EU. The third cluster consists of the rest of the EU countries. These countries have very close values of variables with no significant disproportion.

Figure 1: Dendrogram with Luxembourg

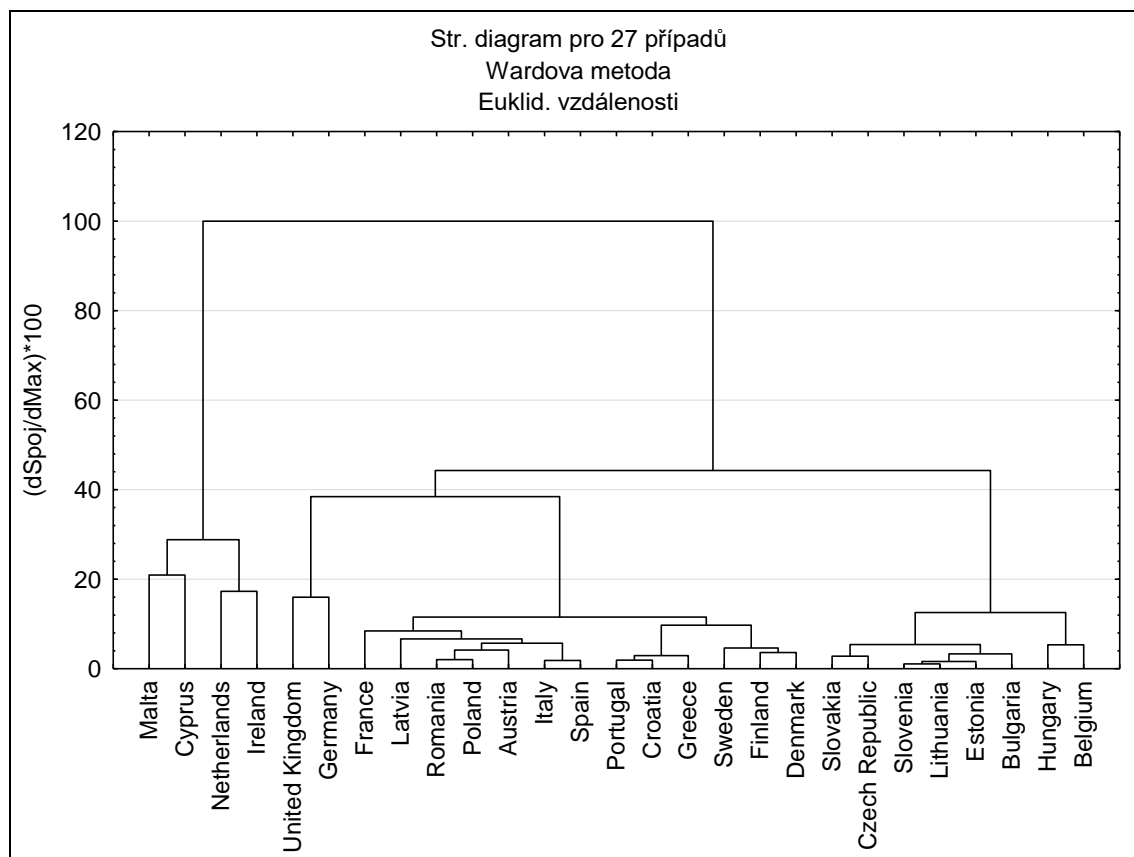


Source: authors

As the Luxembourg's values of variables report outliers the cluster analysis is run once more without Luxembourg. All other attributes of analysis are unchanged. The results are shown by the Figure 2. There are two clusters in the half of distance. The first one can be called tax havens and the second one non-tax havens. There are four countries which this second run of analysis classifies as tax havens: Malta, Cyprus, Netherlands and Ireland. The most important difference from the first analysis can be seen in not including the United Kingdom and Germany to the group of tax havens.

Results of cluster analyses correspond with the previous research. Clusters with higher values of variables, which are associated with tax havens, concentrate countries with some evidence of being tax havens. For the concrete EU countries, five of them can be called tax haven considering the results: Luxembourg, Ireland, Netherlands, Malta and Cyprus.

Figure 2: Second Dendrogram without Luxembourg



Source: authors

Studies mentioned in the literature review section show several important aspects of tax havens utilization. First, there is connection between tax planning and intellectual property (Jones & Temouri, 2016), (Richardson & Taylor, 2015). Results are consistent with these studies because cluster of tax havens generates high level of receipts for IP. Payments for the use of intellectual property are frequent way of transfer pricing therefore their level is an important indicator for tax havens identification. For the concrete values, all the tax havens report similar situation with one exception: Cyprus. Four other countries (Netherlands, Luxembourg, Ireland and Malta) have high share of receipts for the use of patents and other similar assets. This also corresponds with current research because companies use intangible assets in profit shifting activities.

High level of FDI flows are also connected with the tax havens. These flows are very high especially in Luxembourg. Overall, the values of indicators for this country have the greatest anomalies in the set of EU countries. FDI flows from and to Luxembourg are more than sixty times larger than its GDP (Eurostat, 2018, B), (Eurostat, 2018, C). For all other tax havens, the value of outward and inward FDI exceed their GDPs more than twice. This does not count for other EU countries. But the position of Luxembourg is not specific only because of FDI flows. Luxembourg is the country with the largest financial sector considering the size of economy. Large amounts of exports are also connected with the group of tax havens. Countries which are considered as open economies with significant export (e.g. the Czech Republic) has smaller amount of exports to GDP than countries like Luxembourg and Ireland. This factor shows that companies use tax havens as a place for profit shifting activities.

5. Conclusion

This paper shows the significance of EU tax havens. Countries like Luxembourg or Netherlands are heavily used by multinational companies and it has only one logical explanation: they are tax havens. Other EU countries with considering their size do not report so high level of international flows. This contribution also confirms the importance of intellectual property in tax havens' utilization.

The asymmetric of tax havens' economies is significant. Therefore, we can notice relatively strong results about the group of tax havens. Identification of tax havens is not only important for international organizations or tax authorities, but it also brings information about companies' behaviour. From this perspective, financial managers of companies tend to use legislation of identified tax havens to reduce companies' tax liabilities. Business environment of identified group of tax havens belongs to the most tax friendly in terms of international taxation.

On the other hand, this study relies on aggregated quantities and the situation at the bilateral level of relation between two countries can be more diverse. Further research should analyse this problem as a group of partial links at the bilateral level. This view should bring extended information about managers' decision making.

Acknowledgment

This contribution was made with the financial support of SGS_2018_013.

References

- [1] Aubry, M. and Dauphin, T. (2017). Opening the Vaults: The use of tax havens by Europe's biggest banks. Oxfam international. Oxfam GB, Oxford. [Online]. Available: <https://www.oxfam.org/en/research/opening-vaults>
- [2] Berkhout, E. (2016). Tax Battles: The dangerous global race to the bottom on corporate tax. Oxfam international. Oxfam GB, Oxford. [Online]. Available: <https://www.oxfam.org/en/research/tax-battles-dangerous-global-race-bottom-corporate-tax>
- [3] Chardonnet, A. and Langerock, J. (2017). Blacklist or whitewash? What a real EU blacklist of tax havens should look like. Oxfam international. Oxfam GB, Oxford. [Online]. Available: <https://www.oxfam.org/en/research/blacklist-or-whitewash-what-real-eu-blacklist-tax-havens-should-look>
- [4] Dyreng, S. D., Hoopes, J. L. and Wilde, J. H. (2016). Public pressure and corporate tax behavior. *Journal of Accounting Research*, vol. 54, no. 1, pp. 147-186.
- [5] European Commission (2018). Common EU list of third country jurisdictions for tax purposes. [Online]. Available: https://ec.europa.eu/taxation_customs/tax-common-eu-list_en
- [6] Eurostat (2018a) Exports of goods and services in % of GDP. [Online]. Available: <http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tet00003&plugin=>

- [7] Eurostat (2018b) Inward FDI stocks in % of GDP. [Online]. Available: <http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tec00105&plugin=>
- [8] Eurostat (2018c) Outward FDI stocks in % of GDP. [Online]. Available: <http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tec00106&plugin=1>
- [9] Fichtner, J. (2016). The anatomy of the Cayman Islands offshore financial center: Anglo-America, Japan, and the role of hedge funds. *Review of International Political Economy*, vol. 23, no. 6, pp. 1034-1063.
- [10] Gumpert, A., Hines Jr, J. R. and Schnitzer, M. (2016). Multinational firms and tax havens. *Review of Economics and Statistics*, vol. 98, no. 4, pp. 713-727.
- [11] Jaafar, A. and Thornton, J. (2015). Tax havens and effective tax rates: An analysis of private versus public European firms. *The International Journal of Accounting*, vol. 50, no. 4, pp. 435-457.
- [12] Janský, P. and Prats, A. (2015). International profit-shifting out of developing countries and the role of tax havens. *Development Policy Review*, vol. 33, no. 3, pp. 271-292.
- [13] Jones, C. and Temouri, Y. (2016). The determinants of tax haven FDI. *Journal of World Business*, vol. 51, no. 2, pp. 237-250.
- [14] Klassen, K. J., Lisowsky, P. and Mescall, D. (2017). Transfer pricing: Strategies, practices, and tax minimization. *Contemporary Accounting Research*, vol. 34, no. 1, pp. 455-493.
- [15] Novotný, J. and Kruml, L. (2015). Development of Tax Havens due to Globalization Processes and their Impact on the Czech Republic. *Proceedings of 15th International Scientific Conference on Globalization and its Socio-Economic Consequences*. Rajcke Teplice, Slovakia, pp. 531-537.
- [16] Richardson, G. and Taylor, G. (2015). Income shifting incentives and tax haven utilization: Evidence from multinational US firms, *The International Journal of Accounting*, vol. 50, no. 4, pp. 458-485.
- [17] Tax Justice Network (2018). Financial Secrecy Index – 2018 Results. [Online]. Available: <https://www.financialsecrecyindex.com/introduction/fsi-2018-results>
- [18] The World Bank (2018a). GDP. [Online]. Available: <https://data.worldbank.org/indicator/NY.GDP.MKTP.CD>
- [19] The World Bank (2018b). Charges for the use of intellectual property, receipts. [Online]. Available: <https://data.worldbank.org/indicator/BX.GSR.ROYL.CD>
- [20] The World Bank (2018c). Insurance and financial services. [Online]. Available: <https://data.worldbank.org/indicator/BX.GSR.INSF.ZS>
- [21] Tobin, G. and Walsh, K. (2013). What makes a country a tax haven? An assessment of international standards shows why Ireland is not a tax haven. *The Economic and Social Review*, vol. 44, no. 3, pp. 401-424.

AUDIT OF AUDITING COMPANIES

Zuzana Juhászová^{1,a,*}, Miloš Tumpach^{2,b} and Zuzana Kubaščíková^{3,c}

^{1,2,3}University of Economic in Bratislava, Faculty of Economic Informatics, Department of
Accounting and Auditing, Dolnozemska cesta 1, 852 35 Bratislava, Slovakia,

^azuzana.juhaszova@euba.sk, ^bmilos.tumpach@euba.sk, ^czuzana.kubascikova@euba.sk

*Corresponding author

Abstract. An entity is expected to provide a true and fair view of its financial and financial position in the financial statements. For this reason, the financial statements and the subsequent annual financial statements of the accounting units are verified by the auditor. This activity is performed by statutory auditors, who can act as natural persons as well as legal entities. Statutory audit is conducted based on International Standards on Auditing (ISA), which many countries of the world have adopted for their own sake. Depending on the size criteria, audit firms may also be audited. Therefore, the contribution will focus on audits carried out in audit firms based in Slovakia in 2014-2017. Audited companies are generally companies that operate not only on the Slovak market but also abroad, all over the world. In many cases, auditing companies act as part of a network of multinational companies. The auditing firm's audit is therefore important not only for the company itself but primarily for its clients. In globalization, it is not a problem to carry out an audit in one country where the entity is based in another country. The data for the analysis were obtained from the financial statements and from the websites of the individual audit firms. Consequently, we will analyse these companies with an impact on the assessment of the impact of audit firms on the market.

Keywords: Accounting, Auditing, Financial Statements

JEL Classification: M410, M420, M200

1. Introduction

In keeping with the accounts of the audit firm, they respect the national framework (Accounting Act, accounting procedures which consider many widely accepted principles in transnational systems) (Ondrušová - Parajka 2014), therefore also in accordance with national the rules then prepare the financial statements (Horváth, 2017). The main activity of audit firms is above all to provide an opinion on whether the statutory auditor expresses whether the audited entity's financial statements (Šlosárová, 2014) provide a true and fair view of the financial position and results of operations under the Act on Accounting or International Accounting Standards (Kareš, 2015), (Kršeková - Pakšiová, 2015), (Bajra – Cadez, 2018). Based on this view, many users decide whether they will invest in the entity, whether its financial institutions provide a loan or take other decisions (Kršíková - Rybka, 2012).

2. Goal of the post

In the paper, we focus on the audit reports of audit firms, on the following hypotheses:

- H1 All audit firms have published financial statements in the financial statements.

- H2 All audit firms that were required to audit the accounts by the auditor are among the large entities.
- H3 All audit firms that have been required to audit the financial statements by the auditor have an auditor's report in the required structure.
- H4 All audit firms that have been required to audit the accounts by the auditor have their financial statements published in the financial statements, including the publication of the Auditor's Report.

3. Methods of processing

There were 237 companies operating in the Slovak market in the years 2013-2016, which provide not only consulting services in the exercise of the auditing profession, but mainly carry out audits, i.e. verify the financial statements of other companies. The data for the subsequent analysis were drawn primarily from the financial statements register, where entities are required to disclose their financial statements (Stanková - Marci, 2016). We will designate them as auditing companies for their contribution.

With the published financial statements, we focused on selected data from financial statements - assets, turnover, number of employees. Since some audit firms have an accounting period chosen as an economic period of twelve consecutive months, for the analysis we have chosen a period of four consecutive years in which the audit firms have published their financial statements.

4. Auditing companies

Despite the obligation to disclose financial statements (Section 23 of Act No. 431/2002 Coll., As amended, the accounting law), three of the total number of audit firms did not have their financial statements published either at the Company's headquarters or in the accounts of the financial statements. For this reason, we must reject hypothesis 1.

4.1 Size criteria in auditing firm's environment

Each of the auditing companies operates in different types of accounting units - such as micro entities, small units or large units (Šlosárová - Bednárová, 2015), (Pavlova, K. S. 2018). whether as single-party companies or companies that are part of large multinational companies (Košovská, 2015).

An overview of the size of the micro, small, and large unit of account is given in the following table. An entity that meets at least two of these conditions (Section 2, General Provisions, paragraphs 6 to 8 of the Accounting Act) on the size of assets, turnover and average recalculated number of employees is classified in the size group from the following accounting period:

Table1: Classification of companies by size

	Property	Net sales	Average recalculated number of employees
Mikro entity (§ 2 ods. 6)	< 350 000	< 700 000	< 10
Small entity	350 000 > 4 000 000	700 000 > 8 000 000	10 > 50

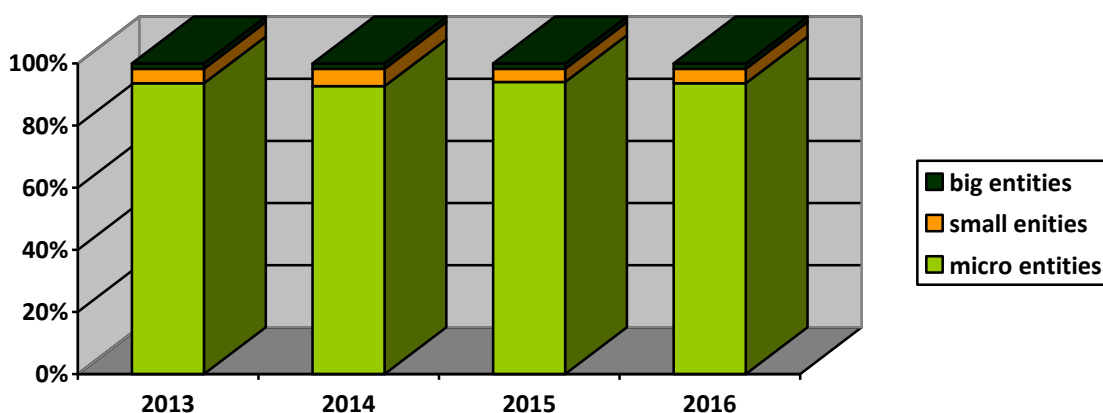
(§ 2 ods. 7)			
Big entity (§ 2 ods. 8)	>4 000 000	> 8 000 000	> 5

Taking this criterion into account, the structure of auditing companies is listed in the following report:

Table 2: The distribution of audit firms by size

	2013	2014	2015	2016
Mikro entities	218	216	219	218
Small entities	11	13	10	11
Big entities	4	4	4	4

Figure 1: The distribution of audit firms by size



For an entity to be obliged to verify the financial statements by the auditor, only size criteria are insufficient (Krišková - Užík, 2015). This obligation is laid down in the Act on Accounting (§ 19 Auditing of the Financial Statements by the Auditor, Paragraph 1 of Act No. 431/2002 Coll., On Accounting as amended) for those entities where at least two of the following conditions apply:

- the total amount of the assets exceeded EUR 1 000 000,
- Net turnover exceeded EUR 2 000 000,
- the average recalculated number of employees exceeded 30 in one accounting period.

Within the monitored group of companies that engage in the provision of audit services, we have identified the companies that have this obligation. Four are among those we call the "big square", which include Deloitte Audit s. r. o., KPMG Slovakia spol. s r. o., E & Y spol. s r.o. (previously referred to as Ernst & Young Slovakia, Ltd.) and PricewaterhouseCoopers Slovakia, p. r. about.). Another auditing company, which is required to have audited financial statements, is a small entity - VGD SLOVAKIA s.r.o. Therefore, we must reject hypothesis 2.

4.2 Auditor's report in audit firms

To verify Hypothesis 3 and Hypothesis 4, we have been gradually analysing the audit reports of all audit firms that were required to have the financial statements certified by the auditor.

The auditor's report must include (in accordance with § 27 of Act No. 423/2015 on Statutory Audit and on Amendments to Act No. 431/2002 Coll., On Accounting as amended) the following facts:

- a) an introduction by which the statutory auditor determines the accounts that are the subject of a Statutory Audit, stating
 1. the name of the entity,
 2. the date on which the financial statements are drawn up and the accounting period to which the financial statements relate,
 3. the procedures used for the preparation of the financial statements,
- b) a definition of the extent of the statutory audit carried out, including the applicable International Auditing Standards, according to which the Statutory Audit was performed,
- c) an opinion by which the statutory auditor expresses whether the financial statements give a true and fair view of the financial position and results of operations in accordance with the law on accounting or international accounting standards, the statutory auditor's opinion being unconditional, conditional or negative; if, on the basis of the information available, it is not possible for the Statutory Auditor to express his opinion, the Auditor's report contains a refusal to express an opinion,
- d) an indication of the facts which the Statutory Auditor underlined without expressing a conditional view,
- e) a statement of all significant uncertainties relating to events or circumstances that may give rise to material doubts as to the entity's ability to continue to operate continuously,
- f) information on the home Member State of the audit firm if the statutory auditor performs statutory audits on behalf of the audit firm.

Since we analysed the auditor's reports issued after January 1, 2016, when the Statutory Audit Act came into effect, we compared the individual auditor's reports with the required structure.

Deloitte Audit s. r. o.

Auditor's report entitled: Independent Auditor's Report for Deloitte Audit Auditors. r. about. for 2016 and for 2017 issued by the same auditor. Both reports were published in the accounts of the financial statements. Both are completely identical to the date on which the Auditor's Reports were issued: 16.5.2017 and 17.5.2018. Both audits have the same structure:

- Reviews
- Basis for opinion
- Liability of the statutory body for the financial statements
- Auditor's responsibility for the audit of the financial statements
- Report on the information to be included in the annual report.

KPMG Slovensko spol. s r. o.:

Auditor's report: The Independent Auditor's Report to the Statutory Body of KPMG Slovensko spol. s r.o. in 2016 and in 2017 issued by the same auditor. Both reports were published in the accounts of the financial statements. Both audits have a different structure. The auditor's report for the year ended 30 September 2016 has the following structure:

- Liability of the statutory body for the financial statements

- Auditor's responsibility
- Reviews

The auditor's report for the year ended 30 September 2017 has the following structure:

- Reviews
- Basis for opinion
- Liability of the statutory body for the financial statements
- Auditor's responsibility for the audit of the financial statements
- Report on Further Requirements of Laws and Other Legislation - Report on the Information to be included in the Annual Report

Spoločnosť E & Y spol. s r. o.

Auditor's report: The Independent Auditor's Report for ERNST & YOUNG, s.r.o., Bratislava, 2016 and 2017, is issued by the same auditor. Both auditor's reports were disclosed in the financial statements. Both audits have a different structure. The auditor's report for the year ended June 30, 2016 has the following structure:

- The company's management responsibility for the financial statements
- Basis for opinion
- Reviews

The auditor's report for the year ended 30.7.2017 has the following structure:

- Reviews
- Basis for opinion
- The responsibility of the statutory body of the Company for the financial statements
- Auditor's responsibility for the audit of the financial statements
- Report on other requirements of laws and regulations

PricewaterhouseCoopers Slovensko, s. r. o.

The Auditor's Report is titled: Independent Auditor's Report to Partners and Managing Directors of PricewaterhouseCoopers Slovakia, p. r. about. in 2016. The auditor's report for 2017 has not yet been published in the register of financial statements. The auditor's report for 2016 has the following structure:

- Reviews
- Basis for opinion
- Liability of the accountants for the financial statements
- Auditor's responsibility for the audit of the financial statements
- Report on Further Requirements of Laws and Other Legislation - Report on the Information to be included in the Annual Report.

VGD SLOVAKIA, s.r.o.

The Auditor's Report is titled: The Independent Auditor's Report for Partners and the Statutory Body of VGD SLOVAKIA, s.r.o. The report is for 2016 when the audit firm was required to have audited accounts. The auditor's report for 2016 has the following structure:

- Reviews
- Basis for opinion
- Liability of the statutory body for the financial statements
- Auditor's responsibility for the audit of the financial statements

- Report on Further Requirements of Laws and Other Legislation - Report on the Information to be included in the Annual Report.

Table 3: Analysis of Audit Reports of Audit Firms

	Deloitte Audit s. r. o.		KPMG Slovensko spol. s r. o.		E & Y spol. s r. o.		PricewaterhouseCoopers Slovensko, s. r. o.		VGD SLOVAKIA , s.r.o.
season	Calendar year		Economic year		Economic year		Calendar year		Calendar year
date	1.1.2016 - 31.12.2016	1.1.2017 - 31.12.2017	1.10. 2015 - 30.9.2016	1.10. 2016 - 30.9. 017	1.7.2015 - 30.6. 2016	1.7.2016 - 30.7.2017	1.1.2016 - 31.12.2016	1.1.2017 - 31.12.2017	1.1.2016 - 31.12.2016
disclosure of the financial statements	yes	yes	yes	yes	yes	yes	yes		yes
audit of the financial statements	yes	yes	yes	yes	yes	yes	yes		yes
audit of the annual report	yes	yes	no	no	no	no	yes		yes
introduction									
• Title	yes	yes	yes	yes	yes	yes	yes		yes
• Day and period	yes	yes	yes	yes	yes	yes	yes		yes
• approach	yes	yes	yes	yes	yes	yes	yes		yes
Scope definition	yes	yes	yes	yes	yes	yes	yes		yes
opinion	yes unconditional								
Statement of facts without effect on conditional opinion	no	no	no	no	no	no	no		no
Expressions to the threat of continuous business activity	no	no	no	no	no	no	no		no

5. Results

After analysing the auditing companies, we evaluated the hypotheses. Hypothesis 1 was denied because we identified companies that do not have financial statements in the financial statements. Hypothesis 2 has also been rejected because we have identified, in addition to the four largest auditing firms, another one that has the obligation to have audited accounts. Hypothesis 3 was accepted because all the audited reports were in the required structure. This assumes that auditing companies perform consistently (Meluchová & Mateášová, 2015) and companies' accounts drawn up based on information from accounting (Maděra, 2015) provides a true and fair view of the specific accounting unit - auditing company (Banociová & Tusan, 2016). At the same time, we have thoroughly verified that audit firms have the audit reports in order (Yu, 2014). The different structure of the audit report was mainly due to the amendment of the Statutory Audit Act as of September 30, based on the unconditional views published in their reports, there is a presumption of their continued activity in the following periods (Krišková & Užík, 2016). The last hypothesis regarding disclosure in the accounts of

the financial statements was rejected because there is no PWC auditor's report for 2017 published today, probably due to the shifted accounting period.

6. Conclusion

Based on the above analysis, we have come to the conclusion that auditing companies publish the financial statements in the financial statements so that they fulfil their reporting obligation to the users of the financial statements. Audit companies that were audited during the reporting period had an unqualified opinion in the auditor's report, which for the users of the data in the financial statements means that the accounting entity in the financial statements provides a true and fair view of the financial position and the profit or loss (Litjens et al., 2015), (Brivot et al., 2018). This is also a prerequisite that, when the entity has a proper accounting system, it also carries out its activities rigorously, which in the case of auditing companies is doubled.

References

- [1] Bajra, U. and Cadez, S. (2018). Audit committees and financial reporting quality: The 8th EU Company Law Directive perspective. *Economic systems*, vol. 42, no. 1, p. 151.
- [2] Banociová, A. and Tusan, R. (2016). Setting of Audit Procedures on the Auditing of the Financial Statements of the Municipality. *Proceedings of the 11th international scientific conference public Administration*, pp. 9-21.
- [3] Brivot, M., Roussy, M. and Mayer, M. (2018). Conventions of Audit Quality: The Perspective of Public and Private Company Audit Partners. *Auditing: a journal of practice and theory*, vol. 37, no. 2, p. 51.
- [4] Horváth, P. et al. (2017). Status quo and future development of sustainability reporting in Central and Eastern Europe. *Journal of East European management studies (JEEMS)*. - Mering: Reiner Hampp Verlag, vol. 22, no. 2, pp. 221-243.
- [5] Kareš, L. (2015). *Teória auditu*. Bratislava Wolters Kluwer, 1. vyd.
- [6] Košovská, I., Váryová, I., Bojňanský, J., Ferenczi-Vaňová, A. and Krajčírová, R. (2015). Amendments in the accounting of entrepreneurs - specifics of measurement, bookkeeping and reporting in a micro accounting entity in the Slovak republic. *Financial management of firms and financial institutions proceedings: 10th international scientific conference Ostrava, Czech Republic*, pp. 554-565.
- [7] Krišková, P. and Užík, J. (2015). Implementácia požiadaviek nadnárodnej úpravy auditu do slovenskej legislatívy. *Účtovníctvo a audítorstvo v procese svetovej harmonizácie, zborník z medzinárodnej vedeckej konferencie, VIRT - vzdelávacie zariadenie EUBA, Bratislava*, s. 65-67.
- [8] Krišková, P. and Užík, J. (2016). The Going concern within the overall perspective of the auditor on the financial statements. *Účetnictví a auditing v procesu světové harmonizace. Mezinárodní vědecká conference*, Vranov nad Dyjí, Česko, pp. 112-115.
- [9] Kršeková, M. and Pakšiová, R. (2015). Financial reporting on information about the financial position and financial performance in the financial statements of the public

- sector. *International scientific conference Finance and risk proceedings of the 17th international scientific conference*, Bratislava, Slovak Republic, pp. 136-145.
- [10] Kršíková, V. and Rybka, L. (2012). Audit risk in the context of the audit profession. *European financial systems international scientific conference*, Brno, Czech Republic, pp. 102-106.
- [11] Litjens, R., Joost van Buuren and Vergoossen, R. (2015). Addressing Information Needs to Reduce the Audit Expectation Gap: Evidence from Dutch Bankers, Audited Companies and Auditors Addressing Information Needs to Reduce the Audit Expectation Gap: Evidence from Dutch Bankers, Audited Companies and Auditors. *International journal of auditing*, vol. 19, no. 3, p. 267.
- [12] Maděra, F. (2015). Postavenie účtovníka a regulácia profesie účtovníka na Slovensku: vývoj, súčasný stav, perspektívy. *Auditor: časopis Komory auditorů České republiky.*, vol. 22, no. 3, pp. 19-25.
- [13] Meluchová, J. and Mateášová, M. (2015). The Ethical aspect of the business in insurance in the conditions of a globalized financial market. *Financial management of firms and financial institutions, 10th international scientific conference*, Ostrava, Czech Republic. pp. 783-790.
- [14] Ondrušová, L. and Máziková, K. (2016) The Revaluation at fair value in merger. *Účetnictví a auditing v procesu světové harmonizace. Mezinárodní vědecká conference*, Vranov nad Dyjí, Česko, pp. 148-152.
- [15] Ondrušová, L. and Parajka, B. (2014). The Revaluation of assets and liabilities at fair value in merger. *Managing and Modelling of Financial Risks. international scientific conference. Managing and Modelling of Financial Risks, 7th International Scientific Conference*, Ostrava, Czech Republic. pp. 577-581.
- [16] Pavlova, K. S. (2018). Methodology for Monitoring the Customer Value Perception of the Service Quality in Small Audit Companies, *HELIX*, vol. 8, no. 5, p. 3593.
- [17] Stanková, A. and Marci, A. (2016). Limitations of classical statistical models in the process of usage and possibilities of using neural networks in the field of predicting financial situation of the business. *Účetnictví a auditing v procesu světové harmonizace, ezinárodní vědecká conference*, Vranov nad Dyjí, Česko, pp. 177-181.
- [18] Šlosárová, A. (2014). *Analýza účtovnej závierky*. Bratislava Vydavateľstvo EKONÓM.
- [19] Šlosárová, A. and Bednárová, B. (2015). Analysis of measurement approaches in financial statements of selected industrial enterprises in the Slovak republic from perspective of user's usefulness. *Financial management of firms and financial institutions, 10th international scientific conference*, Ostrava, Czech Republic, pp. 1263-1273.
- [20] Yu, Z. (2014). The empirical study of the effect of audit quality on audit charge-through studies on accounting firms auditing public companies in 2012. *Proceedings of the International Conference on Education Tecnology and Information System (ICETIS 2014)*, vol. 115, p. 570.

IMPACT OF THE ECONOMIC CRISIS ON THE AVAILABILITY OF FINANCIAL RESOURCES IN SMALL AND MEDIUM-SIZED ENTERPRISES IN THE FACE OF GLOBALIZATION

Roman Juris^{1,a,*}, Elena Gregova^{2,b}

¹University of Zilina, The Faculty of Operation and Economics of Transport and Communications,
Department of Economics, Univerzitna 1, 010 26 Zilina, Slovakia

²University of Zilina, The Faculty of Operation and Economics of Transport and Communications,
Department of Economics, Univerzitna 1, 010 26 Zilina, Slovakia

^aroman.juris@fpedas.uniza.sk, ^belena.gregova@fpedas.uniza.sk

*Corresponding author

Abstract. The financial and economic crisis, which broke down in 2007 in the United States, has gradually hit other economies, resulting in negative effects that have also been reflected in the conditions of the SR. The main causes of the crisis are known, but the consequences have not been expected to such an extent. Due to the continuous intensification of integration processes in the current period of globalization, it is possible to talk about a situation where there are virtually no significant barriers between individual economic entities at all levels, especially in the area of communication, movement and trade. Individual business entities perceive the quality of the business environment differently depending on a number of factors, for example depending on the subject matter, the life cycle of the business or the product, the conditions of the competitive environment, but also the phase of the economic cycle in which the economy is located. Many businesses suffer from problems that arise not only from the outside environment but also from their own internal environment. On the one hand, therefore, there may be sectorial risks, the general risks that operate outside the enterprise and usually affect all businesses or businesses operating in a particular sector or region. On the other hand, there may be problems arising from the internal environment, for example, lack of financial resources as an internal barrier, which may have different causes. Some small and medium-sized enterprises need foreign financial resources, which, however, due to their unfavourable credit ratings may be unavailable to them. The subject of the study is the impact of the financial and economic crisis on the availability of foreign financial resources for small and medium-sized enterprises, its manifestations in the management of enterprises.

Keywords: small and medium-sized enterprises, globalization, financial crisis, financial resources

JEL Classification: F63, H20, O31

1. Introduction

The economic and financial crisis can be considered as one of the most important challenges for the sustainability of the globalization process. Notwithstanding the significant benefits of globalization of the world economy - although not all countries have the same

benefits - in terms of liberalization of global capital, goods and services mobility, due to the interdependence of the global economy, there is also a negative impact on bank, currency and economic crises. In this context, despite the fact that the ongoing crisis was initially perceived as the only US crisis, it has gradually emerged as the worst global economic crisis since the Second World War, both in terms of its scale and its negative impacts to the global economy.

Small and medium-sized enterprises (SMEs) worldwide are the backbone of the economy and the main employer. They are also important in terms of creating and applying innovations. In the past, large companies have been the driving force behind the economies of developed countries. Small and medium-sized enterprises were considered as a means of support for the big economy, as a means of enriching the market and filling out market segments that were not interested in large companies for various reasons.

2. Impacts of the financial and economic crisis

At the macroeconomic level, the cyclical development of the economy is necessary because the economy is not developing in the first place. The dynamics of the economy's development lies in its diversity and reflects sectoral developments and international dependencies. The 2008 recession has had a prolonged and varying effect both across and within countries (Kitsos & Bishop, 2018). Market economy results in a non-linear development that accompanies various degrees of risks and crises. Crisis Management is designed to analyse crisis situations and take action to address them. The microeconomic sphere is represented by enterprises in various organizational - legislative form and entrepreneurial activity. The source of the risks is the life of the product and the form of the services provided. Innovative SMEs may implement differentiation and focus strategies and survive without CSs, whereas innovation may be obtained through cost leadership strategy (Ulubeyli et al., 2018). The internal market is linked to the foreign market in the product or service sphere, as well as in the financial sphere. The finances present both own and foreign capital, as well as the efficiency of operating ratios, resulting in returns and resources for investment. The product market verifies the need for corporate performance and determines the value of the enterprise's valuation. The financial market verifies capitalist power, weaknesses in business, and hence the resolution of risk elements in an enterprise is judged from both points of view. Financial stability is an operational stability. The result of operating work may be reflected in profits in business activity with a different internal and foreign market structure. The sources of risk in these activities can be identified after a thorough analysis. However, it is important for companies to efficiently satisfy their business and commercial activities.

Gozora (2017) defines the crisis situation as a difficult predictable course of events and activities that, in the event of disruption, the failure of the balance of natural, social, production and technological systems can endanger the life of the population, the environment, the economic and intellectual property of the country. This is a situation that may arise at macroeconomic, microeconomic or enterprise level, and special approaches and measures to address them need to be implemented.

Expecting the crisis can be registered based on signals from the external but also from the internal environment of the company. External signals include: fluctuations, stagnation of product and service sales, increasing competitive pressure from companies whose market share can be attained by higher quality, innovation or a lower price, worse satisfaction of

customers' needs that are affected by changes in consumer preferences (Vodacek & Vodackova, 2009).

The financial crisis that broke out in the US quickly became a global crisis. At the very beginning, in the summer of 2007, however, the crisis did not have a major impact on developing and emerging economies. But over time, especially since September 2008, the effects of the financial crisis have begun to feel almost all countries, whether directly or indirectly. In the case of predominantly developing and emerging countries, their exchange rates weakened, resulting in a sharp fall in the value of securities, a decrease in the inflow of foreign investment, a decline in exports, and, in many countries, a complete suspension of the IPO (public offering of shares). The decline in cross-border lending led to a deterioration in the borrowing conditions of small firms (Bremus & Neugebauer, 2018).

The impact of the financial and economic crisis on the dynamics of securities developments was dramatic. After a long-term boom in nearly all major financial markets, the value of securities has been severely overtaken by the ongoing crisis. The weakening of the real global economy has sparked a decline in future earnings from securities, which eventually provoked a massive "sell-off" on the capital markets, contributing to a faster fall in the world economy. The less deposit-funded, less profitable and less capitalized cooperative banks are, the more likely they are to securitize and the more likely it is that they will securitize to a larger extent (Castellani, 2018). The same holds true for the significant slowdown in private credit provided by banking institutions in both advanced, developing and emerging countries.

The economic crisis was hit by small and medium-sized businesses (SMEs) and thousands declared bankruptcy. Most of them depend on a limited number of customers or buyers, and sales have fallen further. In addition, for an unprecedented limitation of credit availability, it is too high a risk for them to expand their portfolio of products or to turn to other regions not only within the settlement but also beyond the borders. While SMEs are very responsive to the economic downturn, they are much more gruelling in rescue efforts than larger firms and are therefore able to more quickly adapt to market conditions, for example by sharing the cost of renting office space with another small company. Since they can save themselves otherwise - they do not go to such a large extent to redundancy or disturbance of operations as big companies. On the other hand, however, they are at a disadvantage, as State aid mostly receives systemically more substantial and, in particular, far larger businesses. This dilemma was also solved by the Slovak government in creating anti-crisis measures. On the side of the government's steps, a wave of criticism has also emerged that aid is being given only to the big ones and to the small ones they forget. SMEs can play vital role in assisting and fostering entrepreneurial activity with special focus on Information Technology businesses (Abbas, 2018).

Marko Curavic from the European Commission's DG for Business, during a panel discussion during the first European Small Business Week in Brussels, talked about obstacles that prevent Europeans from even trying to lose their jobs by running their own businesses. European SMEs are currently negatively affected by two types of factors - hard and soft (Euractiv, 2009).

For the hard factors he said:

- Bureaucracy and administrative obstacles. The Commission's long-term goal is to shorten the business start-up in the member countries to three working days.

- Blocked access to funds. Due to the financial crisis, banks have much stricter credit availability rules for new SMEs, which are currently considered to be too risky.
- In addition, the tax burden and lack of skills and entrepreneurial education are considered a hindrance.

The soft factors that prevent Europeans from doing business are the fear of bankruptcy and the fear of loss of property. Curavic pointed out in particular that corporate bankruptcy is perceived in Europe almost as a crime.

The wave of global financial crises (2008-2009) caused a surge in the capital flows of developed countries particularly, between developed and developing countries. The crunch hit all financial sectors with unanticipated severity (Mustafa et al., 2018). With regard to the blocked credit flow, many Member States, such as Ireland, in the case of state support to the banking sector in return, call for an immediate resumption of lending to small and medium-sized enterprises. France has set up a network of credit intermediaries whose role it is to intervene if banks refuse SMEs. Italy also monitors lending by banks to businesses.

2.1 Overview of measures to combat the economic and financial crisis in selected Member States during the 2008 crisis

In order to overcome the adverse impact of the economic crisis on small and medium-sized enterprises, individual countries have put in place various government-backed support mechanisms that have been implemented through support institutions and commercial banks.

Although the country's economic stimulus packages are different, in fact, their governments agree that extraordinary interventions in the economy are necessary to stop the downfall of economic growth and the alarming rise in unemployment.

France has created a plan released by the French government in October 2008, including 22 billion support for SMEs. Under the government's agreement with banks, 17 billion of this amount is distributed to small businesses by banks. They must publish the report every month as they fulfil their duties. The remaining 5 billion was given by a state authority mandated to support innovative businesses and SME development OSEO, which guaranteed funding from banks and capital investors. OSEO recorded 5500 requests for assistance and guaranteed EUR 450 billion in loans.

In **Great Britain**, the incentive scheme for the economy included tax cuts in particular regions. The government has reduced VAT from 17.5% to 15% to boost entrepreneurial activity and consumer confidence. In addition, in the framework of financial guarantees for businesses, they have released £ 1.3bn in support of bank loans worth between £ 1,000 and a million. The guarantee could be used to support new loans or to refinance existing ones that increased the risk.

In April, the **Italian government** approved a plan to increase the budget of the Fondo di Granzia (guarantee fund) from € 500,000 to € 1.5 million. The decision was part of the package to help companies avoid bankruptcy. Lobby groups representing SMEs have requested more loans, less bureaucracy and improved business environment. Ownership concentration has a negative relationship with the performance of foreigner- and financial-owned firms, while boards exert a positive role on performance. Interestingly, the financial crisis does not impact the performance of Italian gambling SMEs and some business segments, such as bingo, perform even better during the crisis (La Rosa & Bernini, 2018).

In **Ireland**, exporters faced several challenges, particularly for fluctuations in British pounds and the euro. The UK is the most important export market for Irish SMEs, and Irish have an increasing tendency to shop in Northern Ireland, where prices are also lower for reduced VAT. To help SMEs, a 100 million Enterprise Stabilization Fund was created for "internationally traded companies". In addition, the government considered the establishment of so- a bad bank whose role is to absorb toxic assets from financial institutions to re-release the credit flow towards SMEs. The state assumed responsibility for loans and assets totalling € 90 billion through the National Asset Management Agency.

Romania had a three-year macroeconomic plan to overcome the crisis and a plan to recapitalize state-owned banks - CEC and EximBank. Unemployment benefits were extended by three months, and those who were forced to work for three months could receive 75% of their salary without being taxed. The biggest obstacle for Romanian SMEs is bureaucracy. According to the report, PricewaterhouseCoopers spends an average of 202 hours per year on tax-related administrative operations.

Slovak anti-crisis measures did not create any special fund for SMEs. Access to finance should be ensured by existing instruments. The increase in the share capital of the Slovak Guarantee and Development Bank (SZRB) by about EUR 33 million since the beginning of 2009 should create a space for financing programs for small and medium-sized entrepreneurs. In addition, by 31 March, the European Investment Bank's loan line of EUR 30-40 million should be drawn up for the development of small and medium-sized enterprises. By the same date, Eximbanka's share capital should have been increased by about EUR 11.5 million.

In the next action, the government planned to accelerate the implementation of the Jeremie initiative for small and medium-sized enterprises. The aim was to use bank guarantees and a micro-loan program, implemented through SPVs.

The State aid (de minimis) scheme for the Operational Program Competitiveness and Economic Growth has also been provided with a space for higher financial assistance in relation to the temporary two-year exemption above the de minimis threshold for State aid of up to EUR 500 000.

Another group of measures concerned innovation and increased competitiveness. In the anti-crisis plan, the government said it was necessary to promote innovation and technology transfer, especially for SMEs, to address energy intensity, reduce environmental impacts and increase production efficiency. The government therefore wanted to accelerate the program to support the emergence of networks and clusters, a program to support activities to engage Slovak companies in international clusters, including the use of Community programs (e.g. 7RP, CIP).

Applied research and innovation have also been supported by the Research and Development Support Agency. In 2009, the government supported a total of 26.6 million euros for 20 projects (companies). The measure was to increase staffing capacities in corporate research and development, businesses have gained resources on the condition that they expand the research and development workplace. Government-controlled banks (GCBs) significantly increased their lending to small and medium-sized enterprises (SMEs) whose main bank was a large bank in the 2008-09 financial crisis. Further analyses show that the weak relationship between large banks and SMEs is a major cause for this phenomenon (Ogura, 2018).

In spite of the problems and the high risks of collapses, it can be just the small and medium-sized enterprises, which will most likely contribute to the rehabilitation of the Slovak economy. With their ability to quickly adapt, they can quickly respond to new market conditions and adjust their production to meet the changing needs of customers or end consumers.

3. Conclusion

Supporting the growth of innovative and competitive small and medium-sized enterprises is the subject of research in many countries. In industrialized countries, numerous approaches are identified to achieve strategic and tactical goals. Methods of financing for small and medium-sized enterprises (SMEs) are a demanding issue due to low confidence by banks. To quantification financial health are applied different methods from financial management. Mazanec and Bielikova (2016) recommend the use of multivariate methods. Practical methods, techniques and tools are needed to help optimize decision-making in overcoming barriers to innovation. In particular, information and knowledge are taken into account, taking into account:

- Systemic aspects of the development of small and medium-sized enterprises not only in the Slovak Republic, but also in the global market environment.
- Identify and understand barriers, barriers and risks of small and medium-sized enterprises and ways to overcome them in a global market environment.
- Innovative SME Entrepreneurship Trends in a Global Marketplace.
- Using support systems and good practice (Workie et al., 2010).

These findings are relevant for SME policies aimed at facilitating access to credit, reducing the cost of borrowing, and decreasing default; risk management of banks; and the application of theories of financial economics in the context of a financial crisis (Duarte et al., 2018). In the centrally managed economies, the consequences were borne by the state as a whole, in market economies, they concern directly all the entities entering into the relationship with the given business entity. In other words, market participants (owners, creditors, suppliers, subscribers, employees, competitors, the state, etc.) (Kliestik & Majerova, 2015). The system approach is particularly important in terms of the impact of the global economic crisis on SMEs. The global crisis has hit SMEs as well as large businesses. The crisis has strengthened the risks and barriers to SMEs' innovation, on the one hand, and opportunities.

Acknowledgment

The paper is an output of the science project VEGA 1/0428/17 CREATION OF NEW PARADIGMS OF FINANCIAL MANAGEMENT AT THE THRESHOLD OF THE 21ST CENTURY IN CONDITIONS OF THE SLOVAK REPUBLIC.

References

- [1] Abbas, S. A. (2018). Entrepreneurship and Information Technology Businesses in Economic Crisis. *Entrepreneurship and Sustainability Issues*, vol. 5, pp. 682-692.
- [2] Bremus, F. and Neugebauer, K. (2018). Reduced cross-border lending and financing costs of SMEs. *Journal of International Money and Finance*, vol. 80, pp. 35-58.

- [3] Castellani, D. (2018). Mortgage-backed Securitization and SME Lending During the Financial and Economic Crisis: Evidence from the Italian Cooperative Banking System. *Economic Notes*, vol. 47, pp. 187-221.
- [4] Duarte, F. D., Gama, A. P. M. and Gulamhussen, M. A. (2018). Defaults in bank loans to SMEs during the financial crisis. *Small Business Economics*, vol. 51, pp. 591-608.
- [5] Euractiv. (2009). Kriza a male a stredne podniky. [Online]. Available: <https://euractiv.sk/section/podnikanie-a-praca/linksdossier/kriza-a-male-a-stredne-podniky-000237/>
- [6] Gozora, V. (2017). *Krizovy manazment podniku*, Bratislava: Wolters Kluwer, 184 pp.
- [7] Kitsos, A. and Bishop, P. (2018). Economic resilience in Great Britain: the crisis impact and its determining factors for local authority districts. *Annals of regional science*, vol. 60, pp. 329-347.
- [8] Klietnik, T. and Majerova, J. (2015). Selected issues of selection of significant variables in the prediction models. *Financial management of firms and financial institutions*, vol. 10, pp. 537-543.
- [9] La Rosa, F. and Bernini, F. (2018). Corporate governance and performance of Italian gambling SMEs during recession. *International Journal of Contemporary Hospitality Management*, vol. 30, pp. 1939-1958.
- [10] Mazanec, J. and Bielikova, A. (2016). Influence of globalization on financial health of Bratislava airport with emphasis on prediction bankruptcy models. *Globalization and its socio-economic consequences*, vol. 16, pp. 1330-1337.
- [11] Mustafa, F., Khursheed, A. and Fatima, M. (2018). Impact of global financial crunch on financially innovative microfinance institutions in South Asia. *Financial Innovation*, vol. 4.
- [12] Ogura, Y. (2018). The objective function of government-controlled banks in a financial crisis. *Journal of Banking & Finance*, vol. 89, pp. 78-93.
- [13] Ulubeyli, S., Kazaz, A. and Sahin, S. (2018). Survival of construction SMEs in macroeconomic crises Innovation-based competitive strategies. *Journal of Engineering Design and Technology*, vol. 16, pp. 654-673.
- [14] Vodacek, L. and Vodackova, O. (2009). *Synergie v modernim management*, Praha: Management Press, 170 pp.
- [15] Workie, M. T. et al., (2010). *Development and Prospects of World Economy. Recovery in the Global Economy: Reality or Myth?* Ekonomický ústav SAV a Prognostický ústav SAV.

TARGET AND PROCESS ORIENTATION OF FINANCIAL MANAGEMENT FROM THE ASPECT OF GLOBALIZATION

Jana Kajanová^{1,a,*}

¹Comenius University in Bratislava, Odbojárov 10, 820 05 Bratislava, Slovakia

^ajana.kajanova@fm.uniba.sk

*Corresponding author

Abstract. Development tendency of current business environment has a direct impact on results, possibilities and ambition of business subjects. Changes caused by globalization, economic, political, legislative, cultural or social influence create the initial moments and positions for their management and decision-making processes. Pressure and emphasis on higher quality, more effective and more responsible management of business subjects bring opportunities for research in the field of target and process orientation of financial management. Actual development of current global business environment causes pressure on business subjects in terms of business efficiency increase, enhancement of competitiveness, assurance of quality and responsible decisions and decrease of risks negatively influencing their existence, activities and achieved results. The purpose of this contribution is to identify the key features of the process and target orientation of financial management in terms of increasing the performance and competitiveness of business subjects, presenting the basic knowledge from this field and analysing the advantages and disadvantages of the new management method. The conclusions of the contribution summarize the new perspectives, possibilities and specifics of such management, its advantages and disadvantages, and formulate general recommendations for manufacturing companies. The main benefit of this contribution is the presentation of a new aspect of enterprise management, which is focused on manufacturing companies and allows for increased business effectiveness and competitiveness. Target and process orientation is a new challenge for managers and management of business subjects.

Keywords: globalization, target and process orientation, financial management, competitiveness

JEL Classification: F65, F63, G32

1. Introduction

Entrepreneurial subjects address many challenges and tasks in the area of financial management as a result of globalization impacts. Globalization is a phenomenon of nowadays associated with the development of information and communication technologies, information society and it also influences decisions of managers (Kučera & Látečková, 2015). Globalization represents one base characteristic of economic and political integration, it is a process which in modern society is included in all spheres of public life, is essential for economic growth in the world economy. The process of globalization leads to increase economic interdependence and interconnection of countries, where geographical boundaries

and physical distance lose their meaning, and national economies, conditionally said, lose their national economic identity (Rentková & Panevski, 2017). Globalization as shown in many studies and authors brings both positive and negative impacts (Kajanová, 2016). Setting up a system for sustainable development, ensuring the required activity and business performance are essential for long-term planning, strategy development, or financial investment planning. Investments are closely associated with changes ongoing in the financial market (Zatrochová & Kuperová, 2015).

Changes caused by globalization, economic, political, legislative, cultural or social influence create the initial moments and positions for their management and decision-making processes. Pressure and emphasis on higher quality, more effective and more responsible management of business subjects bring opportunities for research in the field of target and process orientation of financial management in the entrepreneurial subjects. To assess the importance of technological innovation for economic growth, an ideal measure should capture the economic value of new inventions and be comparable both across industries and across time (Kogan et al., 2017). One of the way how to increase the effectiveness of the companies is using of business process management. Business process management (BPM) as a systematic managerial approach enables organization's workflow to be more effective, more efficient and more capable to adapt to an ever-changing environment (Gažová et al., 2016).

At present time many business subjects are dealing with problems caused by the specific situation in the entrepreneurial and competitive environment, with the analysis of impacts of the economic crisis, and with the necessity of the dynamic reaction to changes influencing the internal and as well as external environment of those subjects. One of the areas which identifying mapping and referring about the situation in the enterprise is the financial area, which captures with its instruments facts executed in enterprises. Using financial statements, financial planning, analysis, financial statements, financial analysis enterprises provide the first ideas and background on their management and decision-making. Using of financial information for decision-making is also discussed by Porter and Norton (Porter & Norton, 2013). Financial analysis as a tool of prediction of corporate financial situation is in a detail mentioned in publication of Lesáková and Gundová (Lesáková & Gundová, 2014).

However, there is still no comprehensive system approach to process and target management that would quickly and adequately evaluate the business situation and highlight the potential risks and threats. Scientists have worked partly ways to help businesses measure performance and success. Critical situations influencing market position, expansion opportunities, revenue growth, economic results and existence of entrepreneurial subjects represent accelerators supported crisis management. This must necessarily have tools that are able to identify, evaluate and measure characteristics providing information about the state and quality of the business activity. This approach is examined in greater detail by the authors Bohner, Galles and Heim (Bohner et al., 2012). The hectic changes in the business environment require adequate responses by entrepreneurs. Business environment, in its widest understanding, reflects the quality of economic conditions and preconditions for the economic performance of these business subjects (Peráček et al., 2017). Changes in the business environment played important role in the whole process. Entrepreneurship is generally viewed as essential for the development of present market economies, as new firms are often source of increased productivity and innovation, leading to economic growth and growth of employment (Milošovičová & Stachová, 2016). Barriers and challenges for entrepreneurship are elaborated in work of Sulíková and Strážovská (Sulíková & Strážovská, 2016).

At present, a number of business entities deal with problems caused by a specific situation in the business and competitive environment and with the need of a dynamic response to changes affecting the internal and external environment of these entities. Competitive advantage can be generated by retention of qualified employees and by their development; highly important role plays quality management of knowledge employees (Hyršlová et al., 2015). By entering of Slovakia and the Czech Republic to EU, local markets opened completely for EU entities, this fact significantly changed the character of the business and competitive environment in the second half of the last decade (Kajan, 2016). The business environment is one of the basic assumptions of long-term competitiveness and growth of the market economy (Majerčák et al., 2015). Problems of competitiveness, economy, efficiency, accountability and business security require a specific approach in business management and decision-making of entrepreneurs. The evaluation of international opportunity using a time-based model is discussed by Yanto Chandra (Chandra, 2017).

2. Characteristics, significance and benefits of target and process orientation of financial management

The target orientation of financial management system is a close link between business objectives with different areas and phases of financial management. Its importance lies in the possibility to plan and manage financial flows more precisely and optimally, to obtain and allocate financial resources of the company, to make good and responsible decisions about corporate investments and to provide the company with the necessary financial stability. The usage benefits of the target financial management are: directly linking financial decisions to corporate objectives, closer interaction of financial decisions and fulfillment of business goals, higher quality of financial decisions, enable more rigorous investment planning. The disadvantages of targeting financial management can be classified as: more complicated approval processes, prioritizing the achievement of corporate goals prior to maintaining financial stability, limiting the "freedom" of financial department decisions.

Business process management focuses on improving corporate performance by managing business processes (Panagacos, 2012). The topic of business process management is also described by N. Verma and M. Dumas (Verma, 2009; Dumas et al. 2013). The process orientation of financial management is kind of a financial management which accepts business processes at the highest possible level on different levels of corporate governance, ensuring their connections with individual areas and phases of financial management. Its importance lies in the possibility of more accurately identifying and controlling the ongoing processes, ensuring the planned financial flows, maintaining the quality of the company's performance, thus ensuring the success of the financial transactions and the satisfaction of the customers.

The advantages of using the process oriented financial management include: ensuring a higher quality of business performance, achieving lower claim costs, warranty and post-warranty service, improving the personal coverage of business processes, improving the performance of business processes, higher opportunities to raise financial resources, increasing business profitability and success, orientation towards socially responsible business. The disadvantages of the process oriented financial management include: insufficient orientation towards business objectives, increased process management costs, the necessity of providing reliable information systems, higher financial costs of IT process controlling systems, greater isolation of financial decisions.

3. Objectives of the paper

The purpose of this contribution is to identify the key features of the process and target orientation of financial management in terms of increasing the performance and competitiveness of business subjects, presenting the basic knowledge from this field and analysing the advantages and disadvantages of the new management method.

The partial objectives are: to analyze the current state of financial management in selected manufacturing enterprises, to link the impact of globalization on the financial management of business subjects, to point out the increase of process management attractiveness in manufacturing plants, to enumeration of open options for further research following the presented results in the area concerned, to create the documents to support the development of the targeting and process orientation of financial management.

4. Methods

In the course of research the following scientific methods were used: analysis, synthesis, deduction, comparison, monitoring, and questionnaire. During processing of the results we used the graphic and mathematical-statistical methods. In accordance with the principles of scientific work the structure of the paper is following: introduction, objectives, methods, results and discussion, conclusion, and reference.

On the basis of the objectives set, we have summarized the appropriate domestic and foreign sources dealing with the questioned topics. We have set up a questionnaire focused on the financial management situation. The questionnaire was distributed to manufacturing companies where it is possible to use both the target and the process orientation of financial management. The results of the research were evaluated and subsequently we identified the possibilities and benefits of implementing the target and process orientation of the financial management in the conditions of the production enterprises in Slovakia.

5. Results and Discussion

As a research starting point of “target and process orientation of financial management”, we conducted a survey of the financial management situation within small and medium-sized enterprises in Slovakia, the possibilities of changes acceptance in financial management and the entrepreneurs' responses to target-oriented and process-oriented financial management.

In the survey, we approached 120 (small and medium-sized) manufacturing enterprises. The feedback we have received from 76 respondents, this number represented 63.3% from asked group. The breakdown of respondents to small and medium-sized enterprises is shown in Table 1.

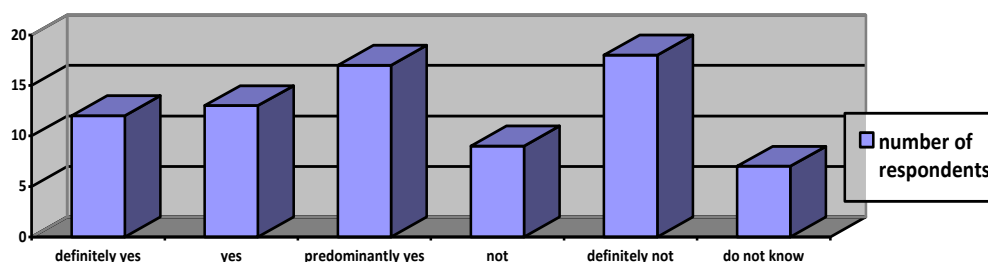
Table 1: Respondents by enterprise size

Respondents	Number	Percent [%]
Small enterprises	29	38.16
Medium-sized enterprises	47	61.84
Total	76	100.00

Source: own elaboration

Business entities first addressed the current level of financial management of the business. On the question "Do you consider the current financial management of your business as appropriate and on good quality level?" Respondents could choose from the options: "definitely yes", "yes", "predominantly yes", "no", "definitely not", "do not know". Respondents' replies are noted in Fig.1.

Figure 1: Results of respondents' replies I

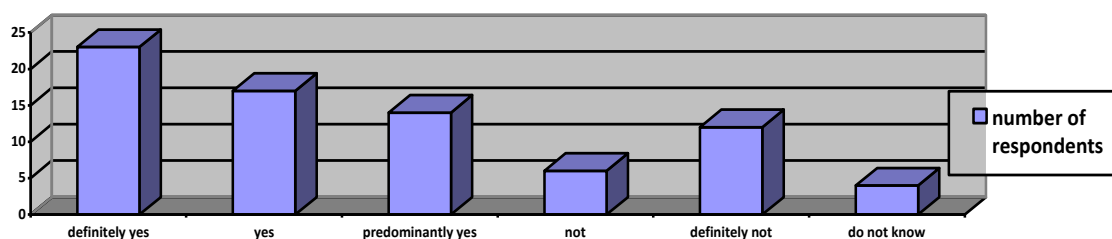


Source: own elaboration

Financial management was evaluated by the respondents as follows: 32.9% responded "definitely yes and yes", 22.4% answered "predominantly yes", 35.5% responded "no and definitely no" and 9.2% respondents could not answer. Based on the results, we can say that the situations in the financial management respondents are partially positive, which can be justified by strong subjectivity, as the respondents are usually part of the financial management of the companies. A significant group of respondents identified the current financial management as problematic, creating a prerequisite for further research in this area.

As next step we have identified the possibilities and willingness to innovate, respectively to modernize financial management in the companies surveyed. A further part of the questionnaire examined whether companies would consider changes in financial management, with assumption the changes would ensure increased performance, would promote sustainable development and ensure the competitiveness of the business entity. On the question "Would you be willing to make certain changes in financial management which would ensure efficiency gains, promote sustainable development and ensure the competitiveness of the business entity?" Respondents' answers are noted in Fig. 2.

Figure 2: Results of respondents' replies II



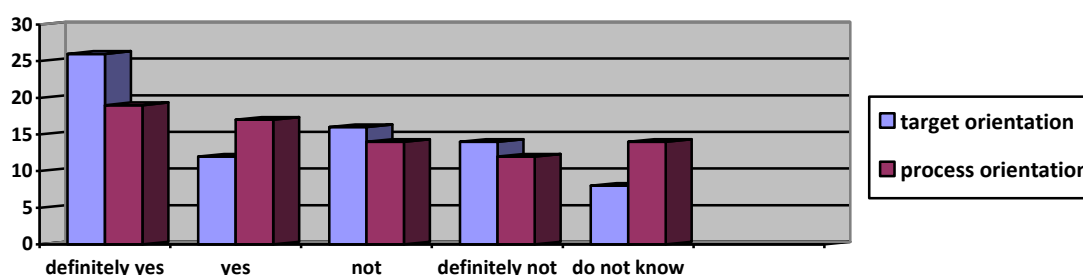
Source: own elaboration

The willingness and the possibility of changing the financial management were assessed by the respondents as follows: 30.3% responded "definitely yes", 22.4% responded "yes", 18.4% answered "mostly yes"; "no" responded 7.9%; 15.8% responded "definitely no" and 5.3% respondents could not answer. Based on the results, we assume there is a desire and interest in

use of modern approaches and innovations in financial management, even in businesses where managers are quite satisfied with the current financial management status.

This result has confirmed our assumption that business entities, in an effort to ensure long-term success and high quality performance, are looking for new challenges to implement into their financial management. In the next part, the respondents answered the question whether they had heard, or noticed information on the target orientation, respectively - process orientation in financial management. Respondents' replies are noted in Fig. 3.

Figure 3: Results of respondents' replies III



Source: own elaboration

Fifty percent of the respondents met the target of financial management, 39.5% of the respondents did not meet, and 10.5% of the respondents could not answer. Approximately 47.4% of respondents met the financial management process, 34.2% of respondents did not meet, and 18.4% did not respond. Based on the number of respondents who responded positively, we evaluate the positive knowledge and expertise of our financial management staff. Subsequently, we briefly outlined the basic characteristics, significance and benefits of the financial management's target and process orientation.

In the next part, respondents were asked about the preferences in the selection of the target, respectively process orientation of financial management. Using the scale from 1 to 10, the respondents should indicate interest, respectively the possibility of implementing the target, or process orientation of financial management. For the financial management target orientation, the average score was 6.3 and, for the financial management process orientation, it scored 4.6. Within the framework of free answers, suggestions for combining both approaches were interesting.

6. Conclusion

The quality of financial management significantly influences the success and performance of business entities. Innovation and modernization of management systems are an essential part of quality and responsible management. Challenges for financial management in the form of target orientation and process orientation provide businesses with the opportunity for innovative behavior and acceptance of progress in this area.

The main benefits of this contribution is the presentation of the current situation in the financial management on the sample of selected business entities, the identification of the innovation possibilities of financial management, a view on perceptions of entrepreneurial subjects on the target and procedural orientation of the financial management, the transfer of knowledge to the scientific and business community.

The most important results of the presented research are: linking the impact of globalization on the financial management of business entities, presentation of new trends and tendencies in financial management, pointing out the increase of process management attractiveness in manufacturing plants, identifying the preference of the financial management target (average 6.3) compared to the financial management process orientation (average of 4.6), enumeration of open options for further research following the presented results in the area concerned, creation of documents to support the development of the targeting and process orientation of financial management.

The conclusions of the contribution summarize the new perspectives, possibilities and specifics of such management, its advantages and disadvantages, and formulate general recommendations for manufacturing companies. The main benefit of this contribution is the presentation of a new aspect of enterprise management, which is oriented to manufacturing companies and allows for increased business effectiveness and competitiveness. Target and process orientation is a new challenge for managers and management of business subjects.

Acknowledgment

This paper is an output of the science project VEGA 1/0647/18 "Determinants of the target process orientation and financial management within the purview of development of the present business environment".

References

- [1] Bohner, M., Galles, G. and Heim, J. (2012). Multiplier-accelerator models on time scales. *International Journal of Statistics and economics*, vol. 4, pp. 1-12.
- [2] Dumas, M., Rosa, M. L., Mendling, J. and Reijers, H.A. (2013). *Fundamentals of Business Process Management*. Springer.
- [3] Gažová, A., Papulová, Z. and Papula, J. (2016). The application of concepts and methods based on process approach to increase business process efficiency. *3rd Global Conference on Business, Economics, Management and Tourism (BEMTUR)*. Rome, Italy, pp. 197-205.
- [4] Hyršlová, J., Vnoučková L. and Hájek, M., (2015). Concept of sustainable development and competitiveness of enterprises in chemical industry. *Chemické listy*, vol. 4, pp. 319-326.
- [5] Chandra, Y. (2017). A time-based process model of international entrepreneurial opportunity evaluation. *Journal of International Business Studies*, vol. 48, pp. 423–451.
- [6] Kajan, M. (2016). Globalization of enzyme market and influences on local markets. *16th International Scientific Conference on Globalization and its Socio-Economic Consequences*, Žilina, Slovakia, pp. 800-807.
- [7] Kajanová, J. (2016). Globalization and its impacts on chemical enterprises performance in Slovakia. *16th International Scientific Conference on Globalization and its Socio-Economic Consequences*, Žilina, Slovakia, pp. 808-815.

- [8] Kogan, L., Papanikolaou, D., Seru, A. and Stoffman, N. (2017). Technological Innovation, Resource Allocation, and Growth. *The Quarterly Journal of Economics*, vol. 132, no. 2, pp. 665–712.
- [9] Kučera, M. and Látečková, A. (2015). Management information systems in the process of globalization. *9th International Conference on Applied Business Research (ICABR)*, Talca, Chile, pp. 531-537.
- [10] Lesáková, Ľ. and Gundová, P. (2014). Finančná analýza ex-ante ako nástroj predikovania finančnej situácie podnikov. *Ekonomika a spoločnosť*, vol. 15, no. 1, pp. 5-13.
- [11] Majerčák, P., Baran, D. and Majerčáková, E. (2015). Theoretical framework of business environment and its impact on state development. *10th International Scientific Conference on Financial Management of Firms and Financial Institutions*, Ostrava, Czech Republic, pp. 713- 721.
- [12] Milošovičová, P. and Stachová, P. (2016). Slovak business environment in the context of the situation on the labour market. *4th International Conference on Innovation Management, Entrepreneurship and Corporate Sustainability (IMECS)*, Prague, Czech Republic, pp. 457-468.
- [13] Panagacos, T. (2012). The Ultimate Guide to Business Process Management: Everything You to Know and How to Apply It to Your Organization.
- [14] Peráček, T., Nosková, M. and Mucha, B. (2017). Selected issues of Slovakia business environment. Economic and social development, Managerial issues in modern business. Varazdin: Varazdin development and entrepreneurship agency, pp. 254-259.
- [15] Porter, G. A. and Norton, C. L. (2013). Using Financial Accounting Information: The Alternative to Debits and Credits. Connecticut: Cengage Learning.
- [16] Rentková, K. and Panevski, D. (2017). Analysis of foreign direct investment as a tool of regional development. *20th International scientific conference on economic and social development*. Varazdin: Varazdin development and entrepreneurship agency, pp. 326-334.
- [17] Strážovská, Ľ. and Sulíková, R. (2016). Bariéry a výzvy podnikania na Slovensku. Ekonomická integrace ČR a SR v podmínkách globalizující se Evropy. České Budějovice: Vysoká škola evropských a regionálních studií, pp. 73-82.
- [18] Verma, N. (2009). Business Process Management: Profiting from Process. New Delhi: Global India Publications.
- [19] Zatrochová, M. and Kuperová, M. (2015). Development and the current situation in the financial market in Slovakia. *Economics and management, Ekonomia i zarządzanie*, vol. 2, pp. 57-62.

GLOBALIZATION AND TAX GAP AS A RESULT OF THE TAXPAYERS NONCOMPLIANCE – EVIDENCE FROM POLAND

Alina Klonowska^{1,a,*}

¹Cracow University of Economics, Finance Department, Poland

^aklonowska@uek.krakow.pl

*Corresponding author

Abstract. The main purpose of the article is to present the development of the tax gap in Poland. The indirect purpose is to show the impact of tax arrears on the level of tax gap and indicate which of the selected factors have the greatest impact on the gap. The research period covers the years 2005 – 2018. The subject of research is income tax paid by natural persons. The subject of research are microenterprises and people employed under a contract of employment or other civil-legal contracts. The Pearson correlation coefficient was used in the research. The first chapter of the article characterizes the impact of globalization on the size of the tax evasion phenomenon in Poland, defines the essence of the tax gap and presents the original way of interpreting it. The following part presents the experience of countries regarding the measurement of the tax gap based on the literature review. In the next chapter, based on statistical data, the research of the dependence of selected factors on the gap in PIT was carried out. The figures used in the research come from the Ministry of Finance database and from National Accounts of Poland.

Keywords: tax gap, tax noncompliance, tax arrears, income tax

JEL Classification: H24, H26, F60

1. Introduction

Globalization is a process that leads to many measurable benefits. Nevertheless, every evolution is accompanied by the risk of negative consequences associated with change. One of them is tax risk. Its materialization determines tax fraud (Klonowska, 2016). In this context, there are two questions about the impact of globalization on the escalation of the tax evasion phenomenon, which in the European Union reaches the size of several hundred billion Euro annually (Study & Reports, 2017). And also to what extent the process of the globalizing economy is conducive to the sharing of knowledge and experience, which should lead to a reduction in the scale of tax evasion.

The article will attempt to answer the raised questions. The main purpose of the article is to present the development of the tax gap in Poland. The indirect purpose is to show the impact of tax arrears on the level of tax gap and indicate which of the selected factors have the greatest impact on the gap. The subject of research is income tax paid by natural persons. The subject of research are microenterprises and people employed under a contract of employment or other civil-legal contracts. The Pearson correlation coefficient was used in the research.

The first chapter of the article characterizes the impact of globalization on the size of the tax evasion phenomenon in Poland, defines the essence of the tax gap and presents the original way of interpreting it. The following part presents the experience of countries regarding the measurement of the tax gap on the basis of literature review. In the next chapter, based on statistical data, the research of the dependence of selected factors on the gap in PIT was carried out.

2. Policy of minimizing tax risk in the conditions of globalization

The accession of Poland to the EU in 2004 promised many positive changes and opportunities for faster growth and economic development. In the same year, the authorities decided to initiate a tax risk management policy by adopting the concept proposed by the European Commission (Compliance Risk..., 2010). By assumption, the actions taken were to contribute to minimizing tax risk, which meant reducing the scale of tax evasion. There was an increase in the amount of unpaid taxes on time, as well as the first serious cases of VAT fraud in intra-Community transactions. Tax arrears, which in 2004 amounted to 1.7% of GDP, in 2000 did not exceed 1.4% of GDP. Currently, these arrears account for almost 5% of Poland's GDP. Tax arrears, which mean unpaid taxes on time, in the case of personal income taxes account for 16% of total tax arrears on an annual basis (Report on the implementation of the state budget..., 2017).

Therefore, starting from 2005, fiscal authorities in Poland classify tax risk, in which tax fraud is most often committed. According to the estimates of the Ministry of Finance (Report on activities..., 2014), in the years 2007 – 2009, the number of entities operating in the areas of tax risk was on average close to 2 million in a year. What constituted about 57% of taxpayers conducting business activity and about 11% of all taxpayers (Letter..., 2013). At that time, in respect of entities from the tax risk areas, mainly increased tax inspections were carried out (cf.: Klonowska, 2017).

The experience of EU and OECD countries (Compliance Risk..., 2010, Management..., 2004) shows a growing trend in estimating the tax gap (Hangacova & Stremy, 2018). This is due to the fact that such estimates show the extent of tax evasion (Andreoni et al., 1998, Rabatinova, 2018, Danquah & Osei-Assibey, 2018). However, some people note that the tax gap is conceptually flawed since it fails to incorporate behavioural responses by taxpayers (Gemmell et al., 2014). Under Polish conditions, the authorities have not yet made estimates of the tax gap. They also do not have any strategy on the basis of which the size of the tax evasion phenomenon would be monitored.

In the literature on the subject, the tax gap is most often defined as the difference between the amount of taxes that should be paid to the state budget (potential receipts) and the amount actually received (Spickova, 2010). Silviani & Baer (1997) argue that the amounts of potentially received taxes include those that have not been paid due to tax evasion, tax arrears and other shortages due to misinterpretation of the rules. Brown & Mazur (2003) recognize that the tax gap can be used to assess the level of tax discipline. Similarly, Slemrod (2007), who emphasizes that the tax gap can be considered as an expression of the level of tax discipline. The reasons for the tax gap are indicated by Fuest and Riedel (2009). The authors argue that the tax gap may occur or result from understatement of income and failure to

submit declarations (*underreporting and nonfilling*). The reason may also be the improper payment of the tax (*underpayment*).

It is not possible to accurately determine the amount of the gap, hence it is considered to correspond to the estimated financial risk size, including the sum of individual identified threats. Table 1 shows the author's method of calculating the tax gap in PIT. An indirect method based on the disposable income category was used for the research (cf.: Fuest & Riedel, 2009; Klonowska, 2017).

Table 1: Hidden amounts of unpaid personal income taxes in Poland in 2015

Potential tax liability	Actual tax liability
Tax receipts planned to be obtained: PLN 78 268 million	Actual tax receipts adjusted by the amount enforced and declared overpayment/returns: PLN 71 589 million
Enforced tax amounts: PLN 693 million	Enforced tax amounts: PLN 693 million
Stated amounts of tax arrears: PLN 6 777 million	-
Total: PLN 85 738 million	Total: PLN 72 282 million
-	Stated amounts of tax arrears:: PLN 6 777 million
-	Hidden amounts of unpaid taxes (net tax gap) ¹ : PLN 6 679 million
-	Total amount of unpaid taxes: PLN 13 456 million
-	Gross tax gap: PLN 14 149 million
Total tax liability: PLN 85 738 million	Total tax liability: PLN 85 738 million

Legend:

¹ Hidden amounts of unpaid taxes are other than stated tax arrears that have not been declared and paid.

Source: Author's own calculations on the base [National Accounts by institutional sectors and sub-sectors. Available: <http://stat.gov.pl/obszary-tematyczne/rachunki-narodowe/>, 10.05.2018, Information on the settlement of personal income tax, <https://www.finance.mf.gov.pl/pit/statystyki>

Estimates of the tax gap in PIT for the period 2008-2015 are presented in Table 2.

Table 2: The tax gap in personal income tax and its components in 2008-2015 (PLN million)

Period	Net PIT gap	Tax arrears	Amounts enforced	Gross PIT gap
2008	9 541	3 284	388	13 213
2009	8 018	3 721	503	12 242
2010	8 008	4 072	614	12 694
2011	13 133	4 530	691	18 354
2012	5 582	5 308	752	11 642
2013	4 901	6 002	780	11 683
2014	10 971	6 425	702	18 098
2015	6 679	6 776	693	14 148

Source: Author's own research on the base [National Accounts by institutional sectors and sub-sectors. [Online]. Available: <http://stat.gov.pl/obszary-tematyczne/rachunki-narodowe/>, Information on the settlement of income tax paid by individuals. <https://www.finance.mf.gov.pl/pit/statystyki>].

3. The experience of countries in estimating the tax gap

Estimates of the tax gap recognized as the most accurate and comprehensive are conducted by the Internal Revenue Service in the USA. Sweden has also been conducting estimates of the tax gap for over 20 years and together with the United States provides the most detailed approaches. They include various types of taxes, including so-called quasi-fiscal charge (Fuest & Riedel, 2009). Among them are also Great Britain and France (McManus & Warren, 2006). Great Britain, Sweden and Denmark are examples of EU Member States that have their methodology and publish regular reports in this area. According to OECD data (2011), almost half of the countries belonging to this organization estimate the tax gap. In 12 of them tax authorities are obliged by the Ministry of Finance or the government to conduct estimates for all or some taxes. In France, Spain and the United States there is no formal requirement in this area (more on this in: Klonowska, 2017). However, relatively few tax authorities in countries belonging to the European Union estimate the tax gap, it is only 11 countries (Strategic approach..., 2011).

The US fiscal authorities have started the implementation of the concept that allowed to determine the degree of taxpayers' compliance with law in 1968. Activities were carried out until 1988 and were implemented under the *Taxpayer Compliance Measurement Program* (Dubin, 2012). Based on the American experience, the tax gap is estimated according to the following formula:

$$\begin{array}{l} \text{Total Tax Liability} \\ \text{TTL} = \text{TVT} + \text{GTG} \end{array} \quad (1)$$

$$\begin{array}{l} \text{Gross Tax Gap} \\ \text{GTG} = \text{NTG} + \text{ELP} \end{array} \quad (2)$$

Explanations for the formulas:

TTL – *Total Tax Liability*;

TVT – *Tax Paid Voluntarily and Timely*;

GTG – *Gross Tax Gap*;

ELP – *Enforced and Other Late Payments of Tax*;

NTG – *Net Tax Gap*.

Gross tax gap is the difference between the tax that should be paid and the one paid voluntarily and on time. *Net tax gap* is understood as the difference between the gross tax gap and the tax gap eliminated by control activities. According to the American solutions, the net tax gap is the gross tax gap reduced not only by taxes enforced as a result of the inspections carried out, but also those that were overdue and paid voluntarily (Dubin 2012).

4. Research on the impact of selected factors on the tax gap in PIT in Poland – results

The subject of the research is the income tax gap paid by natural persons in Poland. The research group is the household sector as its share in collecting gross disposable income in the national economy is prevailing. The research was carried out to determine what effect tax arrears have on the tax gap, as well as their individual types. The types of tax arrears are shown in Table 3. The Pearson correlation coefficient was used in the research. The information from the reports on the implementation of the external risk management strategy

was used, data resulting from information on the annual taxpayers tax settlement paid by natural persons and information from national accounts. The research period covers the years 2008-2015.

Table 3: Tax arrears on personal income tax, 2008-2015 (PLN million)

Specification	2008	2009	2010	2011	2012	2013	2014	2015
Total tax arrears	3 284	3 721	4 072	4 530	5 308	6 002	6 425	6 776
From previous years	2 313	2 482	2 789	3 124	3 683	4 165	4 908	5 307
Paid in instalments and postponed	90	135	123	121	144	166	206	241
Suspension of implementation of the decision	168	240	131	92	88	148	98	110
In enforcement proceeding ¹	2 210	2 475	2 757	3 020	3 588	3 974	4 030	4 050
Other arrears ^{1,4}	814	868	554	699	828	983	945	881
In relation to which no action has been taken	139	109	4	6	7	9	24	45
Receivables resulting from non-final decisions with immediate enforceability	-	-	107	120	951	729	209	222

Source: National Accounts by institutional sectors and sub-sectors. [Online]. Available: <http://stat.gov.pl/obszary-tematyczne/rachunki-narodowe/>, Information on the settlement of personal income tax, <https://www.finanse.mf.gov.pl/pit/statystyki>.

During the research period, the tax gap in PIT in gross terms amounted to over PLN 14 billion on average. In relation to PIT revenues, the tax gap accounted for 35% of the funds due on average in a year. About 14% of the amount not paid to the state budget accounts were tax arrears and amounts that were finally enforced. The remaining, the largest part of the tax gap is hidden funds before tax, undeclared and not paid by taxpayers. In contrast to the tax gap in gross terms, the amount of the net tax gap was at the level of over PLN 8 billion on average in a year. It is characteristic, however, that the rate of its average annual growth, which was at the level of 15%, significantly exceeds the rate of growth of the gap in gross terms (8%).

On the basis of the conducted analysis, no significant relationship was found between the size of tax arrears and the size of the tax gap. There was a tendency that with the increase of tax arrears the size of the tax gap is growing. The test results are presented in Tab. 4 in the Annexes. The research also proved the lack of a significant relationship between PIT arrears and their components, and the size of the tax gap. There was a tendency that with the increase in arrears in PIT, including previous years, arrears paid in instalments and deferred, arrears in enforcement proceedings – the tax gap is growing, while with the number of suspended decisions, the remaining arrears, including in relation to which no actions have been taken, receivables resulting from non-final decisions with immediate enforcement, the size of the tax gap decreases. The results are shown in Table 4.

Table 4: Pearson correlation – research results

Specification	Arrears in PIT	Including from previous years	Paid in instalments and postponed	Suspension of implementation of the decision	In enforcement proceedings	Other arrears	In relation to which no action has been taken	Receivables resulting from non-final decisions with immediate enforceability
Gross tax	0,233	0,285	0,215	-0,478	0,188	-0,051	- 0,215	-0,667
tax	N = 8	N = 8	N = 8	N = 8	N = 8	N = 8	N = 8	N = 6
gap	p = 0,578	p = 0,494	p = 0,609	p = 0,231	p = 0,656	p = 0,905	p = 0,609	p = 0,148

Source: author's own calculations.

5. Conclusion

The countries belonging to the EU structures, including Poland, experienced the problem of escaping the tax with double force when the internal borders were opened. It can be assumed that globalization has contributed to the escalation of tax risk. This is evidenced by the upward trend in the level of tax arrears. However, the assessment is not clear because the gap in PIT was characterized by fluctuation. In the context of globalization and its impact on the phenomenon of tax evasion J. Alm (2017) spoke out, claiming that globalization is conducive to the reduction of the tax gap. The author wrote in his article "globalization have generated a workforce dynamic in which taxpayers generally are employed by large business enterprises (where individual tax compliance is fairly high) rather than in traditional mom-and-pop businesses (where individual tax compliance is typically low). At the same time, the author notes that „we have learned many things but that we also still have many gaps in our understanding of how to measure, explain, and control tax evasion” (Alm, 2012).

By entering into the Europe-wide trend of actions taken to combat tax fraud, the Polish fiscal authorities should adopt the concept of systematic monitoring of the size of the tax gap. This will support tax risk management by identifying the causes (so far unrecognised) of non-compliance.

Acknowledgment

This paper is an output of the science project 005 WFP-KF/01/2017/S/7005.

References

- [1] Alm, J. (2012). Measuring, explaining, and controlling tax evasion: lessons from theory, experiments, and fields studies. *International Tax and Public Finance*, vol. 19 no. 1.
- [2] Alm, J. and Soled, J. A. (2017). W(h)ither the Tax Gap. *Washington Law Review*, vol. 92, no. 2.
- [3] Andreoni, J., Erard, B. and Feinstein, J. (1998). Tax compliance. *Journal of Economic Literature*, vol. 36, no. 2.

- [4] Brown, R. E. and Mazur, M. J. (2003). IRS's Comprehensive Approach to Compliance Measurement. *Internal Revenue Service*. [Online]. Available: <https://www.irs.gov/pub/irs-soi/mazur.pdf>.
- [5] Danquah, M. and Osei-Assibey, E. (2018). The Extent and Determinants of Tax Gap in the Informal Sector: Evidence from Ghana. *Journal of International Development*, vol. 30, no. 6.
- [6] Dubin, J. A. (2012). The Causes and Consequences of Income Tax Noncompliance, Springer +Business Media, New York.
- [7] European Commission. (2010). Compliance Risk Management Guide for Tax Administration. [Online]. Available: https://ec.europa.eu/taxation_customs/sites/taxation/files/resources/documents/common/publications/info_docs/taxation/risk_managt_guide_en.pdf.
- [8] Fuest, C. and Riedel N. (2009). Tax evasion, tax avoidance and tax expenditures in developing countries: A review of the literature, Oxford University Centre for Business Taxation [Online]. Available: https://assets.publishing.service.gov.uk/media/57a08b3de5274a31e0000a66/60670_TaxEvasionReportDFIDFINAL1906.pdf.
- [9] Gemmel, N. and Hasseldine, J. (2014). Taxpayers' Behavioural Responses and Measures of Tax Compliance „Gaps”: A Critique and a New Measure. *Fiscal Studies*, vol. 35, no. 3.
- [10] Poland Statistics. (2018). National Accounts by institutional sectors and sub-sectors. [Online]. Available: <http://stat.gov.pl/obszary-tematyczne/rachunki-narodowe/>
- [11] Hangacova, N. and Stremy, T. (2018). Value Added Tax and Carousel Fraud Schemes in the European Union and the Slovak Republic. *European Journal of Crime Criminal Law and Criminal Justice*, vol. 26, no. 2.
- [12] Klonowska, A. (2016). Tax risk and implementation of the state fiscal policy goals. [Online]. Available: <https://www.obserwatorfinansowy.pl/forma/rotator/ryzyko-podatkowe-a-realizacja-celow-polityki-fiskalnej-panstwa/>
- [13] Klonowska, A. (2017). Luka podatkowa. Skutki dla finansów publicznych, (Tax gap. Consequences for public finances) C. H. Beck Publishing House, Warszawa.
- [14] McManus, J. and Warren, N. (2006). The Case for Measuring Tax Gap. *eJournal of Tax Research*, vol. 4, no. 1.
- [15] Ministry of Finance. (2014). Reports on activities carried out by tax offices in the implementation of the external risk management strategy for the years 2000-2009 (MF – ERM).
- [16] Ministry of Finance. (2017), Report on the implementation of the state budget. [Online]. Available: <https://www.mf.gov.pl/ministerstwo-finansow/dzialalnosc/finanse-publiczne/budzet-panstwa/wykonanie-budzetu-panstwa/sprawozdanie-z-wykonania-budzetu-panstwa-roczne>.
- [17] Ministry of Finance. (2018). Information on the settlement of personal income tax.[Online]. Available: <https://www.finance.mf.gov.pl/pit/statystyki>.

- [18] OECD. (2004). Compliance Risk Management: Managing and Improving Tax Compliance, [Online]. Available: <https://www.oecd.org/tax/administration/33818656.pdf>.
- [19] OECD. (2011). Strategic approach for managing taxpayers' compliance, Tax Administration in OECD and Selected Non - OECD Countries: Comparative Information Series (2010). [Online]. Available: <https://www.oecd.org/tax/administration/CIS-2010.pdf>.
- [20] Letter from the Ministry of Finance dated 30 August 2013, AP10-016-14/NOI/2013, Department of Tax Administration, Ministry of Finance.
- [21] Rabatinova, M. (2018). Selected Aspects of Fiscal Policy in Central Europe: Case of Slovakia. *European Journal of Transformation Studies*, vol. 6, no. 1.
- [22] Silviani C., Baer K. (1997). Designing a Tax Administration Reform Strategy: Experience and Guidelines, *IMF Working Paper*, WP/97/30.
- [23] Slemrod, J. (2007). Cheating Ourselves: The Economics of Tax Evasion. *Journal of Economic Perspectives*, vol. 21, no. 1.
- [24] Spickova, I. (2010). Tax Gap Its Importance, Proceedings of the 8th International Conference on Economic Policy in the European Union Member Countries, Silesian Univ Opava, School Business Administration, Karvina.
- [25] Study and Reports on the VAT Gap in the EU – 28 Member States: 2017 Final Report (2017), TAXUD/2015/CC/131, CASE – IAS. [Online]. Available: https://ec.europa.eu/taxation_customs/sites/taxation/files/study_and_reports_on_the_vat_gap_2017.pdf

COMPARISON OF BONITY INDEX WITH SELECTED FINANCIAL INDICATORS IN THE PROJECT

Jozef Klučka^{1,a}, Matej Masár^{2,b,*}

¹Faculty of Security Engineering, University of Žilina, the Slovak republic

²Faculty of Security Engineering, University of Žilina, the Slovak republic

^ajozef.klucka@fbi.uniza.sk, ^bmatej.masar@fbi.uniza.sk

*Corresponding author

Abstract. Companies operate in a dynamic global environment, which is very volatile. Managers must react efficiently to changes in global conditions. In an effort to make it easier for businesses to operate on the global market as well as to maintain their competitiveness, individual central authorities declare projects. In the year 2017, the Ministry of Economy of the Slovak Republic announced projects. Within the Operational program Research and Innovations, there was announced the call for Requirement to provide non-repayable financial grand, which was a target to support innovations via industrial research and experimental development within domain healthy food and environment (code OPVAI/DP/2017 1.2.2 – 13). Applicants had to fulfil also the level of bonity index (BI) (BI greater or equal 2). The aim of the article is to analyse, based on the data obtained, if the project assumption are met (i.e. that the proposed BI indicator is relevant to the conclusion on expected sustainability). Innovation itself and its implementation in an enterprise will be the accelerator of economic recovery. From the context of the project assignment, the higher the value of the BI (on the selected scale) and the other indicators met, the higher the chance of obtaining a non-repayable financial contribution - this increases the assessment of the project.

Keywords: Project, Bonity Index, Financial Indicators, Slovakia, Risk

JEL Classification: B40, D20, H20, M21

1. Introduction

In the year 2017, there were announced projects by Ministry of Economy Slovak Republic. Within the Operation program Research and Innovations, there was published the call for Requirement to provide non-repayable financial contribution targeted to support innovations via industrial research and experimental development within domain Healthy Food and Environment (code OPVAI/DP/2017 1.2.2 – 13).

The project objective is the support of projects focused on the achievement of product innovations or process via research and development activities. Moreover, it discusses finalization of innovation measures i.e. the development of achieved innovation and its implementation into the production process. The expected result will fall to increasing innovation level in enterprises.

The project idea is – to increase competitive position of enterprises and long-term sustainability via support of innovations conditions in enterprises (OPVAI, 2017, A). Increasing sustainability will impact on Slovak citizens the standard of living.

Applicants for non-repayable financial grand had to present (besides other conditions) – the level of bonity index. The condition was that the level of BI should be equal or higher than 2 (OPVAI, 2017, A). This requirement is based on the assumption, (according to the authors of this paper), that the level of an enterprise and its ability to implement innovations as well as long-term sustainability of entrepreneurial activities is guaranteed by the BI level in the current year, (in conditions the year 2017 is requested). The project implementation assumes co-financing of the entrepreneurial subject and the financial amount depends on an authorized activity, actions, and the applicant's region.

In the paper, authors will verify whether the bonity index can be considered as relevant and whether it denies the state of the company similar to the selected financial indicators. Assuming that trend of BI is consistent with the development of selected financial indicators. In general, we can conclude that BI corresponds to one of the project objectives increasing the competitiveness and sustainability of the business entity (the applicant).

In this article, we will discuss the project's assumption (i.e. that the proposed BI indicator is relevant to concluding the conclusions on expected sustainability). Innovation itself and its implementation in an enterprise will be the accelerator of economic recovery. From the context of the project assignment, the higher the value of the BI (on the selected scale) and the other indicators met, the higher the chance of obtaining a non-repayable financial contribution - this increases the assessment of the project.

In the paper we will verify the following assumption of the project:

The hypothesis 1)

The development of financial indicators will have the same trend as the BI indicator (if the BI trend will fall, rise or stagnate also will fall, rise, or stagnate the trend of most of the financial indicators of the company).

The hypothesis 2)

The development of financial indicators will have a different trend as that the BI indicator (if BI will have a growing trend, the overwhelming majority of the selected financial indicators will have a declining trend)

Both hypotheses are based on the assumption of the project where the required level of BI, which guarantees that an enterprise that plans to implement a research and development project, will be stable at a given level and will have sufficient resources to implement the project. The level of BI does not represent a statement about the current position of the company but also about its near future - in terms of minimizing possible problems in the implementation of the research project of the innovation project.

2. Review of the problem

To define the term bonity index we must start with the term bonity. Bonity is defined by Kelíšek (2009) „...as a brand name, reputation, the ability of an enterprise to pay its payables to banks, insurance companies, suppliers“.

Bonity of an enterprise is defined as „an ability in time and in an amount to fulfill its payables. It expresses a reputation, quality, and ability to pay. These indicators are applied by banks before a loan provision or by investors before starting cooperation. The method is focused on revenue, profit and cash flow“ (Ekonomický slovník, 2018). Bonity index is based on elements of multivariate discriminatory analysis according to the simplified method (Jasková, 2016). Calculation of IB is most frequently applied in Central European countries, especially in Swiss, Austria, and Germany (Kovacova, 2017; Belás, 2011).

“There are six main aspects of operating performance and financial condition. We can evaluate financial ratios:

1. A **liquidity ratio** provides information on a company's ability to meet its short-term, immediate obligations.
2. A **profitability ratio** provides information on the amount of income from each currency unit of sales.
3. An **activity ratio** relates information on a company's ability to manage its resources efficiently.
4. A **financial leverage ratio** provides information on the degree of a company's fixed financing obligations and its ability to satisfy these financing obligations.
5. A **shareholder ratio** describes the enterprise's financial condition in terms of amounts per share of stocks.
6. A **return on investment ratio** provides information on the amount of profit, relative to the assets employed to produce that profit” (Belás, 2015; Buganová, 2014; Šoltés, 2016; Biais, 1997).

The current liquidity ratio - is commonly used to measure short-run solvency, the ability of the firm to meet its debt requirements as they come due. Current liabilities are used as the denominator of the ratio because they are considered to represent the most urgent debts, requiring retirement within one year or one operating cycle. The available cash resources to satisfy these obligations must come primarily from cash or the conversion to cash of other current assets (Babich, 2012; Kucharčíková, 2015; Kelíšek 2017).

The accounts receivable activity turnover - measures how many times, on average, accounts receivable are collected in cash (Babich, 2012; Barrot, 2016).

The accounts payable activity turnover - how many times, on average, payables are paid during the year (Fraser & Ormiston, 2004).

The debt leverage ratio - the ratio of total debt to total assets measures the percentage of funds provided by creditors (Babich, 2012). It considers the proportion of all assets that are financed with debt (Babich, 2012).

The debt to equity ratio - measures the riskiness of the firm's capital structure in terms of the relationship between the funds supplied by creditors and investors (Biais, 1997). Times interest leverage earned. The time's interest earned ratio measures the extent to which operating income can decline before the firm is unable to meet its annual interest costs (Biais, 1997; Potkanová, 2016).

3. Method

For the purpose of the research, it has been performed a random sample of 18 enterprises (it has been applied the database of all successful applicants for financing the project). As sources for financial data have been applied databases www.finstat.sk, www.registeruz.sk.

To verify hypotheses of the paper we have executed the following steps:

- we have realized randomized sample of an entrepreneurial subject – from a database of applicants, whom non-repayable financial contribution was approved,
- for the selected business entity we quantified BI for the time period 2014-2016 (in project conditions was demanded 2017),
- calculate selected financial indicators in a given period,
- we have interpreted the results in b) and c) - the evaluation was based on a comparison of the development of BI and selected financial indicators in 2014-2016.

The calculation of selected indicators and the rating index was defined as follows:

Table 1: Calculation of selected financial indicators

Ratio	Comments
Liquidity	
liquidity ratio 1. Grade	financial assets / short term external resources
liquidity ratio 2. Grade	(financial assets + short-term receivables) / short term external resources
liquidity 3. Grade	(financial assets + short-term receivables + inventories) / short term external resources
Return	
return on assets (ROA)	net profit / total assets
return on equity (ROE)	net profit / equity
Debt utilization	
total debtness	(external resources(reserves, payables, loans) / total liabilities)
interest coverage	(EBIT + paid interests) / paid interests
Activity	
inventory turnover	inventories / daily sales
receivables turnover	(short-term receivables * nr. of days in time period)/(sales of goods + sales of products and services)
total assets turnover	total assets / sales per day
payables turnover	payables / operating costs per day (or sales per day)

Source: Belás, 2011; Kelíšek, 2009; Barrot, 2016; Babich 2012; Kelíšek, 2017

In our approach, we split sample of 18 enterprises into categories large, middle, small and microenterprises. This structure is based on the tab. 2.

Table 2: Categories of enterprises

Category	Nr. of empl.	Yearly revenue	Total capital
Large	>250	>50 mil. €	>43 mil. €
Middle	<250	<=50 mil. €	<=43 mil. €
Small	<50	<=10 mil. €	<=10 mil. €
Micro	<10	<=2 mil. €	<=2 mil. €

Source: 2003/361/EC

4. Results

A set of 18 enterprises to which a non-repayable financial contribution was granted was analysed from the point of view of the size of the enterprise and the evolution of the BI trend and the trend of the development of selected financial indicators for 2014-2016.

After the results of the rating index, as well as the selected financial indicators of activity, profitability, liquidity, and indebtedness, individual values were compared for all categories of the company (see Table 3). In the tables, the abbreviations used to describe trends were as follows: if the development trend of the financial indicators and the rating index was positive - the mark [<]; if the development trend of the financial indicators and the rating index was negative – the mark [>]; if the trend of financial indicators and the rating index stagnated - mark [=].

Table 3: Results of comparison Bonity index with selected financial indicators

Enterpr.	BI		Liquidity – 1.grade		Liquidity – 2. grade		Liquidity – 3.grade		ROA		ROE	
	2015/2014	2016/2015	2015/2014	2016/2015	2015/2014	2016/2015	2015/2014	2016/2015	2015/2014	2016/2015	2015/2014	2016/2015
1	>	<	<	=	>	>	>	<	<	<	>	<
2	=	<	=	=	<	<	=	>	<	>	>	<
3	=	<	<	=	<	<	<	<	<	>	=	>
4	=	=	<	>	>	<	=	>	>	=	<	=
5	<	=	=	=	<	=	<	>	>	=	<	<
6	<	<	=	=	=	=	>	<	<	<	<	<
7	<	=	<	=	>	<	>	>	>	<	>	<
8	>	=	<	=	<	=	<	<	>	>	>	>
9	>	<	>	=	=	=	<	>	<	>	=	>
10	>	<	<	<	<	>	>	>	<	>	<	>
11	<	=	<	>	<	=	>	>	<	>	>	<
12	<	=	<	=	<	>	>	>	>	<	<	>
13	<	>	>	<	=	<	<	>	>	<	=	<
14	=	=	=	=	<	=	<	<	<	>	<	<
15	=	=	=	=	<	>	>	<	<	>	>	>
16	>	<	<	>	<	=	<	>	<	<	>	<
17	=	>	=	>	=	>	<	>	<	>	<	>
18	=	<	<	>	>	<	>	<	<	<	<	>

Enterpr.	Interest coverage		Total debttness		Inventory turnover		Receivables turnover		Return on assets		Payables turnover	
	2015/2014	2016/2015	2015/2014	2016/2015	2015/2014	2016/2015	2015/2014	2016/2015	2015/2014	2016/2015	2015/2014	2016/2015
1	<	=	>	<	<	>	=	=	<	<	>	<
2	=	<	=	>	>	>	<	>	>	<	<	>
3	<	<	<	<	<	>	>	<	=	=	<	=
4	<	=	>	<	>	=	>	<	=	=	<	>
5	<	<	<	>	>	<	<	>	<	>	<	>
6	<	<	<	>	=	>	<	=	<	=	<	<
7	<	>	<	>	<	<	<	=	=	<	<	>

8	<	<	<	<	<	>	>	>	<	>	<	>
9	=	=	>	<	<	>	=	=	<	>	<	<
10	>	<	>	<	<	>	<	>	>	=	<	<
11	>	>	=	>	<	>	<	>	<	<	<	>
12	<	>	>	=	<	<	<	<	>	=	>	=
13	<	=	=	=	>	=	=	>	=	>	>	>
14	=	=	=	<	<	>	=	>	<	>	<	>
15	<	>	>	>	<	>	>	>	<	=	<	=
16	=	=	<	<	>	<	<	>	<	>	<	>
17	>	>	>	<	>	<	>	>	<	=	=	<
18	>	<	<	<	>	<	<	<	=	=	>	<

Source: Authors

Then we compared the trend of the development of selected financial indicators in time with the development of the credit index, to confirm the hypotheses of the article. The resulting trends of financial indicators were then divided into 3 groups according to trends. The group was always compared with the highest number. For the result we used the abbreviations: N-mismatch and Y-compliance. Tab. 4 describes the comparison of the BI trends with the development trends of the most frequent trends development group of selected financial indicators. On the basis of the results, we can see that the development of BI with selected financial indicators is in line with 10 out of 18 cases (N for 2015/2014) and in 9 out of 18 inconsistent cases (N for 2016/2015).

Table 4: Results of comparison Bonity index with selected financial indicators

Enterpr.	Comparison					
	BI		Financial indicators		Conclusion	
	2015/2014	2016/2015	2015/2014	2016/2015	2015/2014	2016/2015
1	>	<	</>	<	Y	Y
2	=	<	>/=	>	Y	N
3	=	<	<	<	N	Y
4	=	=	>	=	N	Y
5	<	=	>	=	N	Y
6	<	>	<	<	Y	N
7	<	=	<	<	Y	N
8	>	=	<	>	N	N
9	>	<	<	<	N	Y
10	>	<	<	<	N	Y
11	<	=	<	<	Y	N
12	<	=	<	<	Y	N
13	<	>	<	=	Y	N
14	=	=	=	<	Y	N
15	=	=	<	<	N	N
16	>	<	<	<	N	Y
17	=	>	</>	</>	N	Y
18	=	<	</>	</>	N	Y

Tab. 4 describes the comparison of the trend of the BI trends with the development trends of the most frequent trends development group of selected financial indicators. On the basis of the results, we can see that the development of BI with selected financial indicators is in line with 10 out of 18 cases (N for 2015/2014) and in 9 out of 18 inconsistent cases (N for 2016/2015).

5. Conclusion

On the basis of results achieved, we reject hypotheses 1 and 2 as the trend of financial indicators has the same behaviour as BI trend in 47% of investigated cases (in 17 cases out of 36), while trends in financial indicator have a different behaviour than trends of BI in 53% of investigated cases (19 cases out of 36 cases). Based on the above, it is possible to assume that of the project assignment where the required level of creditworthiness guarantees that a company planning to implement a research and development project will be stable at a given level and will have sufficient resources to implement the project. The BI level thus does not represent a statement about the current position of the company but also about its foreseeable future - in terms of minimizing possible problems in the implementation of the research and innovation projects.

Acknowledgment

This publication was created in the frame of the project VEGA 1/0918/16 Risk management of SME'S in the context of clusters involvement activities in the Slovak Republic.

References

- [1] Babich, V., Aydin, G. Brunet, P. et al. (2012). Risk, Financing and the Optimal Number of Suppliers. *Supply chain disruptions: theory and practice of managing risk*, pp. 195-240.
- [2] Barrot, J.N. (2016). Trade Credit and Industry Dynamics: Evidence from Trucking Firms. *Jouranal of Finance*, vol. 71, no. 5, pp. 1975-2015.
- [3] Belás J. and Cipovova E. (2011). Internal model of commercial bank as an instrument for measuring credit risk of the borrower in relation to financial performance (credit scoring and bankruptcy models). *Journal of Competitiveness*, vol. 3, no. 4.
- [4] Belás J., Demjan V, et al. (2015). The business environment of small and medium-sized enterprises in selected regions of the Czech Republic and Slovakia. *E & M ekonomie a management*, vol. 18, no. 1, pp. 95-110.
- [5] Biais, B; Gollier, C (1997). Trade credit and credit rationing. *Review Of Financial Studies*, vol. 10, no. 4 , pp. 903-937.
- [6] Buganová K., Hudáková M, et al. (2014). The Assessment of the Impact of the Security Risk on the Small and Medium-sized Enterprises in the Slovak Republic. *Proceedings of the 2nd international conference on management innovation and business innovation (ICMIBI 2014), Lecture Notes in Management Science*, vol. 44, pp. 116-121.
- [7] Jasková, D. and Havierníková K. (2016). The assesment of slovak regions' competitiveness. *Proceeding of the International Multidisciplinary Scientific Conferences on Social Sciences and Arts*, bk 2: political sciences, law, finance, economics and tourism conference proceedings, vol. III, pp. 1077-1084 .
- [8] Kelišek A., Hudáková M., and Titko M. (2017). Assessment of approaches to measuring the quality of business environment in Slovakia. *Finance and performance of firms in*

- science, education and practice: proceedings of the 8th international scientific conference, Zlín, Czech Republic.*
- [9] Kelíšek, A. (2009). Economic impact of disasters. *Ekonomicky casopis*, vol. 57, no. 8, pp. 832-832.
- [10] Kováčová M. and Klieštík T. (2017). Logit and Probit application for the prediction of bankruptcy in Slovak companies. *Equilibrium-quarterly journal of economics and economic policy*, vol. 12, no. 4, pp. 775-791.
- [11] Kucharčíková, A., Guttenova D. and Vojteková M. (2015). FDI in Automotive and Slovakia Economy. *Proceedings of the International Conference. 19th International Scientific Conference on Transport Means*, Kaunas, Lithuania, pp. 169-176.
- [12] OPVAI (2017). Operačný program výskum a inovácie [online]. [cit. 2018-02-12]. Retrieved from: https://www.opvai.sk/vyzvy/mhsr/dopytovoorientovaneprojekty/15122017_vyzva_opvai-mhdp2017122-13/
- [13] Potkanová T. and Kucharčíková, A. (2016). Value Management Impact and Economic Policy. *Vision 2020: innovation management, development sustainability, and competitive economic growth*, vol. I – VII, Seville, Spain, pp. 1382-1390.
- [14] REGISTERUZ. Hospodárske výsledky firiem [online]. [cit. 2018-02-20]. Available: www.registeruz.sk
- [15] Šoltés, V. et al. (2016). The impact of business environment on regional disparities. *Cbu international conference proceedings Innovations in science and education*, pp: 187-191.

IMPACT OF GLOBALIZATION ON STRUCTURE AND CONTENT OF FINANCIAL STATEMENTS IN FINANCIAL ACCOUNTING WITH THE IMPLEMENTATION OF EU DIRECTIVES IN THE SLOVAK REPUBLIC

Iveta Košovská^{1,a,*}, Ivana Váryová^{2,b}

¹Slovak University of Agriculture in Nitra, Faculty of Economics and Management, Department of
Accountancy, Tr. Andreja Hlinku 2, 949 76 Nitra, Slovakia

²Slovak University of Agriculture in Nitra, Faculty of Economics and Management, Department of
Accountancy, Tr. Andreja Hlinku 2, 949 76 Nitra, Slovakia

^aiveta.kosovska@uniag.sk, ^b ivana.varyova@uniag.sk

*Corresponding author

Abstract. Accounting is still evolving, thanks to the globalization and convergence of national economies, accounting systems are being harmonized not only within the European Union but also around the world. The main task of the accounting information is the true and fair view on all facts, which create the subject of accounting. The securing of information comparability from financial statements of accounting entities from any country in the world is the subject of accounting harmonization. In recent years the accounting harmonization has been a quite preferred theme. The reconciliation of financial statements content is an indispensable condition of global economics development. Several changes have arisen from the Directive 2013/34/EU of the European Parliament and of the Council of 26 June 2013 on the annual financial statements, consolidated financial statements and related reports of certain types of undertakings, which influenced the bookkeeping and preparing of financial statements of accounting entities bookkeeping in the system of double entry system of accounting in the SR. The main aim of this article is to present the impact of globalization on structure and content of financial statements in financial accounting with the implementation of EU directives in the Slovak Republic.

Keywords: financial accounting, financial statements, globalization, harmonization

JEL Classification: M21, M40, M41

1. Introduction

The globalization of the system of international economic, political, social, scientific, technical, information and other ties is manifested, first of all, through the globalization of business (Ellul et al., 2016). Most authors agree that globalization is a persistent problem, which on the one hand, is very positive and, on the other hand, brings many complicated problems (Domonkos & Ostrihoň, 2015; Saxunová et al. 2018). We can see globalization process all around us and it actually influences all parts of economic life (Berzakova & Bartošová, 2016). Business in the global economy must constantly adapt their activities to the new technologies, competitive pressures and constantly changing business environment

(Bieliková & Paliderová, 2016). The growing globalization is considered to be as a long-term process which joins states and continents all around the world in the cultural, political, economic and other area and requires as well as the flow of information exceeding any borders except for the movement of goods and people. Accounting is also affected by the consequences of globalisation. The information deriving from the accounting are processed to financial statements of corporation; shall be comparable between individual states and therefore provide relevant information mainly for potential investors (Kuchařová et al., 2017). According to many authors financial accounting is a comprehensive system of records that provides information on the business entity's operation, data on the profit or loss and communicates relevant information to users. The output of financial accounting is, therefore, economic information presented in financial statements and annual report, on the basis of which all users (both external and internal) can make a variety of decisions (Hakalová et al., 2017; Pakšiová, 2017; Tumpach et al., 2014). In recent years, the awareness among users of financial statements has been observed to increase. As a result, their expectations regarding the financial statements and the amount of information disclosed continuously grow. Another important change in accounting systems emerges in nonfinancial information disclosure. Global trends unanimously indicate that besides traditional financial information, investors pay attention to business model issues, social responsibility and employment policy (Papaj, 2017). This development requires consistent financial reporting across the world. Reliable and comparable financial data can direct the company in the right direction. It is therefore desirable to unify the accounting systems (Hinke et al., 2013; Svoboda & Bohušová, 2017; Bohušová et al., 2012; Balashova et al, 2015).

2. Methods

Accounting systems have their own specifics and rules in different countries. The main aim of this article is to present the impact of globalization on structure and content of financial statements in the financial accounting with the implementation of EU directives in the Slovak Republic. In order to achieve the article's aim we derive from the current status of knowledge in the SR. The source for the article's processing was mainly the scientific literature and valid legal regulations of accounting and financial statements in the Slovak Republic (the Act No. 431/2002 Coll. on Accounting with the latest amendments, and the Directive 2013/34/EU of the European Parliament and of the Council of 26 June 2013 on the annual financial statements, consolidated financial statements and related reports of certain types of undertakings. We derived from the use of inductive-deductive and analytical-synthetic scientific methods in individual manners of understanding and explaining the given issue.

3. Results and Discussion

Nowadays in the globalized world the quality information provided in time presents the crucial source for decision making and strong-minded company management. The accounting secures the activities directed to the numerical expression of company structure and processes which are performed in the accounting entity and it prepares the output in the form of partial and summarized analyses tailored to the various internal and external needs of users. The accounting systems (bookkeeping systems) of individual countries might seem analogic. However there exist some discrepancies which derive from the existence of various economic,

legal, tax, cultural and other differences. The before mentioned differences originated in the historical development of these countries as well as in various institutional factors. Consequently they have an impact on the creation of specific accounting rules, requirements of governments and professional organizations such as measurement, accounting, reporting and presentation of individual items of financial statements to external users.

Financial accounting is the process (in which financial information is identified, analysed and measured), that is finalized in the preparation of financial reports on the economic entities (types of entities: corporations, partnerships, and proprietorships). Financial information is communicated through financial reports to internal and external interested parties (for instance, stockholders, creditors, government agencies, management, employees, consumers, labour unions, etc.) In individual countries the various approaches towards the accounting regulation are applied. As stated they depend mainly on the social-legal system and are fully regulated by the state institutions (in the SR by the Ministry of Finance of the SR), in cooperation with the state bodies and independent professional organizations. The explanatory ability of the content of accounting and information from the financial statements depend on the legal regulation of accounting. The legal regulation of accounting is based on the legal norms and is determined by a high level of regulation. The legal regulation is essential for the securing of the same explanatory ability and mutual comparability of information between various accounting entities. On an equal basis, the current accounting also regulates the financial statements. The general legal norm in the SR which stipulates the obligation to keep the accounting is the Act No. 513/1991 Coll. Commercial Code (Articles 35 till 40) with the latest amendments. Pursuant to the Commercial Code entrepreneurs are obliged to keep the accounting in the extent and manner determined by the special law (i. e. the Act on Accounting). Except for that it stipulates that in what system and under which conditions entrepreneurs can account for; it determines to commercial companies the obligation related to the registration, approval and verification of financial statements. The basic legal norm is presented by the Act No. 431/2002 Coll. on Accounting with the latest amendments. The bookkeeping systems in the SR are further determined by the Measure of the Ministry of Finance of the Slovak Republic. The crucial condition for the development of global economics is the convergence of accounting systems. The majority of national accounting systems differentiate and therefore they are not suitable information source for all external users. The output of accounting systems in the form of financial statements, e. g. the financial statements of companies which shares are traded on the financial or capital markets should become a comprehensible source of information for users in all countries. The harmonization of accounting presents the way to meet this aim. The process of international harmonization and regulation of accounting deals with the overcoming of existing discrepancies between individual national accounting systems. The legal base of harmonization of legal regulations in the area of accounting presents the treaty establishing the European Economic Community so called the Treaty of Rome. Based on this treaty the adjustment of legislation of Member States is performed by means of issued norms. The decrees of the EU bodies can be in the form of regulations, directives or recommendations. The regulation has an immediate effect in each Member State without having to be transformed into Member States' legislation. As regards the recommendation each Member State can decided whether or not to transform it into its national law. The directive is something between the regulation and the recommendation because the objective pursued by it is binding for each Member State but the choice of form and means to achieve this task is left to individual Member States. The means

of harmonization of accounting regulations are presented by directives which have the character of legal regulations.

The Directives of the European Union are binding for Member States; their requirements are realized by means of the national legal regulation of each Member State therefore they shall be adopted to it. Their final form is the result of compromises because their adoption requires the unanimous consent of all Member States. The compromises are presented by means of alternative solutions in the Directives. Nevertheless the national legal regulations significantly differentiate after the implementation of the Directives of the European Parliament and the Council. The European Union firstly enacted these Directives for the coordination of Member States accounting:

- Fourth Council Directive 78/660/EEC of 25 July 1978 of the Treaty on the annual accounts of certain types of companies, has been amended several times,
- Seventh Council Directive 83/349/EEC of 13 June 1983 of the Treaty on consolidated accounts, has been amended several times as well).

Except of before mentioned Directives the accounting is regulated as well as by:

- Council Directive 86/635/EEC of 8 December 1986 on the annual accounts and consolidated accounts of banks and other financial institutions (with the latest amendments),
- Council Directive 91/674/EEC of 19 December 1991 on the annual accounts and consolidated accounts of insurance undertakings (with the latest amendments).

The before stated Directives have been adopted in the Slovak Republic by the amendment of the Act on Accounting effective since 1 January 2005 and have become binding for the Slovak Republic. In October 2011 the European Commission disclosed the Proposal of integrated Directive of the European Parliament and the Council on the annual accounts and consolidated accounts and the annual accounts of certain types of undertakings. The result of discussions to the proposal content was the adoption of the Directive 2013/34/EU of 26 June 2013 on the annual financial statements, consolidated financial statements and related reports of certain types of undertakings (hereinafter referred to as the Directive of the European Union on the financial statements), amending Directive 2006/43/EC of the European Parliament and of the Council and repealing Council Directives 78/660/EEC and 83/349/EEC. It is determined to the EU Member States. In the part Transposition the Directive stipulates that the EU Member States, i.e. as well as the SR, shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive by 20 July 2015. They shall immediately inform the Commission thereof. This Directive takes into account and complies with the EU policy which is determined as „Green to small and medium-sized enterprises“. The Commission Communication entitled "Think Small First – Small Business Act for Europe", adopted in June 2008 and revised in February 2011, recognises the central role played by small and medium-sized enterprises. The stated direction is aimed to integrate the SBA with „the Europe 2020 strategy“ in order to secure the intelligent, sustainable and inclusive growth and further to decrease the administrative burden of economic subjects, to improve the entrepreneurship environment, mainly for small and medium-sized enterprises, and to support their internationalization. The Slovak Republic has adopted the Directive of the European Union on the financial statements to the legal regulations of the accounting particularly by the Act No. 333/2014 Coll. which has amended the Act No. 595/2003 Coll. on Income Taxes with the latest amendments and which has amended several acts and as well as

the Measures of the Ministry of Finance of the Slovak Republic (some have been amended or have been newly issued). The several amendments of the Act on Accounting caused its full transposition to the national legislation of the SR. The significant amendment which has been brought by the Directive of the EU on the financial statements is also the categorization of accounting units to size groups in the Slovak Republic. The Act on Accounting pursuant to the new accounting directive defines three groups of accounting units that are classified into “size groups” as follows:

- micro accounting unit,
- small accounting unit or
- large accounting unit.

Table 1: Comparison of companies' classification to size categories pursuant to the Directive No. 2013/34/EU and the Act No. 431/2002 Coll. on Accounting as amended on 1 January 2018.

Size criteria	EU Directive	The Act on Accounting in the SR
a) total sum of assets did not exceed EUR 350,000, b) net turnover did not exceed EUR 700,000, c) the average calculated number of employees did not exceed 10 during the accounting period.	Micro entity	Micro accounting unit
a) total sum of assets exceeded EUR 350,000 but did not exceed EUR 4,000,000, b) net turnover exceeded EUR 700,000 but did not exceed EUR 8,000,000, c) the average calculated number of employees exceeded 10 but did not exceed 50 during the accounting period.	Small entity	Small accounting unit
a) total sum of assets exceeded EUR 4,000,000 but did not exceed EUR 20,000,000, b) net turnover exceeded EUR 8,000,000 but did not exceed EUR 40,000,000, c) the average calculated number of employees exceeded 50 but did not exceed 250 during the accounting period.	Medium-sized entity	Large accounting unit
a) total sum of assets exceeded EUR 20,000,000, b) net turnover exceeded EUR 40,000,000, c) the average calculated number of employees exceeded 250 during the accounting period.	Large entity	Large accounting unit

Source: own processing

The provisions on micro accounting units have been adopted by the Act No. 352/2013 Coll. but the Act No. 333/2014 Coll. has brought the change in these provisions. The Directive of the EU on the financial statements defines also one size group of accounting units – medium-sized entities. The SR has not adopted this category. The Member States of the EU have the possibility to make certain exemptions, simplifications for small and medium-sized enterprises in order to reduce their administrative burden related to bookkeeping and financial statements. The Slovak Republic by adopting the Directive of the EU on the financial statements to the legal regulations had to replace also the Measure of the Ministry of Finance of the SR. Till that time only one measure was in force, the Measure of the Ministry of Finance of the SR No. 4455/2003-92 defining details of the arrangement, marking, and content specification of items of an individual financial statement and extent of data determined for publication from an individual financial statement for entrepreneurs using double entry bookkeeping, as amended. In connection to the before mentioned categorization to size groups the SR has enacted the separate measure of the Ministry of Finance of the SR

amending requirements related to the preparation of financial statements, stipulating the content of its individual parts. Since the first adoption the Directive on financial statements has went through several amendments which the SR has transposed to its legal regulations pursuant to deadlines. Bigger or smaller discrepancies can be found in financial statements between individual size groups of accounting units.

Table 2: Measures of the Ministry of Finance of the Slovak Republic amending the financial statements in connection to the size groups' classification.

Size group	Measure of the Ministry of Finance of the Slovak Republic	Amends
Micro accounting unit	Measure of the Ministry of Finance of the Slovak Republic of 11 December 2013 No. MF/15464/2013-74 for compiling financial statements, stipulating details on the arrangement, naming and content of items included in separate financial statements and on the extent of separate financial statements' disclosures for micro-entities , as amended	- Balance Sheet - Profit and Loss Statement - content of Notes
Small accounting unit Foreign person keeping the accounting pursuant to the accounting procedures for entrepreneurs	Measure of the Ministry of Finance of the Slovak Republic of 3 December 2014, no. MF/23378/2014-74 stipulating the details of separate financial statements and the extent of separate financial statements' disclosures for small reporting entities, as amended	- Balance Sheet - Profit and Loss Statement (financial statements are adopted from the Measure No. MF/18009/2014-74) - content of Notes
Large accounting unit Public interest entity keeping the accounting pursuant to the accounting procedures for entrepreneurs	Measure of the Ministry of Finance of the Slovak Republic of 3 December 2014, no. MF/23377/2014-74 stipulating details of separate financial statements and the extent of separate financial statements' disclosures for large reporting entities and public interest entities, as amended	- Balance Sheet - Profit and Loss Statement (financial statements are adopted from the Measure No. MF/18009/2014-74) - content of Notes

Source: own processing

The financial statements of micro accounting unit are simplified as regards the requirements for information presented in financial statements. The Balance Sheet and Profit and Loss Statements are condensed. Several balance sheet and profit and loss statements' components are disclosed together in one statement line. The assets in the Balance Sheet for current and prior accounting period are expressed in net value, i. e. in the measurement adjusted for accumulated depreciation and value adjustments. The accruals and deferrals are not disclosed separately in the Balance Sheet of a micro accounting unit but are disclosed together with other receivables and liabilities. The Profit and Loss Statement is condensed as well. Individual components are aggregated, several of them at the level of account groups. It contains also one indicator, added value, which includes production, consumption as well as margin. The content of Notes to the financial statements of a micro accounting unit is very brief and contains only basic information. The Statement of Changes in Equity and the Statement of Cash Flow are not included in the Notes of a micro accounting unit. The requirement for the information presented in the financial statements of small accounting units are increasing. The template for the Balance Sheet and the Profit and Loss Statement is common for small accounting units as well as large accounting units and is entitled as "Financial statements of entrepreneurs keeping double-entry accounting". In the Balance Sheet the gross value of assets is disclosed, as well as correction (accumulated depreciation and value adjustments) and net value for a current accounting period. Also the content of Notes is more concrete with extensive information on main facts influencing the financial

situation of an accounting unit. The Statement of Changes in Equity and the Statement of Cash Flow are not included in the Notes of a small accounting unit as well. Large accounting units and public interest entities shall disclose more extensive number of detailed information without any simplifications in their financial statements. The Notes of a large accounting unit include detailed information on facts presenting the subject of accounting. The Statement of Cash Flow and the Statement of Changes in Equity are the part of the Notes of large accounting units and public interest entities. The big discrepancies in the content of Notes in individual size groups are presented in the disclosure of additional and explanatory information on the Balance Sheet and the Profit and Loss Statement. The financial statements of individual size groups of accounting units regardless their categorization shall be comprehensible, pursuant to the Directive of the European Union on the financial statements and shall provide true and fair view on assets, liabilities, financial situation and the profit or loss of an accounting unit.

4. Conclusion

Globalization and creation of international concerns with a diverse structure of owners require the elaborated system of collecting, processing and providing of relevant information needed for the assessment of economic situation of subjects and receiving of adequate decisions with the aim to achieve the pre-determined tasks. The accounting belongs to the historically oldest information source of a human society. The regulation of accounting differentiates in individual states with regard to the manner as well as the content. In the EU countries the accounting harmonization is expressed in the following areas:

- firstly in the content unification of financial statements elements, determination of assets, liabilities, equity, costs, revenues, profit and its components,
- in the unification of principles, methods and techniques of their measurement,
- in the manner of content and formal arrangement of financial statements,
- in the requirement for the content of explanatory data and additional information to financial statements.

An important milestone was the adoption of the Directive of the European Parliament and the Council 2013/34/EU of 26 June 2013 on the annual financial statements, consolidated financial statements and related reports of certain types of undertakings. The Slovak Republic has adopted the Directive of the European Union on the financial statements to the legal regulations of the accounting particularly by the Act No. 333/2014 Coll. and which has amended several acts and as well as the Measures of the Ministry of Finance of the Slovak Republic (some have been amended or have been newly issued). The several amendments of the Act on Accounting caused its full transposition to the national legislation of the SR.

Acknowledgment

This paper is an output of the science project VEGA no. 1/0666/17 with the title Impact of Integration and Globalization on Business Risk in Slovak Agriculture.

References

- [1] Balashova, N. N., Šilerová, E. and Melikhov, V. A. (2015). Developing the Metodology to Form Integrated Reporting of Agroholdings in the Russian Federation. *AGRIS on-line Papers in Economics and Informatics*, vol. 7, no. 4, pp. 19 – 29.

- [2] Berzaková, V. and Bartošová, V. (2016). Business share value in global environment. *16th International Scientific Conference Globalization and Its Socio-Economic Consequences*, Žilina, Slovakia, pp. 168-174.
- [3] Bieliková, A. and Paliderová, M. (2016). Receivables management in the global economy. *16th International Scientific Conference Globalization and Its Socio-Economic Consequences*, Žilina, Slovakia, pp. 183-190.
- [4] Bohušová, H., Svoboda, P. and Nerudová, D. (2012). Biological assets reporting: Is the increase in value caused by the biological transformation revenue? *AGRICECON*, vol. 58, no. 11, pp. 520–532.
- [5] Domonkos, F. and Ostrihoň, F. (2015). Inclusive growth in selected central European countries. *Ekonomický Časopis*, vol. 63, no. 9, pp. 881-905.
- [6] Ellul, A., Jappelli, T., Pagano, M. and Panunzi, F. (2016). Transparency, tax pressure, and access to finance. *Review of Finance*, vol. 20, no. 1, pp. 37-76.
- [7] Farkaš, R. (2014). *Nová účtovná smernica Európskej únie*. 1. vyd. Bratislava: Wolters Kluwer, pp. 164.
- [8] Hakalová, J., Palochová, M. and Psenková, Y. (2017). Globalization trends in financial accounting and taxation of business entities in compliance with the implementation of EU directives and upcoming recodification of tax legislation in the Czech Republic. *17th International Scientific Conference Globalization and Its Socio-Economic Consequences*, Žilina, Slovakia, pp. 613-620.
- [9] Hinke, J. and Stárová, M. (2013). Application Possibilities and Consequences of Biological Assets and Agricultural Produce Reporting in Accordance with IFRS Principles in the Czech Republic. *AGRIS on-line Papers in Economics and Informatics*, Prague, vol. 5, no. 4, pp. 77 - 89.
- [10] Kuchařová, I., Pfeiferová, D. and Sturcová. (2017). The problem of persistence of fixed assets accounting and tax differences within the EU in the time of globalization and harmonization. *17th International Scientific Conference Globalization and Its Socio-Economic Consequences*, Žilina, Slovakia, pp. 1211-1218.
- [11] Pakšiová, R. (2017). The critical analysis of profit for its allocation decision-making. *Scientific Annals of Economics and Business*, vol. 64, pp. 41-56.
- [12] Papaj, E. (2017). The role of the narrative reporting in contemporary accounting. *17th International Scientific Conference Globalization and Its Socio-Economic Consequences*, Žilina, Slovakia, pp. 1859-1866.
- [13] Saxunová, D., Novackova, D. and Kajanova, J. (2018). International Tax Competition Complying with Laws: Who are its Beneficiaries? *Journal of Eastern Europe Research in Business and Economics*, vol. 2018, 16 p.
- [14] Svoboda, P. and Bohušová, H. (2017). Amendments to IAS 16 and IAS 41: Are there any differences between plant and animal from financial reporting point of view? *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, vol. 65, no. 1, pp. 327 – 337.
- [15] Tumpach, M., Manová, E. and Meluchová, J. (2014). Relevantnosť národného podnikového finančného výkazníctva v Slovenskej republike z pohľadu veriteľov ako neprivilegovaných používateľov. *Ekonomický časopis*, vol. 62, no. 5, pp. 495 – 507.
- [16] Zákon č. 431/2002 Z. z. zákon o účtovníctve, v znení neskorších predpisov. Available: <http://www.finance.gov.sk/Default.aspx?CatID=4833>

PROBLEMS OF CAPITAL FLIGHT OF EA19 FROM FLOW OF FUNDS' VIEW OF POINT

Jana Kotlebová^{1,2,a,*}

¹University of Economics in Bratislava, Faculty of National Economy, Department of Banking and
International Finance, Dolnozemska cesta 1, Bratislava, Slovakia

²Slovak Academy of Sciences, Institute of Economic Research, Sancova 56, Bratislava, Slovakia

^ajana.kotlebova@euba.sk

*Corresponding author

Abstract. The moderate economic recovery in Euro Area is the reason why it is crucial to determine whether the capital flight to abroad is present and if, in which extent it can be considered as undesirable with respect to the present changes in the process of globalization. The first step in our research is to define the different forms of capital flight as well as their measurement. In the next stage of our observation we detect the channels through which this capital flight is realized, so we determine the reasons of these processes in Euro Area. We will quantify the size of this capital flight by the usage of approach based on the flow of funds' analysis. Our estimation lies on assessment of household sector decisions about holding of financial wealth in the different forms of financial assets in domestic economy and in abroad. We distinguish holding of deposits, short-term and long-term debt securities, listed and investment fund shares as a capital flight in distribution of this financial wealth. Capital flight can bear legal forms as a logic consequence of international economic cooperation and competition in global environment, and illicit forms which by-pass the regulation. In this paper an attention is paid to the legal form of capital flight. Our data sample covers quarterly data for EA19 from integrated economic and financial accounts by institutional sectors between 1999 – 2017. Our results suggest that capital flight measured in the sector of households in legal form takes form especially of listed shares, deposits as well as investment funds share as the consequence of low interest rates in EA19 and depreciated EUR.

Keywords: capital flight, flow of funds, international policy coordination, financial crisis

JEL Classification: F65, E50, F42, G01

1. Introduction

From the start of EA's financial crisis in 2008 the two main euromoney prices – nominal interest rates and exchange rate against USD are falling down. The cheaper money and weaker currency can bring some advantages, but on the other hand can cause the decline in returns of investments held in EUR. In this case the question is how and where the financial funds of individual economic sectors of EA19 are used. Are they used in the same economy they arise, or do they move in abroad and create so called capital flight?

2. Review of Empirical Studies, Methodology and Data

We can find a huge literature about the problematic of capital flight, but up to date doesn't exist its exhaustive definition. First reference can be found in paper of Kindleberger (1937) which claims that it is "abnormal capital outflows propelled from a country ... by .. any one or more of a complex list of fears and suspicions". This definition bears some negative aspects of capital movement. Capital flight is often improperly substituted by term a dirty money or illegal capital flows, but these terms differ by scope and behaviour. Capital flows can be legal and illegal. Capital, which is leaving domestic economy, can follow different motives. It can be a component of payments resulted from standard international cooperation or can be driven by an effort to increase its value by taking the better opportunity to be invested abroad. Often the capital leaves domestic economy because of home unfavourable conditions (political, social, economic), but still by the way, which respects the best practices used in international financial relationship (legal movement). If the movement of capital is not respecting international law conditions, so its birth, accumulation and distribution evade rules stated in legal framework of country, it is considered as illegal flow. Capital flights can be licit or illicit. They differ by the source of capital as well as methods used to transfer money. The special form of capital flight can be mentioned an illicit flow of capital when economic agents try to find special channels, through which their wealth is better placed. This form is very closed to the illegal form of capital flight. Illicit capital is that one, which has negative impact on an economy, but doesn't cover only illegal capital, so can be also in legal form. OECD's definition of illicit financial flows covers a set of methods and practices aimed at transferring financial capital out of a country in contravention of national or international laws and they range from private individual transferring funds into accounts abroad without having paid taxes to highly complex money laundering schemes involving criminal networks setting up multi-layered multi-jurisdictional structures to hide ownership and transfer stolen funds (OECD, 2013). So, the capital flight can be evoked by motives which follow portfolio, social controls or dirty money approaches.

Main instruments how money leaves domestic economy within capital flight definition are special types of invoice falsification (mispricing, misinvoicing), usage of cyberpayment technologies (usage of digital currency or digital payment platform, which are not under the control of regulation authorities) (Ju et al, 2016), or simply holding of money (in different assets) abroad by citizens and firms. In some extent capital flight can occur when bank branch transfers money to mother company abroad officially in form of invoice's payment for advices and supporting services. The very frequent case is used when recipient of some goods and services in domestic economy pays to the agent which has open account in abroad.

Measuring of capital flight can be realised by different ways. Criteria used can be followed:

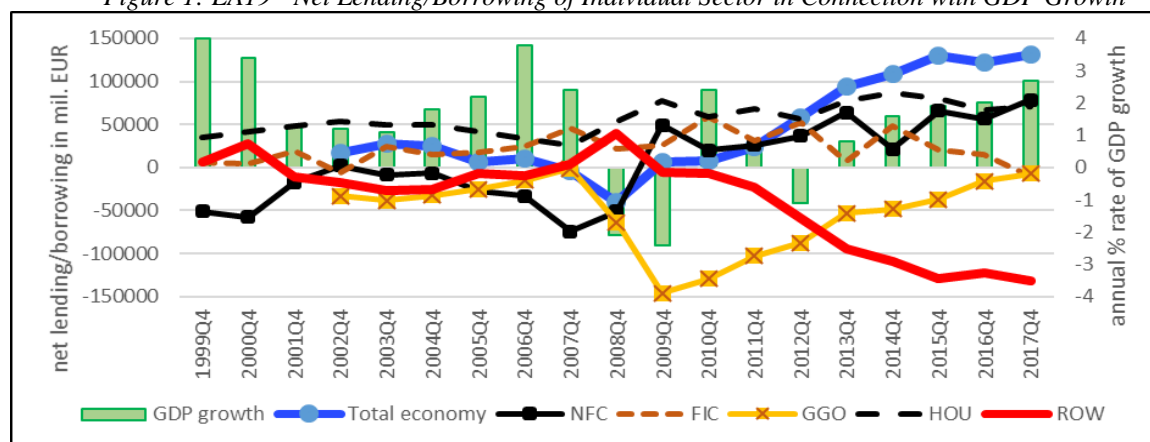
- a) by sectoral approach – to measure whole economy or individual entities (separately households, non-financial corporations, financial institutions, governments or specifically banks, foreign-trade companies etc.),
- b) by statistical sources (balance-of-payment, BIS reports of claims and liabilities of financial institutions on national, regional or world base, system of national accounts statistics, tax system statistics),
- c) by individual items or indicators used,
- d) by purposes (to show special attributes of capital flights).

In the empirical studies balance of payment's approach prevails, when capital flight is assessed through the measuring of net errors and omissions (Siranova & Tiruneh, 2018), mis-invoicing Gunter (2017), Cheung at al (2016), hot money approach (Cai at al, 2016), short-term foreign portfolio investments by the household sector (Lensink at al, 2000). Hwang at al. (2017) claim that extreme net capital flow episodes increased drastically in the 2000s relative to previous years. They confirm also that the liability-flow-driven episodes have the worse effect on economy in comparison with the asset-flow-driven episodes. Brada at al (2013) argue that the financial liberalization has fuelled rather than reduced capital flight by reducing its costs and increasing the funds that can be moved abroad. In our case, we follow approach of Pastor (1990) who provide broader definition of capital flight in extent of acquiring enormous amount of foreign assets abroad by citizens. Our choice is influenced by the findings of Byrne & Fiess (2016) that the strongest evidence of capital flight is in equity and bank flows. For the analytical purposes, we use an approach based on flow of funds. „Main function of the flow of funds accounts is to reveal the sources and uses of funds that are needed for growth and development.“ (Klein, 2000). Flow of funds statistic consists from financial assets and liabilities (flows and stocks) while the result of their comparison in the form of net lending of one sector constitutes de facto net borrowing for another sector. This also applies to domestic economy in relation to the rest of the world. The positive balance between net acquisition of financial assets and net incurrence of financial liabilities in the form of net lending to domestic economy represents net borrowing to the rest of the world.

3. Results and Discussion

The starting point of our analysis is the assessment of the financial imbalance (net lending/net borrowing position) of individual sectors and their contributions to overall position of domestic economy towards the rest of the world (economic analysis).¹³ This allows us to show how these sectors react to changes in the real economic conditions, especially in the financial services. It reflects in investments and savings balance on asset side and in the structure of their financing on the liabilities side. Contributions of individual sectors transform into overall position of the country to the rest of the world.

Figure 1: EA19 - Net Lending/Borrowing of Individual Sector in Connection with GDP Growth



Source: own processing, data ECB 2018

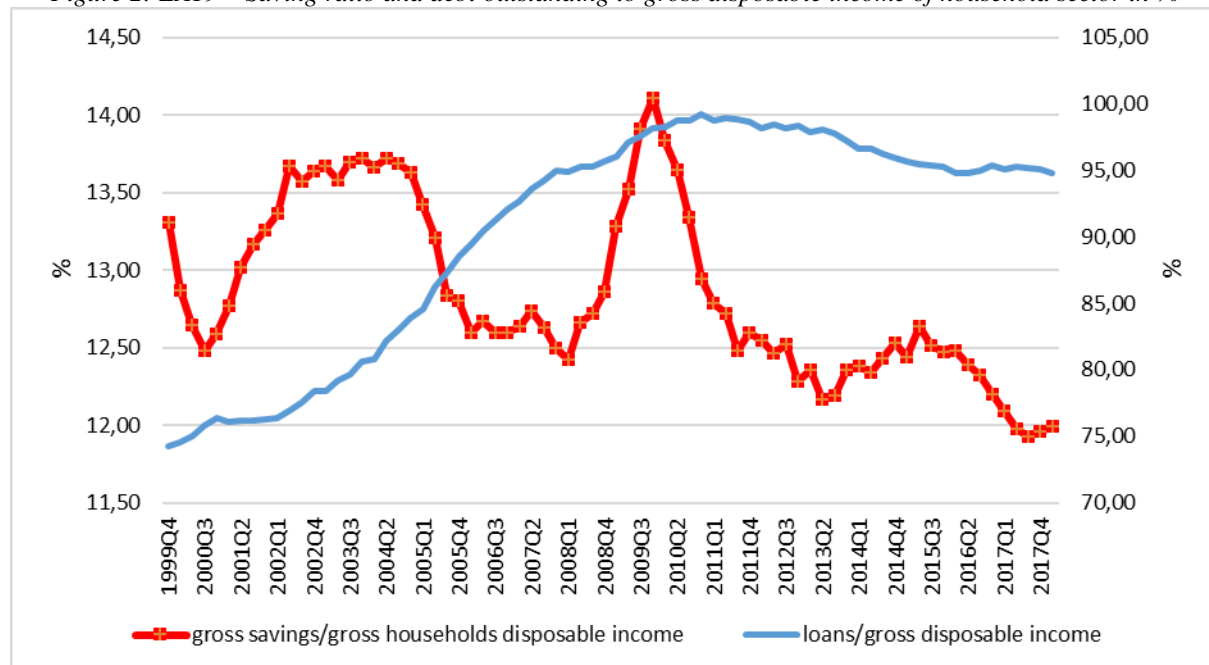
¹³ Net lending (creditor position) is the situation when financial assets exceed liabilities, in opposite, net borrowing (debtor position) means, that the financial liabilities are higher than financial assets.

In line with the Figure 1, after the collapse of EA in 2008/2009, there is evident gradual recovery of economic growth, especially from 2013. EA19 as a whole jumped to the net lending position and in turn, the position of rest of the world is in net borrowing. The main contribution to the improving trend belongs to the sectors of households and non-financial corporations. Positive measures take also sector of general government after the process of consolidation of public finance. The position of financial corporations is worsening.

We pay attention especially to the household sector (S. 14, S.15) as the one of the important clients of financial system.

In terms of positive economic growth's trajectory, we suppose an improvement in the financial wealth of households too. But the saving ratio (gross savings/gross disposable income) decreases from the pop of crisis and faces historical minimum from the establishment of Euro Area. On the other hand, also the indebtedness of households decreases too.

Figure 2: EA19 – Saving ratio and debt outstanding to gross disposable income of household sector in %

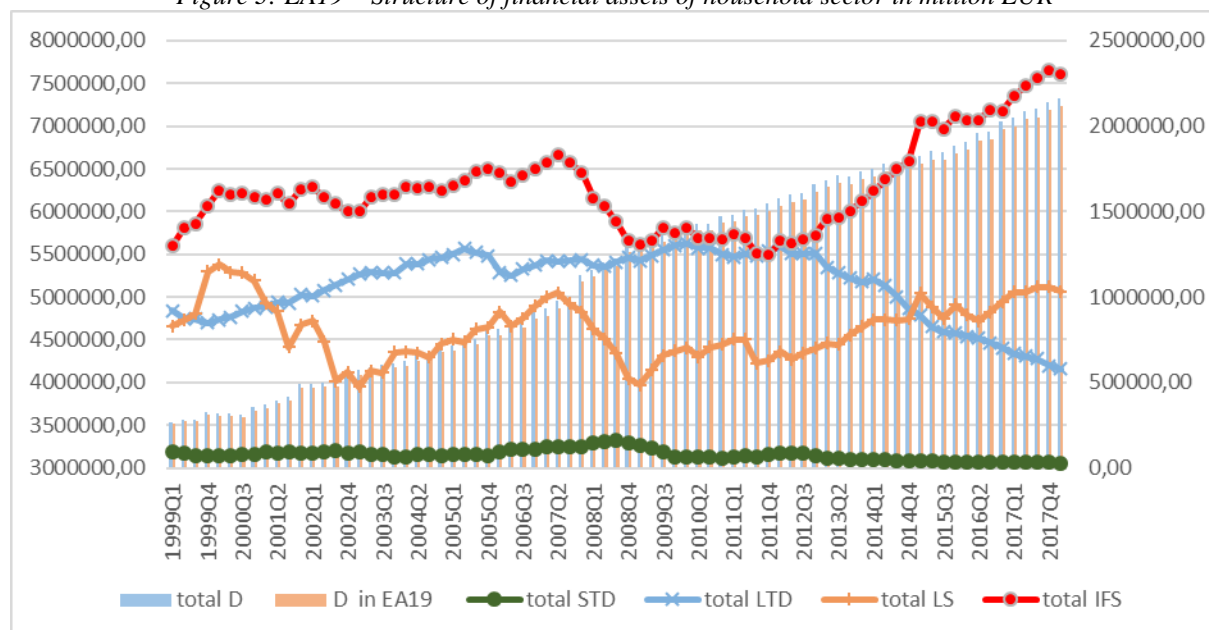


Source: own processing, data ECB 2018

We would like to investigate the tendency of creation of different financial assets in domestic economy and outside of EA19 to measure broad capital flight. We take into the consideration deposits (D), short-term debt securities (STD), long-term debt securities (LTD), listed shares (LS) as well as investment funds shares (IFS). The problem of our estimation is lack of data for majority of the financial assets on bilateral basis, so between households and rest of the world. Data available from 1999 concern only deposits, the rest of analysed data is available only from the 2013Q4.

Figure 3 shows that the households keep the prevailed amount of their assets in the form of deposits, and majority of them in the Euro Area. In the other assets the domestic holdings prevail too. From the start of 2008 crisis deposits gradually increase in absolute value. App. 1.3% of deposits move to the rest of the world.

Figure 3: EA19 – Structure of financial assets of household sector in million EUR

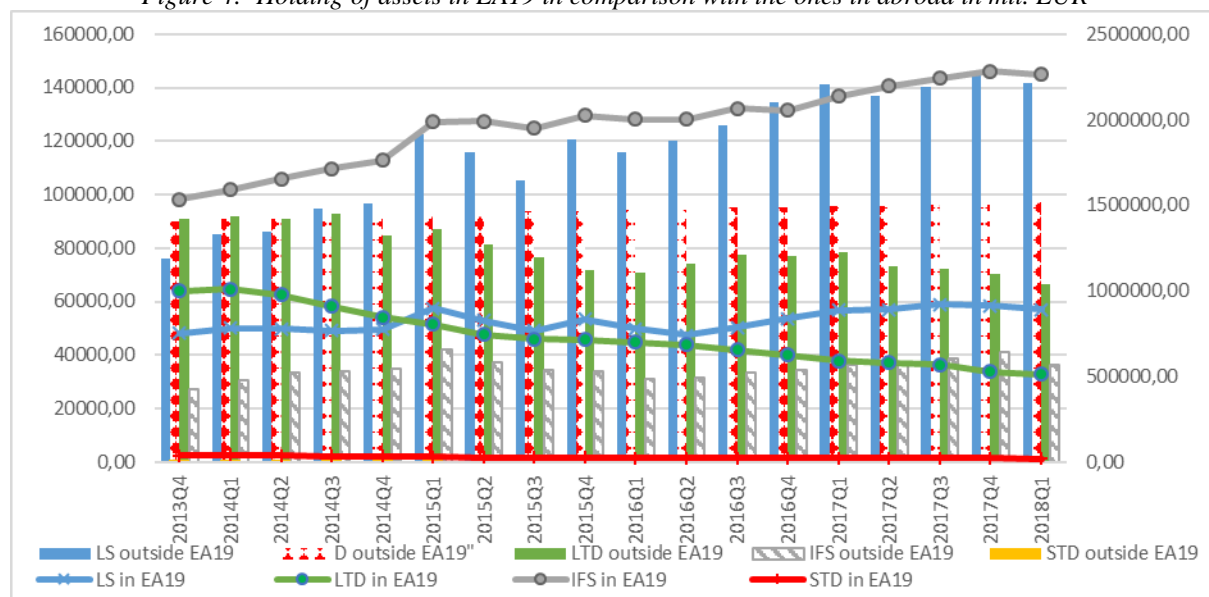


Source: own processing, data ECB 2018

Note: total D and D in EA19 left axis

Besides deposits, the most favourite financial assets by their shares are investment fund shares, followed by listed shares, long-term debt securities and short-term debt securities. In comparison, total assets in investment fund shares form app. 31.4% of total deposits of households in nominal value, but the share of investments to these assets on foreign markets is app. 1.5% in 2018Q1. Demand for foreign listed shares is higher, around 13.7%. Descending trend in total holding is visible in long-term debt securities as well as in short-term debt securities. On the other hand, more than $\frac{1}{4}$ short-term debt securities are bought on foreign markets, in the case of long-term debt securities it is app. in 11.4%.

Figure 4: Holding of assets in EA19 in comparison with the ones in abroad in mil. EUR



Source: own processing, data ECB 2018

Note: assets held in EA19 on the right axis and outside of EA19 on the left axis

From the other point of view, as the Figure 4 illustrates, money is flowing in nominal terms in abroad mainly in the form of investments to the listed share, deposits, long-term debt securities, investment fund shares and short-term debt securities. Increasing trajectory is present in holding of listed shares and investment fund shares in abroad.

4. Conclusion

We can agree with the study of Schmidt & Zwick (2015) which claim, that very important factor of the capital flight in Euro Area are crisis contractions in international capital flows along with a high level of economic uncertainty. We also suggest, as Benigno et al. (2015) that large changes in capital flight are typically accompanied by an economic boom and followed by slump. The similar results confirm Broner et al (2013).

During the whole analysed period, the EA19 as a whole is in a creditor position to the rest of the world. Decreasing saving ratio and indebtedness of households indicate the worsening of income position of households. Households exhaust their savings and face a weaker ability to make new loans.

Household sector invests in abroad mainly in the form of listed shares (increasing tendency), deposits (stable development) and investment fund shares (increasing tendency). Investments into the long-term and short-term debt securities decrease.

This legal capital flight is closely related from the crisis period to the lower interest rates in EA19, depreciated EUR against USD as well as more visible growth on equity markets. On the other hand, capital outflow is not so critical as the domestic holding of all financial assets prevails in enormous extent.

In general, the uncertainty in the global economy persists. Investments in equity markets can bear some risk in regard to potential presence of price bubble if their growth is not accompanied with the adequate economic growth.

This paper is only the simple insight into the problematic of capital flight. Our further investigation is in a deeper analysis of data sample for individual economic sectors in relation with the main economic and financial variables which can serve as explanatory variables for capital flight.

Acknowledgment

This paper is an output of the science project APVV-15-0666 “Capital Flight and its Impact on the Slovak Economy”, project VEGA 1/0613/18 “Deepening of Economic Inequalities as a Consequence of Distributional Effects of Unconventional Monetary Policy” as well as project implementation Creating Excellence in Economic Research Department for Addressing the Challenges of Civilization in the 21st Century (ITMS 26240120032) supported by the Research & Development Operational Programme funded by the ERDF.

References

- [1] Benigno, G., Converse, N. and Fornaro, R. (2015). Large Capital Inflows, Sectoral Allocation and Economic Performance. *Journal of International Money and Finance*, vol. 55, pp. 60-87.

- [2] Brada, J. C., Kutan, A. M. and Vuksic, G. (2013). Capital Flight in the Presence of Domestic Borrowing: Evidence from Eastern European Economies. *World Development*, vol. 51, pp. 32-46.
- [3] Broner, F., Didier, T., Erce, A. and Schmukler, S. L. (2013). Gross Capital Flows: Dynamics and crises. *Journal of Monetary Economics*, vol. 60, issue 1, pp. 113-133.
- [4] Byrne, J. P. and Fiess, N. (2016). International Capital Flows to Emerging Markets: National and Global Determinants. *Journal of International Money and Finance*, vol. 61, pp. 82-100.
- [5] Cai, T., Dang, V. Q. T., and Lai, J. T. (2016). China's Capital and 'Hot' Money Flows: An Empirical Investigation. *Pacific Economic Review*, vol. 21, issue 3, pp. 276-294.
- [6] Gunter, F., R. (2017). Corruption, Costs and Family: Chinese Capital Flight, 1984 – 2014. *China Economic Review*, vol. 43, pp. 105-117.
- [7] Hwang, I., Jeong, D., Park, H. and Park, S. (2017). Which Capital Flows Mater? *Emerging Markets Finance and Trade*, vol. 53, no. 2, pp. 289-305.
- [8] Cheung, Y. W., Steinkamp, S. and Westermann, F. (2016). China's Capital Flight: Pre- and Post-Crisis Experiences. *Journal of International Money and Finance*, vol. 66, pp. 88-112.
- [9] Ju, L., Lu, T. and Tu, Z. (2016). Capital Flight and Bitcoin Regulation. *International Review of Finance*, vol. 16, no. 3, pp. 445-455.
- [10] Kindleberger, C. P. (1937). *International Short-Term Capital Movements*. New York: Augustus Kelley, p. 158
- [11] Klein, L. R. (2000). Preface. *Financial Systems in Transition*, ed. A.E. Fleming and M.M. Giugale, pp. ix–xii. Singapore: World Scientific.
- [12] Lensink, R., Hermes, N. and Murinde V. (2000). Capital Flight and Political Risk. *Journal of International Money and Finance*, vol. 19, no. 1, pp. 73-92.
- [13] OECD (2013). Measuring OECD Responses to Illicit Financial Flows. [Online]. Available: <http://globalinitiative.net/measuring-oecd-responses-to-illicit-financial-flows-from-developing-countries/>
- [14] Pastor, M. (1990). *Capital Flight and The Latin American Debt Crisis*. Economic Policy Inst.
- [15] Schmidt, T. and Zwick, L. (2015). Uncertainty and Episodes of Extreme Capital Flows in the Euro Area. *Economic Modelling*, vol. 48, pp. 343-356.
- [16] Siranova, M. and Tiruneh, M. W. (2018). Exploding Net Errors and Omissions as a Capital Flight Phenomenon: the Case of Slovakia. *Applied Economics*, vol. 50, no. 16, pp. 1866-1884.

WAYS OF FINANCING CLUSTERS IN SLOVAKIA AND IN THE WORLD

Emília Krajňáková^{1,a,*}

¹Faculty of Socio-Economic Relations, Trenčín University of Alexander Dubcek in Trenčín,
Slovak

^aemilia.krajnakova@tnuni.sk

*Corresponding author

Abstract. The article looks into the issue of clusters and into different ways of financing them, with focus being placed on the situation in Slovakia and in the world. We provide an overview of relevant literature, which then forms a basis for a characterization of clusters in the national economy, advantages and disadvantages of this form of cooperation, cluster's activities and also for a description of cluster cooperation in the EU. We focus on the financing of cluster initiatives, activities and regional policy in the EU. In addition, we provide a general overview of the state of cluster initiatives in Slovakia and of the Slovak Cluster Union (cooperation of multiple Slovak clusters) and a concise characterization of selected Slovak clusters. However, the main focus is placed on the analysis of clusters financing in the European countries based on the data gained in a questionnaire. A general overview is given of clustering in Slovakia, Cluster Union, which is a co-operation between several clusters in Slovakia or brief characteristics of the selected Slovak clusters. The greatest emphasis is on the analysis of cluster financing in non-post-communist and post-communist countries of the EU, which is created based on the results of questionnaire. The last part is focused on the proposal measures resulting from the analysis.

Keywords: clusters, cluster initiative, competitiveness, cluster financing

JEL Classification: D2, D21, M12, R11

1. Introduction

Globalizácia je procesom celosvetovej ekonomickej, politickej a kultúrnej integrácie. Pre jej ekonomické aspekty sú charakteristické voľný obchod, voľný pohyb kapitálu, rast počtu a rozsahu difúzií spoločnosti, tendencia k outsourcingu neprofilovej činnosti organizácií špecializovaným spoločnostiam, tendencia k väčšej otvorenosti podnikov a pod. Uvedené aspekty globalizácie ekonomiky sú typické aj pre rozvoj klastrov. Globalizácia klastrov sa prejavuje v niekoľkých formách, z ktorých najjednoduchšou je rast exportu tovarov a služieb firmami tvoriacich klaster. Inou formou je rozšírenie exportu doplnkových tovarov, strojov a zariadení, čo môže zvýšiť podiel trhových operácií nepatriacich konečnému výrobcovi tovaru. Vo vysoko-technologických odvetviach, (napr. počítačová technika, stavebné materiály) vzniká kreatívna konkurencia. Otázkami rozvoja kreatívneho priemyslu sa zaoberá (Vojtovič, 2015), ktorý analyzuje kvalitatívne charakteristiky subjektov kreatívneho priemyslu, predmet ich činnosti, vzťahy s ich konkurentmi a zákazníkmi, formy spolupráce s inými spoločnosťami z rovnakej priemyselnej sféry a s verejnými a štátnymi organizáciami. Súčasne skúma záujmy spoločností pôsobiacich v oblasti kreatívneho priemyslu s cieľom

určiť ich potenciál užšej spolupráce na inštitucionálnej a organizačnej úrovni. (Kordoš, 2016) sa zaoberá otázkami kreatívneho priemyslu a jeho pozíciou v súčasnej politike priemyslu Európskej únie, kde z dlhodobého hľadiska zohráva rozhodujúcu úlohu v štruktúre priemyslu Európskych spoločností.

Globalizácia vplyva na klastre tiež prostredníctvom mobility kapitálu, t.j. kúpy miestnych podnikov nadnárodnými korporáciami (Kordoš & Vojtovič, 2016). Toto sa dvojako odzrkadľuje na fungovaní klastra: 1) získanie veľkou korporáciou niekoľkých malých podnikov v regióne môže spôsobiť likvidáciu tesných, často neformálnych spojení medzi firmami v rámci klastra a vzťahy vo vnútri klastra sa stávajú vertikálnymi. 2) príchod nadnárodných korporácií môže pozitívne ovplyvniť rozvoj klastra vďaka rozšíreniu inovácií a trhu odbytu pre malé a stredné podniky klastra. Klastre nielenže prežili v podmienkach opakujúcich sa kríz, ale demonštrovali svoju schopnosť optimalizovať obmedzené zdroje. Za ostatné dve desaťročia rokov vo väčšine európskych klastrov pozorujeme zvýšenie počtu zamestnancov a v 70% klastrov badáme zvýšenie počtu firiem. Geografická koncentrácia firiem v rovnakom a/alebo príbuznom odvetví vytvára trh práce pre kvalifikovanú pracovnú silu (Murphy, 2004). Potrebu cielej klastrovej politiky podčiarkuje okrem ekonomicko-sociálnych benefitov aj skutočnosť, že celkovo až 38 % všetkých európskych zamestnancov pracuje vo firmách, ktoré sú súčasťou klastrov. V niektorých regiónoch je dokonca až 50 % pracovnej sily viazanej v klastroch.

2. Obsahové vymedzenie pojmu klastrov a klastrová iniciatíva

Fenomén klastra ako odvetvovej aglomerácie na nejakom teritóriu ekonomický vzájomne prepojených podnikov je známy z obdobia remeselníckej výroby. Dokonca existujú v literatúre odkazy z polovice 17.st., avšak za najspoľahlivejší zdroj možno považovať koncepciu ekonomickej aglomerácie, ktorú zaviedol Alfred Marshall, ktorý v knihe „Princípy ekonomiky“ skúmal priemyselné regióny Veľkej Británie. Vo svojom výskume rozoberal „lokalizované výroby“ a priemyselné zóny, pod ktorými rozumieme práve klastre s dostatočne hlbokou medzifirmovou del'bou práce (Marshall, 1890).

Taliansko je považované za „pramater“ súčasných klastrov. Značný impulz k integrácii podnikateľa tejto krajiny získali po prijatí zákona „O právnej organizácii kolektívnych pracovných vzťahov“ v 1923 roku, ktorý predvídal: 1) možnosť zjednotenia podnikov, podnikateľov a osôb námezdnéj práce tohto či iného odvetvia výroby v korporácii; 2) dve formy spojenia medzi právne určenými subjektmi zjednotenia: spojenie vertikálne, ktoré bolo pomenované „syndikátom“ a horizontálne, ktoré dostalo názov „korporatívne“. Rozširuje sa koncepcia autonómneho industriálno-výrobného bloku vykreslená v diele M.Fovela „Ekonomika a korporativizmus“, ktorá hlása, že na miesto manažérov priemyslu a MAP musí stať blok všetkých prvkov, patriacich do korporácie (Fovel, 1929).

Popularita teórie klastrov priniesla veľké množstvo definícií tohto pojmu, avšak v konečnom dôsledku tieto názory nepriniesli nič nové, pretože sa stále riadime a používame definíciu, ktorú zaviedol do vedeckého obehu americký ekonóm M. Porter. „Klastre sú koncentrované podľa zemepisného príznaku skupiny vzájomne prepojených spoločností, špecializovaných dodávateľov, firiem príbuzných odvetví, a tiež spojených ich činnosťou organizácii (napr. univerzít, agentúr pre štandardizáciu, obchodných komôr) v určitých smeroch konkurujúcich, a zároveň spolupracujúcich“ (Porter, 1990). V roku 1998 Porter

aktualizoval definíciu: „Klastre sú miestne koncentrácie vzájomne prepojených firiem a inštitúcií v konkrétnom odbore. Klastre zahŕňujú skupinu previazaných priemyslových odvetví a ďalších subjektov dôležitých pre hospodársku súťaž. Obsahujú napríklad dodávateľov špecializovaných vstupov ako sú súčasti, stroje a služby a poskytovateľov špecializovanej infraštruktúry. Klastre sa často rozširujú smerom dole k odbytovým kanálom a zákazníkom a do strán k výrobcom komplementárnych produktov a k spoločnostiam v priemyslových odvetviach príbuzných z hľadiska schopností, technológií alebo spoločných vstupov. Mnoho klastrov tiež zahŕňa vládne či iné inštitúcie – ako napríklad univerzity, normotvorné agentúry, výskumné tímy, či obchodné asociácie, ktoré poskytujú špecializované školenia, vzdelávanie, informácie, výskum a technickú podporu“ (Porter, 1998).

Z dôvodu, že malé a stredné podniky majú nižší kapitál a nedostatočné skúsenosti, vytvárajú aliancie, zoskupenia, obchodné siete a zoskupenia. Vytvorenie podnikateľských sietí sa ukazuje ako účinná forma spolupráce, v rámci ktorej sa podniky navzájom podporujú a zlepšujú vlastnú schopnosť inovovať. Obchodná sieť je dôležitým mikroekonomickým faktorom, ktorý ovplyvňuje rozvoj zainteresovaných podnikov. Navyše, tieto siete tiež rozvíjajú región, v ktorom boli založené (Mura & Machová, 2015). Vzhľadom na sektorové, regionálne alebo národné špecifiká však tvorba univerzálnej klastrovej politiky nie je možná. Všeobecne možno konštatovať, že podpora vzniku nových klastrov je komplikovanejšia v porovnaní s podporou existujúcich klastrov (Karlsson, 2007). Klastrová politika závisí od typu klastrov, aktuálneho stupňa rozvoja klastra, ale aj od znalosti možnosti vhodných podporných nástrojov. Klastre vysokou efektívnosťou, flexibilitou a inováciami pozitívne vplyvajú na ekonomickú výkonnosť (Sölvell, et.al, 2003). Firmy v klastroch profitujú z geografickej blízkosti s ostatnými členmi klastra z dôvodov lepšieho toku znalostí, dostupnosti kvalifikovanej pracovnej sily (Strunz & Vojtovič, 2014). Okrem toho v dynamických klastroch sú personálne výmeny frekventované (Mazanec & Bielikova, 2017). Významným rozvojovým faktorom je, že firmy v klastroch sa integrujú s univerzitami častejšie v porovnaní s inými firmami a majú lepší prístup k medzinárodným sieťam a kapitálu (EICMP, 2008).

Neformálne kontakty medzi zamestnancami firiem sú považované za jeden z hlavných nositeľov znalostí medzi firmami v klastroch a tieto kontakty predstavujú dôležitý difúzny kanál znalostí (Dahl & Pedersen, 2004). Z pohľadu priestorovej ekonómie v klastroch existuje geografické sústredenie vzájomne previazaných podnikov, špecializovaných dodávateľov, poskytovateľov služieb, podnikov v príbuzných odvetviach a pridružených inštitúciách, ako sú univerzity, agentúry a obchodné asociácie rôznych smerov, ktoré súťažia, ale tiež spolupracujú. *Zapojeným podnikom umožňujú klastre zlepšovať konkurencieschopnosť a dosahovať tak vyššiu výkonnosť*“ píše (Pavelková & Jirčíková, 2008). Hlavným problémom ostatných desaťročí je hľadanie alternatívnej energie, ktorá by neohrozila životné prostredie a zároveň ušetrila aj tak obmedzené prírodné zdroje na celom svete. Autori príspevku (Navickas et al., 2017) takúto alternatívu vidia v zakladaní klastrov biomasy, ktoré by boli konkurencieschopné na trhu s energiou. Vo vedeckej literatúre absentuje výskum fungovania zoskupení biomasy a ich vplyv na konkurencieschopnosť energetických podnikov. V podobnom duchu sa nesie aj ďalší príspevok spomínaných autorov (Navickas et al., 2016).

Podľa Svetového prieskumu klastrových iniciatív 2012 (Global Cluster Initiative Survey 2012), klastrové iniciatívy začali vznikať v 80-tych rokoch 20. storočia. Ich popularita stúpla po roku 2000 a najväčší rozmach zaznamenali od roku 2007 do 2011.

V roku 2003 bol uskutočnený celosvetový prieskum o klastrových iniciatívach, ktorý bol neskôr zverejnený v knihe „Zelená kniha klastrových iniciatív.“ Prieskumu sa zúčastnili staršie aj mladšie zavedené klastre, z high-tech (IT, farmaceutika) aj low-tech odvetvia (zábavný, textilný, potravinársky priemysel apod.). Jednou z oblastí prieskumu boli ciele klastrových iniciatív. Tie boli rozdelené podľa 6 hlavných činností. Nasledujúci obrázok charakterizuje početnosť klastrových iniciatív k danej činnosti.

3. Stručná charakteristika slovenských klastrov

Prvé klastre začali vznikať od roku 2007, a to bez podpory štátu. Všetky klastre vznikali aktivitou „bottom-up“ jednotlivých firiem, v niektorých prípadoch boli klastrové iniciatívy financované zo strany VÚC. V roku 2007 vznikol prvý – automobilový klaster, podporený samosprávou, mestom a niekoľkými podnikateľmi. Medzi najrozvinutejší klaster zrejme patrí Autoklaster v Trnave a najpopulárnejší klaster cestovného ruchu je klaster Liptov. Okrem nich najrýchlejšie vyvíjajúce sa klastre sú klastre IT Valley v Košiciach, 1. slovenský strojársky klaster, Slovenský plastikársky klaster a klastre ORAVA a Turiec.

Klastrovú iniciatívu na Slovensku je možné rozdeliť do dvoch typov:

- *Technologické klastre*: Autoklaster (Trnavský kraj), BITERAP (Košický kraj), 1.slovenský strojársky klaster (Banskobystrický kraj), Elektrotechnický klaster (Trnavský kraj), Energetický klaster (Trnavský kraj), Klaster AT+R (Prešovský kraj), Košice IT Valley z.p.o (Košický kraj), Slovenský plastikársky klaster (Trnavský kraj), Z@ict (Žilinský kraj)
- *Klastre cestovného ruchu*: Klaster cestovného ruchu (Trnavský kraj), Klaster LIPTOV (Žilinský kraj), Klaster ORAVA (Žilinský kraj), Klaster TURIEC (Žilinský kraj), Združenie cestovného ruchu Balnea Cluster (Banskobystrický kraj).

4. Spôsoby financovania klastrov

Vznik klastrových iniciatív a realizácia klastrových aktivít si vyžaduje dostatočné množstvo finančných prostriedkov. Vzhľadom k tomu, že investície do inovačných aktivít sú zväčša mimoriadne nákladné, vyžadujú si zabezpečenie z viacerých zdrojov. Daná skutočnosť sa týka najmä investícií do vedy a výskumu, nehmotných inovačných investícií a inštitucionálneho a regulačného rámca inovácií. Zdroje financovania inovácií, teda aj klastrov možno rozdeliť na dve veľké kategórie: súkromné zdroje a verejné zdroje. V rámci nich existuje rada rôznych nástrojov určených na financovanie inovačných aktivít.

Prieskum publikovaný v knihe „Zelená kniha klastrových iniciatív“ uvádza, že klastrové iniciatívy s dostatočne vysokým rozpočtom sú schopné lepšie dosahovať svoje ciele a priority. Táto zásada však neplatí pre všetky ciele. Ciele, ako napr. obchodná spolupráca, networking alebo lobovanie si nevyžadujú investovanie veľkého množstva finančných prostriedkov. Na druhej strane štedro financované klastrové iniciatívy umožňujú splnenie náročných cieľov vrátane podpory vzniku spinn-offs, šírenia technológií vo vnútri klastra, zabezpečenia technických tréningov a infraštruktúrnych projektov. Taktiež podporujú rozvoj inovácií, rast a zvýšenie konkurencieschopnosti klastrov. Finančná podpora klastrov zo súkromných zdrojov je zabezpečená najmä prostredníctvom členských poplatkov firiem zapojených do klastra a spolufinancovania dohodnutých projektov. Príjmy z vlastných zdrojov sa využívajú

najmä na prevádzkové účely firiem a poskytovanie služieb členom klastra. Financovanie z verejných zdrojov je skôr doplnkové a využíva sa najmä pri podpore nových strategicky významných odvetviach ako biotechnológia, optoelektronika apod., z dôvodu ich finančnej náročnosti a vysokého stupňa rizika. Verejné zdroje možno rozdeliť na tri kategórie: štátne, regionálne a fondy EÚ. Podpora zo štátneho rozpočtu zabezpečuje nielen rozvoj podnikov samotného klastra, ale aj podporu malých a stredných podnikateľov, posilnenie konkurencieschopnosti podnikov a celého regiónu. Štátna podpora má nenávratný charakter a obvykle sa člení na:

Priamu finančnú podporu. Obvykle má účelový charakter a stanovuje sa na základe výsledkov verejnej súťaže vo výskume a vývoji na grantové projekty. Podpora je poskytovaná prostredníctvom rôznych štátnych fondov alebo rozpočtov územných samospráv. Nástroje priamej finančnej podpory sú dotácie a príspevky, úhrady úrokov, úhrady časti úverov, realizácie štátnej záruky poprípade bankovej záruky a návratné finančné pomoci.

Nepriamu finančnú podporu: Vykonáva sa formou daňových úľav, daňových prázdnin, prevzatia štátnej záruky na úvery apod. V našom výskume sme sa zamerali na analýzu klastrov a ich financovanie v nepostkomunistických a postkomunistických krajinách EÚ. Pre účely analýzy som zvolil dotazníkový prieskum. Kontaktné údaje na jednotlivé klastre sme získali z dokumentu „European Cluster Organisation Directory“ publikovaného Európskou úniou a organizáciou EUROPE INNOVA.

Dotazníkový prieskum bol uskutočnený prostredníctvom internetovej aplikácie GoogleDocs, ktorá bola odoslaná jednotlivým klastrom e-mailovou formou a mala dve verzie: slovenskú, ktorá bola poslaná slovenským a českým klastrom, anglická verzia ostatným krajinám. Všetky dotazníky boli odoslané v rovnakom čase a reprezentanti klastrov mali približne tri týždne na ich vyplnenie. V prípade, že respondent nevyplnil dotazník do dvoch týždňov, bol mu odoslaný pripomienkový e-mail o blížiacom sa konci dotazníkového prieskumu. Celkovo bolo oslovených 433 klastrov z 21 krajín EÚ, z ktorých je 8 postkomunistických a 13 nepostkomunistických. Zo skupiny postkomunistických krajín bolo oslovených 97 klastrov, zo skupiny nepostkomunistických 336 klastrov. Celkovo bolo prijatých 74 odpovedí (vyplnených dotazníkov), 26 zo skupiny postkomunistických krajín a 48 zo skupiny nepostkomunistických krajín, čo činí celkovú 17,1% návratnosť dotazníkov, pričom bolo 26,8% z postkomunistických krajín a 14,3% z nepostkomunistických krajín EÚ. Najväčšie množstvo oslovených klastrov bolo z Francúzska (58), Dánska (39), Nemecka (33), Švédska (32) a Španielska (28), naopak najmenší počet z Estónska (4), Írska (5) a Grécka (5). Zo Slovenska bolo oslovených 14 klastrov. Najväčší počet odpovedí bol prijatý z Česka (16), Fínska (8), Rakúska (7), Belgicka a Španielska (6). Zo Slovenska odpovedali 4 klastre. Klastre z Bulharska, Estónska, Grécka a Slovinska neodpovedali vôbec.

5. Analýza financovania klastrov v nepostkomunistických a postkomunistických krajinách EÚ

Vyhodnotenie dotazníkového prieskumu je rozdelené podľa jednotlivých otázok dotazníka do troch menších častí. Prvá časť pozostáva z vyhodnotenia klastrov nepostkomunistických krajín EÚ, druhá časť z vyhodnotenia klastrov postkomunistických krajín EÚ a tretia časť pozostáva z ich vzájomného porovnania. V prípade, že respondent nevyplnil niektorú z otázok, odpoveď na danú otázku bola vynechaná.

Piata otázka sa zamerala na oblasti, ktoré mali hlavný podiel na financovaní vzniku klastra znela: „*Ktorá z oblastí mala hlavný podiel na financovaní vzniku klastra*“?

Až 46% klastrov **nepostkomunistických krajín** bolo počas ich vzniku financované vládou. Dvoma alebo viacerými oblasťami bolo financovaných 31% klastrov, 17% bolo priemyslom, 4% vysokou školou a najmenej 2% medzinárodnou organizáciou.

Vznik klastrov u **postkomunistických krajín** bol zo 45% prípadov financovaný najmä dvoma alebo viacerými oblasťami, 33% priemyslom a 22% vládou. Primárne financovanie vzniku klastrov vysokou školou alebo medzinárodnou organizáciou sa neuskutočnilo.

POROVNANIE: Klastre nepostkomunistických krajín oproti postkomunistickým sú častejšie financované vládou (približne dvakrát viac), na druhej strane priemysel sa na financovaní vzniku klastra podieľa približne o polovicu zriedkavejšie. Významnejšie sa na financovaní vzniku klastra podieľajú dve alebo viaceré oblasti pri postkomunistických krajinách. V nepostkomunistických krajinách boli 2 klastre financované prevažne vysokou školou a 1 klastre medzinárodnou organizáciou, klastre v postkomunistických krajinách vysokou školou ani medzinárodnou organizáciou financované neboli.

Šiesta otázka znela: „*Ktorý zdroj mal najväčší podiel na financovaní aktivít klastra v 1.-4. roku jeho existencie*?“ a siedma otázka: „*Ktorý zdroj mal najväčší podiel na financovaní aktivít klastra v 5. a viac rokov jeho existencie*“?

Klastrové aktivity v 1.-4. roku existencie u **nepostkomunistických krajín** boli financované najmä z verejných zdrojov (58%), potom nasledovali kombinované zdroje (36%) a nakoniec súkromné zdroje (6%).

Klastrové aktivity v 1.-4. roku existencie v **postkomunistických krajín** boli financované hlavne z kombinovaných zdrojov (57%), potom nasledujú verejné zdroje (30%) a súkromné zdroje (13%).

POROVNANIE: Podobne ako pri predchádzajúcej otázke, financovanie aktivít klastrov u nepostkomunistických krajinách v 1.-4. roku existencie je dvakrát častejšie financovanie z verejných zdrojov a naopak častejšie financovanie z kombinovaných a súkromných zdrojov pri postkomunistických krajinách (takmer dvojnásobne z kombinovaných zdrojov).

Financovanie aktivít klastrov za 5. a viac rokov existencie v nepostkomunistických krajinách bolo u verejných zdrojov znížené z 58% na 35%, naopak zvýšilo sa financovanie hlavne zo súkromných zdrojov z 6% na 25%. Nepatrne o 4% sa zvýšilo financovanie z kombinovaných zdrojov a to z 36% na 40%.

Financovanie aktivít klastrov v 5. a viac rokov existencie v postkomunistických krajinách bolo u verejných zdrojov znížené z 30% na 8%, naopak došlo k zvýšeniu financovania prevažne zo súkromných zdrojov z 13% na 25% ako aj k zvýšeniu z kombinovaných zdrojov z 57% na 67%.

POROVNANIE: Hoci trend znižovania verejných zdrojov a zvyšovania súkromných aj kombinovaných zdrojov je v oboch skupinách krajín podobný, rast súkromných zdrojov v nepostkomunistických krajinách je markantnejší, zatiaľ čo pokles verejných zdrojov v postkomunistických krajinách sa ešte viac prehĺbuje.

Ôsma otázka sa týkala podpory zo súkromných zdrojov a znela: „*Ktorý typ podpory súkromných zdrojov považujete za najdôležitejší*?“

Financovanie klastrov zo súkromných zdrojov v **nepostkomunistických krajinách** prebieha prevažne z členských poplatkov firiem v klastri (51%). Na druhom mieste sa umiestnil predaj vlastných produktov a služieb (23%) a na treťom financie z iných zdrojov (16%). Sponzorstvá sú zastúpené zo 6%, financovanie prostredníctvom bankových produktov nebolo uvedené vôbec.

Financovanie klastrov zo súkromných zdrojov v **postkomunistických krajinách** prebieha prevažne z predaja vlastných produktov a služieb (43%), ďalším významným zdrojom sú členské poplatky (29%) a iné zdroje (18%). Sponzorstvá, priame zahraničné investície a bankové produkty sú zastúpené približne rovnomerne okolo 4%.

POROVNANIE: Klastre v nepostkomunistických krajinách sú zo súkromných zdrojov najčastejšie financované z členských poplatkov, potom z predaja vlastných produktov a služieb. Tento trend je pri klastroch v postkomunistických krajinách opačný, najčastejšie sú financované z predaja vlastných produktov a služieb a potom z členských poplatkov. Takmer pätina klastrov v oboch skupinách krajín je financovaných z iných zdrojov. Sponzorstvá v nepostkomunistických krajinách sú o niečo populárnejšie, zatiaľ čo priame zahraničné investície sú na rovnakej úrovni. Zdroj bankové produkty bol zo skupiny postkomunistických krajín považovaný za najdôležitejší v jednom prípade, zo skupiny nepostkomunistických krajín nebol tento zdroj považovaný za najdôležitejší ani raz.

Deviata otázka sa týkala podpory zo súkromných zdrojov a znela: „*Ktorý typ podpory verejných zdrojov považujete za najdôležitejší?*“

Financovanie z verejných zdrojov je pri klastroch z nepostkomunistických krajín výrazné najmä z regionálnej a lokálnej podpory (49%). Nasleduje štátna podpora (29%), podpora z EÚ (18%) a podpora z iných zdrojov (4%).

Financovanie z verejných zdrojov je pri klastroch postkomunistických krajín najvýraznejšie z podpory z EÚ (67%), potom nasleduje štátna podpora (22%), regionálna a lokálna podpora (7%) a nakoniec podpora z iných zdrojov (4%).

POROVNANIE: Financovanie z verejných zdrojov v nepostkomunistických krajinách je zabezpečované najmä z regionálnej a lokálnej podpory (7-krát viac), zatiaľ čo v postkomunistických krajinách najmä z podpory EÚ (3-krát viac). Štátna podpora je častejšia v nepostkomunistických krajinách a financovanie z iných zdrojov je raritné v oboch prípadoch.

Acknowledgment

Príspevok bol napísaný v rámci riešenia grandových úloh: VEGA č.1/0953/16 a VEGA č.1/0918/16

References

- [1] Dahl, M.S. and Pedersen, C.R. (2004). Knowledge Flows Through Informal Contacts in Industrial Clusters: Myth or Reality? *Research Policy*, vol. 33, no. 10, pp. 1673 – 1686.
- [2] EICMP (2008). *Cluster Policy in Europe. A brief Summary of Cluster Policies in 31 European Countries*. Europe Inova Cluster Mapping Project. Oxford Research AS.
- [3] Fovel M. (1929). *Economia e corporativismo*. Ferrara.

- [4] Havierníková, K. (2013) . The Cluster Policy in the Slovak Republic. *Proceedings of the 14th International Scientific Conference on International Relations - Contemporary Issues of World Economics and Politics Location: Smolenice, Slovakia*, pp. 258-265.
- [5] Karlsson, Ch. (2007). Clusters, Functional Regions and Cluster Policies. *CESIS, Electronic Working Paper Series* 2007, no. 84, Stockholm: Centre of Excellence for Science and Innovation Studies.
- [6] Kordoš, M. (2016). Creative Industry and European Union Industry Policy - Interactions and Challenges. *Proceedings of the 3rd International Multidisciplinary Scientific Conference on Social Sciences and Arts, SGEM 2016*, Albena, Bulgaria, pp. 807-814.
- [7] Kordoš, M. and Vojtovič, S. (2016). Transnational corporations in the global world economic environment. *Proceedings of the 3rd International Conference on New Challenges in Management and Organization: Organization and Leadership*, Dubai, UAE, vol. 230, pp. 150-158.
- [8] Marshall, A. (1890). *Principles of Economics*., MacMillan, London
- [9] Mazanec, J. and Bielíková, A. (2017). The Personnel Marketing as a Competitive Tool in Global Environment. *Proceedings of the 17th International Scientific Conference on Globalization and its Socio-Economic Consequences*. Rajecké Teplice, Slovakia, Part III, pp. 1533-1539.
- [10] Mura, L. and Machová, R. (2015). Evaluation of the Innovation Performance of Business Networks. *Proceedings of the 5th Central European Conference in Regional Science (CERS)*, Kosice, Slovakia, pp. 634-642.
- [11] Murphy, P. and Murphy, A. (2004). *Strategic Management for Tourism Communities: Bridging Gaps*. Clevedon: Channel.
- [12] Navickas, V., Vojtovic, S. and Svazas, M. (2016). Clusterization Processes Influence to Competitiveness: Biomass Clusters Case. *Proceedings of the 1st International Conference Contemporary Issues in Theory and Practice of Management*, Czestochawa, Poland, pp. 302-308.
- [13] Navickas, V., Vojtovic, S. and Svazas, M. (2017). Biomass Clusters Influence on Business Competitiveness. *Polish Journal of Management Studies*, vol. 16, no. 2, pp. 188-197.
- [14] Pavelková, D. and Jirčíková, E. (2008). Klastry jako nástroj zvýšení konkurenceschopnosti firem. *Ekonomie a management*, vol. 11, no. 3, pp. 63-72 .
- [15] Porter, M. (1990). *The Competitive Advantage of Nations* The Free Press. New York.
- [16] Porter, M. (1998). *On Competition*. Harvard Business School Press, Boston.
- [17] Sölvell, O. et al. (2003). *The Cluster Initiative Greenbook*, Stockholm: Bromma tryck AB.
- [18] Strunz, H. and Vojtovič, S. (2014). Vocational training and employment in the creative industry. *Proceedings of the International Multidisciplinary Scientific Conferences on Social Sciences and Arts*, Albena, Bulgaria, vol III, pp. 787-794.
- [19] Vojtovič, S. (2015). Future for the Regional Creative Industry. *Proceedings of the International Scientific Conference on Knowledge for Market Use - Women in Business in the Past and Present*, Olomouc, Czech Republic, pp. 1093-1099.

ANALYSIS OF WEAKNESSES IN COMPLIANCE WITH AUDITING STANDARDS IN VIEW OF THE RISK OF EXPRESSING AN INAPPROPRIATE AUDITOR'S OPINION ON FINANCIAL STATEMENTS IN CONDITIONS OF GLOBALIZATION

Petra Krišková^{1,a,*}, Ján Užík^{2,b}

¹Department of Accounting and Auditing, Faculty of Economic Informatics, Dolnozemska cesta 1/B,
852 35 Bratislava, Slovak Republic

²Department of Accounting and Auditing, Faculty of Economic Informatics, Dolnozemska cesta 1/B,
852 35 Bratislava, Slovak Republic

^apetra.kriskova@euba.sk, ^bjan.uzik@euba.sk,

*Corresponding author

Abstract. The audit of the financial statements, its performance and the process, is subject to strict regulation at national and transnational levels. International auditing standards are the core set of standards to be applied to each audit of financial statements engagement. Auditors adhere to professional standards and legal and regulatory requirements while performing financial statement audits. Those standards require that appropriate professional skepticism be applied in the exercise of professional judgment. The widespread and diversification of business in this modern day, has continued to increase the complexity of business transactions and of accounting standards (Dimitrova – Sorova, 2016). Deviating or non-compliance with the standards may cause, that the audit will not to be performed correctly, and this fact may lead to the wrong auditor's opinion on the financial statements. In relation to statutory requirements, auditors and audit firms are subject to regular quality control for an audit by regulatory authorities. In the case of the Slovak Republic, the regulatory body means the Slovak Chamber of Auditors and the Audit Oversight Office. The purpose of quality control is, in particular, the complete audit documentation for an audit engagement. Quality control focuses to demonstrate the compliance with international auditing standards (Kareš – Kňažková, 2016.). A quality control review is performed on a regular basis, every 3 years for audits in public interest entities and every 6 years for audits in other entities. The deficiencies revealed during the quality control review often reveal the imperfections of the audit documentation, for example due to non-compliance with the requirements of international auditing standards, possibly by omitting part of the mandatory documentation or violating the requirements of statutory standards. The auditor's documentation, which is fully and correctly compiled in accordance with professional standards, provides an appropriate basis for the auditor's opinion on the financial statements and at the same time, it protects the auditor from potential future disputes.

Keywords: audit of financial statements, auditor, auditing standards, auditor's opinion

JEL Classification: M42, F60, F69

1. Introduction

Používatelia informácií z účtovnej závierky si uvedomujú význam auditu účtovnej závierky a v prípade budúcej investície do príslušnej účtovnej jednotky svoje rozhodnutie prijímajú aj na základe správy audítora (Devi – Devi, 2014). Aj z tohto dôvodu je jeden z najdôležitejších faktorov auditu účtovnej závierky jeho vysoká a udržateľná kvalita. Vplyvom ekonomickej krízy požiadavky používateľov informácií z účtovnej závierky narastli, čo samozrejme priamo vplýva aj na očakávania od audítorskej profesie (Gajdošová, 2016).

Štatutárny audit je v zmysle zákona č. 423/2015 Z. z. o štatutárnom audite a o zmene a doplnení zákona č. 431/2002 Z. z. o účtovníctve v znení neskorších predpisov (ďalej len “zákon o štatutárnom audite”) (Maděra, 2016) definovaný ako overovanie individuálnej účtovnej závierky alebo konsolidovanej účtovnej závierky a overovanie individuálnej výročnej správy alebo konsolidovanej výročnej správy alebo overovanie na základe rozhodnutia účtovnej jednotky, ktorá nemá povinnosť overenia individuálnej účtovnej závierky alebo konsolidovanej účtovnej závierky a overovania individuálnej výročnej správy alebo konsolidovanej výročnej správy (ďalej len “audit”). Zákon o štatutárnom audite ďalej vo svojom znení uvádza, že audit sa vykonáva v súlade s požiadavkami Medzinárodných audítorských štandardov (ďalej len “ISA”). V súčasnosti je v platnosti 37 Medzinárodných audítorských štandardov (ISA), ktorých zoznam uvádzame v nasledujúcej tabuľke.

Table 1: Zoznam Medzinárodných audítorských štandardov podľa príslušnej skupiny

Skupina štandardov	Názov skupiny	Vybrané štandardy patriace do skupiny
200 - 299	Základné princípy a zodpovednosť	ISA 200 – Celkové ciele nezávislého audítora a vykonanie auditu v súlade s medzinárodnými audítorskými štandardmi ISA 210 – Dohodnutie podmienok zákaziek na audit ISA 230 – Audítorská dokumentácia
300 - 499	Posúdenie rizík a reakcia na posúdené riziká	ISA 300 – Plánovanie auditu účtovnej závierky ISA 315 – Identifikácia a posúdenie rizika významných nesprávností poznaním účtovnej jednotky a jej prostredia ISA 320 – Významnosť pri plánovaní a vykonávaní auditu ISA 450 – Vyhodnotenie nesprávností zistených počas auditu
500 - 599	Audítorské dôkazy	ISA 500 – Audítorské dôkazy ISA 505 – Externé potvrdenia ISA 520 – Analytické postupy ISA 530 – Výber vzorky v audite ISA 550 – Spriaznené osoby ISA 580 – Písomné vyhlásenia
600 - 699	Použitie práce ostatných	ISA 600 – Špeciálne úvahy – audit účtovnej závierky skupiny ISA 620 – Použitie práce experta nominovaného audítorom
700 - 799	Záver auditu a správa	ISA 700 – Formovanie názoru na účtovnú závierku a správa k účtovnej

		závierke ISA 705 - Modifikácie názoru v správe nezávislého audítora ISA 706 - Odseky so zdôraznením skutočnosti a odseky o iných skutočnostiach v správe nezávislého audítora
800 - 899	Špeciálne oblasti	ISA 800 - Špeciálne úvahy – audit účtovnej závierky zostavenej v súlade s rámcom na osobitné účely

Source: vlastné spracovanie

2. Audítorská dokumentácia v zmysle ISA

Vykonanie každého auditu musí byť riadne zdokumentované. Takáto dokumentácia má obsahovať okrem obligatórných dokumentov, ako auditovaná účtovná závierka, auditovaná výročná správa, zmluva, na základe ktorej sa audit vykonáva a pod., aj záležitosti vyplývajúce z požiadaviek jednotlivých ISA. Štandardy sú koncipované práve s cieľom, aby poskytovali návod audítorovi na každú možnú oblasť, ktorá je súčasťou auditu účtovnej závierky, a ktorá môže mať vplyv na formuláciu názoru audítora na účtovnú závierku. Kombinácia týchto faktorov, vrátane eliminácie možných hrozieb a stimulov porušovania profesijných požiadaviek, má vplyv na zabezpečenie skutočnej kvality auditov účtovnej závierky (Lin – Tepalagul, 2015).

V tomto kontexte možno uviesť niekoľko oblastí, ktoré majú tvoriť súčasť audítorskej dokumentácie v nadväznosti na ISA, ide o:

- Stratégia, plán a program auditu,
- Posúdenie rizík významných nesprávností,
- Posúdenie rizík súvisiacich s podvodom,
- Existencia spriaznených osôb a riziká spojené s ich existenciou,
- Nepretržité pokračovanie v činnosti účtovnej jednotky,
- Posúdenie udalostí, ktoré nastanú po dni, ku ktorému sa zostavuje účtovná závierka,
- Úroveň významnosti používanej pri príslušnom audite a iné.

Za účelom dosiahnutia cieľa auditu (vyjadriť primeraný a zodpovedajúci názor na účtovnú závierku) (Banociová – Tusan, 2016) je vhodné, ak auditor kombinuje pri výkone auditu uplatňovanie požiadavky profesionálneho skepticizmu, odborného úsudku, dodržiava ustanovenia zákona o štatutárnom audite, požiadavky ISA, Etického kódexu audítora a ďalších usmernení prislúchajúcich k výkonu auditu vydaných Slovenskou komorou audítorov (Domoracká - Hunyady, 2016). Za tohto predpokladu je pravdepodobné, že auditor vyjadrí, zváži a posúdi všetky okolnosti, ktoré majú vplyv na účtovnú závierku a vyjadrí k nej vhodný a primeraný názor audítora (Kršíková – Rybka, 2012).

2.1 Nedostatky odhalené v audítorských dokumentáciách

Zákon o štatutárnom audite obsahuje ustanovenia, z ktorých vyplýva povinnosť previerky kontroly kvality pre všetkých audítorov a audítorské spoločnosti. To znamená, že audítori a audítorské spoločnosti sú povinní v časovom horizonte raz za 6 rokov (pri audite subjektov verejného záujmu raz za 3 roky) predložiť určené audítorské dokumentácie na previerku.

Zámerom uvedenej previerky je zachovávanie vysokej kvality auditu účtovných závierok, a to prostredníctvom kontroly, či príslušná dokumentácia obsahuje požadované záležitosti v súlade s ISA (Kareš, 2016), Etickým kódexom audítora a ostatných profesijných usmernení, ďalej či auditor získal dostatočné a vhodné audítorské dôkazy a v neposlednom rade, či názor audítora je primeraný a zodpovedá tomu, čo je uvedené v dokumentácii.

Na základe výsledkov previerok kvality v roku 2016 sme vypracovali sumarizáciu najzávažnejších nedostatkov v audítorských dokumentáciách. Najväčšiu mieru nedostatkov predstavovala absencia oligatórnych záležitostí vyplývajúcich práve z ISA. V nasledujúcej tabuľke uvádzame, podľa nášho názoru, najzávažnejšie nedostatky v audítorských dokumentáciách, a to podľa tematicky súvisiacich skupín ISA.

Table 2: Sumarizácia zistených nedostatkov v audítorských dokumentáciách

Skupina ISA	Najzávažnejšie nedostatky
200 - 299	Audit vykonávaný bez zmluvy o audite. Zmluva o audite neobsahovala povinné náležitosti. Chýbajúce posúdenie dodržania požiadavky na nezávislosť audítora. Chýbajúce dôkazy potvrdzujúce závery audítora k overeniu jednotlivých oblastí výkonu auditu a dokumentujúce uplatnenie profesionálneho skepticizmu. Neposúdené riziko existencie podvodu.
300 - 499	Nedokumentované stanovenie rizík a reakcia audítora na tieto riziká. Neurčená úroveň významnosti pre audit. Chýbajúce posúdenie rizík vyplývajúcich z externého prostredia, napr. externe vedené účtovníctvo, externe zostavená účtovná závierka. Nezdokumentované zistené nesprávnosti a ich vplyv na názor audítora na účtovnú závierku.
500 – 599	Nepreukázané overenie poznámok účtovnej závierky a výkazu cash flow. Neúčasť, príp. nezdokumentovaná účasť na fyzickej inventúre. Dokumentácia neobsahovala externé potvrdenia, napr. externé potvrdenie zostatku pohľadávok, záväzkov. Neuplatňovanie analytických postupov pri audite. Nestanovenie spôsobu výberu vzorky. Nepreverenie transakcií so spriaznenými osobami. Vyhlásenie manažmentu nie je dostačujúce alebo neobsahuje predpísané náležitosti.
600 - 699	Nezistené žiadne závažné nedostatky
700 - 799	Správa audítora a dodatky správy audítora nezodpovedajú po formálnej a obsahovej stránke zverejnenému vzoru. Auditor neodôvodnil modifikovaný názor na overenie účtovnej závierky.

Source: Slovenská komora audítorov. Prehľad nedostatkov zistených v roku 2016.

2.2 Vplyv zistených nedostatkov v audítorských dokumentáciách na názor audítora na účtovnú závierku

Vychádzajúc z predchádzajúcej analýzy zistených nedostatkov možno konštatovať, že z veľkej časti ide o závažné nedostatky, ktoré môžu mať vplyv na to, či auditor vyjadrí vhodný názor na účtovnú závierku. V menšej miere ide o nedostatky, ktoré predstavujú iba formálne nezrovnalosti.

Pokiaľ ide o skupinu 200 – 299 medzinárodných audítorských štandardov, jej obsahom je špecifikácia základných princípov auditu a zároveň vymedzenie zodpovednosti audítora na jednej strane a zodpovednosti manažmentu na strane druhej. Vychádzajúc z výsledkov previerky kontroly, častokrát sa audit vykonával bez riadne uzavretej zmluvy o výkone auditu,

prípadne ak zmluva bola uzatvorená, tak neobsahovala povinné náležitosti. Tento nedostatok môže spôsobiť, že zmluvné strany nepochopia cieľ a zameranie auditu, prislúchajúcu zodpovednosť a povinnosti, ďalej časové vymedzenie auditu a pod. Táto skutočnosť však môže vplývať na názor audítora, kedy napríklad bez zmluvne podchytených termínov vydania správy audítora, môže byť nútený zo strany účtovnej jednotky k nereálnym termínom ukončenia auditu. Ďalším významným nedostatkom je neposúdenie rizika existencie podvodu. Podvod, a to či podvod týkajúci sa účtovného vykazovania alebo podvod vo forme krádeže, sa odhaľuje veľmi náročne, a preto je dôležité, aby auditor dôsledne zvážil, či neexistuje indícia, ktorá by podvod naznačovala. V takom prípade by auditor mohol nasmerovať auditorské postupy na identifikovanú oblasť za účelom odhalenia alebo naopak vylúčenia podvodu.

Skupina 300 – 499 medzinárodných auditorských štandardov sa zameriava na posúdenie rizík, ktoré vyplývajú či už z interného alebo naopak z externého prostredia účtovnej jednotky a majú vplyv na informácie vykazované v účtovnej závierke. Z príslušnej analýzy vyplýva, že audítori nevenovali týmto rizikám dostatočnú pozornosť, čo môže v konečnom dôsledku spôsobiť skreslenie názoru audítora na účtovnú závierku. Ako príklad možno uviesť, že ak auditor neposúdil externé prostredie účtovnej jednotky (napr. podmienky trhu, na ktorom pôsobí), tak nie je schopný posúdiť, či bude účtovná jednotka schopná nepretržite pokračovať v činnosti. Za závažný nedostatok považujeme aj absenciu stanovenia úrovne významnosti, kedy bez takto určenej hranice, auditor nevie posúdiť, či zistené nesprávnosti sú alebo nie sú významné s vplyvom na názor audítora.

ISA 500 – 599 sa venujú oblasti získavania a vyhodnocovania auditorských dôkazov. Auditor je schopný vyjadriť zodpovedajúci názor audítora na účtovnú závierku len za predpokladu, že získal dostatočné a vhodné auditorské dôkazy. To znamená, že dôkazy musia byť v primeranom množstve a aj kvalite. Z údajov tabuľky 2 je vidieť, že práve pri dokumentácii auditorských dôkazov vzniklo najväčšie množstvo nedostatkov. Pritom ide o oblasť auditu, ktorá podľa nášho názoru, má najväčší vplyv na názor audítora na účtovnú závierku. Pokiaľ auditor nevykoná a nezdokumentuje postupy, týkajúce sa dôkazov napríklad v oblasti zásob (účasť na fyzickej inventúre), prípadne odsúhlasenia významných zostatkov pohľadávok alebo záväzkov prostredníctvom confirmácií, ďalej dôkazov o transakciách so spriaznenými osobami a pod., môže ísť o vážne ohrozenie, či vyjadrený názor audítora zodpovedá skutočnostiam.

V skupine ISA 600 – 699 neboli zistené nedostatky, prípadne nedostatky boli nevýznamného charakteru. Príslušná skupina obsahuje iba tri štandardy a tieto štandardy sa využívajú skôr v menšej miere z dôvodu ich špecifického zamerania. Ide o štandardy, ktoré sa týkajú komunikácie audítorov pri audite konsolidovanej účtovnej závierky, ďalej o využívanie interného auditu, pokiaľ v príslušnej účtovnej jednotke existuje alebo o nomináciu a využitie experta na oblasť, z ktorej auditor nemá potrebné znalosti. Podľa nášho názoru, z dôvodu špecifického zamerania štandardov a potreby uplatňovania ich požiadaviek v menšej miere, pri dokumentácii postupov súvisiacich s uvedenými ISA nevzniklo také množstvo nedostatkov ako pri iných, bežne uplatňovaných štandardov.

Štandardy 700 - 799 sa orientujú na závery auditu, obsahovú a formálnu úpravu správy audítora a formuláciu názoru audítora na účtovnú závierku. V tejto oblasti boli zistené nedostatky skôr formálneho charakteru, kedy správa audítora nespĺňala formálnu úpravu a požadované náležitosti. Za závažný nedostatok považujeme, ak v správe audítora chýba odôvodnenie modifikácie názoru audítora. Používateľ správy audítora tak nemá vedomosť,

prečo audítor modifikoval názor audítora, a tak nevie prijať potrebné rozhodnutia, ktoré by za predpokladu, že dôvod modifikácie pozná, prijal (Kubaščiková – Juhászová, 2016).

Všetky nedostatky, ktoré boli prierezom dokumentácií zistené a analyzované, majú dôsledok aj v globálnom prostredí. V súčasnej dobe možno vnímať trend nadnárodných, globálnych spoločností, ktoré vykonávajú svoju činnosť na medzinárodnej pôde. Účtovné závierky týchto spoločností predstavujú dôležitý dokument, na základe ktorého prijímajú investori a iní používatelia svoje rozhodnutia (Tumpach – Juhászová – Meluchová, 2013). I z tohto dôvodu je nesmierne dôležité, aby audit účtovnej závierky bol vykonaný riadne a dokumentácia prislúchajúca k nemu obsahovala všetky požadované záležitosti, a bola tak v súlade s medzinárodnými audítorskými štandardmi a ostatnými predpismi prislúchajúcimi k auditu.

3. Conclusion

Na základe analýzy zovšeobecnených výsledkov kontroly kvality audítorskej činnosti za príslušné obdobie a ich vplyvu na kvalitu výkonu auditu, ako aj na názor audítora sme dospeli k názoru, že takto zovšeobecnené informácie poskytované odbornej verejnosti spolu s adekvátnou vzdelávacou činnosťou, ktorú Slovenská komora audítorov zabezpečuje, môžu prispieť k zvyšovaniu kvality výkonu auditu slovenskými audítormi a audítorskými spoločnosťami pomocou správnej aplikácie požiadaviek, ktoré sú na audítorov kladené medzinárodnými audítorskými štandardmi. Analýzou dostupných informácií, či už ide o články, príspevky, literatúru a iné študijné materiály bolo zistené, že publikačná činnosť v oblasti auditu je nedostatočná, pričom ide o kľúčové témy k zabezpečeniu kvality audítorských služieb (Porte - Saur-Amaral – Pinho, 2018). Audítori sa na základe uvedených informácií môžu vystríhať často vyskytujúcich nedostatkov, prijať opatrenia na zdokonaľovanie relevantných procesov v rámci výkonu auditu. Neustále zvyšovanie kvality audítorskej činnosti je podľa nášho názoru dôležité, pretože auditom verifikované informácie poskytované účtovnou závierkou, či už finančné (Pakšiová – Kubaščiková, 2014) a v neposlednom rade aj nefinančné (Pakšiová, 2016), sú vo všeobecnosti podstatnými informáciami z hľadiska správneho rozhodovania používateľov informácií z účtovnej závierky.

Acknowledgment

This paper is an output of the science project: APVV-16-0602 Zvyšovanie relevantnosti účtovných informácií v SR – od nákladov k hodnote

References

- [1] Banociová, A. and Tusan, R. (2016). Setting of Audit Procedures on the Auditing of the Financial Statements of the Municipality. *Proceedings of the 11th international scientific conference public Administration*, pp. 9 – 21.
- [2] Devi, A. and Devi, Sh. (2014). Audit Expectation Gap between Auditors and Users of Financial Statements. *European Journal of Business and Management*, vol. 6, no. 14, pp. 75-82.

- [3] Dimitrova, J and Sorova, A. (2016). The role of Professional Skepticism in Financial Statement Audit and its appropriate Application. *Journal of Economics*, [S.l.], vol. 1, no. 2.
- [4] Domoracká, D. and Hunyady, K. (2016). Objective and purpose of financial statement audit and forensic audit. *Účetnictví a auditing v procesu světové harmonizace. Mezinárodní vědecká konference*, Vranov nad Dyjí, Czech Republic, pp. 40-43.
- [5] Gajdošová, Z. (2016). Causes and impacts of the global financial crisis on the world economy. *Účetnictví a auditing v procesu světové harmonizace. Mezinárodní vědecká konference*, Vranov nad Dyjí, Czech Republic, pp. 44-51.
- [6] Kareš, L. and Kňázková, V. (2016). Interpretation of the results of control of the organization providing assurance services. *Účetnictví a auditing v procesu světové harmonizace. Mezinárodní vědecká konference*, Vranov nad Dyjí, Czech Republic, pp. 84-91.
- [7] Kareš, L. (2016). Is the modification of International auditing and assurance standards board (IAASB) encreasing of the audit quality? *Účetnictví a auditing v procesu světové harmonizace. Mezinárodní vědecká konference*, Vranov nad Dyjí, Czech Republic, pp. 77-83.
- [8] Kršíková, V. and Rybka, L. (2012). Audit risk in the context of the audit profession. *European financial systems international scientific conference*, Brno, Czech Republic, pp. 102-106.
- [9] Kubaščíková, Z. and Juhászová, Z. (2016). Analysis of financial statements focusing on detection of Ponzi schemes using XBRL. *Proceedings of the 13th international scientific conference European financial systems 2016*, Brno, Czech Republic, pp. 408 - 412.
- [10] Lin, L. and Tepalagul, N. (2015). Auditor Independence and Audit Quality. *Journal of Accounting, Auditing & Finance*, vol. 30, no. 1, pp. 101-121.
- [11] Maděra, F. (2016). Slovak act on statutory audit: Reflection on terminology. *Účetnictví a auditing v procesu světové harmonizace. Mezinárodní vědecká konference*, Vranov nad Dyjí, Czech Republic, pp. 122-129.
- [12] Pakšiová, R. and Kubaščíková, Z. (2014). Risks of company's non-realised profits distribution. *Managing and modelling of financial risks. International scientific conference*, Ostrava, Czech Republic, pp. 598 - 605.
- [13] Pakšiová, R. (2016). Reporting of non-financial information on companies in the context of sustainable development in Slovakia? *Účetnictví a auditing v procesu světové harmonizace. Mezinárodní vědecká konference*, Vranov nad Dyjí, Czech Republic, pp. 153 - 160.
- [14] Porte, M., Saur-Amaral, I. and Pinho, C. (2018). Research in auditing: main themes. *Rev. contab. finanç.* [online], vol. 29, no. 76, pp. 41-59.
- [15] Tumpach, M., Juhászová, Z. and Meluchová, J. (2013). Is there any relevance of business-related financial reporting in Slovakia. *9th international scientific conference*, Ostrava - Mariánské hory, Czech Republic, pp. 987 – 994.

COMPARISON OF WACC CALCULATION IN THE INTERNATIONAL BUSINESS ENVIRONMENT

Pavol Kubala^{1,a,*}

¹University of Zilina, Faculty of Operation and Economics of Transport and Communications,
Univerzina 1, 010 26 Zilina, Slovakia

^ap-kubala@hotmail.com

*Corresponding author

Abstract. Weighted average costs of capital (WACC) are used to determine the value of the total capital structure of an enterprise. Weighted average costs of capital are particularly appropriate to select a sound investment project, either national or international, that takes into account a capital planning. The proportion of equity and debt available for the enterprise to finance the projects may vary depending on the type of project (property-oriented projects may require more debt to finance) and costs of capital are based on the specificity of the investment. However, the critical point is that the relative weights of equity and debt or other components of capital are based on the market value of each component, not on the accounting one. The essence is to calculate or estimate the weight of each component of the capital structure. Thus, the main aim of the paper is the comparison of the calculation of weighted average costs of capital in business environment in the context of the international market. It was found out that there is a diametrical difference between the calculations of weighted average costs of capital for publicly- traded companies and for private companies, which is proved by a realized case study accepting the principles of globalized business environment.

Keywords: weighted average cost of capital, cost of equity, cost of debt

JEL Classification: G17, G32, F60

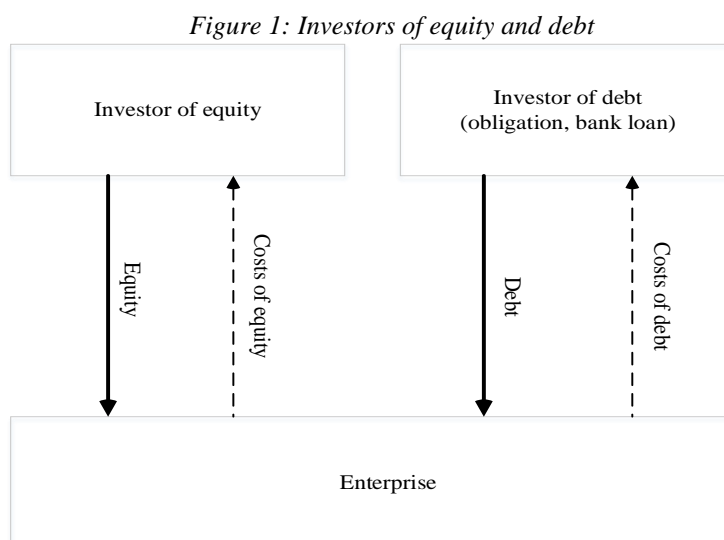
1. Introduction

Cost of capital is an important commercial and financial instrument. It represents the expected rate of return required by the market to obtain funds for an investment (Pratt, 2002, pp. 3). In economic conditions, the cost of capital represents an opportunity cost - the cost which we abandon and prefer the best alternative investment (Huang & Kang, 2018). It recalls the economic principle of substitution, and therefore, that an investor does not invest in the asset if there is a more attractive substitute. The market requires a certain set of investors, responsible adepts to realize the investment (Gorelkina & Kuhle, 2018).

Thus, the cost of capital can be perceived from three perspectives. The asset side is a measure that should be discounted to the present value of future expected cash flows. The liabilities side presents the economic cost of an enterprise to attract and acquire capital in a competitive environment where investors carefully analyse and compare all revenue generating options. On the investor side, the return is expected and required when investing in

venture capital (Sargent, 2018). However, each of these perspectives determines the cost of capital differently, they all consider the same value.

An enterprise tries to gain capital from various sources, the most important are debt and equity, both of which need to calculate the cost of capital, Figure. 1.



Source: Schlegel, 2014

One of the reasons why enterprises compute cost of capital is an estimate of the minimum discount rate used to assess the proposed capital expenditures (El Ghouli et al, 2018). The purpose of such an analysis is to decide which of the planned projects should be carried out by the company.

The cost of capital is a function of investing. Brealey & Myers (1992, p. 254) claim, that the actual cost of capital depends on the amount of available capital. It would not be correct to consider potential investment on the basis of the corporate total cost of capital if the investment carries a higher or lower risk than existing business activities. Every investment project needs to be evaluated in terms of own opportunity costs of capital (Popovic & Paunovic, 2018). The cost of capital depicts the investor's expectations, which can be divided into three basic elements: (i) actual rate of return, which is the amount, the investor expects to borrow on its risk-free basis; (ii) expected inflation and (iii) risk, i. e. uncertainty, when and how the enterprise receives money or other economic income.

The first two elements are also referred to as the time value of money. Expectations may vary from one investor to another, so the market seeks to create a consensus with regard to individual types of investment and determines the cost of capital for investments of various degrees of risk (Berry-Stolzle & Xu, 2018). Costs of capital derived from investor expectations and market consensus are expected economic income, usually measured by cash flow, to estimate the present value and compare investment alternative of same or different risk levels (Peia & Vranceanu, 2018). One of the reasons why enterprises estimate the costs of capital is an estimate of the minimum discount rate used to assess the proposed capital expenditures (projects). The purpose of such an analysis is to decide which of the planned projects should be accepted by the company.

2. Methodology

The weighted average cost of capital (WACC) is used to determine the value of the total capital structure of an enterprise and to calculate the total cost of capital. The weighted average costs of capital are particularly appropriate when selecting a proper investment project, taking into account capital planning. The proportion of equity and debt available for the enterprise to finance projects may vary depending on the type of project (property-oriented projects may require more debt for financing) and costs of capital are based on the specificity of the investment. The essence is to calculate or estimate the weight of each component of the capital structure. However, the critical point is that the relative weights of equity and debt or other components of capital are based on the market value of each component, not on the book value.

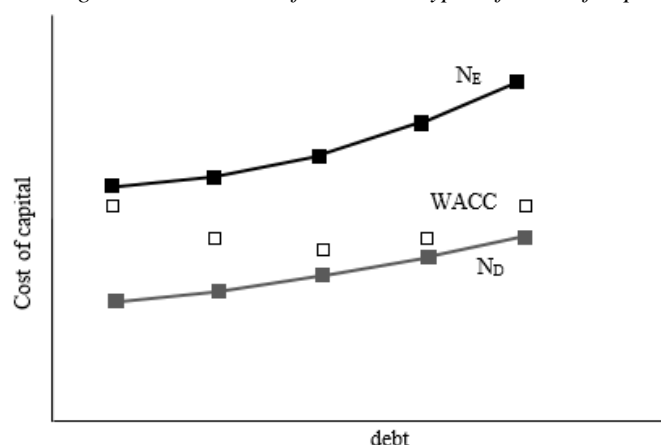
The basic algorithm to calculate the weighted average cost of capital takes into account three components of the capital structure:

$$WACC = (k_e \cdot W_e) + (k_p \cdot W_p) + [k_{d(pt)}(1-t) \cdot W_d] \quad (1)$$

where	WACC	weighted average costs of capital
	k_e	cost of equity
	W_e	weight of equity in the capital structure
	k_p	cost of preferred stock
	W_p	weight of preferred stock in the capital structure
	$k_{d(pt)}$	cost of debt
	t	taxation
	W_d	weight of debt in the capital structure

We can use any number of sources of capital into the equation and calculate their weighted average. However, we need to know their weights on total resources and to quantify their individual costs.

Figure 2: Behaviour of individual types of costs of capital



Source: Pavelkova & Knapkova, 2005

Costs of debt increase as a consequence of rising indebtedness, as the risk of creditors is higher and they require higher returns of invested funds. Costs of equity are higher than costs of debt and increase with the debt. Owners bear greater risk, thus they require higher return of their capital. The risk rises with increasing indebtedness. The weighted average cost of capital,

as a result of the impact of taxes and costs of financial distress, evolves in relation to the level of indebtedness as the "U" curve. Firstly, WASS decreases with increasing indebtedness, however, from a certain level of indebtedness WACC starts to increase (the impact of the financial crisis) resulting from the possibility of debt repayment problems.

Thus, the main aim of the paper is the comparison of the calculation of weighted average costs of capital in business environment in the context of the international market, focusing on the differences between the calculations of weighted average costs of capital for publicly-traded companies and for private companies which is proved by a realized case study accepting the principles of globalized business environment.

3. Results and Discussion

The enterprises, which trade publicly, may calculate the weights of each capital component by multiplying the volume of the non-paid component by its market price and then calculating the percentage of each component on the total market value. This process can be summarized in five steps:

1. Identify the number of shares or individual components of the capital structure.
2. Determine the market price per unit of a given component of the capital structure.
3. Multiply the number of units of each component by a unit market price.
4. Sum the total market value of the components to obtain the market value of the invested capital (MVIC).
5. The distribution of the total market value of the components according to the market value of the invested capital results in the determination of the percentage of the individual capital components in the company capital structure.

Let's assume that we have some information about the capital structure of a publicly-traded enterprise (Table 1)

Table 1: Capital structure of a company

Component	Number / nominal value in €	Price in € / % of the nominal value	Total sum in €	Weights in %
Common stock	500,000	9 €	4,500,000	53 %
Preferred stock	100,000	30 €	3,000,000	36 %
Bonds	1.000,000 €	0,9 %	900,000	11 %
Market value of invested capital			8,400,000	100 %

The calculation of the weighted average costs of capital requires some other information, and thus we suppose:

- the cost of equity is 20 %;
- taxation 21 %.
- dividend on the preferred stock is 4.5 € per share per year. Considering that the market price of the preferred stock is 30 €, the cost of preferred stock is 15% (ratio of dividend and market price);
- bonds pay 9 % interest rate of their nominal value. The current yield is 10%, is we assume, that the usual nominal value of a bond is 1000€. Then the annual interest is calculated as a product of the given interest rate (9%) and the nominal value, i.e. 90 €.The current yield as a ratio of the annual interest to the percentage value of the bond nominal value. However, to estimate the cost of debt, we use yield to maturity. To

simplify the illustration we assume, that the maturity of bond is 3 years and the interest is paid at the end of each year. Using the equation (1) we can calculate the cost of debt (13 %):

$$900 = \frac{90}{(1 + k_{d(pt)})} + \frac{90}{(1 + k_{d(pt)})^2} + \frac{90}{(1 + k_{d(pt)})^3} + \frac{1000}{(1 + k_{d(pt)})} \quad (2)$$

Finally, the weighted average cost of capital of the publicly- traded enterprise may be determined, using the same equation

$$WACC = (0.20 \cdot 0.53) + (0.15 \cdot 0.36) + (0.13 \cdot (1 - 0.21) \cdot 0.11) = 0.106 + 0.054 + 0.011 = 0.171, t.j. \quad 17.1\% \quad (3)$$

The results can be summarized considering the components of the capital structure, Table 2.

The calculation of weighted average cost of capital of private enterprises addresses one major problem, the absence of the securities market. Therefore, it is necessary to estimate the market value to determine the weights. Estimating the weights of individual components of the capital structure thus becomes an iterative process for enterprises (using computer technology) that need to know the present value of the debt.

Table 2: Weighted average costs of capital of individual components of the corporate capital structure

Component	Costs	Weights	Weighted costs
Common stock	0.20	0.53	0.106
Preferred stock	0.15	0.36	0.054
Debt after taxes	0.10	0.11	0.011
Weighted average cost of capital			0.171

The process of estimating the weights of the components of the capital structure of *private enterprises* can be summarized in the following eight steps (Bowman & Bush, 2006, pp.71-81):

1. Estimate the market value of securities (also debt and preferred stock).
2. Make the first estimate of the market value of weights of all components of the capital structure (debt common and preferred stocks)
3. Calculate the approximate value using the algorithm (2).
4. Suggest the volume of cash flows available to all invested capital and growth rates necessary for a discounting model of the investment valuation.
5. Calculate the approximate market value of invested capital combining the computations in steps 3 and 4.
6. Subtract from the MVIC (calculated in step 4) the value of all components defined in the first step, which gives the approximate value of equity.
7. Compute the capital structure weights using the equity value.
8. Repeat the process, until the computed value of weights come close to the weights used in computing the WACC.

Let's assume that the company has a two-component capital structure – common stock and debt. The book value of long-term liabilities is 400,000 € (40%), common stock 600,000 € (60%), the interest rate on foreign capital is 10%. We estimate the cost of equity at 25%, income tax 21%, estimated net cash flow of the total invested capital is 250,000 € and the growth of net cash flow is expected at a constant level of 5% in the first year.

Considering the economic background of the enterprise, it is necessary to estimate the weights of the capital structure using the general equation of the WACC calculation (1).

$$WACC = (0.25 \cdot 0.60) + (0.10 \cdot (1 - 0.21) \cdot 0.40) = 0.15 + 0.032 = 0.182 \quad (4)$$

The results indicates that the total weighted average cost of capital of the private company is 18.2%.

The next step in the process is to calculate the market value of the invested capital at a given WACC level. The values are used into the equation for the calculation of the constant growth:

$$PV = \frac{NCF}{k - g} = \frac{250,000}{0.182 - 0.05} = 1,893,939 \text{ €} \quad (5)$$

where PV present value
 NCF net cash flow
 k cost of capital
 g expected long-term growth rate

Subtracting the value of debt 400,000 €, we get the market value of equity of 1,493,939 €. However, the value does not correspondent with the book value of equity of 600,000 €. Based on the calculated results, the weights of the capital structure components are portrayed in Table 3.

Table 3: Weights of the capital structure components (first estimation)

Component	Value in €	Weight
Common stock	1,493,939	79 %
Debt	400,000	21 %
Market value	1,893,939	100 %

The whole process is necessary to repeat, as we initially assumed a 60:40 capital structure (equity to debt), and the calculation produced a significantly different results, a ratio of 80:20.

Therefore, we try to repeat the calculation with the following estimate: 75% common stock, 25% debt. We recalculate the weighted average cost of capital using the equation (1):

$$WACC = (0.25 \cdot 0.75) + (0.10 \cdot (1 - 0.21) \cdot 0.25) = 0.1875 + 0.02 = 0.207 \quad (6)$$

It indicates, that the total weighted average costs of capital are estimated at 20.7%, which is much higher compared to the first estimate. Then we calculate the present value at a given growth rate:

$$PV = \frac{250,000}{0.207 - 0.05} = 1,592,357 \text{ €} \quad (7)$$

Subtracting the value of debt implies the market value of equity of 1,192,357 €. On this basis, the weights of the market values of the components of the capital structure are depicted in Table 4.

Table 4: Weights of the capital structure components (second estimation)

Component	Value in €	Weight
Common stock	1,192,357	75 %
Debt	400,000	25 %
Market value	1,592,357	100 %

It should be noted that this method of the weighted average cost of capital calculation is not very consistent with the exact line. Finally, we can assume that 20.7% WACC is more acceptable for the enterprise than the costs calculated in the initial estimate (18.2%). By repeating the whole process several times, we would get results that are even more accurate.

Latest researches show (see Belkhir et al, 2017 and Aubert et al., 2017) that using financial information gives economic advantages to enterprises, having a significant impact on the cost of capital. Isabel-Maria & Ligia (2017) declare that the growing requirements for corporate transparency have encouraged companies to report their performance to shareholders, investors and society in general from the economic, social and environmental points of views.

4. Conclusion

In the paper we compared the calculation of weighted average costs of capital in business environment in the context of the international market, focusing on the differences between the calculations of weighted average costs of capital for publicly- traded companies and for private companies which is proved by a realized case study accepting the principles of globalized business environment. The process of the WACC calculation has some significant differences caused by the fact, that the weights of the capital structure components must be at market value, and because private company stocks do not have market values, the process of computing the WACC for a private company is an iterative one, starting with approximations of market value weights of capital structure components.

Acknowledgment

The contribution is an output of the scientific project VEGA 1/0428/17 Creation of new paradigms of financial management at the threshold of the 21st century in the conditions of the Slovak Republic.

References

- [1] Aubert, N., Kern, A., Hollandts, X. (2017). Employee stock ownership and the cost of equity. *Research in International Business and Finance*, vol. 41, pp. 67-78.
- [2] Belkhir, M., Boubakri, N., Grira, J. (2017). Political risk and the cost of capital in the MENA region. *Emerging Markets Review*, vol. 33, pp. 155-172.
- [3] Berry-Stolzle, T., Xu, J. (2018). Enterprise risk management and the cost of capital. *Journal of Risk and Insurance*, vol. 85, no. 1, pp. 159-201.
- [4] Bowman, R.G., Bush, S.R. (2006). Using comparable companies to estimate the betas of private companies. *Journal of Applied Finance*, vol. 16, no. 2, pp. 71–81.
- [5] Brealey, R. A., Myers, S. C. (1992). *Teorie a praxe firemních financí*. Praha : Victoria Publishing.
- [6] El Ghouli, S., Guedhami, O., Kim, H., et al. (2018). Corporate environmental responsibility and the cost of capital: International evidence. *Journal of Business Ethics*, vol. 149, no. 2, pp. 335-361.

- [7] Gorelkina, O., Kuhle, W. (2018). Information Aggregation through stock prices and the cost of capital. *Journal of Institut. and Theoretical Economics*, vol. 174, no. 2, pp. 399-420.
- [8] Hunag, L., Kang, Q. (2018). Information, investment adjustment and the cost of capital. *Journal of Financial and Quantitative Analysis*, vol. 53, no. 4, pp. 1715-1754.
- [9] Isabel-Maria, G.S., Ligia, N.G. (2017). Integrated information and the cost of capital. *International Business Review*, vol. 2, no. 5, pp. 959-975.
- [10] Pavelkova, D., Knapkova, A. (2005). *Výkonnost podniku z pohledu finančního manažera*. Praha: Linde.
- [11] Peia, O., Vranceanu, R. (2018). The cost of capital in a model of financial intermediation with coordination friction. *Oxford Economic Papers- New Series*, vol. 70, no. 1, pp. 266-285.
- [12] Popovic, Z., Paunovic, M. (2018). The dependence of the cost of capital on degree of diversification. *Montenegrin Journal of Economics*, vol. 14, no. 1, pp. 53-67.
- [13] Pratt, S. P. (2002). *Cost of Capital: Estimation and Applications*. New Jersey: John Wiley & Sons, Inc.
- [14] Sargent, J.R. (2018). The productivity puzzle and the cost of capital. *Economic Affairs*, vol. 38, no. 2, pp. 265-272.
- [15] Schlegel, D. (2014). A comparison of global empirical results on company cost-of-capital practices. *International Journal of Business & Globalisation*, vol. 12, no. 1, pp. 53–62.

EXCISE TAXES RATES CHANGES EFFECTS ON TAX YIELDS IN GLOBAL ECONOMY: CZECH REPUBLIC CASE STUDY

Gabriela Kukalová^{1,a}, Lukáš Moravec^{2,b,*}, Dana Bína Filipová^{3,c} and Kamila Webrová^{4,d}

^{1,2,3,4}Czech University of Life Sciences Prague, Faculty of Economics and Management, Department of Trade and Accounting, Kamýcká 129, Praha 6 – Suchbátka, 165 21, Czech Republic

^akukalova@pef.czu.cz, ^bmoravec@pef.czu.cz, ^cxbind002@studenti.czu.cz, ^dwebr.k@seznam.cz

*Corresponding author

Abstract. The excise taxes are an important source of revenues for the states budgets around the world. Nevertheless, the influence of the excise taxes rates on the relevant commodity consumption and contextual tax yields is the object of the long term continuing international discussion; moreover, the potential role of tax rate is different at different excise taxes and in different states around the world potentially. This article deals with the trend in tax revenues relating the excise taxes from the year 2004 to 2015 and it covers the taxes on mineral oils, tobacco tax, alcohol tax, tax on wine and the tax on beer. This article evaluates globally the potential impact of the excise taxes rates, and possibly other relevant variables of individual excise taxes, on the tax revenues gained by the Czech Republic. The input data are obtained from the relevant official sources, particularly from databases of the Customs Administration of the Czech Republic. For the evaluation of the tax rate importance, statistical methods of hypotheses testing are used. The Gretl software is used as the main tool. The results can be potentially used for assessing fiscal policies in the states around the world, based on these results to propose an adjustment of the tax system in the field of excise duties and consequently to estimate the tax yield of excise duties globally with respect to conditions of the current economies around the world.

Keywords: excise taxes, tax yields, tax rates, Czech Republic, global economy

JEL Classification: H23, H26, H30, H71

1. Introduction

Excise taxes are levied selectively on selected commodities, above all with a view to reduce their consumption (mainly due to negative health impacts or negative environmental impacts). However, the revenue from these taxes is also not negligible. In the Czech Republic, according to the forecast, the excise tax revenue will be CZK 154.7 billion, i.e. 11.8% of the planned state budget (MFR, 2018). In the Czech Republic, there is currently a mineral oil tax, alcohol tax, beer tax, wine and intermediate products tax, manufactured tobacco tax, and from 1 July 2015 also a tax on raw tobacco (The Czech Republic, 2004). Consumption taxes are introduced in a number of countries around the world and are the part of the global economy. Excise taxes are also often an important part of government revenues. In the European Union, excise duties are subject to harmonization. Harmonization across the EU focuses not only on

excise duties but also on entire tax and accounting systems. Harmonization trends in financial accounting within the European Union are analyzed, for example, by Hinke (2011). Harmonization in excise duties is, for example, aimed at uniform determination of a minimum tax rate.

The tax rate affects the price of taxed goods and affects the revenue from taxed commodities. The excise tax rates are therefore the subject of discussion and the subject of a number of studies. Zatonski et al. (2018) conducted a qualitative analysis of the public debate on raising the alcohol tax rate in Poland in 2013 and identified two main frameworks for discussion: health and the economy. From a health point of view, the increase in rates is discussed in relation to health effects and to the reduction of consumption of taxed commodities (e.g. Ho et al., 2017, Li et al., 2017, Cebula et al., 2016, Marsh et al., 2016). The economic evaluation focuses mainly on the revenues. Zimmermannová & Šíroký (2016) analyzed the economic impacts of the development of cigarettes taxation in the Czech Republic and the Slovak Republic.

Revenues from excise taxes are affected not only by the rates level but also by other factors. Moravec et al. (2017) in their study state that, in addition to the rate, net income per capita and number of registered vehicles is an important factor for mineral oil tax revenues. Holková & Falat (2017) propose the use of statistical methods for modeling the reduction of the excise tax rate on petrol with the same tax profits in Slovakia. Dutkowsky & Sullivan (2017) examined cross-elasticity effects in excise taxation for markets characterized by monopolistic competition and over-shifting. With strong cross-elasticity, revenue can be continuously increased by raising the excise tax (Dutkowsky & Sullivan, 2017). Rybová (2015) analyzed the EU countries consumer tax revenues in the period 2000-2012 and notes that excise tax revenues in the NMS-12 countries are lower than that of the EU-15 countries.

The aim of our article is to evaluate the dependency of the yield of individual excise taxes on their tax rate in the period 2004-2015. This article is a part of a broader research on excise tax issues in the Czech Republic and links to previously published articles (e.g. Moravec et al., 2016; Moravec et al., 2017) that dealt with the impact of rate and other factors on excise tax revenues. At present, within the framework of these issues, income from excise taxes is examined in the context of costs of treatment of cigarette and alcohol consumers and other social costs.

2. Methods

In the framework of the analysis of rates and revenues from excise taxes in the Czech Republic, data are being worked out for the period 2004-2015. The starting year of the surveyed period is the year of accession of the Czech Republic to the European Union, since January 1, 2004 is also effective Act No. 353/2006 Coll., on excise taxes. The analyzed period ends in 2015 when a tax on raw tobacco was introduced (with effect from 1 July 2015), but this tax is not included in the analysis. The analysis includes individual excise taxes: mineral oil tax, alcohol tax, beer tax, wine and intermediate products tax and tobacco tax. The analysis of mineral oil tax is specifically focused on tax revenues from diesel oil and unleaded petrol. Regarding the tax on tobacco products, the analysis is particularized in cigarettes (tax rate ad valorem and specific tax, and the minimum tax rate per cigarette), cigars and cigarillos and smoking tobacco. Relevant data on revenues from these excise taxes in individual years of the

analyzed period were obtained from the annual reports of the Customs Administration of the Czech Republic (CSCR). The tax rates are determined by Act No. 353/2003 Coll. on excise taxes, as it is current in the given year. Rates and yields are shown in Table 1. The tax rate on beer is in CZK per hl for beer in ° Plato. The rate of the beer tax is valid for breweries with an annual beer production over 200 000 hl. The tax rate for wine and intermediate products applies to sparkling wines and intermediate products. Still wines have a rate of 0 CZK/hl.

Table 1: Rates and yields from excise duties in 2004-2015

Tax rates and yields	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Mineral oil tax												
Rate – oil (CZK/1000 l)	9,950	9,950	9,950	9,950	9,950	9,950	10,950	10,950	10,950	10,950	10,950	10,950
Rate – petrol (CZK/1000 l)	11,840	11,840	11,840	11,840	11,840	11,840	12,840	12,840	12,840	12,840	12,840	12,840
Mineral oils yields (mil. CZK)	65,327	75,450	76,636	80,837	82,078	79,465	81,416	80,938	78,832	76,537	80,121	84,525
Tobacco tax												
Cigarettes - rate ad valorem (%)	23.00	23.50	24.75	26.67	28.00	29.00	28.00	28.00	28.00	27.00	27.00	27.00
Cigarettes - specif. rate (CZK/pc)	0.480	0.540	0.698	0.855	1.030	1.030	1.067	1.070	1.120	1.160	1.190	1.290
Cigarettes - min. rate (CZK/pc)	0.927	1.035	1.303	1.593	1.920	1.920	2.003	2.010	2.100	2.180	2.260	2.370
Rate - cigars, cigarillos (CZK/pc)	0.440	0.615	0.790	0.882	1.150	1.150	1.150	1.150	1.250	1.300	1.340	1.420
Rate - tobacco (CZK/kg)	600	660	788	889	1,280	1,280	1,335	1,340	1,400	1,635	1,808	1,896
Tobacco tax yields (mil. CZK)	21,525	25,428	32,242	46,998	37,507	37,704	42,467	44,958	47,001	46,861	44,696	50,864
Alcohol tax												
Rate (CZK/hl)	26,500	26,500	26,500	26,500	26,500	26,500	28,500	28,500	28,500	28,500	28,500	28,500
Yields (mil. CZK)	5,305	5,774	6,806	7,122	7,077	6,937	6,523	6,766	6,509	6,345	6,720	7,113
Beer tax												
Rate (CZK/hl)	24.00	24.00	24.00	24.00	24.00	24.00	32.00	32.00	32.00	32.00	32.00	32.00
Yields (mil. CZK)	3,613	3,503	3,548	3,657	3,560	3,439	4,297	4,488	4,656	4,516	4,586	4,709
Tax on wine and intermediate products												
Rate (CZK/hl)	2,340	2,340	2,340	2,340	2,340	2,340	2,340	2,340	2,340	2,340	2,340	2,340
Yields (mil. CZK)	236	308	318	336	336	326	319	313	321	282	294	320

Source: CSCR (2018), Act No. 353/2003 Coll. about consumption taxes; own elaboration

A regression and correlation analysis were used to describe the causal relationships of statistical features and to assess the dependency of revenues from excise tax on the tax rate. Gretl software was used for these analyzes. Statistical testing was performed at three levels of significance $\alpha = 0.01$, $\alpha = 0.05$, $\alpha = 0.1$.

3. Results and Discussion

Based on the analysis was carried out the assessment of the dependence of excise tax revenues on the tax rate for individual taxed commodities.

3.1 Mineral Oil Tax

In the monitored period 2004-2015 the collection increased with an average annual increase of CZK 842.7 million. The relation of diesel oil and unleaded petrol tax rates and tax revenues was quantified using a Pearson correlation coefficient of 0.402 value identically for both diesel oil and unleaded petrol (Table 2), thus the time evolution of the quantities did not show a strong correlation. Perfect multi-collinearity between explanatory variables makes it impossible to create one model with both variables. In independent models for tax rates for diesel oil and unleaded petrol, regression coefficient values were found to be 3.76. This means that raising one of the tax rates by CZK 1 subject to *ceteris paribus* will lead to an increase in tax revenue of CZK 3.76 million. Subsequent statistical verification, however, showed the statistical insignificance of both variables - tax rates for diesel oil and unleaded petrol. The whole model was also identified as statistically insignificant, the conclusion of statistical verification is the low impact of tax rates on diesel oil and unleaded petrol on the tax collection. According to the results of similar studies, other variables can be evaluated as statistically significant. Moravec et al. (2017) report the results for the period 2000-2011. According to the created econometric model, the tax revenue is influenced by the average tax rate of unleaded fuel and diesel tax rates, change in net income per capita and change of registered motor vehicles.

Table 2: Mineral Oil Tax

	Diesel oil	Unleaded petrol
Pearson's coefficient	0.40199	0.40199
Constant of explanatory variable (mil. CZK)	39,193.3	32,081.8
Coefficient of tax rate (mil. CZK)	3.76	3.76
Coefficient of determination	0.1616	0.1616
F-Statistic vs $F_{krit.} = 4.965$	1.927426	1.927426
White test	0.0035	0.0054
Breusch-Godfrey test	0.322	0.322
Jarque-Bera test	0.06719	0.06719

Source: own elaboration

3.2 Tax on tobacco products

In the period under review, changes in tax rates and fluctuations in total tax revenue took place very often (Table 1). Pearson's correlation coefficient indicates a strong direct dependence between the rate and the collection of individual products. The individual estimated models explain the collection variability in the range of 64.9-81.2%. Due to the high multi-collinearity between the explanatory variables, one model with all the variables cannot be created.

The highest share in tax revenues from tobacco products has a tax on cigarettes. Each of the tax rate components was analyzed individually. All tax rate components were identified as statistically significant. The strongest link with the tax collection was found at a specific part

of the cigarette tax rate, and only marginally lower at the minimum cigarette tax rate. A similar conclusion was reached by Moravec et al. (2017), which states that the level of tax rates for cigarettes are strongly linked to total tax revenue in the analyzed period 2000-2011.

Table 3: Tax on manufactured tobacco

	Cigarettes - rate ad valorem	Cigarettes - specific rate	Cigarettes - minimum rate	Cigars, cigarillos	Smoking Tobacco
Pearson's coefficient	0.80614	0.90132	0.89735	0.87755	0.81214
Constant of explanatory variable (mil. CZK)	-69,264.8	9,178.58	8,630.24	11,834.8	18,132
Coefficient of tax rate (mil. CZK)	4,105.86	31,903.9	17,330.6	26,593.7	17,4819
Coefficient of determination	0.64937	0.81237	0.80523	0.77009	0.65957
F-Statistic vs $F_{krit.} = 4.965$	18.56	43.297	41.342	33.495	19.376
White test	0.44836	0.24762	0.24449	0.2913	0.44461
Breusch-Godfrey test	0.237	0.782	0.789	0.585	0.832
Jarque-Bera test	0.98716	0.03470	0.03526	0.03367	0.09298

Source: own elaboration

3.3 Alcohol tax

The collection of alcohol tax does not have a strong link to the rate of this tax. The correlation coefficient indicates a very weak relationship between these quantities. The regression analysis also found the low value and statistical significance of the regression coefficient of the alcohol tax rate as an explanatory variable for the collection of alcohol tax (Table 4). Also, the statistical significance of the model as a whole is low, and it follows from all of these data that the alcohol tax rate has little effect on the collection of this tax. It can be said that there are variables that affect more the collection of taxes. This result corresponds to the results of a similar study using the 1993-2011 data. The correlation coefficient and the outputs of the testing suggest the conclusion that changes in the variable - alcohol tax rate do not adequately explain changes in the variable - income tax (Moravec et al., 2017).

Table 4: Alcohol tax

	Ethanol
Pearson's coefficient	0.14963
Constant of explanatory variable (mil. CZK)	4,393.88
Coefficient of tax rate (mil. CZK)	0.0796
Coefficient of determination	0.02239
F-Statistic vs $F_{krit.} = 5.117$	0.2290
White test	0.00499
Breusch-Godfrey test	0.127
Jarque-Bera test	0.28018

Source: own elaboration

3.4 Beer tax

The relationship between the base tax rate and its total collection was quantified using the Pearson correlation coefficient, the result shows a very strong direct dependence between the rate and the collection. The regression coefficient shows that raising the beer tax rate by 1 CZK represents an increase of the tax collection by CZK 123.573 million. The coefficient is statistically significant in the same way as the whole model, the results show the clear strong

influence of the basic rate of the beer tax on the tax collection. The parameter is significant at the significance level of 1%, 5% and 10%. The estimated model explains the collection variability from 95%.

Table 5: Beer tax

	Beer
Pearson's coefficient	0.9775
Constant of explanatory variable (mil. CZK)	587.65
Coefficient of tax rate (mil. CZK)	123.573
Coefficient of determination	0.9555
F-Statistics vs $F_{krit.} = 4.965$	214.333
White test	0.18491
Breusch-Godfrey test	0.283
Jarque-Bera test	0.30538

Source: own elaboration

3.5 Wine tax

As regards the rate of wine tax and intermediate products, correlation or regression analysis could not be carried out due to the constant tax rate for sparkling wine and intermediate products. The tax rate on silent wine is CZK 0/hl. In the absence of changes in tax rates, it is not possible to quantify the effect of changes in tax rates on wine and intermediate products on the collection of this tax.

4. Conclusion

In the case of mineral oil tax, it was not possible to confirm that the amount of tax can influence the amount of the collected taxes. The regression analysis indicated a weak direct linear dependence of the amount of tax collections on tax rates on diesel oil and unleaded petrol, but more influence has other variables.

As regards the tax on tobacco products the greatest impact on the tax revenue was at the specific tax rate (cigarettes) and at the tax rate for cigars and cigarillos. The smallest impact in the monitored period had the tax rate on smoking tobacco. Overall, the results show that it is possible to influence the collection of this tax through the tobacco and tobacco products rates.

In the case of alcohol tax, the weak link between the tax rate and the collection amount from this tax was identified. Given the statistical insignificance of the model, it was concluded that there are variables that have a greater impact on the amount of alcohol tax revenue than the tax rate.

The beer tax yield is almost perfectly dependent on the beer tax rate. The tax rate was identified as a statistically significant variable in the regression model, and it is therefore possible to state that the beer tax rate can affect the collection of this tax.

As regards excise tax on wine and intermediate products, it was not possible to assess the impact of changes in tax rate on its yield. Due to the constant tax rate in the period under review, it is not possible to perform neither correlation nor regression analyzes.

Acknowledgment

This paper is an output of the science project No. 20181013 - Tax Laboratory Pilot Project Utilizing the Human Behavior Research Unit of FEM CULS Prague, supported by the Internal Grant Agency (IGA) of Faculty of Economics and Management, CULS Prague.

References

- [1] Cebula, R. J., Angjellari-Dajci, F. and Kashian, R. (2016). Are there interregional differences in the response of cigarette smoking to state cigarette excise taxes in the USA? Exploratory analysis. *Journal of Applied Statistics*, vol. 43, no. 8, pp. 1494-1507.
- [2] Customs Administration of the Czech Republic. (August 2018). Výroční zprávy [online]. Available: <https://www.celnisprava.cz/cz/statistiky/Stranky/vyrocní-zpravy.aspx>.
- [3] Dutkowsky, D. H. and Sullivan, R. S. (2017). Excise taxes, over-shifting, cross-elasticity, and tax revenue. *Applied Economics Letters*, vol. 24, no. 2, pp. 113-116.
- [4] Hinke, J. (2011). Evolution Trends in Finance Accounting in the European Union. *Conference on New Trends in Business Management in Theory and Practice in Cross-Border Comparison*, Mariánské Lázně, Czech Republic, pp. 47-54.
- [5] Ho, L. M., Schafferer, C., Lee, J. M., Yeh, C. Y. and Hsieh, C. J. (2017). The effect of cigarette price increases on cigarette consumption, tax revenue, and smoking-related death in Africa from 1999 to 2013. *International Journal of Public Health*, vol. 62, no. 8, pp. 899-909.
- [6] Holková, B. and Falat, L. (2017). Statistical Learning as a Tool for Optimizing the Level of Excise Tax of Mineral Oils in Slovakia. *12th International Scientific Conference of Young Scientists on Sustainable, Modern and Safe Transport*, High Tatras, Slovakia, pp. 318-323.
- [7] Li, J., Newcombe, R., Guiney, H. and Walton, D. (2017). Impact on Smoking Behavior of the New Zealand Annual Increase in Tobacco Tax: Data for the Fifth and Sixth Year of Increases. *Nicotine & Tobacco Research*, vol. 19, no. 12, pp. 1491-1498.
- [8] Marsh, L., Cameron, C., Quigg, R., Hoek, J., Doscher, C., McGee, R. and Sullivan, T. (2016). The impact of an increase in excise tax on the retail price of tobacco in New Zealand. *Tobacco Control*, vol. 25, no. 4, pp. 458-463.
- [9] Ministry of Finance of the Czech Republic (MFČR). (May 2018). Státní rozpočet 2018 v kostce. [Online]. Available: <https://www.mfcr.cz/cs/oministerstvu/vzdelavani/rozpocet-v-kostce/statni-rozpocet-v-kostce-2018-31944>.
- [10] Moravec, L., Kukalová, G. and Ptáček, M. (2017). Tax Rate Changes Impact on Mineral Oils Taxes Yields in the Czech Republic. *European Financial Systems 2017: Proceedings of the 14th International Scientific Conference*, Brno, Czech Republic, pt. 2, pp. 86-94.
- [11] Moravec, L., Kukalová, G., Regnerová, O. and Ptáček, M. (2016). Tax Yields of Excise Duties Applied to Tobacco Products and Alcoholic Beverages. *Scientific Papers of the University of Pardubice, Series D*, vol. 23, no. 38, pp. 107-116.

- [12] Rybová, J. (2015). The Share of Excise Taxes on Consumption Expenditure of Consumers in the European Union. *16th Annual Conference on Finance and Accounting, ACFA Prague 2015. Procedia Economics and Finance*, Prague, Czech Republic, pp. 590-597.
- [13] The Czech Rep. (2003). Act nr. 353 from 26th September 2003 about consumption taxes. In *Sbírka zákonů České republiky*. Number 118.
- [14] Zatonski, M., Hawkins, B. and McKee, M. (2018). Framing the policy debate over spirits excise tax in Poland. *Health Promotion International*, vol. 33, no. 3, pp. 515-524.
- [15] Zimmermannová, J. and Šíroký, J. (2016). Economic Impacts of Cigarette Taxation Development in the Czech Republic and the Slovak Republic. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, vol. 64, no. 6, pp. 2191-2200.

MODELING THE MECHANISM FOR FORMING REQUESTS IN THE ACTIVITIES OF THE TAX AUTHORITY

Yury Borisovich Melnikov^{1,a,*}, Elena Alexandrovna Onokhina^{2,b}, and Sergey
Alexandrovich Shitikov^{3,c}

¹ Ural State University of Economics, 8 Marta str., 62, of.476, Yekaterinburg, 620014, Russia

² Ural State University of Economics, 8 Marta str., 62, of.476, Yekaterinburg, 620014, Russia

³ Ural State University of Economics, 8 Marta str., 62, of.476, Yekaterinburg, 620014, Russia

^aUriiMelnikov58@gmail.com, ^bOnokhina@yandex.ru, ^cShitikov-s-a@yandex.ru

*Corresponding author

Abstract. The globalization of the economy leads to aggravation of competition between the systems of state management of the economy and the corresponding institutions. The authors consider the optimization of the activities of the tax authority. It is carried out in the following directions: I) improvement of the legislation and procedures described in the regulatory documents; II) improvement of internal procedures and functioning of the tax authority; III) the use of external resources, for example, the involvement of self-regulating organizations; IV) improvement of the effectiveness of staff, etc. The most important reserve for improving the work of staff is to improve their skills, which allows implementing new, more optimal procedures. The latter is possible due to the use of strategies as the basis of the activity management system and the model of the managerial decision-making process that takes into account the optimization of the query system that ensures the adequacy of the solution. In the proposed model, an algebraic approach to modeling is realized at different levels. This approach consists of three components: 1) a system of basic models; 2) systems of typical transformations and typical combinations of models; 3) a mechanism of approximation. This approach is implemented at the level of strategies for creating a set of variants of management decisions, the formation of information requests, etc., finished in the level of creating a specific query and analyzing the answers to it.

Keywords: taxes, strategy of tax authorities, algebraic approach, economy

JEL Classification: E62, H26, C02

1. Introduction

One of the important activities of the state, which can be considered as a major state business project is the management of the activities of tax authorities. This project is directed to optimization of a ratio of expenses and results of his realization, which is embodied into increasing the amount of tax collections, creating a more comfortable environment for investment and business, and, as a result, in increasing the growth rate of the economy. The quality of decisions made in the field of tax management depends on the adequacy of the information on which models for making optimal decisions are based. Tax authorities receive information from reports of economic entities, direct and indirect assessments of the results of

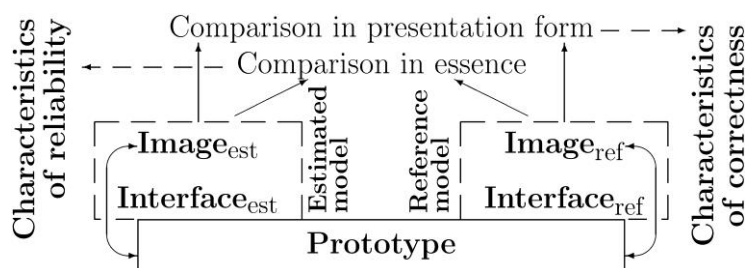
their work, sociological research, responses to requests of governing bodies, partners, etc. We propose model of functioning of system of inquiries.

The modern stage of the development of society is characterized by the introduction of artificial intelligence systems (Silva & Fonseca, 2019), (Dobrodum & Kyvlyuk, 2018), (Kalanov, 2017). The initial stage of creating an artificial intelligence system to automate the process of managing a business process is usually a formalization of the corresponding business process, the creation of a system of its models. Improvement of the activities of the regional tax authority can occur in the following areas: I) improving the legislation and procedures described in the regulatory documents; II) improvement of internal procedures and system of functioning of the tax authority, including automation of processes, introduction of artificial intelligence systems; III) improving the effectiveness of staff, in particular through training; IV) use of external resources, for example, involvement of self-regulating organizations, etc. In the theory of management, an important place is given to the problem of creating options for management decisions, the choice and implementation of an optimal solution. One of the conditions for the success of an optimal choice is the availability of reliable information. An important source of such information is the answers to information requests. Our research is aimed at formalizing the process of query generation, which is currently insufficient for use in artificial intelligence systems. Methodological base of the research directed to optimization of procedures due to modeling of system of inquiries is use of the theory of strategy as components of the theory of modeling of Yu. Melnikov.

2. Strategy as a decision-making mechanism, i.e. mechanism for creating reference models of activity

We consider purposeful activity. Achievement the goal is determined by comparing models of the result with the reference models: indicators achieved, established relationships, etc. Consider some consequences. First, an assessment of the level of achievement of the goal can be considered as a special case of assessing the adequacy of the model, see Fig. 1. Axiomatic definition of adequacy is given in (Melnikov, Onokhina & Shitikov, 2018).

Figure 1: The concept of adequacy of the model

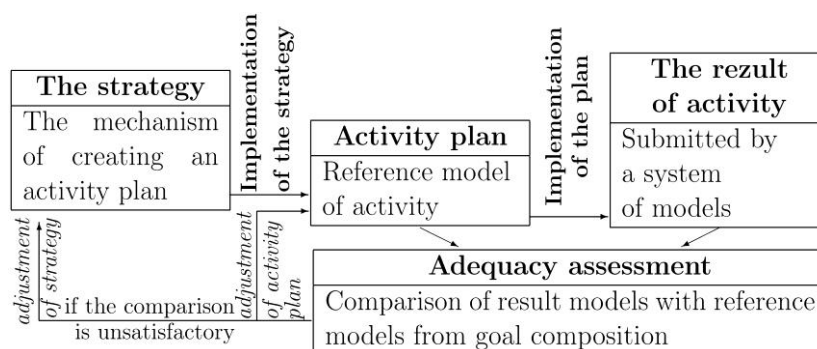


Secondly, the purpose actually includes reference models of result of activity. We will refer to the totality of the reference models which are a part of the purpose of activity as the maintenance of the goal of activity. Moreover, in practice, it can usually be considered that the goal is a system of reference performance models.

In the concept "maintenance of the purpose of activity" it is possible to allocate subjective and objective components. Quite often as an objective component of maintenance of the purpose of activity it is possible to consider "averaging" of contents of the corresponding goal

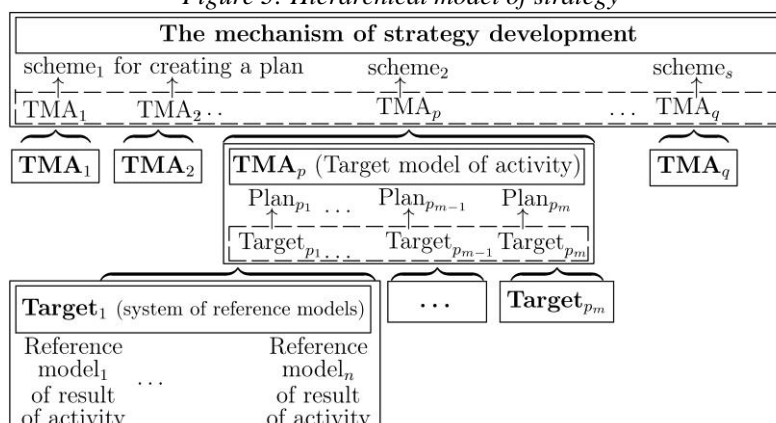
in a certain group of subjects (for example, among professionals, among relevant or potential consumers, etc.). The most important component of the ability to set a goal and achieve it is the ability to create and implement appropriate plans. As a mechanism for creating an activity plan, we propose to consider the strategy of activity (Melnikov, Onokhina & Shitikov, 2016), see Fig. 2.

Figure 2: Strategy and its implementation



In our opinion, the developer and the executor of the plan can perceive each item of the plan of activities either as a reference to a known algorithm or as an indication of the purpose of the activity without specifying the method of achieving it. Note that the perception of the point of the plan is subjective and, for example, differ between the developer and the executor of the plan. In the case when the executor of the plan took his point as an indication of the purpose of the activity, i.e. system of reference models of the result of activity, it still has to build a plan for achieving this local goal. As is known, such a procedure of gradually bringing the plan to a state where all its points are treated as references to the algorithm is called the method of bottom-up analysis. Possession of this method is necessary for the success of the activity. In particular, the success of professional activity is usually associated with mastering the key strategies of this activity. To describe the strategy, it seems to us convenient hierarchical model of the strategy, shown in Fig. 3.

Figure 3: Hierarchical model of strategy



For example, in fact Polya and his followers considered research strategies and their applications (Grozdev & Nenkov, 2014). However, for complex strategies, it turns out to be excessively cumbersome. We proposed an algebraic approach to describe such strategies. There are various interpretations of the latter concept (Devaraj, 2018), (Jakšić, Maksimović & Pilipović, 2018), (Ritirc, Biere & Kauers, 2018), (Di Somma, Giorgio & Pierluigi, 2019). But

we understand by an algebraic approach a system of three components: 1) a system of basic strategies; 2) the system of typical transformations and typical combinations of strategies; 3) the mechanism of approximation, intended to represent (in general, approximate) the required strategy in the form of the result of applying (perhaps, multiple) model transformations and typical combinations of basic strategies.

3. Model and strategies for the formation of management decisions using information requests

Increase in management efficiency is associated with improved information exchange between performers and the management system. This, in turn, entails an increase in the costs of resources to ensure the exchange of information. Tax authorities generate the operating influences in the form of the requirement of submission of certain documentation during delivery of tax declarations and tax audits. The organization of system of information requests is a necessary part of work of tax authority. In particular, selection of taxpayers for exit checks is carried out mainly in the request mode, that is, tax inspectors form and send requests for the provision of documents, mainly financial (copies of contracts, acceptance certificates, invoices, payment orders, etc.) to various instances.

Level of adequacy of such selection defines efficiency of the subsequent to it of exit checks, so promotes optimization of a ratio of expenses of personnel and material resources of the tax inspection and results of tax audits in the form of increase in receipt of tax collecting.

The importance of creation of system of inquiries for justification of the best decisions in the field of management of the taxation, is confirmed by tax practice in various countries. So, for example, the consequences of the insufficient validity of the decision to raise taxes on rich people in a crisis led to a slowdown in economic growth both because of the reduction in tax collection and because of a reduction in the taxable base (the termination of a number of enterprises due to movement abroad). These are the results of a study conducted by analysts of the Institute for Strategic Analysis of the company Financial and accounting consultants (<https://www.fbk.ru/publications/columns/14845/>). For example, in Ireland, the tax on rich people has increased annually since 2008. Its sharp increase from 41% to 46% in 2009 was accompanied by a deepening economic recession, up to 6% of GDP, and taxes were collected in aggregate less than before the increase. In France, in 2012, the upper lath of this tax has moved from 41 to 45%, and GDP growth in 2012 and 2013 was zero compared to 2% in 2011. In Portugal, the top rate by 2013 reached 48% compared with 42% in 2009. As a result, after a short-term surge (an increase of 2% in 2010), GDP dynamics again went into the negative zone. In Greece, the top rate in 2010 rose from 40 to 45% and stayed at this level for three years. At the same time, the sharp decline in GDP continued to accelerate and slowed only in 2012.

Probably, these consequences could be predicted with a more balanced approach to decision-making. One aspect of this approach is to increase the adequacy of economic models, on the basis of which relevant decisions were made, in particular the implementation of the optimal number of requests and their careful analysis. Optimization of the work of the structures, in particular tax authorities, is related to the accuracy of the information on the basis of which management decisions are made. The introduction of databases, in particular, can lead to a reduction in duplication of requests, an increase in the adequacy of the analysis

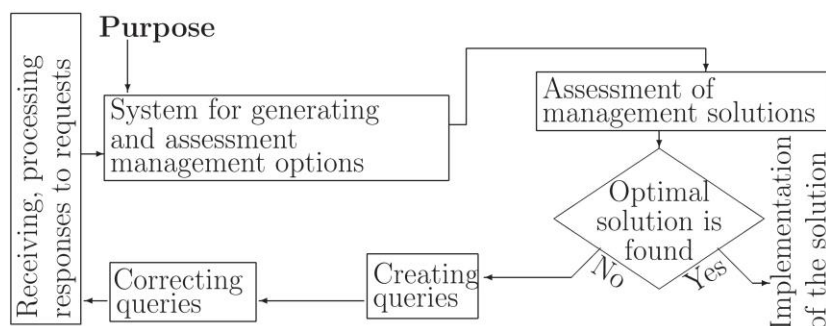
of responses through cross-sectional analysis of heterogeneous information. New prospects in this direction are opened by artificial intelligence systems (Kechar & Nait-Bahloul, 2017), (Pazdnikova & Pechenegina, 2017), (Sutardi & Darmansyah, 2017).

4. Creation an activity strategy using an algebraic approach

The management decision is considered as an activity plan in the article. The executor takes each item of the plan as an indication either of an action algorithm or a description of the purpose of the activity, without specifying the method of achieving it. Here we consider the algorithm as an unambiguous transformation of the source resource into a product, abstracting from a specific sequence of actions. The final result of management activities should be an activity plan (management decision), each item of which is a reference to a known algorithm to the executor. The results of the implementation of the previous items of the plan for the current paragraph can act as resources.

The presented model is ideologically close to the model of the proof accepted in the mathematical theory of proofs (Cockx & Devriese, 2018), if by "theorem" is meant the result of the algorithm, the original resource is treated as an axiom of the calculus, and our understanding of the algorithm is as a rule of inference in the calculus. In particular, the process of creating the formation of a management decision (i.e. an activity plan) can be formalized as a tree of proof, taking into account the orderliness of the "formulas" (points of the plan, points of the management decision). The formalization of all business processes is a necessary element when using artificial intelligence systems. Suppose that the goal of the activity is represented by a task, the volume of any component of which has a numerical value. The model of working with information requests when making managerial decisions is presented in Fig. 4. The presence of an optimal solution means that among all possible variants of managerial decisions, an obvious leader is revealed by the criterion "the mathematical expectation of the ratio between the income received as a result of the implementation of the management decision and the costs of its selection and implementation, including the costs of conducting requests".

Figure 4: Model of creating information requests



If the activity is of a routine nature, then management can be carried out with the help of strategies of routine modelling (Melnikov et al. 2014, A), routine design (Melnikov et al. 2014, B) and routine research activities (Melnikov & Potorochina, 2008), (see Fig. 5). Each of the strategies in Fig. 5 can be combined from the basic strategies of the system described by us. This is one of the options for applying the algebraic approach to modeling strategies (Melnikov, Onokhina & Shitikov, 2016). Systems of basic strategies for routine research and routine design activities, as well as for routine modeling are presented in the tables (Tab. 1), (Tab. 2), (Tab. 3).

Figure 5: The model of creating information requests with the specification of typical strategies

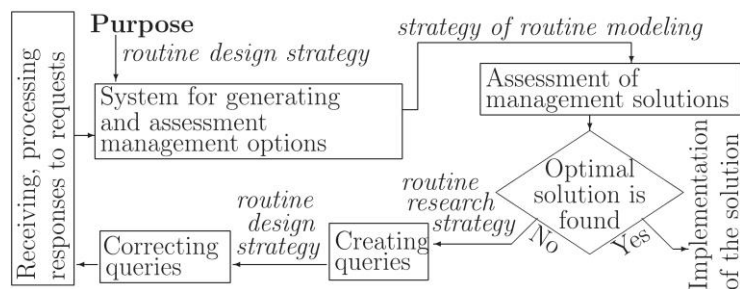


Table1 : Basic strategies for routine modelling

algebraic construction of the model (it is used when there is a standard plan for constructing the required model)	change of model components
	search and use of analogy
	change of roles and priorities
	iterative approximation of the model

Table2 : Basic Strategies of Routine Project Activitie

creation of a new model	adaptation of the known model	creation and using models of adequacy
search and use of analogy	change of roles and priorities	Identify and use restrictions
constructing a model from the characteristics, relationships, or the interface component	enrichment, reduction, abstraction, specification of the model	priority analysis of "extreme" situations
transition from design by elements to the use of assemblies	combining models	expectations

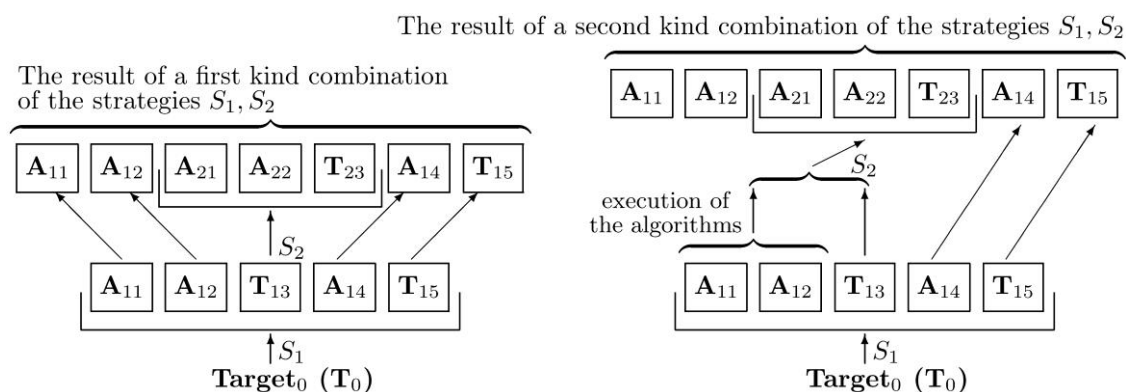
Table3 : Basic strategies for routine research activities

creation of a new model	transformation of the known model
search and use of analogy	change of roles and priorities
priority study of "extreme" situations	enrichment, reduction of the model
expectations	transition from the study of an individual object to the study of a system of objects

5. Typical transformations and typical combinations of strategies

The plan is transformed by the method of bottom-up analysis. This means that every point of the plan, perceived as a local goal of activity, is consistently replaced by an algorithm for achieving it. In the final plan, all points are treated as references to algorithms. In this case, two options are possible to achieve the final plan, which are presented in Fig. 6.

Figure 6: Types of combinations of strategies S_1 and S_2 .



In the case of using a combination of the first kind, the algorithms A_{21} and A_{22} can be created without information about the result of the algorithms A_{11} and A_{12} . A combination of the second kind is used when the successful selection of strategy S_2 requires information about the result of the execution of algorithms A_{11} and A_{12} .

The approximation mechanism for the method of bottom-up analysis consists in analyzing the resources available at the time the plan item is implemented, perceived as a description of the local goal. Choosing a basic strategy, a priori, which seems most promising in this situation. In the event that its application does not meet expectations, a strategy is applied, a priori that appeared to be less promising, and so on. This result in application to the model, presented on (Fig. 5), can be used as a basis for optimizing the query system: from creation, adjustment and using

6. Conclusion

We suggested using the algebraic approach to modeling by the author's interpretation of this term as a methodological basis for making decisions in the sphere of managing the activities of tax authorities. The implementation of the algebraic approach is based on the known decompositions of the strategy of routine research activities, the strategy of routine project activities and the strategy of routine modeling in the form of combinations of relevant basic strategies. The proposed model can be transformed into a mathematical model of the process of making a management decision focused on maximizing the mathematical expectation of the difference between the income received as a result of the implementation of the management decision and the costs of its adoption and implementation. The construction of a mathematical model requires a separate study.

Acknowledgment

The reported study was funded by RFBR according to the research project № 16-06-00240.

References

- [1] Cockx, J. and Devriese, D. (2018). Proof-relevant unification: Dependent pattern matching with only the axioms of your type theory. *Journal Of Functional Programming*, vol. 28.
- [2] Devaraj, S.L. (2018). *Solving of clock problems using an algebraic approach and developing an application for automatic conversion*. 1000. Institute of Physics Publishing.
- [3] Di Somma, M., Giorgio, G. and Pierluigi, S. (2019). Optimal bidding strategy for a DER aggregator in the day-ahead market in the presence of demand flexibility. *IEEE Transactions On Industrial Electronics*, vol. 66, no. 2, pp. 1509–1519.
- [4] Dobrodum, O. and Kyvlyuk, O. (2018). Technological wonder of modern India: on the way to the artificial intellect and smart-society. *Interdisciplinary Studies Of Complex Systems*, no.12, pp. 79–91.
- [5] Grozdev, S. and Nenkov, V. (2014). Design of information-educational environment for the establishment of new facts in mathematics. *International Conference Education*

- And Psychology Challenges Teachers For The Knowledge Society*, Sinaia, Romania, 2nd Ed., vol. 128, pp. 211–216.
- [6] Jakšić, S., Maksimović, S. and Pilipović, S. (2018). An algebraic approach to tempered ultradistributions. *Journal of Mathematical Analysis and Applications*, vol. 466, no. 1, pp. 927–935.
 - [7] Kalanov, T. (2017). Man versus computer: Difference of the essences. The problem of the scientific creation. *Brain-Broad Research In Artificial Intelligence And Neuroscience*, vol. 8, no. 2, pp. 151–178.
 - [8] Kechar, M. and Nait-Bahloul, S. (2017). Performance optimisation of the decision-support queries by the horizontal fragmentation of the data warehouse. *International Journal of Business Information Systems*, vol. 26, no. 4, pp. 506–537.
 - [9] Melnikov, Yu., Onokhina E. and Shitikov, S. (2016). The algebraic presentation of research strategy in the activity of tax authorities. *Globalization and its socio-economic consequences, 16th international scientific conference proceedings*, Rajecke Teplice, Slovakia, pp. 1355-1362.
 - [10] Melnikov, Yu., Onokhina, E. and Shitikov, S. (2018). Improving the adequacy of economic models. *Izvestiya Ural State University of Economics*, vol. 19, no. 1, pp. 94-106.
 - [11] Melnikov, Yu., Evdokimova, D. and Dergachev, E. et al. (2014, A). Strategies of building model. *Upravlenetz*, vol. 3, no. 49, pp. 52-56.
 - [12] Melnikov, Yu.B., Khripunov, I.V. and Chopovda, V.S. (2014, B). Algebraic approach to strategies of project activity. *Izvestiya Ural State University of Economics*, vol. 2, no. 53, pp. 115-123.
 - [13] Melnikov, Yu.B. and Potorochina, K.S. (2008). The strategy as a planning framework for teaching mathematics. *Proceedings of the Russian State Pedagogical University named after Herzen, N 9 (48): natural and exact sciences (physics, chemistry, modern equipment and technology, science, methodology of teaching natural and exact sciences, mathematics)*, pp.103-115.
 - [14] Pazdnikova, N.P. and Pechenegina, T.A. (2017). Formation of public tax culture. *International Journal of Economic Research*, vol. 14, no. 16, pp. 389–398.
 - [15] Ritirc, D., Biere, A. and Kauers, M. (2018). Improving and extending the algebraic approach for verifying gate-level multipliers. *Proceedings of the 2018 Design, Automation and Test in Europe Conference and Exhibition (DATE 2018)*, Institute of Electrical and Electronics Engineers Inc., pp. 1556–1561.
 - [16] Silva, C.S.R. and Fonseca, J.M. (2019) Artificial intelligence and algorithms in intelligent systems: Advanced analytics: Moving forward artificial intelligence (ai), algorithm intelligent systems (ais) and general impressions from the field. *Advances in Intelligent Systems and Computing*. 764. pp. 308–317.
 - [17] Sutardi, A. and Darmansyah, A. (2017). Strategy optimization of land and building tax management of rural and urban sector for acceleration regional development. *Advanced Science Letters*, vol. 23, no. 9, pp. 9026–9034.

ANALYSIS OF THE VALUE OF TAX SHIELD IN THE GLOBAL ENVIRONMENT

Lucia Michalkova^{1,a,*}, Maria Kovacova^{2,b}

¹Department of Economics, Faculty of Operation and Economics of Transport and Communications,
University of Zilina, Univerzitna 1, 010 26 Zilina, Slovakia

²Department of Economics, Faculty of Operation and Economics of Transport and Communications,
University of Zilina, Univerzitna 1, 010 26 Zilina, Slovakia

^alucia.michalkova@fpedas.uniza.sk, ^bmaria.kovacova@fpedas.uniza.sk

*Corresponding author

Abstract. The global economic environment is currently characterized by significant economic growth. This situation is favourable for the growth of enterprise value and subsequent growth in demand and supply on a global, European and domestic (Slovak) scale. Investors in the international capital market finance their investment projects by equity and, in particular, debt, due to the current European cheap money policy. The value of investment projects (enterprises) financed by debt is higher due to the tax benefit of debt - tax shield. The existence of a tax shield is reflected, in addition to the company value, in both gross and net income and profitability ratios. International research lasting more than fifty years has provided several dozen methods, approaches and models to quantify the value (present value) of the tax shield or interest tax shield. The aim of this paper is to classify, compare and analyse selected methods of quantifying the value of the tax shield as a cash flow and to determine which of these methods are applicable globally and which models are subject to specific conditions. Fernandez (2006) algorithm was chosen as a suitable comparison procedure. In the end of the analysis, some of the advantages and drawbacks of generally applicable models, and the ways to solve these problems, such as the Circularity problem, are described.

Keywords: valuation, tax shield, corporate finance, debt

JEL Classification: G12, G31, G32, H43, F65

1. Introduction

The global economy has been rising in recent years, unemployment is at one of the lowest levels, and wages are also rising. A decline in interest rates, which increases overall consumption, also contributes to positive developments. This economic situation encourages investors (individual as well as corporate) to carry out more demanding investment projects. These investments can be financed through equity or debt; current extremely low interest rates put the debt to the fore. The existence of a tax advantage of interest is another reason for the pre-financing of debt financing. This is called tax shield and it is one of the forms of tax optimization.

The investment process is associated with project appraisal and the choice of a fair valuation method is an essential requirement. Since the creation of the Modigliani & Miller

(1963) capital structure theory, more than twenty different tax shield valuation models have been created. Some of these models are used globally; others are used locally and / or are more or less unknown among the academic public. The aim of this paper is to classify, compare and analyse selected methods of quantifying the value of the tax shield as a cash flow and to determine which of these methods are applicable globally and which models are subject to specific conditions.

As it was mentioned above, the first impulse for different approaches to quantification of tax shields was the theory of Modigliani and Miller (1963), abbreviated to *MM* model; company value increases due to the growth of corporate leverage. This newly created value arises from the tax deductibility of interest expense and represents the value of tax shield. According to the assumptions of the model the company can borrow and lend money on perfect capital markets at risk-free rate and market value of debt is constant. For this reason, tax saving (tax shield) is risk-free and the appropriate discount rate for valuing the present value is risk-free interest rate r_f .

Similarly to the Modigliani and Miller model (1963), the other models mentioned below assume that the value of the debt is fixed and does not change over a given period. Myers (1977) and similarly Ruback (2002) assumed that both the tax shield and the debt are equally risky, therefore they are discounted at the cost of debt k_D . Kaplan and Ruback (1995), on the other hand, assume that both the interest tax shield and the company's cash flow share the same systematic risk; both components of the company value (project value) are discounted at the same discount rate, cost of unlevered company (k_U).

Real debt policy is based on the assumption of a certain fixed debt ratio. The Miles and Ezzell (1985) model, in which it assumed that the value of debt is known only in the first period, while the cash flow is deterministic. The tax shield is also deterministic in the first period and in other periods is stochastic. The cost of debt is appropriate discount rate for the first year; in subsequent years, it is unlevered cost of equity. The Harris and Pringle (1985) model is based on the previous model, and the company follows a financial strategy that maintains the constant leverage ratio. According to the authors, the tax shield has a random nature over time and it should be discounted at unlevered cost of equity. Damodaran (2006) did not mention the formula for the value of tax shield, but Fernandez (2007) derived, according to the Damodaran equation (30). On the other hand, Liu (2008) suggested to divide the value of tax shield into two parts: *earned tax shield* and *unearned tax shield* depending on whether the interest rate is higher or lower than *ROI* (return on investment). The author himself noted that his theory is inconsistent with other approaches.

Fernandez (2004, A) argued that the company debt policy is irrelevant and the value of tax shields is only the difference between the present value of taxes for the unlevered company and the present value for the levered company. Cooper and Nyborg (2006) or Fieten et al. (2005) also argued that Fernandez (2004, A) model is based on the combination of two different approaches and the value of tax shield is identical to the Harris and Pringle model in the case of perpetuity. Thus Fernandez in his studies (2004, B) and (2005) modified the original model. He found that the value of tax shield should depend only on the nature of the stochastic process of the net increase of debt and should not depend on the nature of the stochastic process of the free cash flow. The issue is to estimate the present value of net increase of debt which requires estimating the appropriate discount rate.

On the other hand, there are tax shield models based on the book value of the debt. Unlike previous models, they can be applied to the valuation of non-listed companies from emerging markets. Fernandez (2007), in his model, assumed that the company set its debt policy on the basis of target book leverage. Marciniak (2003) suggested *decomposition method* for business valuation. In comparison with other models, this method uses the book value of debt and all cash flows are discounted at the same discount rate (cost of the unlevered equity rather than the weighted average cost of capital), which prevents the formation of circularity problem. In addition to the models mentioned Velez-Pareja (2013) also examined the value of interest tax shield and assumed the book value of the debt. He found that the tax shield is a function of pre-tax profit and interest.

2. Methods

This chapter is aimed at describing methods used to investigate the value of tax shields in emerging markets. Formulae of selected models mentioned in the previous chapter are shown in Table 1.

Table 1: Formulae of tax shield valuation models

Author	Formula
Modigliani a Miller (1963)	$PV(TS) = TD$
Myers (1977)	$PV(TS) = \frac{Tk_d D_{i-1}}{k_d}$
Miles a Ezzell (1985)	$PV(TS) = \frac{1 + k_u}{1 + k_d} \frac{Tk_d D_{t-1}}{k_u}$
Harris a Pringle (1985)	$PV(TS) = \frac{Tk_d D_{i-1}}{k_u}$
Marciniak (2003)	$PV(TS) = \frac{k_d BT}{k_e}$
Fernandez (2005)	$VTS = T \times D_0 + T \times PV[\Delta D]$
Cooper & Nyborg (2006)	$VTS = \frac{Tk_D D}{k_U - g}$
	$VTS = \frac{Tk_D D}{k_D - g}$
Damodaran (2006) ¹⁴	$PV(TS) = \frac{(k_U DT - (k_D - r_f)D(1 - T))}{k_U}$
Practioner's method ¹⁵	$PV(TS) = \frac{(k_D DT - (k_D - r_f)D)}{k_U}$
Fernandez (2007)	$VTS^{BV} = \frac{Tk_U B}{k_U - g}$
Liu (2008)	$\text{Tax shield capacity} = \frac{r_f}{ROI} TD + \left(1 - \frac{r_f}{ROI}\right) TD$

¹⁴derived in Fernandez (2007)

¹⁵derived in Fernandez (2007)

Author	Formula
Velez-Pareja (2013)	$TS = \text{Max}(T \times \text{Min}(\text{EBIT} + \text{OI}, \text{FE}), 0)$

Cost of capital was quantified according to the Damodaran methodology (Valaskova & Gregova, 2017). In the non-traded business environment, information on market values of equity and debt is not available. This criterion would eliminate almost all models of the value of the tax shield except a small set of models based on the book value of debt. In the case of this analysis, however, it is assumed that market and book values are equal; Fernandez (2006) also mentions this possibility. Return on investment (ROI) is quantified as the average annual return on assets. Growth of the enterprise is calculated similarly: as the average annual growth rate of sales over the reference period. In Table 1, the discount factor is not in the Velez-Pareja (2013) model. Velez-Pareja (2010) suggested the discount rate includes both market risk and default risk as follows

$$\psi = W_{dr}K_D + W_{EBIT+OI}K_U \quad (1)$$

The weight W_{dr} represents the share of enterprises that have gone bankrupt (dying) to the total number of enterprises in Slovakia in 2016; on the contrary, the weight $W_{EBIT+OI}$ is the share of enterprises that did not bankrupt to the total number of enterprises in the given period. Data were collected from the Eurostat database (2018).

Fernandez (2006) worked on the existence of so-called "cost of leverage" in analysing models of value of tax shield. This cost is an approximation and risk exposure of the debt versus risk-free debt or equity financing. The author expressed the hypothesis that if this cost does not exist, the value of tax shield (the present value of tax shield) is equal to the maximum value of the interest tax shield, i.e. value according to Modigliani & Miller (1963). Conversely, if this cost exists, which is real in the imperfect markets, the value of tax shield is lower than the product of the value of debt and corporate tax rate. Fernandez also sets the second condition for analysis, namely the theoretical absence of taxes. This means that in a hypothetical country, businesses may not be taxed at corporate level, but risk and cost of leverage may still be present. Therefore, the value of tax shield for zero taxation and cost of leverage is less than zero; if there is no cost of leverage, the value of tax shield is zero. Clearly, these conditions are written in Table 2.

Table 2: Necessary conditions of the analysis

Necessary conditions	Leverage costs $\neq 0$	Leverage costs = 0
Corporate tax > 0	$< DT$	$=DT$
Corporate tax = 0	< 0	$= 0$

Source: adapted from Fernandez (2007)

3. Results and Discussion

The first step of this analysis was the calculation of input variables. The financial information from the financial statements of one Slovak enterprise from 2010-2016 was used for their calculation. According to Velez-Pareja (2010), the information needed for the calculation of the discount rates was drawn from Eurostat. These input data are shown in Table 3.

Table 3: Input data for analysis

Variable	Input data	Variable	Input data
Interest-bearing debt in time t-1	62 502 (Eur)	Average company growth	5,283%
Interest-bearing debt in time t	26 263 (Eur)	\overline{ROI}	1,061%
Corporate tax rate	22%	EBIT + OI	19 611 (Eur)
Riskless interest rate	0,544%	Interest paid	1 950 (Eur)
Cost of debt	7,425%	W_{dr}	2,446%
Unlevered cost of equity	13,941%	$W_{EBIT+OI}$	97,554%
Levered cost of equity	18,017%		

Subsequently, the present values of tax shield were calculated according to the different approaches presented in Table 1. The Fernandez (2005) model is the most complex and this calculation varies according to the nature of stochastic process of the net increase of debt. These are five cases: perpetual debt, debt of one year maturity but perpetually rolled-over, debt is proportional to the equity value, the debt is proportional to free cash flow and the company is expected to repay the current debt without issuing new debt. In addition, Cooper & Nyborg (2006) described two extensions of the existing models: Modigliani & Miller (1963) and Milles & Ezzell (1985) with the assumption of growth. The analysis of the first Fernandez condition (the existence of cost of leverage) is shown in Table 4.

Table 4: Analysis of the first Fernandez condition

Model used	Company value of tax shield (EUR)	Fernandez findings	Validity in emerging markets	Author's findings
Modigliani & Miller (1963)	13 750,44	= DT	yes	-
Myers (1977)	13 750,44	= DT	yes	-
Milles & Ezzell (1985)	7 767, 43	< DT	yes	-
Harris & Pringle (1985)	7 323, 19	< DT	yes	-
Marciniak (2003)	5 666, 49	-	-	< DT
Fernandez (2005) – perpetual debt	13 750,44	= DT	yes	-
Fernandez (2005) – debt of one year maturity but perpetually rolled-over	13 750,44	= DT	yes	-
Fernandez (2005) – debt is proportional to the equity value	2 323,03	< DT	yes	-
Fernandez (2005) – the debt is proportional to free cash flow	13 750,44	= DT	yes	-
Fernandez (2005) – and the company is expected to repay the current debt without issuing new debt	13 750, 44	= DT	yes	-
Cooper & Nyborg (2006) – ME with growth	11 791,98	-	-	< MM with growth
Cooper & Nyborg (2006) – MM with growth	47 673, 72	-	-	= MM with growth
Damodaran (2006)	-10 311,30	< DT	yes	-
Practitioner's method	-23 525,20	< DT	yes	-
Fernandez (2007) – book	22 141, 28	-	-	< MM

Model used	Company value of tax shield (EUR)	Fernandez findings	Validity in emerging markets	Author's findings
value of debt				with growth
Liu (2008) – earned tax shield	7 044,35	-	-	< DT
Liu (2008) – unearned tax shield	6 706,09	-	-	-
Liu (2008) – capacity of tax shield	13 750,44	-	-	= DT
Velez-Pareja (2013)	3112,75	-	-	< DT

The benchmark was the value of the tax shield by Modigliani and Miller (1963). If the value of the tax shield is lower than the benchmark, the model is appropriate for perpetuity in the imperfect (real) market. These models are bold in Table 4. This condition meets eight models altogether. Cooper and Nyborg model (extended model MM) is a benchmark for models with the assumption of business growth. This condition is met by both models presented.

The second Fernandez condition (no corporation tax, cost of leverage) was tested as presented in Table 5.

Table 5: Analysis of the second Fernandez condition

Model used	Company value of tax shield (EUR)	Fernandez findings	Validity in emerging markets	Author's findings
Modigliani & Miller (1963)	0	= 0	yes	-
Myers (1977)	0	= 0	yes	-
Milles & Ezzell (1985)	0	= 0	yes	-
Harris & Pringle (1985)	0	= 0	yes	-
Marciniak (2003)	0	-	-	= 0
Fernandez (2005) – perpetual debt	0	-	-	= 0
Fernandez (2005) – debt of one year maturity but perpetually rolled-over	0	-	-	= 0
Fernandez (2005) – debt is proportional to the equity value	- 11 427,40	-	-	< 0
Fernandez (2005) – the debt is proportional to free cash flow	0	-	-	= 0
Fernandez (2005) – and the company is expected to repay the current debt without issuing new debt	0	-	-	= 0
Cooper & Nyborg (2006) – ME with growth	0	-	-	= 0
Cooper & Nyborg (2006) – MM with growth	0	-	-	= 0
Damodaran (2006)	-30 848,40	< 0	yes	-
Practitioner's method	-30 848,40	< 0	yes	-
Fernandez (2007) – book value of debt	0	-	-	= 0
Liu (2008) – earned tax	0	-	-	= 0

Model used	Company value of tax shield (EUR)	Fernandez findings	Validity in emerging markets	Author's findings
shield				
Liu (2008) – unearned tax shield	0	-	-	-
Liu (2008) – capacity of tax shield	0	-	-	-
Velez-Pareja (2013)	0	-	-	= 0

According to Table 5, the second condition only meets three models; they are marked in bold. On the contrary, the condition of the absence of any taxes and cost of leverage meets seven models. Overall, the analysis shows that both conditions were met only in two cases: Damodaran model and Practioner's method. In theory, just these two models are suitable for the valuation of the present value of the tax shield.

Nevertheless, these conclusions are influenced by the Fernandez definition of the value of the tax shield, which has been questioned, Cooper & Nyborg (2006). For this reason, the conclusions of the analysis have been reassessed. It can be concluded that models that quantify the present value of the tax shield as the product of the debt and the corporate tax rate are appropriate under the assumption of relatively stable economic conditions in the reference period. The second prerequisite for application is a short assessment period, for example, for the valuation of short to medium-term investment projects. By contrast, models that assume the value of a tax shield lower than the product of the debt and the corporate tax rate include risk. They are therefore a more appropriate alternative for long-term investment projects. In this context, we can highlight the Velez-Pareja (2013) model, which has the lowest perpetual value, but has taken into account both the types of risk, i.e. the operational risk and the risk of bankruptcy. The only problematic point is the weighting of both types of cost of capital, as the author himself offers several ways of quantification.

In addition to the previous criteria, it is possible to evaluate tax shield models according to other factors. The first is the issue of cost of capital that are subject to the Circularity problem. One of the options is quantification of the target market capital structure through the iterative process. This method is described, for example, in Mařík (2011). In practice, non-traded companies quantified WACC as well as levered cost of equity on the basis of book values. As Mařík & Maříková (2015) points out, this method is easier, but it creates errors in valuation. The models examined in this paper may be considered suitable for businesses in emerging markets because they are not subject to the circularity problem. Only Marciniak model is burdened with this error if levered cost of equity is estimated based on book values. On the other hand, this model also includes a systematic risk and it is therefore appropriate to remove the error caused by the circularity problem when valuing a business (investment project).

4. Conclusion

In this paper several methods of quantifying the value of the interest tax shield was examined. Fernandez (2006) procedure was used; it was found that only two of the models analysed meet the required conditions: Damodaran (2006) model and Practioner's method. The findings of this analysis divided the models of the present value of the tax shield into two categories: those that are appropriate for short-term investment projects and / or stable

economic conditions and these one that are appropriate for long-term risk investment projects (business valuation).

Moreover, it can be concluded that in terms of emerging markets all models are applicable in theory, but the methods of the carrying amount of the debt are more suitable variant. Methods primarily based on the market value of debt allow you to replace unknown market value with the book value; but the possibility of mistaken evaluation needs to be taken into account. That error, the circularity problem is removable through an iterative process for estimating the cost of capital. At the same time, a wider range of methods makes it possible to better estimate the value of the tax shield and adapt the estimate to specific business and / or macroeconomic conditions. As Copeland et al. (2000, p. 309) mentioned: *We leave it to the reader's judgment to decide which approach best fits his or her situation.*

Acknowledgment

This paper is an output of the science project VEGA 1/0428/17 CREATION OF NEW PARADIGMS OF FINANCIAL MANAGEMENT AT THE THRESHOLD OF THE 21ST CENTURY IN CONDITIONS OF THE SLOVAK REPUBLIC.

References

- [1] Cooper, I.A. and Nyborg K.G. (2006). The value of tax shields IS equal to the present value of tax shields. *Journal of Financial Economics*, vol.81, no.1, pp.215-225.
- [2] Copeland, T.E., Koller T. and Murrin, J. (2000). *Valuation: Measuring and Managing the Value of Companies*, 3rded. New York: John Wiley & Sons.
- [3] Damodaran, A. (2006). *Damodaran on Valuation: Security Analysis for Investment and Corporate Finance*. 2nd ed. New York: John Wiley & Sons.
- [4] Eurostat. Business demography main variables - NACE Rev. 2 [Online]. Available: <http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tin00170&plugin=1>>.
- [5] Fernandez, P. (2004, A). The value of tax shield is NOT equal to the present value of tax shields. *Journal of Financial Economics*, vol.73, pp. 145-165.
- [6] Fernandez, P. (2004, B). The value of tax shields and the risk of the net increase of debt (Working Paper No. 544). [Online]. Available: <https://ssrn.com/abstract=506005>.
- [7] Fernandez, P. (2005). The value of tax shields is not equal to the present value of tax shields: A correction (Working Paper No. 581). [Online]. Available: <https://ssrn.com/abstract=651206>.
- [8] Fernandez, P. (2006). The correct value of tax shields: an analysis of 23 theories. (Working Paper No. 628). [Online]. Available: <https://www.iese.edu/research/pdfs/DI-0628-E.pdf>
- [9] Fernandez, P. (2007). A more realistic valuation: Adjusted Present Value and WACC with constant book leverage ratio. *Journal of Applied Finance*, vol. 17, no. 2, pp. 13-20.
- [10] Fieten, P., Kruschwitz, L., Laitenberger, J., Löffler, A., Tham, J., Velez-Pareja, I. and Wonder, N. (2005). "Comment on "The value of tax shields is NOT equal to the present

- value of tax shields". *The Quarterly Review of Economics and Finance*, vol. 45, no. 1, pp. 184-187.
- [11] Harris, R.S. and Pringle, J.J. (1985). Risk-adjusted discount rates – extensions from the average-risk case. *The Journal of Financial Research*. vol. 8, no.3, pp. 237-244.
- [12] Kaplan, S.N. and Ruback, R.S. (1995). The Valuation of Cash Flow Forecasts: An Empirical Analysis. *Journal of Finance*, vol. 50, no. 4, pp. 1059-1093.
- [13] Liu, Y. (2009). The slicing approach to valuing tax shields. *Journal of Banking & Finance*, vol. 33, pp. 1069-1078.
- [14] Luehrman, T.A. (1997). Using APV: A better tool for valuing operations. *Harvard business review*, vol. 75, pp. 145-154.
- [15] Marciniak, Z. (2003). Wykorzystanie zróżnicowanych stóp kosztu kapitału do wyceny przedsiębiorstw i oceny projektów inwestycyjnych. *Proceedings of Efekty w nośzastosowań systemów informatycznych 2003*, Warszawa, Poland, pp. 63-92.
- [16] Mařík, M. (2011). *Metody oceňování podniku pro pokročilé*, Praha: Ekopress.
- [17] Mařík, M. and Maříková, P. (2015). Kapitálová struktura - problém výnosového ocenění podniku. *Ekonomický časopis*, vol. 63, no. 3, pp. 259-277.
- [18] Miles, J.A. and Ezzell, J.R. (1985). Reformulating tax shield valuation: A note. *Journal of Finance*, vol. 40, pp. 1485-1492.
- [19] Modigliani F. and Miller M.H. (1963). Corporate income taxes and the cost of capital. A correction. *The American Economic Review*, vol. 53, no. 3, pp. 433-443.
- [20] Myers, S.C. (1974). Interactions of corporate financing and investment decisions - Implications for capital budgeting. *Journal of Finance*, vol. 29, no. 1, pp. 1-25.
- [21] Ruback, R.S. (2002). Capital cash flows: A simple approach to valuing risky cash flows, *Financial Management*, vol. 31, no. 2, pp. 85-103.
- [22] Valaskova, K. and Gregova, E. (2017). Modelling of costs of capital in Slovak enterprises. *Ekonomicko-manazerske spektrum*, vol. 11, no. 2, pp. 76-89.
- [23] Velez - Pareja, I. (2013). Return to Basics: Are You Properly Calculating Tax Shields? *Análisis Financiero*, vol. 122, pp. 6-17.
- [24] Velez-Pareja, I. (2010). Risky Tax Shields: An Exploratory Study. *Cuadernos de Administración*, vol. 23, no. 41, pp. 213-235.

VAT CONTROL STATEMENT GLOBAL EFFECTS: CZECH REPUBLIC CASE STUDY IN RELATIVE COMPARISON TO SLOVAKIA

Lukáš Moravec^{1,a,*}, Jana Hinke^{2,b}, Gabriela Kukalová^{3,c} and Jana Myslivcová^{4,d}

^{1,3,4}Czech University of Life Sciences Prague, Faculty of Economics and Management, Department of
Trade and Accounting, Kamýcká 129, Praha 6 – Suchbátka, 165 21, Czech Republic

²University of West Bohemia, Faculty of Economics, Department of Finance and Accounting,
Univerzitní 22, Plzeň, 306 14, Czech Republic

^amoravec@pef.czu.cz, ^bhinke@kfu.zcu.cz, ^ckukalova@pef.czu.cz, ^dxmysj002@studenti.czu.cz

*Corresponding author

Abstract. The Value Added Tax Control Statement is a strong tool of Value Added Tax carousel frauds elimination from the state point of view nevertheless a potentially costs consuming arrangement from the taxpayers' point of view. The presented study estimates the effects of the Value Added Tax Control Statement implementation in the Czech and Slovak Republic under the global conditions set by the EU rules. The paper focuses on the Value Added Tax Control Statement influence on the tax subjects on one hand; and it aims at the impact of the Value Added Tax Control Statement on the Czech state budget respecting the potential changes in Value Added Tax revenues and the Czech Value Added Tax administration costs, potentially influenced by the Value Added Tax Control Statement application in the Czech Republic, on the other hand. The complex analyses covers also the selected Czech Value Added Tax taxpayers' questionnaire survey covering the issue of the Value Added Tax Control Statement implementation administrative costs of the commercial sector. The article aims at the international comparison of Value Added Tax Control Statement implementation global effects in the Czech and Slovak Republic consequently. The differences between technical and legal approaches in the Czech and Slovak Republic are described and evaluated in the paper based on the international comparison. The used data are obtained particularly from the annual reports issued by the Czech and Slovak Financial Administrations and complemented by the data gained from the Customs Administration annual reports.

Keywords: tax administration, VAT control statement, international tax frauds, Czech Republic, Slovak Republic

JEL Classification: H21, H26, H83, M48, D23

1. Introduction

První impuls k zavedení kontrolního hlášení daně z přidané hodnoty v České republice se objevil po volbách do Poslanecké sněmovny Parlamentu ČR konaných v říjnu roku 2013, a to v Koaliční smlouvě uzavřené mezi politickými stranami ČSSD, KDU-ČSL a hnutím ANO 2011 na volební období 2013-2017 (Vláda ČR, 2014). V této smlouvě se uvedení koaliční partneři zavázali mimo jiné navrhnout daňové předpisy vedoucí ke zlepšení výběru daní a

minimalizaci daňových úniků na DPH, což by zvýšilo konkurenceschopnost ČR vůči ostatním státům (Babiš, A. et al., 2013). Cílem kontrolního hlášení je (ať již v ČR, či na Slovensku) získat podrobné informace o významných plněních plátců v reálném čase, čímž se zachytí rizikové obchody, které by mohly mít za následek neoprávněné čerpání nadměrného odpočtu. Na základě tohoto zjištění může správce daně (prakticky okamžitě) zahájit kontrolu, a to ještě před odesláním nadměrného odpočtu zúčastněnému plátcí.

Zavedení kontrolního k DPH na Slovensku předcházela odhad ztráty příjmu z této daně za rok 2010 ve výši 2,3 miliard Euro Inštitútem finančnej politiky MF SR v březnu roku 2012 (IFP MF SK, 2012). Slovenská vláda považovala za nezbytné účinně a systematicky bojovat proti daňovým únikům a podvodům, proto v květnu 2012 schválila usnesení č. 235/2012 „Akční plán boja proti daňovým podvodom na roky 2012-2016“ (Rokovania vlády, 2012). Tento plán je souborem padesáti opatření, mezi nimiž je také zavedení kontrolního výkazu k DPH.

Přes společný cíl zamezit daňovým podvodům existuje předpoklad, že veškeré aspekty související s kontrolním hlášením mezi ČR a SR nejsou harmonizovány. Tento příspěvek si klade za cíl provést komparaci základních aspektů kontrolního hlášení mezi Českou a Slovenskou republikou a dále prostřednictvím dotazníkového šetření zjistit náklady na zavedení a běžné provozní náklady, které musí podnikatelská praxe vynaložit na vyhotovení kontrolního hlášení v ČR.

2. Metody a zdroje

Za účelem zpracování tohoto příspěvku byla použita metoda Desk research založená na komparační analýze legislativních předpisů a formulářů kontrolního hlášení, ale také sekundárních zdrojů, které o dané problematice pojednávají.

V rámci tématu kontrolního hlášení autoři nejprve zjišťovali, jaké vědecké práce byly v oblasti vztahu daně z přidané hodnoty a globalizace provedeny do současnosti. Komparace zdrojů uvedených ve vědeckých databázích Web of Science a Scopus prezentuje následující tabulka:

Table 1: Vědecké práce na téma kontrolní hlášení a harmonizace v rámci daně z přidané hodnoty

Autor	Studijní oblast	Druh výzkumu	Cíl
Semerad, P., Radvan, M. & Bartunkova, L., 2016	Problematické aspekty kontrolního hlášení	Desk research	Identifikace účinků sankcí, kvantifikace dodatečných administrativních a finančních nákladů
Semerad, P. & Bartunkova, L., 2016	Kontrolní hlášení jako řešení daňového úniku v České republice	Desk research	Identifikovat dopad zavedení kontrolního hlášení na daňové subjekty patřící do kategorie malých a středních podniků (MSP), jakož i dopad na příjmovou část národního rozpočtu ČR
Hajduchova, I., Sedliacikova, M. & Vízslai, I., 2015	Náklady související se správou a kontrolou zdanění ve Slovenské republice	Komparační analýza	Analyzovat dopad DPH na výdaje a příjmy státního rozpočtu ve Slovenské republice, vyčíslit náklady související se správou a kontrolou zdanění a následně vyhodnotit účinnost DPH ve vztahu ke státnímu rozpočtu
Martins, A. & Sa, C., 2018	Výpočet zdanitelných příjmů, pokud účetní	Desk research	Definovat a kvantifikovat chyby, které činí účetní výkazy nevhodné pro

	čísla nejsou spolehlivá		posouzení výkonnosti podniků a výpočet zdanitelného příjmu. Dále zkoumat praktické uplatňování předpokládaných daňových konceptů portugalskými soudy a navrhnout kritéria, která mohou fungovat jako směrnice pro firmy a daňové audity.
Bostan, I., Popescu, C., Istrate, C. & et al., 2017	Vlivy působící na výběr DPH u domácích transakcí	Desk research	Odhadnout vliv změny sazeb DPH na stupeň inkasa DPH, otestovat vliv elektronických prvků na výběr DPH nebo na fiskální efektivitu.
Salari, L., Saraji, M. & Jafari, M., 2017	Vztah mezi správou a řízením daně z přidané hodnoty	Korelační analýza	Analyzovat vztah mezi řízením společností a daní z přidané hodnoty na telekomunikační společnosti
Bruna, I. & Pouha, J., 2016	Daňová kontrola v Lotyšsku v oblasti DPH	Desk research	Analyzovat, jak se v lotyšské daňové správě shromažďují důkazy během daňového auditu a na jakých základech se vyvozují závěry pro následný daňový audit na poli DPH
Zidkova, H. & Pavel, J., 2016	Možné faktory, které ovlivňují rozdíl mezi daní z přidané hodnoty	Regresní panely a modely sdružené regrese	Identifikovat statisticky významné proměnné, které mají dopad na rozdíl v teoretické výši a skutečně vybrané výši DPH
Moravec, L., Hinke, J. & Kanka, S., 2018	Stanovení mezery DPH – případ České republiky	Metoda tabulek dodávek a užití, metoda očišťování HDP	Kvantifikovat odhad mezery daně z přidané hodnoty v ČR v období 2007 až 2014
Banociova, A., Jakubikova, E. & Mihokova, L., 2015	Efektivnost daňových kontrol a inkasa DPH ve Slovenské republice	Desk research	Zhodnotit efektivnost metod zjišťování podvodů (místní vyšetřování, daňová kontrola, zveřejňování informací a jejich obdržení od ostatních státních orgánů)
Kislyi, A., Stetsiuk, B. & Kovalenko, I., 2018	Zahraniční a národní zkušenosti Ukrajiny při správě DPH	Komparativní analýza	Provést komparativní analýzu zahraničních a národních zkušeností při správě daně z přidané hodnoty

Source: vlastní zpracování, 2018

Z výše uvedené tabulky je patrné, že konkrétní téma kontrolního hlášení je problematikou pouze českých autorů. Administrativní zátěží spjatou s výběrem daní, resp. daně z přidané hodnoty se však zabývá řada zahraničních autorů. Z výzkumných metod převažují explanační – obecně teoretické metody analýz.

3. Výsledky a diskuse

3.1 Komparace aspektů kontrolního hlášení ČR s kontrolním výkazem SR

Za účelem dosažení cíle bude nejprve provedena analýza základních prvků souvisejících s užíváním kontrolního hlášení ČR/kontrolního výkazu SR:

Table 2: Komparace základních prvků vyplývající z užívání kontrolního hlášení ČR resp. kontrolního výkazu SR

Prvek	Charakteristika v ČR	Charakteristika v SR
Podání hlášení/výkazu	Pouze elektronicky: <ul style="list-style-type: none"> - prostřednictvím datové schránky, - elektronicky se zaručeným el. podpisem, - elektronicky bez zaručeného el. podpisu 	Pouze elektronicky: <ul style="list-style-type: none"> - prostřednictvím portálu finanční správy nebo v aplikaci eDaně po autorizaci prokazující oprávnění jednat jménem plátce. - Po vygenerování ve svém IS prostřednictvím elektronické podatelny Finančního ředitelství SR se zaručeným el. podpisem
Informační systémy	Většina tvůrců IS doplnila: <ul style="list-style-type: none"> - samotný modul hlášení, - typy plnění (podle struktury hlášení, a to v knize přijatých faktur) 	Většina tvůrců IS doplnila: <ul style="list-style-type: none"> - samotný modul hlášení, - typy plnění (podle struktury hlášení, a to v knize přijatých faktur), - datum dodání (uváděné do kontrolního výkazu shodně jako v ČR)
Aplikace elektronického podání pro finanční správu	Finanční správa ČR vytvořila speciální formulář „Kontrolní hlášení DPH platný od 1. 1. 2016, do kterého je možné zapisovat prvotní doklady přímo do příslušných oddílů, nebo lze použít funkci „Načtení souboru“. Po vyplnění všech oddílů je možné provést v aplikaci ADIS/EPO kontrolu formální správnosti, která zobrazí přípustné či nepřípustné chyby. Dále lze vytvořit tiskovou sestavu ve formátu pdf.	Finanční správa SR vytvořila speciální formulář „Kontrolný výkaz daň z pridanej hodnoty“, do kterého může plátce zapisovat prvotní doklady přímo, nebo může použít funkci „Načtení souboru“. Aplikace podání je velmi podobná způsobu ČR.
Struktura hlášení/výkazu	Jednotlivá plnění jsou rozdělena do 5 sekcí s označením A, do tří sekcí s označením B a oddíl C, který slouží pro kontrolu návaznosti na daňové přiznání k DPH.	Oddíl A je rozdělen pouze do dvou částí, oddíl B do tří částí a oddíl C slouží k zaznamenání opravných dokladů (jedná se o dobropisy a vrubopisy k původním daňovým dokladům). Dále existuje oddíl D, kde se uvádějí tržby evidované prostřednictvím el. Registračních pokladem a další (v jiných oddílech neevidované doklady). Po vyplnění všech oddílů je rovněž provést kontrolu formální správnosti a vytvořit tiskovou sestavu ve formátu Huml, resp. xml.
Hranice plnění pro rozdělení do oddílů	Plnění jsou rozdělována dle jednoho finančního limitu: 10 000 Kč včetně DPH.	Plnění jsou rozdělována v jednotlivých oddílech podle několika limitů: Do 100 EUR včetně DPH (oddíl A.1 a B.2) Do 1000 EUR včetně DPH (oddíl A.1 a B.2) Do 1600 EUR včetně DPH (oddíl A.1 a B.2) Nad 5000 EUR včetně DPH (oddíl A.2 a B1)

		Do 3000 EUR odpočitatelné daně (oddíl B.3)
Lhůta pro podání hlášení/výkazu	25 dnů od skončení zdaňovacího období (lhůta pro právnické osoby je vždy po skončení měsíce)	25 dnů od skončení zdaňovacího období (měsíce či čtvrtletí)
Maximální výše sankce	Do 500 tis. Kč	Do 100 tis. EUR

Source: vlastní zpracování, 2018

Z výše uvedené komparační tabulky vyplývá, že oba výkazy mají podobnou koncepci i způsob podání. V rámci analýzy výkazů autoři identifikovali, že na Slovensku jsou zvýhodněna plnění, která jsou zaplacená prostřednictvím elektronické registrační pokladny nebo jinými platebními prostředky výší, od které je povinnost evidovat po jednotlivých dokladech a plátcích oproti fakturám, kde je částka povinnosti evidovat podle jednotlivých dokladů a plátců podstatně nižší. Tato skutečnost může plátce motivovat k vyššímu využití okamžitých plateb a tím může docházet k redukci druhotné platební neschopnosti. Úhrada dokladů není v České republice nijak zohledněna.

Významnou odlišnost autoři shledávají v množství používaných finančních limitů (v případě kontrolního výkazu SR) a dále ve výši sankcí. V České republice jsou sankce přesně odstupňovány zákonem podle druhu prohřešku, na Slovensku jsou stanoveny až do určité výše, kterou určuje správce daně podle okolností prohřešku. Problematika sankcí je neustále předmětem kritiky, neboť jejich výše je podnikovou praxí ČR i SR shodně označována za přemrštěnou až likvidační. Po přepočtu maximální výše sankce v SR na Kč je zřejmé, že vykazuje pětikrát vyšší hodnoty než v ČR.

3.2 Výsledky dotazníkového šetření monitorující náklady podnikové praxe související se zavedením a následnou povinností vykazovat kontrolní hlášení

Za účelem monitorování výše nákladů na zavedení a následnou povinnost pravidelně vykazovat kontrolní hlášení bylo v podnikové praxi ČR provedeno autory dotazníkové šetření, pro které bylo nejprve vytipováno 120 měsíčních plátců DPH, celkem však bylo přijato pouze 20 dotazníků, z čehož 14 bylo komplexně vyplněno. Míra návratnosti tedy činila 11,7 %. Dotazníkové šetření bylo anonymní, oslovené ekonomické subjekty měly různé předměty podnikání (např. zemědělská výroba, strojní výroba, služby, obchod). V dotazníku byly zjišťovány následující skutečnosti:

- roční obrat podniku s možností výběru rozmezí hodnot,
- počet zaměstnanců s možností výběru rozmezí hodnot,
- jednorázové náklady na zavedení kontrolního hlášení (v tis. Kč) s možností výběru rozmezí hodnot,
- běžné náklady po zavedení – v tis. Kč,
- časové náklady – resp. rozdíl mezi dobou zpracování DPH před kontrolním hlášením a po kontrolním hlášení, případné navýšení času v časových jednotkách.

Výsledky dotazníkového šetření provedeného v roce 2017 na vzorku 14 subjektů uvádí následující tabulka:

Table 3: Souhrn dat z dotazníkového šetření

Pořadové číslo respon- denta	Identifikace respondenta		Náklady (v tis. Kč)		Časové náklady na zpracování DPH (v hodinách)		Zvýšení admin. náročnosti
	Roční obrat (v tis. Kč)	Počet zaměstnanců	Jednorázové	Běžné (za měsíc)	Před kontrolním hlášením	Po zavedení kontrolního hlášení	
1	< 500	0	1-10	0,4	0,5	2,5	Ano
2	< 500	1-10	0	0	0,5	2,5	Ano
3	500 – 5 000	1-10	11-50	12	4	8	Ano
4	500 – 5 000	1-10	1-10	3	2	6	Ano
5	500 – 5 000	0	1-10	0,5	1	3	Ano
6	5 000 – 10 000	1-10	1-10	0	0,5	2,5	Ano
7	5 000 – 10 000	11-100	1-10	1,5	3	5	Ano
8	5 000 – 10 000	0	0	0	1	3	Ne
9	> 10 000	> 100	> 50	40	4	6	Ano
10	> 10 000	11-100	1-10	1	3	4	Ano
11	> 10 000	> 100	> 50	8	4	6	Ano
12	> 10 000	11-100	11-50	0	2	5	Ano
13	> 10 000	> 100	0	0	3	4	Ne
14	> 10 000	0	0	0	1	3	Ne

Source: vlastní zpracování, 2017

Dotazníkové šetření přineslo autorům zjištění, že nejvíce firem (konkrétně 6) vynaložilo na zavedení kontrolního hlášení jednorázové náklady v rozmezí mezi 1 a 10 tis. Kč, 4 firmy neměly žádné náklady, dva respondenti v rozmezí 11 až 50 tis. Kč a další dva respondenti vynaložili náklady vyšší než 50 tis. Kč. Společnosti vykazující nulovou výši jednorázových nákladů uvedly, že implementaci kontrolního hlášení měly zajištěnou v rámci aktualizace informačního systému, neboť jako zákazníci platí jednorázovou částku za implementaci všech změn a nelze tedy vyčíslit, kolik připadá právě na kontrolní hlášení. Respondenti, kteří uvedli náklady vyšší než 50 tis. Kč, používají informační systém dodaný mateřskou společností ze zahraničí.

Z uvedených dat o běžných měsíčních nákladech na provoz kontrolního hlášení je zřejmé rozmezí 0–40 tis. Kč, průměr činí 4,7 tis. Kč.

Tabulka dále ukazuje, že u všech dotazovaných respondentů se zvýšily časové náklady na zpracování DPH v průměru 1,85krát (tzn. o 85 %). V některých případech bylo nutné provést reorganizaci administrativních činností přijetím nové pracovní síly, někdy se daná záležitost obešla bez nové pracovní pozice a několik respondentů deklaruje převod časového nákladu na dodavatelskou firmu (účetní, resp. daňovou kancelář).

Jedenáct ze čtrnácti respondentů vykazuje zvýšení administrativní zátěže, přičemž důvodem je nejčastěji pořizování většího množství dat u prvotních dokladů a nutnost vícenásobné kontroly dokladů, dále pak nutnost zaškolení zaměstnanců, úprava softwaru a čas strávený komunikací se správcem daně (v případě výzev).

4. Conclusion

Motivací k zavedení kontrolního hlášení je v obou zmiňovaných zemích zlepšení výběru daní a minimalizace daňových úniků na dani z přidané hodnoty, jež se v ČR odhadují na desítky miliard korun ročně.

Kontrolní hlášení v ČR a kontrolní výkaz v SR mají společnou možnost podání pouze elektronickou formou (čímž se zrychluje sběr dat pomocí propojení stanovených identifikačních znaků) a povinnost odeslat výkazy do 25 dnů od skončení zdaňovacího období. Výrazná odlišnost je ve výši sankcí a dále v členění plnění, které se položkově uvádějí do výkazů. Slovenská republika zvýhodňuje plnění prostřednictvím elektronických registračních pokladen nebo jiných elektronických platebních prostředků, a to výší, od které je povinnost evidovat jednotlivé doklady, což může přispět ke snížení druhotné platební neschopnosti. V České republice nedochází k zohlednění okamžitě zaplacených dokladů, ovšem zase je zde mírně vyšší hranice pro jednotlivě evidované doklady.

Dotazníkové šetření ověřilo, že pro většinu plátců daně znamená zavedení kontrolního hlášení zvýšení nákladů. Významně se plátcům navýšily časové náklady související se zpracováním výkazů, což mělo za následek provedení organizačních změn. Jedná se nejen o nutnost vyhotovit uvedený výkaz, ale i shromažďovat data a kontrolovat jejich správné generování do výkazu. Finanční náklady u plátců daně se liší podle velikosti firmy a podle toho, nakolik flexibilní informační systém plátců používají. Jednorázové náklady na implementaci kontrolního hlášení byly s nejvyšší četností vyčísleny v rozmezí 1–10 tis. Kč, výše běžných měsíčních nákladů na provoz kontrolního hlášení byla stanovena ve výši 4, 7 tis. Kč.

Acknowledgment

Tento článek vznikl za podpory Interní grantové agentury (IGA) PEF ČZU v Praze, číslo projektu 20181013 – Pilotní projekt daňové laboratoře s využitím HUBRU PEF a zároveň jako dílčí výsledek projektu FEK ZČU v Plzni s označením SGS-2017-004: Finance a udržitelný rozvoj v teorii a praxi.

References

- [1] Babiš, A., Bělobrádek, P. and Sobotka, B. (October 2013). Koaliční smlouva. [Online]. Available: https://www.vlada.cz/assets/media-centrum/dulezitedokumenty/koalicni_smlouva.pdf.
- [2] Banociova, A., Jakubikova, E. and Mihokova, L. (2015). Efficiency of Tax Controls and Collection of VAT in the Slovak Republic. *Proceeding of 5th Central European Conference in Regional Science (CERS)*, Kosice, Slovaia, pp. 31-40.
- [3] Bostan, I., Popescu, C., Istrate, C. and et al. (2017). The Impact of Taxation of the Domestic Economic Transactions on the VAT Collection through Electronic Fiscal Devices. *Amfiteatru Economic*, vol. 19, no. 45, pp. 581-594.
- [4] Bruna, I. and Pouha, J. (2016). Update on Tax Control Practice in Latvia in the Scope of VAT Directive 2006/112/EC. *Proceeding of 5th International Conference on Accounting, Auditing, and Taxation (ICAAT)*, Tallinn, Estonia, pp. 23-33.

- [5] Hajduchova, I., Sedliacikova, M. and Viszlai, I. (2015). Value-added Tax Impact on the State Budget Expenditures and Incomes. *Proceeding of 9th International Scientific Conference on Business Economics and Management (BEM)*, Izmir, Turkey, pp. 676-681.
- [6] Inštitút finančnej politiky (2012). Odhad straty príjmov z dane z pridanej hodnoty. [Online]. Available: [http:// www.finance.gov.sk/Components/CategoryDocuments/s_LoadDocument.aspx?categoryId=8181&documentId=7171](http://www.finance.gov.sk/Components/CategoryDocuments/s_LoadDocument.aspx?categoryId=8181&documentId=7171).
- [7] Kislyi, A., Stetsiuk, B. and Kovalenko, I. (2018). Comparative Analysis of Foreign and National Experience of Ukraine in Administration of Value Added Tax. *Baltic Journal of Economic Studies*, vol. 4, no. 2, pp. 301-308.
- [8] Martins, A. and Sa, C. (2018). The computation of taxable income when accounting numbers are not reliable: A note on presumptions. *International Journal of Law and Management*, vol. 60, no. 2, pp. 543-562.
- [9] Moravec, L., Hinke, J. and Kaňka, S. (2018). Stanovení mezery DPH – případ České republiky. *Politická ekonomie*, vol. 66, no. 4, pp. 450-472.
- [10] Rokovania vlády. (2012). Rokovania vlády Slovenskej republiky. [Online]. Available: <http://www.rokovania.sk/Rokovanie.aspx/BodRokovaniaDetail?idMaterial=21072>.
- [11] Salari, L., Saraji, M. and Jafari, M. (2017). The relationship between corporate governance and value-added tax on Telecommunications Company. *International Journal of Advanced Biotechnology and Research*, vol. 8, no. 2, pp. 1029-1043.
- [12] Semerad, P. and Bartunkova, L. (2016). VAT Control Statement as a Solution to Tax Evasion in the Czech Republic. *Proceeding of 19th International Conference Enterprise and Competitive Environment (ECE)*, Brno, Czech Republic, pp. 417-423.
- [13] Semerad, P., Radvan, M. and Bartunkova, L. (2016). VAT Control Statement problematic aspects. *Proceeding of 21st International Conference on Theoretical and Practical Aspects of Public Finance 2016*, Prague, Czech Republic, pp. 90-95.
- [14] Vláda ČR. (2014). Sněmovní tisk 214/0, část č. 1/4. Poslanecká směrovna. [Online]. Available: <https://www.psp.cz/sqw/text/tiskt.sqw?O=7&CT=214&CT1=0>.
- [15] Zidkova, H. and Pavel, J. (2016). What Causes the VAT Gap? *Ekonomicky casopis*, vol. 64, no. 9, pp. 811-826.

ACCOUNTING HARMONIZATION - A CONSEQUENCE OF GLOBALIZATION AND INTERNATIONALIZATION

Myšková Renáta^{1,a,*}, Kopecká Eva², Kuběnka Michal^{3,b} and Sejkora František^{4,c}

^{1,2,3,4}University of Pardubice, Faculty of Economics and Administration, Czech Republic

^arenata.myskova@upce.cz, ^bmichal.kubenka@upce.cz, ^cfrantisek.sejkora@upce.cz

*Corresponding author

Abstract. The financial system of the market economy is currently based on a trust in accounting data. The financial statements present the entity in terms of its financial position and in terms of its performance. Its disclosure capability is as fundamental importance to its users, significant decisions are often taken with long-term consequences based on the information contained in the financial statements. The way and scope of financial accounting regulation is different at the national level, however, in the context of advancing globalization and the internationalization of capital markets, the importance of international accounting harmonization is increasing. The general accounting principles and procedures used in the various countries of the world are gradually unifying. Harmonization of accounting leads to increasing the comparability, clarity and reliability of economic information. The purpose of this contribution is to compare financial statements according to national accounting adjustments and according to IFRS, which usage is legislatively defined in the Czech Republic, also the definition of the significant differences between Czech accounting regulations and international financial reporting standards IFRS. The comparison of financial statements according to Czech accounting regulations and IFRS is made using the data of the real enterprise. Discovered differences are discussed in relation to selected indicators of financial analysis.

Keywords: accounting harmonization, financial statements, financial indicators

JEL Classification: M41, M48, K22

1. Introduction

The ongoing process of accounting standards convergence aims to unify national accounting standards of individual states into supranational approach in accounting in order to ensure the business transparency within a global environment. The quality of information stated in accounting is important for decision making by managers and other stakeholders (Myšková, 2009). Pursuant to Onaliho et al. (2017) the accounting standardisation is linked to the reduction of information asymmetry, Bassemir (2018) believes that the private companies that use IFRS have more growth opportunities. Abad et al. (2018), Neel (2017) and Beuselinck et al. (2017) add that the goal of IFRS is to increase the transparency and comparability of accounting information that should improve the information environment of these companies. It is also supported by the fact that the accounting harmonisation progresses subsequently (Honková, 2016), together with the development of European Financial Reporting Advisory Group (Van Mourik & Walton, 2018), and IFRS are evaluated also in

relation to US GAAP (Blatt & Gulbin, 2018). Pursuant to Ram & Newberry (2017) the complexity of setting of international accounting standard shall be taken in to account in rational decision-making. Pursuant to Koning et al. (2018) the transfer to IFRS was unexpected and not quite welcomed as most of nation accounting systems in the period before IFRS was considered as well adapted to local cultural and environmental characteristics of individual countries. IFRS are also critically regarded by Richard (2017) who states that the accounting system of IFRS is absolutely unsuitable for needs of new ecologic works and presents a serious threat for the development of healthy economic system. The introduction of IFRS is critically also evaluated by Pawsey (2017), from the point of view of costs related to the adaptation of financial statements and the increase of accounting operations. Sanhueza & Parada (2017) warn that there is a risk of IFRS abuse and application of creative accounting. Thus the accounting kept by IFRS has its supporters and opponents and thus this text aims to compare the financial statements based on the national Czech accounting rules and on IFRS and to evaluate the differences that incur due to differences of both systems.

2. Methods

Based on accounting systems characteristics and their comparison the important differences are defined in accounting statements, in the balance as well as in the profit and loss statement. The effect of differences is shown in the case of a specific company, including the effect on the amount of chosen financial indicators.

2.1 Comparison of financial accounts pursuant to the Czech legislation and IFRS

The financial accounting in the Czech Republic is ruled by legal regulations, binding patterns of accounting statements and defined accounting standards. Due to the harmonisation of accounting statements within the European Union some accounting units in the Czech Republic are not subject to the national accounting regulation but the Act No. 563/1991 Coll., on accounting, as amended (hereinafter as ZÚ) adapts the option, or the obligation, to keep accounts and prepare financial statements pursuant to the International Financial Reporting Standards - IFRS, see § 19a ZÚ (Act no. 563/1991). In the Czech Republic there is the Directive No. 500/2002, Coll. that serves as the implementation regulation of ZÚ for business entities and it defines implementation of some provisions of the Act on accounting, as amended, for accounting units that are entrepreneurs accounting with the system of double entry bookkeeping (hereinafter as the Directive No. 500/2002 Coll.). The Czech accounting standards for entrepreneurs (ČÚS) do not treat the financial statements as a whole but they only treat some chosen issues – for example the consolidation of financial statements (ČÚS 020) or comparability in reporting of items in the balance and the profit and loss statement (ČÚS 024). IFRS contain the Introduction, Foreword and Conceptual framework that is the base for solution of individual accounting standards and that enables to understand principles of individual IFRS standards for ensuring of accounting rules consistency. In terms of financial statements the following standards are important IAS 1 – Presentation of financial statements, IAS 7 – Statement of cash flows, IAS 8 – Accounting policies, changes in accounting estimates and errors, IAS 10 – Events after reporting period, IFRS 10 – Consolidated financial statements, IAS 27 – Consolidate and separate financial statements and others (IAS 28, IAS 31 and IFRS 3). The financial statements include: Statement on financial situation by the end of reporting period (balance), Statement on comprehensive income for the reporting period (profit and loss statement in general), Statement on changes in

equity for the reporting period, Statement of cash flow for the reporting period, Comments containing the summary of substantial accounting rules and other explanatory notes, and the Statement of financial situation until the beginning of the latest compared period provided the accounting unit applies the accounting principles retroactively or performs retroactive corrections of financial statements items or changes the items classification for financial statements. The form of statements is not strictly defined, only the minimum scope of presented data is defined.

2.2 Definition of substantial differences

In spite of prevailing effort to harmonize the accounting there are still several substantial differences between compared systems. The Czech accounting misses the document that would be equivalent to the Conceptual framework and thus the definition of assets, liabilities, costs, revenues and equity are missing and the interpretation of these terms can be different in both systems (for ex. set-up costs were shown, until 2016 in the Czech accounting, as assets even based on IFRS they have no assets features). There is also a difference in presented goals of financial statements. IFRS defines the goal of financial statements as the provision of data on financial situation, performance and changes in financial situation of accounting unit that are useful for a large scope of users who make economic decisions. ZÚ in § 7 only states that the financial statements shall be made comprehensibly and shall show true and honest image on the object of accounting and financial situation of accounting unit so that a person who uses such information can make economic decisions. The true image requires that the content of financial statements correspond to real situation and is in accordance with accounting methods. The honest image is fulfilled provided the used accounting methods lead to presentation of true data. The content of financial statements is also different: pursuant to the Czech version the balance, the profit and loss statements and the annex shall be issued, other statements are prepared only by several entities (namely business companies except for micro and small accounting units) whereas the financial statements pursuant to IFRS have strictly defined content compound of all statements (see above). The differences are also seen in the format of individual financial statements because the IFRS standards do not prescribe their format nor their factual character but the accounting pursuant to ČÚS have prescribed formats of some statements of which versions are based on the 4th Directive of the EU:

- Comparison of the balance and the statement of financial situation – pursuant to IFRS assets and liabilities can be divided in current and non-current ones, or the order by liquidity can be used. The most significant differences are in the area of non-current assets and inventory: the classification of non-current tangible property in IFRS (IAS 16) is based on a general definition of assets whereas the economic usability of assets longer than one year is important. The Czech version of accounting prescribes only the way of evaluation. Pursuant to the Czech accounting the spare parts are classified as current assets and are kept as an item of inventories whereas pursuant to IFRS standards they are non-current assets that should be depreciated. The Czech accounting also does not specify the issue of costs related to the disposal of non-current assets that are, based on IAS 16, part of purchase costs of assets, at the amount of estimated provision. According to IFRS the non-current tangible assets are estimated at initial evaluation by purchase price (IAS 16, IAS 40). After the initial statement the model of Fair Value evaluation or the model of Purchase Price can be used. Provided the accounting unit chooses one model of evaluation than, except for exceptions stated in IAS 40, it uses such model for all investments in properties.

The assets are classified based on classes in IAS 16 and use the same models as IAS 40. IFRS also require to differentiate assets that the accounting unit intends to sell, for which it actively search for a buyer and there is a great probability of selling them (IFRS 5). The Czech version accounting does not treat this issue and assets kept for the purpose of sale are shown as the non-current assets. Other visible differences are also shown in the area of non-current intangible assets, inventories or provisions.

- Comparison of the profit and loss statement and of the statement on comprehensive income – IFRS enables to prepare the statement on comprehensive income in form of one complete statement (presenting the statement of comprehensive income, including other comprehensive income statement) or in form of two statements (the statement on comprehensive income and the statement on other comprehensive income). The format is not prescribed, only the minimum content of stated information is defined. On the contrary, the Czech version of accounting prescribes the binding format of the statement with option to prepare it in type or purpose classification, with preferred type classification. In case of purpose classification, there is the obligation, pursuant to § 39 par. 8 of the Directive No. 500/2002 Coll. to state at least basic items of costs in type classification in the annex to the financial statement.
- Comparison of statements on changes in equity – according to the Czech accounting regulations it is not an obligatory part of financial statements, it is prepared only by some accounting units.
- Comparison of statements of cash flows - according to the Czech accounting regulations it is not an obligatory part of financial statements. Both systems enable the choice of direct or indirect method of statement preparation and the cash flows are shown in statements for operational, investment and financial activities. The unrealised exchange rate differences are also stated differently: in the Czech statements they are a cash flow from main activity, in IFRS they are not any cash flow.
- Comparison of the annex and comments – they both serve to amend and clarify facts stated in other financial statements, their composition is similar but the comments are more complex when compared to the annex (see for ex. IAS 1, IAS 10 or IAS 14).

2.3 Mutual concordance of Czech accounting regulations and IFRS

Since 2016 the income and costs of operational and financial activity are shown within the profit and loss statement. The use of component depreciation can be an example of both accounting systems harmonisation. It is suitable in the case when the non-current assets is compound of several parts, i.e. components that have different life time and with regard to the purchase price of the whole asset their evaluation is important. IFRS requires the component depreciation whereas in the Czech Republic it is only an option of choice. Since 2010 buildings, flats and business premises, separate movable items and sets of movable items can be depreciated with regard to the importance and the true and honest image of accounts and of the financial situation of accounting unit. This enables to equally distribute the costs load for the life time of the whole asset made of components.

2.4 Comparison of financial statements in a real company

The comparison is focused on the balance and the profit and loss statement. The company (production company) is a controlled person that is obliged to follow the publicly available consolidated financial statements of its top parent company XY. Pursuant to § 19a par. 7 ZÚ,

based on the decision of shareholders, the separate financial statements are made in accordance with IFRS and published based on the use of the option of consolidation exemption pursuant to IFRS 10 and the exemption of equivalency methods use pursuant to IAS 28. The comparison is based on data from published financial statements of the company prepared pursuant to IFRS as per the balance date 31. 12. 2015 and on internal documents provided by the company kept by accounting rules pursuant to ČÚS. The object of subsequent analysis deals only with the most important items of differences between IFRS and ČÚS. Pursuant to IFRS the company prepares its profit and loss statement under purpose classification, whereas pursuant to ČÚS it is made under type classification and that is why the transformation of statements made under ČÚS was made into the format used by the company for statements issued pursuant to IFRS. From the point of view of the balance the most important differences in assets value relate to non-current property and inventories, as for its liabilities it namely related to equity items and current as well as non-current provisions (see the Table 1).

Table 1: Balance based on IFRS and the Czech regulations

	IFRS		ČÚS	
	31. 12. 2015	31. 12. 2014	31. 12. 2015	31. 12. 2014
Assets in total	202 615	176 869	186 320	162 493
Intangible assets	24 813	25 168	8 806	11 159
Lands, structures, equipment	65 642	65 916	66 174	66 614
Equity interests in daughter companies	49	49	49	49
Equity interests in associated companies	2 352	2 352	2 352	2 352
Other non-current liabilities and financial assets	11 185	9 047	11 305	9 147
Deferred tax receivables	3 613	2 607	3 613	2 607
<i>Non-current assets</i>	<i>107 654</i>	<i>105 139</i>	<i>92 299</i>	<i>91 928</i>
Inventory	15 115	12 326	14 119	11 283
Trade receivables	11 937	11 941	11 937	11 941
Other current receivables and financial assets	5 629	4 387	5 629	4 387
Cash and cash equivalents	62 280	42 878	62 280	42 878
Assets classified as held for sale	0	198	0	0
Accrued and other assets	0	0	56	76
<i>Current assets</i>	<i>94 961</i>	<i>71 730</i>	<i>94 021</i>	<i>70 565</i>
Liabilities in total	202 615	176 869	186 320	162 493
Equity	16 709	16 709	16 709	16 709
Share premium	1 578	1 578	1 578	1 578
Retained profit of previous years	73 147	68 469	58 556	56 550
Economic result for current reporting period	30 816	18 421	28 882	15 764
Additional paid in capital	-4 768	-5 176	-4 768	-5 176
<i>Equity in total</i>	<i>117 482</i>	<i>100 001</i>	<i>100 957</i>	<i>85 425</i>
Financial and other non-current liabilities	5 744	7 898	5 744	7 898
Non-current provisions	13 197	10 509	13 267	10 569
<i>Non-current liabilities</i>	<i>18 941</i>	<i>18 407</i>	<i>18 941</i>	<i>18 407</i>
Trade payables	38 012	35 741	38 012	35 741
Financial and other current payables	10 966	10 280	10 966	10 280
Payables of due income taxes	2 375	1 559	2 375	1 559
Current provisions	14 839	10 881	14 889	10 921
<i>Current provisions</i>	<i>66 192</i>	<i>58 461</i>	<i>66 422</i>	<i>58 661</i>

Source: own comparison based on interne documents of the company

In comparison of the profit and loss statement (hereinafter VZZ) the different effect of both accounting systems in the economic result is visible, see the Table 2.

Table 2: Profit and loss statement pursuant to IFRS and to ČÚS

	IFRS		ČÚS	
	31. 12. 2015	31. 12. 2014	31. 12. 2015	31. 12. 2014
Revenues	314 897	299 318	314 897	299 318
Costs of sold products, goods and services	268 184	254 944	270 379	257 979
Selling costs	13 272	13 466	13 272	13 526
Administrative costs	7 273	6 939	7 358	7 049
Other operating revenues	18 779	5 130	18 779	5 130
Other operating costs	9 793	7 501	9 848	7 562
Operating revenue	35 154	21 598	32 779	18 332
Financial revenues	1 781	2 367	1 781	2 367
Financial costs	2 697	2 616	2 697	2 616
Financial result	-916	-249	-916	-249
Profit before taxation	34 238	21 349	31 863	18 083
Income tax	3 422	2 928	2 971	2 308
Profit after taxation	30 816	18 421	28 892	15 775

Source: own preparation based on interne documents of the company

3. Results and Discussion

Differences in definition of individual items of assets and payables and the resulting effect of their corrections to costs with regard to the amount as well as the structure are shown in the Table 3.

Table 3: Scheme of differences in stated profit pursuant to IFRS and ČÚS (in mil. CZK)

	2015	2014
IFRS – profit before taxation	34 238	21 349
ČÚS – profit before taxation	31 863	18 083
Differences:	-2 375	-3 266
- Development costs of development under own overhead costs and for own purposes	-2 000	-2 800
- Important spare parts	-10	-25
- Depreciation of company vehicles	-300	-350
- Purchase value and depreciation of non-current tangible and nontangible property	-55	-61
- Total prepayments	+20	+15
- Provision for repairs of non-current property	-30	-45

Source: own preparation based on interne documents of the company

Reasons for differences are following.

- Development costs of development under own overhead costs and for own purposes – pursuant to IFRS the costs are activated as the non-current intangible property and they are in costs through systematic depreciation that are in the profit and loss statement part of costs for sold products, goods and services. Pursuant to ČÚS the company includes such costs in costs of regular reporting period as costs of sold products, goods and services but in other sum when compared to the above stated depreciations.
- Important spare parts – pursuant to IFRS they are activated as non-current tangible property, they are included in costs again through depreciations, in the profit and loss statement they are in the item of costs and sold products, goods and services. Pursuant to ČÚS these spare parts are shown as the inventory and after leaving the stocks they are shown in costs of sold products, goods and services.

- Depreciation of company vehicles – this is a specific item in the company accounts. In IFRS these vehicles are kept as inventory with regard to the duration of use, but in case of ČÚS they are recorded as non-current property and fully depreciated.
- Purchase value and depreciation of non-current property – different point of view of accounting systems in determination of purchase price of non-current property causes the different base for depreciations for every specific property when IFRS and ČÚS are used.
- Total prepayments – accrued and other assets are used in ČÚS for costs related with launching of production (thus they do not influence the economic results), in IFRS they are accounted as costs of regular reporting period at the moment of their occurrence.
- Provision for repairs of non-current property – pursuant to ČÚS it is shown together with other provisions as the provision pursuant to specific legal regulations. Scheduled costs are shown in the profit and loss statement gradually before the performance of the repair and thus no single decrease of economic results happens as in case of IFRS.

The difference between items of financial statements pursuant to IFRS and the Czech legislation subsequently influences values of financial indicators as shown in the Table 4.

Table 4: Financial indicators

	2015		2014	
	IFRS	ČÚS	IFRS	ČÚS
Current ratio	1,435	1,416	1,227	1,203
Quick ratio	1,206	1,202	1,016	1,013
Indebtedness (Debt Ratio)	0,420	0,458	0,435	0,474
Assets turnover	2,925	3,412	2,847	3,256
Return on assets (ROA)	0,152	0,155	0,104	0,097
Return on equity (ROE)	0,262	0,286	0,184	0,185
Leverage	1,725	1,846	1,769	1,902
Working capital (in mil. CZK)	28 769	27 599	13 269	11 904

Source: own preparation

Some indicators show similar values but in case of working capital and the leverage the difference due to two accounting systems is apparent. The liquidity and the working capital influence current liabilities that are based on ČÚS higher due to the creation of provision for repairs of tangible property. The return on equity and the leverage reflect the different amount of equity. The indebtedness and return on assets is influenced by different value of assets, the difference in the turnover of fixed assets relates to the value of non-current property that is in IFRS higher due the activation of development costs.

4. Conclusion

Due to the interconnection of national economies and the operation of supranational corporation the pressure on quality and predicative value of accounting information increases. Statements made pursuant to IFRS have better predicative characteristics from the point of view of stakeholders, it makes possible the international comparison of accounting data and simplifies the entry at foreign markets. A kind of disadvantage consists in the freedom in creation of accounting statement structure because the concept of IFRS can be interpreted differently in different countries. Financial statements pursuant to the Czech legislation do not enable in full to correctly evaluate the financial situation and the performance of accounting unit without additional information but they provide sufficient data for needs of income tax determination. The choice of accounting system is reflected not only in different values of

costs, incomes and balance sum but also in values of financial indicators. It cannot be unambiguously determined which one of evaluated systems is better but it is obvious that the harmonisation of accountings will continue.

Acknowledgment

This contribution was made with the financial support of the science project SGS_2018_013.

References

- [1] Abad, D., Cutillas-Gomariz, M., Sanchez-Ballesta, J. and Yague, J. (2018). Does IFRS Mandatory Adoption Affect Information Asymmetry in the Stock Market? *Australian Accounting Review*, vol. 28, no. 1, pp.61-78.
- [2] Bassemir, M. (2018). Why do private firms adopt IFRS? *Accounting and Business Research*, vol. 48, no. 3, pp. 237-263.
- [3] Beuselinck, Ch. et al. (2017). Which Analysts Benefited Most from Mandatory IFRS Adoption in Europe? *International Accounting Research*, vol. 16, no. 3, pp. 171-190.
- [4] Blatt, J. and Gulbin, J. (2018). Achieving IFRS Off-Balance-Sheet Treatment in Trade Receivables Securitizations. *Journal of Structured Finance*, vol. 23, no. 4, pp. 30-35.
- [5] Honková, I. (2016). The Process of Harmonization of Accounting in the Czech Republic. *Proceedings of the 13th International Scientific Conference of the European Financial Systems*, Brno, Czech Republic, pp. 242-248.
- [6] Koning, M., Mertens, G. and Roosenboom, P. (2018). Drivers of institutional change around the world: The case of IFRS. *Journal of International Business Studies*, vol. 49, no. 3, pp. 249-271.
- [7] Myšková, R. (2009). Satisfaction of Financial Managers with Accounting Information System. *Advances in Marketing, Management and Finances*, USA, Houston, pp. 76 -81.
- [8] Neel, M. (2017). Accounting Comparability and Economic Outcomes of Mandatory IFRS Adoption. *Contemporary Accounting Research*, vol. 34, no. 1, pp. 658-690.
- [9] Onali, E., Ginesti, G. and Ballestra, L. V. (2017). Investor reaction to IFRS for financial instruments in Europe: The role of firm-specific factors. *Finance Research Letters*, vol. 21, pp. 72-77.
- [10] Pawsey, N. L. (2017). IFRS adoption: A costly change that keeps on costing. *Accounting Forum*, vol. 41, no. 2, pp. 116-131.
- [11] Ram, R. and Newberry, S. (2017). Agenda Entrance Complexity in International Accounting Standard Setting: The Case of IFRS for SMEs. *Abacus - a journal of Accounting, Finance and Business Studies*, vol. 53, no. 4, pp. 485-512.
- [12] Richard, J. (2017). The Need to Reform the Dangerous IFRS System of Accounting. *Accounting, Economics and Law – a Convivium*, vol. 7, no. 2, pp. 93-103.
- [13] Sanhueza, R. H. and Parada, F. M. (2017). A Perspective on the Creative Accounting Phenomenon form IFRS and IPSAS. *Revista Perspectiva Empresarial*, vol. 4, no. 1, pp. 85-94.
- [14] Van Mourik, C. and Walton, P. (2018). The European IFRS Endorsement Process - in Search of a Single Voice. *Accounting in Europe*, vol. 15, no. 1, pp. 1-32
- [15] Vyhláška č. 500/2002 Sb., kterou se provádějí některá ustanovení zákona č. 563/1991 Sb.
- [16] Zákon č. 563/1991 Sb., o účetnictví, ve znění platných předpisů.

INVESTMENT ACCORDING TO GLOBAL DIVERSIFIED APPROACH

Josef Novotný^{1,a,*}, Michal Kuběnka^{2,b} and Vít Jedlička^{3,c}

^{1,2,3}University of Pardubice, Faculty of Economics and Administration, Czech Republic

^ajosef.novotny@upce.cz, ^bmichal.kubenka@upce.cz, ^cst33815@student.upce.cz

*Corresponding author

Abstract. The aim of the article is to invest into selected types of investment instruments using psychological analysis on the financial market. Global diversified approach is used. The main problem is that many investors do not have experience with this approach, which facilitates investment intentions in a global market environment. The use of the examined approach on investment in financial markets has an impact on investors' psyche because they have a psychological approach that facilitates investment decision-making and reduces the risk of loss in a global market environment. It is necessary to realize that psychological factors on the financial markets dominate and they are presented on the world markets every day, which influences the prices of investment instruments and the behaviour of the investing public in the conditions of globalization. The portfolio of investments built up according to the examined approach, including its evaluation on a model example, spreads the awareness of this investment opportunity. Nowadays, when a number of investments have a global character such as global funds, bonds, and stocks to which an investor can invest from home, it is necessary to use both existing and new approaches. Nowadays people face the fact that they have to put off part of the consumption in order to have decent living conditions at old age. Today it is therefore necessary to implement investment plans by the adult population because social changes have an impact on everyone due to globalization processes.

Keywords: globalization, psychological approach, investor, portfolio

JEL Classification: G1, G11, G15

1. Introduction

Globalization is a phenomenon which daily intervenes in our lives both positively and negatively. Although part of inhabitants can think that globalization processes are none of their concern and that they have no effect to their personal life, the contrary is the case. The positives of globalization, which express oneself in the citizens' daily life, are, for example, the tourism industry. At present, it is possible to travel from one end of the world to another relatively quickly using transportation means. A negative element can be a worldwide poverty, social inequalities, unemployment as well as transport industry which burdens the living environment. It is exactly the transport industry that gave a first pulse for globalization. Globalization elements then began to express themselves in other fields such as financial markets, too. As a result, a market named FOREX (International Interbank Foreign Exchange) has appeared, and it is the most globalized worldwide currency market, in which it is possible to trade non-stop daily for five days per week, where the main players, according to Contreras et al., (2018), are institutional investors. However, together with the origination of new

technologies, this market is being opened for the general public. It contributed, according to Geromichalos and Jung (2018), to a significant development of the trade and investments at the international level. The aim of the paper therefore is to draw attention to the investment in certain types of the investment instruments with the help of a psychological analysis at the financial markets with the use of the Global diversified approach. The main problem is that a series of investors has no experience with this approach which facilitates investment intentions in the global market environment.

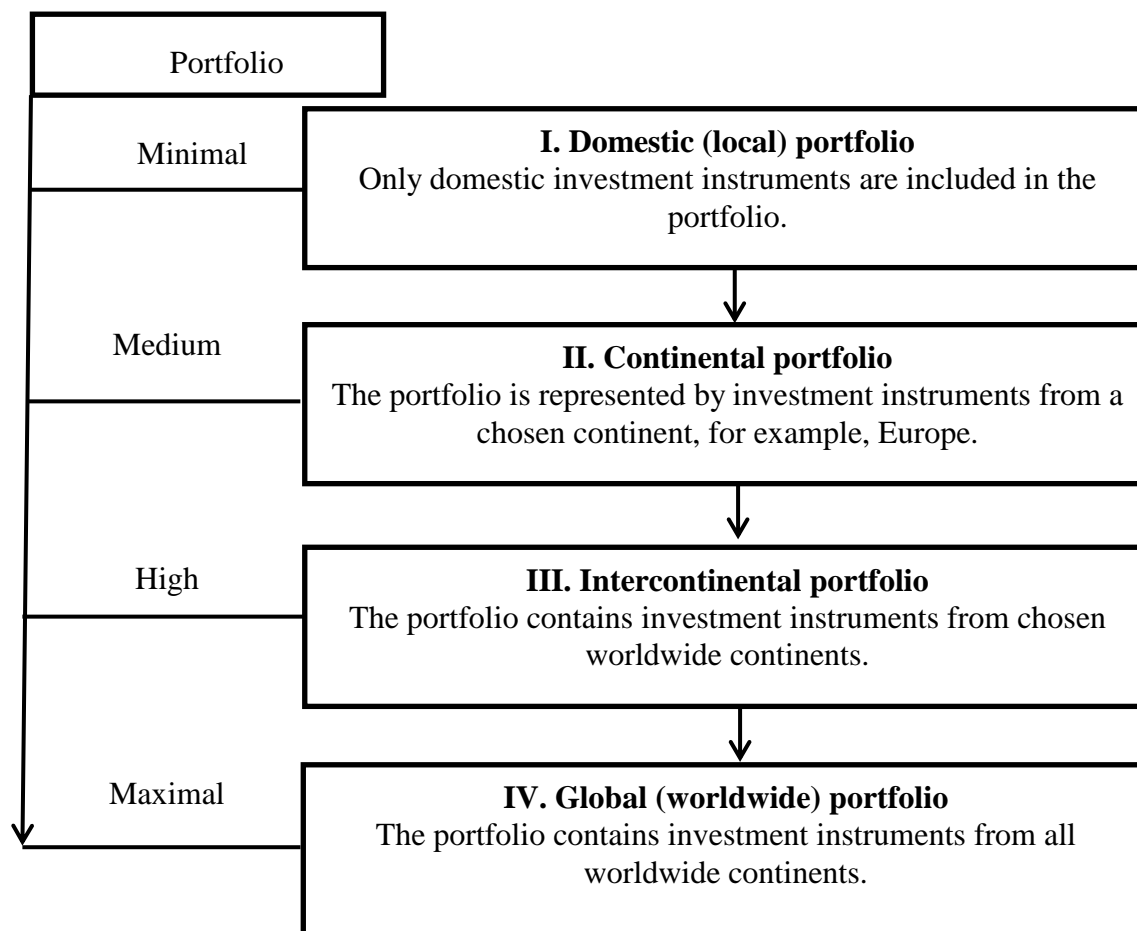
Each investor, no matter whether professional or non-professional, who makes a decision to perform investment intentions in the financial markets, has to take into account that each investment has both positive and negative elements; it is emphasized by Myšková et al, (2013) and completed by Turrall et al, (2010), who declares that certain expenses are related to each executed investment, and each investor has to consider those expenses to ensure realization of his/her investment intention. An investor can affect some investment decisions, and one of possibilities is to create an investments portfolio and thereby to reduce the risk of loss, as well as to carry out trades for which there is a minimum recommended quantity of investment, which he/she has to purchase, and a volume of financial means; and by this he/she can reduce his/her expenses and costs. He/she can further choose investment instruments depending on certain aspects which are specified by him/herself depending on financial possibilities and investment criteria. One investor can only prefer real assets, and another one - only financial investments, where he/she, for example, considers the company's dividend policy as a key policy; Sejkora & Duspiva (2015), Jo & Pan (2009) draw attention on it.

Portfolio compilation and modification is crucial for investors, and it is considerably actual at the present time, because it can be nowadays relatively easy to compile international portfolios, which are global in nature, with the help of securities traders. Poshakwale & Thapa (2011) recommend compilation of an international portfolio from investments in countries where there is a better legal protection of investors. The issue of investments diversification and portfolio compilation at the investment intentions related to stocks in Nigeria is presented by Oloko (2018), and that is on the part of investors both coming from USA and Great Britain. Chen et al, (2018) is also engaged in the matters of international stocks composition of the investments. He is focusing on the analysis of great leaps in so-compiled portfolios. Guerard Jr. et al, (2018) continues to elaborate on this theme. He deals with portfolio compiling in the global environment of the financial markets. Most of countries at the present time is based on the market principles of economy, where the globalization processes accelerate these interconnections between particular countries, and it is also valid for the global financial markets as a whole.

2. Global diversified approach

The Global diversified approach is part of the psychological analysis according to which it is possible to perform investment decision-making in the financial markets. According to Novotný (2018), the main objective of this approach is to maximally diversify risk in the event that the investor makes decision to invest in the worldwide investments and - by this - creates a global portfolio. Fig. 1 represents the Global diversified psychological approach from bottom to top.

Figure 1: Global diversified psychological approach from bottom to top



Source: Novotný (p. 87, 2018)

This Global diversified psychological approach from bottom to top assumes that an investor will implement investment steps deriving from recommendations of this approach. It means that he/she firstly buys investment instruments tradable in the domestic country. It is presumed that he/she buys, for example, stocks of well-known and financially strong companies and then creates a Domestic portfolio, and after some time would extend it with the use of his/her experience which he/she gained by trading with domestic investments. He/she thereby creates a Continental portfolio, which would include investments from the countries that are close to him/her with its culture, language, geographic position and legal environment. After having gained other experience from abroad investments and having reduced a fear, his/her psyche would be strengthened, which can lead to the creation of an Intercontinental portfolio. As a result, the investor starts to invest not only within one continent but he/she includes other chosen continents into his/her portfolio. The last step and the top of investment is creation of the Global portfolio which includes all continents and different investment instruments. This procedure is suitable for a novice and non-professional investor.

It is also possible to invest and create a composition of the investments depending on this psychological approach absolutely conversely; Novotný (2018) pays attention on it, i.e. from top to bottom. It means that the investor starts with the Global portfolio to keep only the Domestic portfolio later; this procedure cannot be excluded since an investor at the present

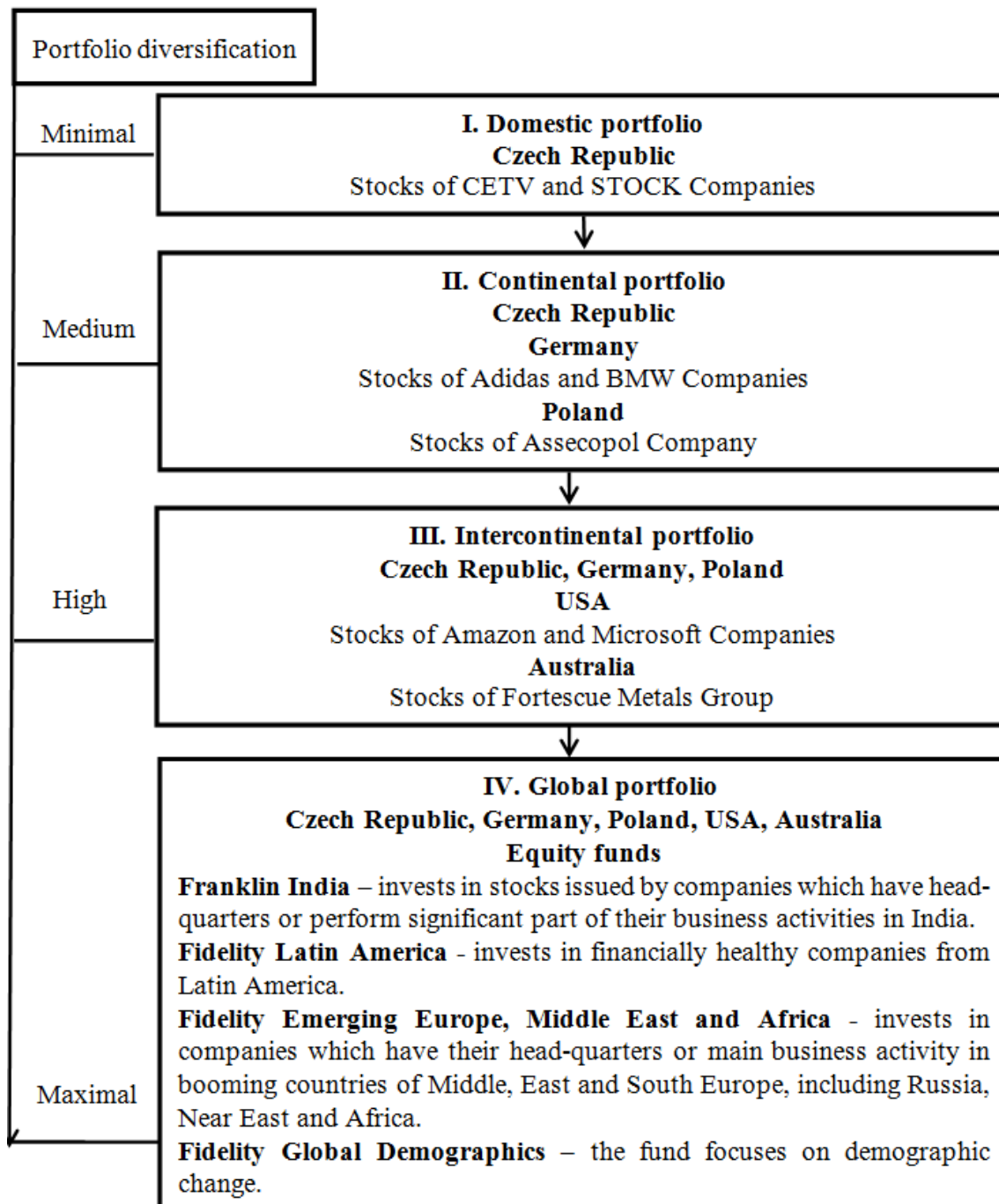
can make decision either by him/herself or with the help of a knowledgeable trader who would recommend him/her immediately at the beginning and compile a Global portfolio for him/her.

3. Investing with the help of the Global diversified approach

We are going to presume in the following model example that a novice investor has made decision according to the Global diversified approach, and that is from bottom to top considering that it is a non-professional investor. The investor will gradually include selected investment instruments into his/her portfolio depending on recommendations deriving from the analysis of the chosen approach. The next assumption is that he/she, always starting from the first purchase till a half of the year of the purchase, buys other investment instruments so that he/she creates a global diversified approach of his/her own investments during two years and - by this - reduces the risk. It is the influence of the risk that has an impact on the investors' psyche.

The first executed investment was carried out by 8/19/2016, when the investor has bought stocks of CETV and STOCK Companies on the Prague Securities Exchange (BCPP, 2018) and has then created a Domestic portfolio. In half a year from the first purchase, he/she has extended his/her composition of the investments and then created a Continental portfolio, where he/she has included stocks of German companies, Adidas and BMW, and also stocks of Accecopol Company from Poland. During the next half a year, he/she has later bought stocks on an American exchange, namely stocks of Amazon and Microsoft (Akcie, 2018), as well as invested at the same time in Fortescue Metals Group, the stocks of which are tradable on the Australian exchange (Australian Securities Exchange, 2018); this decision resulted in the creation of an Intercontinental portfolio. After the elapse of six months from the creation of the Intercontinental portfolio, he/she has made decision to invest in equity funds that are offered by ING Podílové fondy Company (2018) and thereby created a Global portfolio, into which he/she included the following four funds: Franklin India, Fidelity Latin America, Fidelity Emerging Europe, Middle East and Africa, and Fidelity Global Demographics. The portfolio composition is presented in Fig. 2, where you can see which items have been bought by the investor.

Figure 2: Portfolio composition according to the Global diversified psychological approach



Source: our own processing

While investing, the crucial moment is when and at which cost a particular investment instrument was purchased, because it influences results of the total portfolio as well as the investors' psyche. Each proper investor must be interested in his/her own investments as well as evaluate and perform other investment decision-making. It is the regular evaluation of the achieved results that is important for the time of sale. The Table 1 below represents evaluation of the portfolio compiled according to the Global diversified psychological approach. It is presumed that the investor has only purchased one stock or one allotment certificate, and on 8/17/2018, he/she has made decision to sale the whole portfolio. Considering the fact that the

portfolio is compiled from investments which are offered in different currencies (EURO, Polish Zloty, US Dollars and Australian Dollars), there was used recalculation to Czech Crowns by the date of purchase and sale according to the Exchange List of the Czech National Bank (2018).

Table 1: Evaluation of the portfolio composition compiled according to the Global diversified psychological approach

Portfolio name	Company/Shares Fund name	Purchase date	Purchase price, in CZK	Sale price, by 8/17/2018, in CZK	Absolute revenue, in CZK	Relative revenue, in %
Domestic	CETV	8/19/2016	57.50	78.60	21.1	36.696
	STOCK	8/19/2016	55.90	58.80	2.9	5.188
	In total		113.4	137.4	24	21.164
Continental	CETV	8/19/2016	57.50	78.60	21.1	36.696
	STOCK	8/19/2016	55.90	58.80	2.9	5.188
	Adidas	2/20/2017	4,009.768	5,326.11	1,316.342	32.828
	BMW	2/20/2017	2,298.591	2,094.679	-203.912	-8.871
	Assecopol	2/20/2017	348.582	262.039	-86.543	-24.827
	In total		6,770.341	7,820.228	1,049.887	15.507
Inter-continental	CETV	8/19/2016	57.50	78.60	21.1	36.696
	STOCK	8/19/2016	55.90	58.80	2.9	5.188
	Adidas	2/20/2017	4,009.768	5,326.11	1,316.342	32.828
	BMW	2/20/2017	2,298.591	2,094.679	-203.912	-8.871
	Assecopol	2/20/2017	348.582	262.039	-86.543	-24.827
	Amazon	8/21/2017	21,141.112	42,506.174	21,365.062	101.059
	Microsoft	8/21/2017	1,600.071	2,429.479	829.408	51.836
	Fortescue Metals Group	8/21/2017	101.378	71.004	-30.374	-29.961
	In total		29,612.902	52,826.885	23,213.983	78.391
Global	CETV	8/19/2016	57.50	78.60	21.1	36.696
	STOCK	8/19/2016	55.90	58.80	2.9	5.188
	Adidas	2/20/2017	4,009.768	5,326.11	1,316.342	32.828
	BMW	2/20/2017	2,298.591	2,094.679	-203.912	-8.871
	Assecopol	2/20/2017	348.582	262.039	-86.543	-24.827
	Amazon	8/21/2017	21,141.112	42,506.174	21,365.062	101.059
	Microsoft	8/21/2017	1,600.071	2,429.479	829.408	51.836
	Fortescue Metals Group	8/21/2017	101.378	71.004	-30.374	-29.961
	Franklin India	2/22/2018	983.488	1,044.381	60.893	6.192
	Fidelity Latin America	2/22/2018	254.694	220.320	-34.374	-13.496
	Fidelity Emerging Europe, Middle East and Africa	2/22/2018	505.034	413.481	-91.553	-18.128
	Fidelity Global Demographics	2/22/2018	402.767	437.433	34.666	8.607
	In total		31,758.885	54,918.548	23,183.615	72.999

Source: our own processing

In the case that the investor made decision to sale the whole portfolio by 17th August 2018, it would generate a revenue from the investigated investments in the amount of 72.999 %,

which is a really decent result. All his/her portfolios compiled according to the psychological approach of the Global diversified approach have showed positive overall results. The chosen psychological approach can be considered to be well-founded on the part of the investor, where he/she has firstly compiled a Domestic portfolio which generated total revenues of 21.164 %, which can leave a non-professional investor with a pleasant feeling to continue with investing and to extend the existing investments composition. A Continental portfolio, as a result, was created, where the investor has extended his/her investments by stocks from Germany and Poland, which reached the overall revenue of 15.507 %. After some time, the investor extended the existing portfolio by other stocks from USA and Australia and thereby created an Intercontinental investments composition; this investment decision turned up successful, because the investment instruments were again increased in their value by 78.391 %. Half a year later, the investor have made decision to create a Global portfolio and included equity funds into it, and thereby deepened diversification risks, because he/she has already had not only stocks; it resulted in value increasing by 72.999 %. The practice of the investor according to the investigated psychological approach has proved its substantiation that led to the valuation of the financial means. It is necessary to remember that the model case doesn't include charges, taxes and paying dividends for some of here-investigated investments. It is also necessary to consider the time of purchase and sale, as well as a selection of investments. The authors of the paper draw attention on it, which influences the achieved overall results.

4. Conclusion

Investing in the global environment is not easy at all at the present time with regard to big turbulences and changes which take place round the world. Where one unpleasant event in a particular market can influence behavior of investors on a global scale. It can be beneficial for the investors to invest according to some models or approaches, which elaborates them to make investment decision, and this effects their psyche and other investment decision-making in the future. Investing according to the Global diversified psychological approach proved its substantiation and referred to the importance of investments diversification, but several factors have to be carefully considered. Each investor is different; it is given by his/her relationship to the risk as well as by his/her economic conditions in which he/she lives. The paper also contains a model example, where an investor has only bought one investment instrument from the investigated companies. This step, called an Incomplete Commercial Units Theory, evidently would not be executed by the investor because this method of purchasing is burdened by special charges. Each securities trader has his/her own policy of charges, which - as a rule - derives from the volume of the financial means and a number of the purchased securities. The higher a number and volume are, the lower - in most of cases - charges, or they are even fixedly stipulated without regard to the volume of the financial means and a number of the investment instruments; that's why the authors assume that investors in practice will be and behave rationally.

Acknowledgment

This contribution was made with the financial support of SGS_2018_013.

References

- [1] Akcie (August 2018). Akcie online [Online]. Available: <https://www.akcie.cz/>
- [2] Australian Securities Exchange (August 2018). FORTESCUE METALS GROUP LTD [Online]. Available: <https://www.asx.com.au/asx/share-price-research/company/FMG>
- [3] Burza cenných papírů Praha – BCPP (August 2018). Vybrané akcie [Online]. Available: <https://www.pse.cz/>
- [4] Contreras, A. V., Llanes, A., Bernabeu, P. A., Navarro, S., Sánchez, P. H., Espín, L. J. J. and Cecilia, J. M. (2018). ENMX: An elastic network model to predict the FOREX market evolution. *Simulation Modelling Practice and Theory*, vol. 86, pp. 1-10.
- [5] Česká národní banka - ČNB (August 2018). Kurzy devizového trhu [Online]. Available: http://www.cnb.cz/cs/financni_trhy/devizovy_trh/kurzy_devizoveho_trhu/denni_kurz.jsp?date=17.08.2018
- [6] Geromichalos, A. and Jung, K. M. (2018). An over-the-counter approach to the forex market. *International Economic Review*, vol. 59, pp. 859-905.
- [7] Guerard Jr., J. B., Markowitz, H., Xu, G. and Wang, Z. (2018). Global portfolio construction with emphasis on conflicting corporate strategies to maximize stockholder wealth. *Annals of Operations Research*, vol. 267, pp. 203-219.
- [8] Chen, K., Vitiello, L., Hyde, S. and Poon, S. (2018). The reality of stock market jumps diversification. *Journal of International Money and Finance*, vol. 86, pp. 171-188.
- [9] ING Podílové fondy (August 2018). Kompletní nabídka ING Podílových fondů [Online]. Available: <http://www.ingbank.cz/ing-podilove-fondy/kompletni-nabidka-ing-podilovych-fondu/>
- [10] Jo, H. and Pan, C. (2009). Why are firms with entrenched managers more likely to pay dividends? *Review of Accounting and Finance*, vol. 8, pp. 87-116.
- [11] Myšková, R., Obršálová, I., Čenčík, P. and Šatera, K. (2013). Assessment of Environmental and Economic Effects of Environmental Investment as a Decision Problem. *WSEAS Transaction on Environment and Development*, vol. 9, pp. 268-277.
- [12] Novotný, J. (2018). *Investování na finančních trzích s podporou psychologické analýzy*, 1. vydání. Ostrava: Key Publishing.
- [13] Oloko, F. T. (2018). Portfolio diversification between developed and developing stock markets: The case of US and UK investors in Nigeria. *Research in International Business and Finance*, vol. 45, pp. 219-232.
- [14] Poshakwale, S. S. and Thapa, Ch. (2011) Investor protection and international equity. *Global finance journal*, vol. 22, pp. 116-129.
- [15] Sejkora, F. and Duspiva, P. (2015). The Position of Management of Czech Joint-Stock Companies on Dividend Policy. *Economics and Management*, vol. 18, pp. 73-88.
- [16] Turrall, H., Svendsen, M. and Faures, J., M. (2010). Investing in irrigation: Reviewing the past and looking to the future. *Agricultural Water Management*, vol. 97, pp. 551-560.

EXPONENTIAL RANDOM GRAPH MODEL AS A TOOL FOR ANALYZING THE INTERNATIONAL TRADE

Jan Panuš^{1,a,*}, Jan Hajný^{2,b}

^{1,2}University of Pardubice, Faculty of Economics and Administration, Studentska 95, Pardubice,
Czech republic

^ajan.panus@upce.cz, ^bst28730@student.upce.cz

*Corresponding author

Abstract. This paper deals with the analysis of international trade within the EU from the point of view of modelling social networks using the exponential random graph method. This method appears to be convenient from a practical point of view because it examines the behaviour of specific entities within the network. There are many studies, that analyse the various effects of bilateral trade relationships from different perspectives, such as the volatility rate. International trade has a huge impact on the development of globalization within the world. It creates the appropriate background for the further development of relations between countries and not necessarily between countries dealing with trade. Exponential random graph models attempt to look for dependencies in relationships between entities, and then create a model for network structure. This model provides a view of the entire network from the point of view of local structures such as reciprocated ties or triangles. The social network can then be perceived as a structure that is made up of local patterns of specific relationships that we call network configurations. These configurations correspond to the model parameters. Exponential random graph can be used to create models in different cases and one of the areas where these models are not so much used is international trade. The international trade of EU is well recorded and it is possible to establish a network of relationships where the level of trade and the interconnection between countries creates the appropriate background for further modelling using exponential random graph models.

Keywords: international trade, exponential random graph, social network analysis

JEL Classification: B17, D85, F60

1. Introduction

Globalization has changed the character of the world economy and has influenced international business strategies. Not only large businesses, but also small and medium-sized companies, are also trying to promote internationally. These companies learn to distribute their production activities and services to those countries where it is worth to redistribute their own activities. These activities are transferring to countries that offer favorable conditions. In recent years, not only the dynamics of international trade has increased, but also the shift of technology. Products are compiling internationally across different global chains. Not only the activity of politicians but also activities of economically active organizations, wipes out any border between states, while increasing competition on international markets. This encourages growth in transforming economies.

It is clear that the trade is more common within country than between each other nations (Helliwell, 2000; McCallum, 1995). As (Eaton & Kortum, 2002) estimated that areas that do not have geographical boundaries are able to have five times more trade than those with borders. The lack of trade between countries can often be explained by various formal trade barriers such as poor enforcement of international contracts with the help of governments (Anderson & Marcouiller, 2002) or inadequate information on possibilities for international trade (Portes & Rey, 2005). Business and social networks that operate between countries can help to break down these barriers. Researchers can then help to look at how to overcome these barriers. Research can serve as documents and is able to quantify the existence of such barriers.

While transnational networks are primarily researched as a means of overcoming barriers to trade, much of the research on the impact of domestic networks on international trade is rather motivated by the view that they are an informal barrier to trade, with network members colluding to increase their market power by restricting foreign competition. There is also a line of work that measures the effects of domestic networks on the composition of international trade.

The aim of this paper is to highlight the possibility of analyzing international trade between countries in terms of social network analysis. The paper brings some definitions of economic networks and international trade as outlined in the following chapters. Many publications deal with the field of international trade analysis but few of them deals with social network analysis as a tool to analyze international trade. We discuss the possibility to utilize social network analysis to international trade. We use random graph model to analyze some basic international trade characteristic.

2. Random graph model

Random graph model (Erdos & Renyi, 1966; Albert et al., 1999; Molloy & Reed, 1995) is general term for creating some models and simulation of real world problems. It refers to probability distribution over the graphs and it lies between graph theory and probability theory. Random graphs are used to answer questions about properties of graphs. It is used for explaining complex network usually. These networks need to be modeled for their complexity. It is good to follow these steps for using random graph model.

Each network connection should be seen as random variable. The combination of such points can be described as a relationship with certain probability. Such network is hard to explain on what principles are connection made. It is better to say that we do not know much about such network and that we do not know much about forming of such network. We can say that our model is not capable to be perfect deterministic prediction and that result contains some noise that we are not able to explain. Connections are independent on previous created connections that are made by people. We should create a hypothesis for some particle formation of network that we add to the model. Each parameter of network corresponds with network configuration. Each network configuration can be described as a subset of possible network connections. These configurations refers to structural characteristic of interest and the model represent the probabilistic distribution of random graph.

Researchers recommends simplifying parameters. This simplification is provided by using of homogeneity and other restriction. Model is defined by better way if the researcher limits

the number of parameters. The researcher equate some of the parameters to unify or link other parameters in different way.

Design and interpretation of the model and its parameters. The focus for modelling is the emphasis on designing and interpreting the model. However, this approach usually requires the completion of the previous four points. This last step is very complex if the model structure is complicated, as the real world problems usually are. Researchers often use the benefits of statistical models for networks in case of parameter estimates, as well as an estimate of the uncertainty of the model.

Creating a random graph is done by taking a number of N nodes and interconnecting each other so that each pair i, j has a connection with an independent probability of p . However, if we want to examine models that are close to the real base, we have to accept it. That such a simple model has some weaknesses. One of them is the distribution of degrees in the graph, which is to be calculated as in the real world. Usually it is stated that probability of a graph can be identified solely by counts of subgraphs.

Consider a node in a random graph. With a certain probability, p is linked to each of the $N-1$ other nodes in the graph, and hence the probability p_k that is assigned to node k with a binomial division.

3. International trade and social networks

International trade provides many business opportunities, greatly increases employment, international transport, brings new impetus to solving different problems, it helps to introduce new methods in various areas of economics or politics. International trade can be taken as one of the main pillars of the world's economic fabric. The great benefit is the creation and dissemination of different business databases, both at regional and global level. Transnational networks can facilitate interconnection through commissions of marketing operations that let potential traders know that there are customers who are interested in the product in another country (Chin et al., 1996). Within a given market, these networks can help find a suitable distributor of goods for specific customers (Weidenbaum & Hughes, 1996).

There are many statistical procedures used to analyze international trade where it is often the basic unit of the country and its descriptive statistics such as import quotas, prices, comparative advantages, exchange rates, and so on. Another approach is the relational approach where the main analysis is trade flows between countries. For this reason, I introduce an analysis of social networks as an analytical tool, which is very appropriate. International trade is currently taken more than just a set of bilateral relationships, and social network analysis can be very helpful in this analysis, in describing the overall structure and development.

Empirical analyzes point to the positive effect of international trade on the creation of conditions for trade between groups operating between borders and for immigrants. Immigrants know the characteristics and properties of buyers and sellers in their homeland, and carry this knowledge to new countries as well. However, it is often difficult to predict the extent to which the impact of transnational cooperation works by providing market information or using official information. Often customers' desire for goods from their homeland is apparent rather than having any effect of being part of any network (Gould,

1994). Gould estimates separate import and export equations and the impact of immigrants' influence on bilateral trade between the United States and its partners during the 1970-86.

Possible consequences for economic efficiency in transnational networks that provide information on profitable business opportunities are provided by (Rauch & Casella, 2003). They use a model that considers the following: the manufacturer needs to match to his needs if such agreement is acceptable, then it is possible to employ an internationally immobile labor force and then to realize the production. Within its home country, the manufacturer is able to match his needs (i.e. what he needs to produce and with which resources he can find) based on his own experience. Typical needs and knowledge abroad are not so familiar to manufacturers from other countries, and they cause problems. Such international consensus can then serve to shift labor demand in the form of services to manufacturers from countries where such labor is rare in countries where it is enough.

Social networks, as an analytical tool is an appropriate way to describe and understand networks at international level. There is a large number of problems in transnational co-operation where it is necessary to establish relationship with other producers or employees who know the environment and are a suitable tool for how to efficiently use resources in the countries concerned. The exponential random graph model (ERGM), which will be described in the next chapter, is then an appropriate tool for analyzing and modeling a given situation.

3.1 ERGM as an analytic tool

Exponential random graphs model is a part of random graph model has following form:

$$P_r(X = x) = \left(\frac{1}{k}\right) \exp[\sum_A \mu_A z_A(x)], \quad (1)$$

where X_{ij} is a random graph that represents the connection between actors. X then represents the element matrix n and x then represents the matrix of the realized network connections. A then represents another network of configuration types. $Z_A(x)$ represents a set of dependent variables on the model, expressing that any set of statistics A calculated on x affects the probability of creating a given network. An unknown parameter is represented by μ_A coefficient and this parameter estimated and expresses the effect of network statistics in the monitored network model. The coefficient k represents the number of numerators displayed in a possible network with n number of elements.

Parameters are initially estimated in ERGM using pseudo-similarity (Strauss & Ikeda, 1990) but this approach is often not reliable. Instead, it is more appropriate to use the Markov Chain of Monte Carlo as a similarity estimate (Geyer & Thompson, 1992). Monte Carlo simulates the distribution of a random graph using the initial values of the parameters, and this process is repeated until we reach the cleaned values that we compare with the simulated distribution of the given graph with the observed data (Snijders, 2002). The advantage of this approach is that with an infinite number of network configuration distributions, we give an estimate equivalent to maximum like-hood estimation and provide a reliable number of standard errors (Wasserman & Robins, 2005). A series of other network specifications, called the social circuit dependence (Pattison & Robins, 2002), have been developed that significantly reduce cases where the high level of triads often occurs due to poor model specification (Hunter & Handcock, 2006; Robins et al., 2009).

The ERGM is defined as exponential form of log-likelihood function and this function usually has surface with globally concave

4. Discussion

There are several articles that discuss the possibilities of using ERGM to model links between individual objects (Kim et al., 2016; Mizruchi, 1996). It is possible to study the influence of independent changes on the characteristics of different companies, the coefficients of dyad and the structural effects of these companies. The authors point to these features as important in creating new connections in international trade. There is a greater likelihood of such connections occurring in the case of similar characteristics.

An important aspect in the social network analysis and ERGM analysis is primarily the research question that is followed by the research project. Much of the answer lies in the nature of the relationships between the objects under investigation and not in their characteristic features, which can be very problematic. ERGM also combines substantive and relational variables, and quantitative with qualitative analysis, which requires a considerable burden of the researcher. Concepts related to the research question must then be strictly defined and the outputs from such analysis must be correctly interpreted. Some metrics have unambiguous equivalents in import and export values, unlike others, where interpretation is rather intuitive, but there are also central business partners.

For further social network analysis, closeness centrality can be used to determine the distance of one node to the other nodes and the betweenness centrality to determine the node frequency in the shortest path of the entire network. However, in the context of international trade, these statistics are difficult to interpret, even though some authors use these interpretations. One option is the adjacency matrix analysis, but this is only possible for a limited number of countries, which are then subjected to a corresponding analysis that will allow for a change in the level of association between countries over time. An appropriate analysis is the so-called structural equivalence when similar relationships between other entities in the network are detected. This procedure is appropriate to use for classifying countries in different business networking tasks.

In the case of expanding the development of business opportunities strategies or attracting potential customers, the ERGM methodology is an appropriate tool. It is possible to better describe network dependencies and more accurate analysis of the factors that have been investigated. The results can then be used to test the link using rigorous scientific empirical evidence for model development (Colquitt & Zapata-Phelan, 2007). The impact of organizational resources on alliance formation is important because multi-source companies have more opportunities to build links, and their higher level makes it possible to eliminate the need for co-operation through alliances.

Various studies highlight the importance of using micro-transactions in interregional and transnational cooperation. Here too, the ERGM method is well suited to creating models of existing links between individuals and their interconnection to create links between organizations and companies (Gulati & Westphal, 1999; Rosenkopf et al., 2001). People who have previously worked in multinational companies are setting up new startups, and these businesses are then linked to the staff of large companies, and they can gain new impetus for further cooperation.

ERGM is an appropriate technique that can be used in various areas of research and modeling in the areas of international trade. It is possible to model production and supply networks, but it is also possible to plan and analyze strategic research with regard to transnational trade. As individuals, organizations and the whole community become more interconnected, it is necessary to create processes that allow for a better understanding of the entire structure of the network. The ERGM then builds on the classic foundations of social networking analysis and moves them in a further direction to better understand the genesis of social networks.

Acknowledgment

This paper is an output of the University of Pardubice science project No SGS2018025.

References

- [1] Albert, R., Jeong, H. and Barabasi, A. L. (1999). Internet – Diameter of the World-Wide Web. *Nature*, vol. 401, pp. 130-131.
- [2] Anderson, J. E. and Marcouiller, D. (2002). Insecurity and the pattern of trade: An empirical investigation. *Review of Economics and Statistics*, vol. 84, pp. 342-352.
- [3] Eaton, J. and Kortum, S. (2002). Technology, geography, and trade. *Econometrica*, vol. 70, pp. 1741-1779.
- [4] Erdos, P. and Renyi, A. (1966). On existence of a factor of degree 1 of a connected random graph. *Acta Mathematica Academiae Scientiarum Hungaricae*, vol. 17, pp. 359-&.
- [5] Geyer, C. J. and Thompson, E. A. (1992). Constrained Monte-Carlo Maximum-Likelihood for Dependent Data. *Journal of the Royal Statistical Society Series B – Methodological*, vol. 54, pp. 657-699.
- [6] Gould, D. M. (1994). Immigrant Links to the Home Country – Empirical Implications for United States Bilateral Trade-Flows. *Review of Economics and Statistics*, vol. 76, pp. 302-316.
- [7] Gulati, R. and Westphal, J. D. (1999). Cooperative or controlling? The effects of CEO-board relations and the content of interlocks on the formation of joint ventures. *Administrative Science Quarterly*, vol. 44, pp. 473-506
- [8] Helliwell, J. F. (2000). How Much Do National Borders Matter? Brookings Institution Press.
- [9] Hunter, D. R. and Handcock, M. S. (2006). Inference in curved exponential family models for networks. *Journal of Computational and Graphical Statistics*, vol. 15, pp. 565-583.
- [10] Chin, K. S., Yoon, I. J. and Smith, D. (1996). Immigrant small business and international economic linkage: A case of the Korean wig business in Los Angeles, 1968-1977. *International Migration Review*, vol. 30, pp. 485-510

- [11] Kim, J. Y., Howard, M., Pahnke, E. C. and Boeker, W. (2016). Understanding network formation in strategy research: Exponential random graph models. *Strategic Management Journal*, vol. 37, pp. 22-44.
- [12] McCallum, J. (1995). National Borders Matter – Canada – US Regional Trade Patterns. *American Economic Review*, vol. 85, pp. 615-623.
- [13] Mizruchi, M. S. (1996). What do interlocks do? An analysis, critique, and assessment of research on interlocking directorates. *Annual Review of Sociology*, vol. 22, pp. 271-298.
- [14] Molloy, M. and Reed, B. (1995). A Critical-point for Random Graphs With a Given Degree Sequence. *Random Structures & Algorithms*, vol. 6, pp. 161-179.
- [15] Pattison, P. and Robins, G. (2002). Neighborhood-based models for social networks. *Sociological Methodology*, vol 32, pp. 301-337.
- [16] Portes, R. and Rey, H. (2005). The determinants of cross-border equity flows. *Journal of International Economics*, vol. 65, pp. 269-296.
- [17] Rauch, J. E. and Casella, A. (2003). Overcoming informational barriers to international resource allocation: Prices and ties. *Economic Journal*, vol. 113, pp. 21-42.
- [1] Robins, G., Pattison, P. and Wang, P. (2009). Closure, connectivity and degree distributions: Exponential random graph (p^*) models for directed social networks. *Social Networks*, vol. 31, pp. 105-117.
- [2] Rosenkopf, L., Metiu, A. and George, V. P. (2001). From the bottom up? Technical committee activity and alliance formation. *Administrative Science Quarterly*, vol. 46, pp. 748-772.
- [3] Snijders, T. A. (2002). Markov chain Monte Carlo estimation of exponential random graph models. *Journal of Social Structure*, vol. 3, pp. 1-40.
- [18] Strauss, D. and Ikeda, M. (1990). Pseudolikelihood Estimation for Social Networks. *Journal of the American Statistical Association*, vol. 85, pp. 204-212.
- [19] Wasserman, S. and Robins, G. (2005). An introduction to random graphs, dependence graphs, and p^* . *Models and methods in social network analysis*, vol. 27, pp. 148-161.
- [20] Weidenbaum, M. L. and Hughes, S. (1996). The Bamboo Network: How Expatriate Chinese Entrepreneurs are Creating a New Economic Superpower in Asia, Martin Kessler Books.

MARKET RISK PREMIUM AND DEFAULT UNDER THE CONDITIONS OF GLOBALIZATION OF MAJOR CAPITAL MARKETS OF THE UE AND GFCI COUNTRIES

Jacek Pera^{1,a,*}

¹Faculty of Economics and International Relations,, International Economics Department, Cracow
University of Economics, Poland

^aperaj@uek.krakow.pl

*Corresponding author

Abstract. The purpose of the work is to examine the relationship between market risk premium and default. The research hypothesis assumes that the amount of the market risk premium significantly affects the level of the estimated probability of default of the company. The analysis was carried out on the example of the largest capital markets in the European Union and GFCI within the period from 1 January 2012 to 31 December 2017. Time series of the 20 most important stock market indices of non-financial companies representing all continents were applied in the empirical study. The largest non-financial companies, with regard to assets held as of 1 January 2012, listed on particular capital markets and included in the analyzed stock indices, one for each index, were included in the study. The following research methods were applied: CAPM equilibrium model, Sharpe's market asset value ratio and the market value of the corporate equity. The empirical study used time series of the 20 most important stock market indices of non-financial companies representing the analyzed markets. The article consists of introduction, applied methodology of the study and the results of the research and issues for further analysis. As a result of the analysis, the following research conclusion was established: the final value of companies from the GFCI area does not prove any significant difference with regard to their value before considering the risk premium. In the case of the EU market, this difference is significant. This means that capital markets with weaker capital and poorer, less stable economic conditions are less able to face market risk.

Keywords: premium, market risk, liquidity, default, index.

JEL Classification: C32, C36, E47, G12, G15.

1. Introduction

Rapid price changes in international capital markets caused by globalization of financial markets, financial crises, speculative attacks, fluctuation of interest rates, risk premium, uncertainty due to unpredictable information or other macroeconomic factors, lead to the transfer of market risk to all market participants (investors, business entities and financial institutions in particular). This process is of particular importance when large and cyclical losses are observed in the markets. They are identified with extreme price changes and a threat to market participants (losses caused may contribute to an increase or complete default). Therefore, this is a great challenge for today's international capital markets.

A factor partially mitigating the risk of losses is the amount of the set risk premium that may significantly reduce the size of these losses in practice and contribute to the overall improvement of the company's financial condition. The surplus of the nominal rate of return on investment in securities over the assumed rate of return on securities was considered to be called a risk premium. According to Dobija (2006), "the risk premium is an economic constant and with a free, good market, it shapes fair economic values, wages, prices, profits and interest rates. According to this author, fair values could (...) be used for economic policy, a policy of social justice, and at the same time sustainable development." According to the Palgrave dictionary (Newman, 2004), the risk premium is considered to be the difference between the expected (based on all available information) profit from the risk-bearing asset and the profit from the safe asset. In the subject literature, risk premium also defines the surplus of the return on investment over the risk-free rate. Similarly, Cornell (1999) in the definition of this category stated that this term refers to the difference between the return on investment in ordinary securities and the return on investment in secure government securities. The risk premium was similarly specified by (Ibbotson & Sinquefeld, 1976; Mehra & Prescott, 1985; Brealey & Myers, 1996; Siegel, 2002; Fama & French, 2002; Welch, 2000). Mishkin (2003) uses the concept of risk premium, which he defines as the spread between the interest rate of a particular security at risk of default and risk-free securities. Such a definition, although not always formulated explicitly, is often used in works on securities gains. A similar definition is provided by Duffee (1999) and Amato & Remolona (2003). Others, such as Collin-Dufresne (2001), do not directly define the term of risk premium, they use such a definition in their calculations, (Carr & Wu, 2016; Corte et al., 2016), (Du et al., 2016). According to Krzeńskiak (2005) "it must be noted that the risk premium definitions are rather of empirical nature. The *considered* subject is defined by the method of its measurement, and not by the economic interpretation of the concept. Such a definition often leads to a rash identification of the linguistic content of the concept with its economic content. The fact that despite the widespread use of the concept of risk premium, it still raises some doubts confirms this thesis." Mishkin (2003) states that (despite the name) this premium proves not only the issuer's default risk, but also its liquidity. Therefore, he suggests that it would be more precise to use the definition of the risk premium and liquidity. Annaert & De Ceuster (1999) also attempted to use a descriptive definition of the risk premium in their study claiming that it should at least compensate investors for losses related to the risk of bankruptcy, but - due to the risk aversion phenomenon - it must also take into account the premium, which is the remuneration for incurring the risk of loss exceeding the expected losses (Krzeńskiak, 2005). Additional premium allows undertakings to attract investors that are interested in a higher rate of return on investment and are willing to take higher investment risk to achieve it. The correct valuation of the risk premium has now become necessary not only due to the increase in basic types of risk (currency, interest rate or even bankruptcy risk), but also due to the complexity of contemporary investment strategies, which are a consequence of the ongoing globalization of international capital markets. These strategies often remain highly sensitive to relative changes of asset prices (and therefore also to changes in the risk premium). What is more, the literature suggests that the amount of risk premium in individual markets may be a certain indicator of the level of their development, expectations of market participants, as well as one of the economy fluctuations indicators (Guha & Hiris 2002) (ECB, 2017). The identification of factors determining the amount of the risk premium may allow investors to distinguish the change in the premium amount resulting from a change in the issuer's situation from the one that results from changes in the market situation. Analysis of the dynamics and

structure of the risk premium is necessary to minimize the risk of securities of different structure. At the macroeconomic level, disaggregation of the risk premium may allow early identification of negative market signs, and thus increase the chance to avoid negative processes (such as the formation of speculative bubbles or market panic). This mainly applies to entities with a significant portfolio of securities. It can also contribute to earlier forecast of changes in the cycle of economy fluctuations (Krześniak, 2005). As mentioned above, the risk premium is often defined as a market risk premium, e.g. as a surplus return on capital over the return on risk-free securities. The literature described three main methods for determining this premium: on the basis of models using historical data (actually achieved returns), discounted cash flow models and utility function based models. The empirical study in this thesis mainly uses the first of these approaches.

2. Methods

In order to examine the relationship between the market risk premium and default, 20 financial centers in the world were subject to the analysis. The empirical research used the time series of the 20 most important stock indices of non-financial companies representing all continents:

- a) Latin America and the Caribbean– Brasilia: BOVESPA (Petrobras - PETR3/PETR4).
- b) North America - New York: DJIA (General Electric – GE), Chicago: CHX (Magellan Development Group – MDG), Toronto: CNQ (Imperial OIL-IO).
- c) Australia and Oceania – Sydney: S&P/ASX 200 (The a2 Milk Company - A2M) .
- d) Asia and the Pacific - Singapore: STI (Singapore Technologies Engineering Ltd - S63.SI), Hong Kong: HIS (Tencent Holdings Limited - 0700.HK), Shanghai: SSE (China Shipbuilding Industry - CSI, Tokyo: NIKKEI 225 (**Toyota Motor Company – TMC**).
- e) Middle East and Africa – Dubai: DFMGI (Emaar Development PJSC-ED - PJSC).
- f) Europe (UE) – London: FTSE 100 (Vodafone Group – VG), Frankfurt: DAX (Volkswagen Group – VOW), Warsaw: WIG 20 (KGHM-KGHM), Paris: CAC 40 (Total –Total), Amsterdam: AEX (Royal Dutch Shell - RDSA), Tallinn: Eesti Telekom - ETLAT), Riga: TALSE (Baltika - BLT1T), Prague: PX (ČESKÝ TELECOM – CT), Budapest: BUX (MOL Group – MOL), Cyprus: CYSMMAPA (Cyprus Forest Industries-CFI).

The analysis included the largest non-financial companies with regard to the assets held as of 1 January 2012, listed on individual capital markets and included in the analyzed stock exchange indices, one for each index. Companies' period of operation on the market completely coinciding with the period assumed for analysis was the condition for the classification of the analyzed companies for the study. The selection of the largest companies was made due to the fact that they are capital-intensive - they make numerous and large investments and, therefore, are exposed to a very high risk of losses and reduction of the value of their assets. In this particular case, the premium amount will be significant from the point of view of their liquidity and, thus, potential default. The necessary data used in the study come from databases such as: World Development Indicators (WDI), Global Development Finance (GDF) and from www.bloomberg.com and www.damodaran.com as well as websites of individual stock exchanges. For the European Union, a more detailed analysis was carried out, applying 10 largest indices. The level of importance of indices is based on the Global Financial Center Index (GFCI). The choice was guided by their importance on the financial

markets. The data was synchronized in terms of time, while any missing data was interpolated using the moving average method for 3 preceding and following observations. For this purpose, daily observations were used from 1 January 2012 to 31 December 2017, which resulted in a total of $L = 36,000$ observations. An accounting year of 360 days was used for calculation. The selection of the research period was guided by the actual period of the last crisis 2007-2008 and the effects of its impact immediately after its completion. Therefore, it was assumed that in the adopted period of research: 1 January 2012 to 31 December 2017, there was a relative stability and comparability of management conditions, which in turn was shown in the level of the risk premium for investors and the emergence of potential default in companies included in individual indices. The analysis assumes that based on the market value of a company included in a particular stock exchange index, the volatility of this value and the structure of the company's liabilities allow it to be considered in default if the value of its assets at time t is lower than the value of debt (D). In such a case, the company should declare its bankruptcy. While estimating the relationship between the market risk premium and default, a proprietary, unified approach was used, based on models presented in the literature (Crosbie & Bohn, 2003; Berg & Kaserer, 2008; Wójcicka, 2008; Feunou Jahan-Parvar & Okou, 2018; Berardi & Plazzi 2018). However, it should be remembered that the market risk premium is today calculated on the basis of various methods and models - this means that it affects the solvency level of a given listed company differently. Logarithmic rates of return were used in the study (1):

$$r_t = 100\% * (\ln(P_t) - (\ln P_{t-1})) \quad (1)$$

Market risk was assessed by estimating the neutral risk (R_n) and the real probability of default (PD), in which the difference between the neutral risk value and the probability of default is determined by the dynamics of change in the value of assets - the ratio of the value of Sharpe's assets in particular. Taking this into account and having the asset correlation coefficient, the market-based Sharpe's ratio was estimated – MBS (2).

$$MBS = \frac{\mu - r}{\sigma} = \frac{\Phi^{-1}(R_N(t,T)) - \Phi^{-1}(PD,(t,T))}{\sqrt{T-t}} \quad (2)$$

Where: μ - average rate of return on the company's assets, σ - variation of the rate of return on the assets of a company, r - risk-free interest rate.

The market value of the company's equity (E) is calculated based on the following formula (3):

$$E = AN(d_1) - De^{rT} N(d_2) \quad (3)$$

Where: A – value of company's assets, D – nominal value of debt, T – maturity time, $N(d_1)$, $N(d_2)$ - value of the cumulative distribution of a standardized normal distribution.

To estimate the average value of the return on assets μ (that essentially affects the level of the estimated probability of default), a Capital Assets Pricing Model was used (4) CAPM:

$$CAPM = \frac{\Phi^{-1}(R_N(t,T)) - \Phi^{-1}(PD,(t,T))}{\sqrt{T-t}} \frac{1}{P_{E,M}} \quad (4)$$

Where: $P_{E,M}$ – market portfolio, Φ - random variable having the distribution of $N(0,1)$, T – maturity time, t – assets value at t , R_n – neutral risk, PD – probability of default.

Assets market value and its variability was calculated based on the following formula (5):

$$\sigma_E E = N(d_1) \sigma_A A \quad (5)$$

Where: σ_E - variability of equity.

The value of all short-term liabilities (not exceeding one year) plus half of the book value of the long-term debt to be serviced was used as a point of default (A).

The following assumptions were used for calculations:

- estimates were made without dividing into different types of shares,
- risk-free rate of return in the following years was calculated as the average monthly profitability of government treasury securities representing each of the examined financial centers,
- values of β coefficients necessary in the CAPM model were estimated on the basis of prediction equations where the role of the explanatory variable is played by the monthly rate of return from a particular index, while the explained variables - the monthly profitability of shares of each analyzed entity.

3. Results and Discussion

Table 1 and Figure 1 presents the results of estimated PD including the estimated value of μ and using the risk-free rate (r) and the Sharpe's index calculated on this basis. Based on the results (summary and final results are presented in Table 1), it may be assumed that the same values of probabilities of default estimated with the μ parameter and the risk-free rate (r) are significantly different from in companies. Therefore, the values of the market risk premium estimated with (2) for individual companies assume different values. The market value of companies after consideration of the risk premium is similarly different. As a result, the final value of GFCI companies does not significantly differ from their value before the risk premium. For the EU market, this difference is significant. This means that capital markets having weaker capital and worse, less stable economic conditions, are worse at market risk. It should be noted that in both cases, i.e. companies from the GFCI and EU, there was a downward trend in the value of the assets of individual companies. The largest decreases were reported by the following companies: ETLAT, BLT1T and CFI - on average 15-20% of their market value. The range of decreases for: CT, KGHM, MOL, RDSA, Total, VG and VOM was at an acceptable level of 5-10% of their market value. For the companies from the GFCI area, all analyzed companies: 0700.HK, A2M, CSI, GE, NDG, NDG, OIL-IO, PETR3/PETR4, PJSC, S63.SI and TMC recorded decreases that did not exceed 5% of their market value. After application of the risk premium, capital-intensive companies and companies from the GFCI area are widely recognized, as well as companies from the EU area, must significantly adjust their market values, which also significantly impairs their liquidity. The conducted research also proves that in the case of the size of the market risk premium, the capital value of the company plays a significant role. This is important as the companies with strong and stable capital are more able to face the estimated (sufficiently or insufficiently) size

of the market risk premium than companies whose capital is less stable or small. Future research on risk premium and its correlation with default should be made in three basic areas:

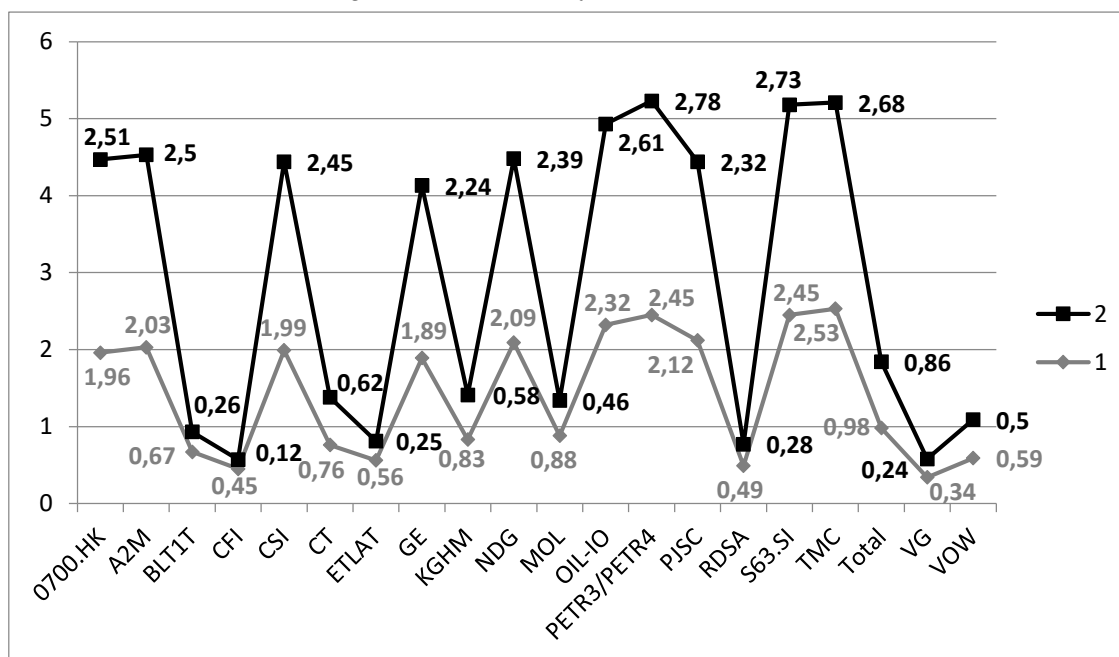
Table 1: Average PD values for 20 non-financial companies from the GFCI and EU area and their market value before and after risk premium

Companies	PD _μ	PD _r	MBS	Market value* - MBS (1)	Market value* + MBS (2)	Change direction
0700.HK	(+) 0.019085	(+) 0.027643	(+) 0.55	1.96	2.51	-
A2M	(+) 0.035057	(+) 0.011754	(+) 0.47	2.03	2.50	-
BLT1T	(-) 0.000005	(-) 0.002356	(-) 0.41	0.67	0.26	-
CFI	(-) 0.001732	(-) 0.054351	(-) 0.33	0.45	0.12	-
CSI	(+) 0.000511	(+) 0.008610	(+) 0.46	1.99	2.45	-
CT	(-) 0.000601	(-) 0.000323	(-) 0.14	0.76	0.62	-
ETLAT	(-) 0.001441	(-) 0.043121	(-) 0.31	0.56	0.25	-
GE	(+) 0.001712	(+) 0.003622	(+) 0.35	1.89	2.24	-
KGHM	(-) 0.000029	(-) 0.011314	(-) 0.25	0.83	0.58	-
NDG	(+) 0.012921	(+) 0.084341	(+) 0.30	2.09	2.39	-
MOL	(-) 0.002970	(-) 0.031111	(-) 0.42	0.88	0.46	-
OIL-IO	(+) 0.011591	(+) 0.015143	(+) 0.29	2.32	2.61	-
PETR3/PETR4	(+) 0.014072	(+) 0.015144	(+) 0.33	2.45	2.78	-
PJSC	(+) 0.050572	(+) 0.011821	(+) 0.20	2.12	2.32	-
RDSA	(-) 0.001372	(-) 0.000011	(-) 0.21	0.49	0.28	-
S63.SI	(+) 0.005434	(+) 0.031342	(+) 0.28	2.45	2.73	-
TMC	(+) 0.001033	(+) 0.003040	(+) 0.15	2.53	2.68	-
Total	(-) 0.000451	(-) 0.000819	(-) 0.12	0.98	0.86	-
VG	(-) 0.002227	(-) 0.000215	(-) 0.10	0.34	0.24	-
VOW	(-) 0.000123	(-) 0.003222	(-) 0.09	0.59	0.50	-

*Price/book value

Source: The author's own development.

Figure 1: Market value for (-) MBS and (+) MBS



Source: The autor's own development.

A. Analysis of the behavior of estimated values in other industries and sectors of economies and an attempt to introduce other coefficients correcting PD values.

B. Amount/value of premium - to do this, research should be carried out the purpose of which will be to confirm unequivocally that the risk premium values in the past properly reflect and forecast its future values. Currently, no such research has been carried out, and the researchers' forecasts regarding the future value of the risk premium are significantly different.

C. The issue of default - in recent years research on linking the risk premium with the probability of default has been significantly extended. However, researchers still do not agree on how to measure this relationship. In the case of the capital market, the risk premium increases with the deterioration of the quality of the security and the increase in the associated risk. It is therefore necessary to undertake further research in this area in order to establish comparable and uniform measurement methods.

4. Conclusion

This paper is an output of the science project: Market risk premium and default under the conditions of globalization of the main capital markets of the EU and GFCI countries. The research carried out fully confirms the assumed research hypothesis stating that the amount of the market risk premium significantly influences the level of the estimated probability of the company's default. A poorly estimated amount of the market risk premium may lead the company to significant problems related to its liquidity and even contribute to its default. It should be remembered, however, that this hypothesis has been proved on the basis of an original, unified approach, which is not necessarily commonly used on the stock market. The market risk premium is calculated today on the basis of various methods and models. This means that it differently affects the solvency of a particular listed company. This makes it very difficult to assess the liquidity of a given listed company and thus its market value. There are no doubts that there is a relationship between the amount of the market risk premium and the company's default issue. This relation affects the value of assets held by both a large, capital-intensive company, as well as a weaker company with a lower level of assets. It is obvious that the assumed market risk premium is of greater importance for small companies than for large companies. In the case of the former, it may significantly affect the level of their liquidity and therefore lead to their default. In the case of large, capital-intensive companies, there is rather an issue of "depletion" of assets held by it, in the event of an improperly set market risk premium. However, in extreme cases - contrary to small companies - the risk of default may be considered. Therefore, it is important that on a global scale parameter based methods and means were adopted that allow for safe determination of the market risk premium, adequate to the changing macroeconomic environment of the company. Such methods will also ensure relative investment security for both companies and potential third stakeholders.

References

- [1] Amato, J.D. and Remolona, E.M. (2003). The credit spread puzzle. *BIS Quarterly Review*, pp. 51–63.
- [2] Annaert, J. and De Ceuster, M.J.K. (1999). Modelling European Credit Spreads, Research Report, Universiteit Antwerpen – UFSIA: Antwerpen.
- [3] Berardi, A. and Plazzi, A. (2018). Inflation Risk Premia, Yield Volatility, and Macro Factors. *Journal of Financial Econometrics*, pp. 5-10.

- [4] Berg, T. and Kaserer, C. (2008). Linking Credit Risk Premia to the Equity Premium, Technische Universitat Munchen, Working Paper no. 01, p. 4.
- [5] Brealey, R. A. and Myers, S. C., (1996). Principles of Corporate Finance, 5th Edition, The McGraw-Hill Companies: New York, p. 180.
- [6] Du, D., Hu, O. and Zhao, X., (2016). Currency risk premium and U.S. macroeconomic announcement. *The Journal of Financial Research*, vol. 39, pp. 335-340.
- [7] Carr, P. and Wu, L. (2016). Analyzing volatility risk and risk premium in option contracts: A new theory. *Journal of Financial Economics*, vol. 120, pp. 5-10.
- [8] Collin-Dufresne, P., Goldstein, R.S. and Martin, J.S. (2001). The Determinants of Credit Spread Changes. *Journal of Finance*, no. 56, pp. 2177–2207.
- [9] Cornell, B. (1999). The Equity Risk Premium. The Long-Run Future of The Stock Market, John Wiley & Sons: New York, pp. 18-19.
- [10] Corte, P.D., Ramadorai, T. and Sarno, L., (2016). Volatility risk premia and exchange rate predictability. *Journal of Financial Economics*, vol. 120, pp. 25-30.
- [11] Crosbie, P. and Bohn, J. (2003). Modeling Default Risk – Modeling Methodology, Moody's KMV Company.
- [12] Dobija, M. (2006). Wartość godziwa jako kryterium prawdy w teorii ekonomicznej, [in:] Dążenie do prawdy w naukach ekonomicznych, Akademia Ekonomiczna w Krakowie: Kraków.
- [13] Duffee, G.R. (1999). Estimating the Price of Default Risk. *Review of Financial Studies*, no. 12, pp.197–226.
- [14] Fama, E. F. and French, K. R. (2002). The Equity Risk Premium. *The Journal of Finance*, vol. 57, no. 2, p. 637.
- [15] Feunou, B., Jahan-Parvar, M. R. and Okou, C. (2018). Downside Variance Risk Premium. *Journal of Financial Econometrics*, vol.16, pp. 345-347.
- [16] Guha, D. and Hiris, L. (2002). The aggregate credit spread and the business cycle. *International Review of Financial Analysis*, no. 11, pp. 219–227.
- [17] Hull, J.C.(2014). Options, futures and other derivatives, Prentice Hall, upper Saddle River, New Jersey, no. 5, p. 622.
- [18] Ibbotson, R. G. and Sinquefeld, R. A. (1976). Stocks, Bonds, Bills and Inflation: Year-by-Year Historical Returns (1926-1974). *Journal of Business*, vol. 49, no. 1, p. 11.
- [19] Krześniak, A. (2005). Dekompozycja premii za ryzyko na rynku pozaskarbowych instrumentów dłużnych na przykładzie polskiego rynku obligacji korporacyjnych, Materiały i Studia NBP, no. 197, pp. 6, 8.
- [20] Mehra, R. and Prescott, E. (1985). The Equity Premium: A Puzzle. *Journal of Monetary Economics*, vol. 15, no. 2, p. 145.
- [21] Mishkin, F.S. (2003). The Economics of Money. Banking and Financial Markets, no. 6, Addison Wesley: Boston.
- [22] Newman, P. (2004). The New Palgrave Dictionary of Economics and the Law, Palgrave Macmillan, March, vol. 1–3.
- [23] Siegel, J. (2002). Stocks For The Long Run. The Definitive Guide to Financial Market Returns and Long-Term Investment Strategies, 3rd Edition, McGraw-Hill: New York, p.17.
- [24] Welch, I. (2000). Views of Financial Economists on the Equity Premium and on Professional Controversies. *Journal of Business*, vol. 73, no. 4, p. 501.
- [25] Wójcicka, A. (2008). Szacowanie premii za ryzyko rynkowe za pomocą modeli oceny ryzyka kredytowego w warunkach polskiej gospodarki, Studia i Prace Wydziału Nauk Ekonomicznych i Zarządzania w Szczecinie, no. 10.

OUTLIERS DETECTION TECHNIQUES: IMPACT ON THE PREDICTION ABILITY OF INTERNATIONAL PREDICTION MODELS

Ivana Podhorska^{1,a,*}, Anna Siekelova^{2,b}

¹University of Zilina, Faculty of Operation and Economics of Transport and Communications,
Department of Economics, Univerzitna 1, 010 26 Zilina, Slovak Republic

²University of Zilina, Faculty of Operation and Economics of Transport and Communications,
Department of Economics, Univerzitna 1, 010 26 Zilina, Slovak Republic

^aivana.podhorska@fpedas.uniza.sk, ^banna.siekelova@fpedas.uniza.sk

*Corresponding author

Abstract. Usually, under the conditions of globalization, most-real world data sets contain outliers, means unusual large or small values when compared with others in data set. Generally, outliers or extreme values have a negative effect on data analysis. Especially, some statistical methods are very sensitive to their existence in data set, namely ANOVA test or regression analysis. Their existence may cause an incorrect results and wrong identification of relationship between variables. For these reasons, methods for detecting outliers in data set represent very actual topic not only in Slovakia but also in abroad. Paper main aim is to capture impact of outliers detection on the prediction ability of international prediction models. Paper works with one method for outliers detection, namely: interquartile range (IQR). In addition, paper works with selected international prediction models. Paper applies method for outliers detection on the data set of financial ratios that are necessary for prediction models calculation. Then, paper follows changes in prediction ability of international prediction models after removing outliers according to specific technique for outliers. For detection of outliers by the above-mentioned technique, relevant statistical software is used. To capture prediction ability of selected international prediction models matrixes of changes are used. The issue of outliers detection and their removal is very actual, in the context of globalization when scientific community works with the wide range data set.

Keywords: outliers, prediction ability, prediction models

JEL Classification: G55, G32, G33

1. Introduction

Prediction models can early predict the probability of company bankrupt. They differ in their process, financial indicators and predictive ability. Their predictive ability may be affected by the sample used, especially in the wide range sample. (Alaminos et al., 2016; Karas & Reznakova, 2018) Detection of outliers in the sample plays an important role. For outliers were considered values with significant variance from other values. Their existence may cause an incorrect results and wrong identification of relationship between variables. Paper main aim is to capture impact of outliers detection on the predictive ability of international prediction models. Paper works with one method for outliers detection, namely:

interquartile range (IQR). (Kral & Bartosova, 2016; Svabova & Durica, 2016; Fabozzi et al., 2010) In 70s of 20ty century, were published 28 studies about prediction models, in 80s of 20ty century were published 53 studies and in 90s of 20ty century were published 70 studies about prediction models. Multiple discriminant analysis was analysed in works of Altman (1968), Plihal et al. (2017), Oz & Simga-Mugan (2018) and so on. Review stated by (Bellovary et al., 2007; Agarwal & Taffler, 2007; Alaka, 2018). In 70s of 20ty century, also raised prediction models based on the logistic regression - logit and probit models. Logit analysis was analysed in works of Zavgren (1985), Jakubik and Teply (2006), Slavicek & Kubenka (2016), Krusinskas et al. (2014). Probit analysis was analysed in works of M. Zmijewski (1984). Review stated by (Press & Wilson, 1978; Valaskova & Kramarova, 2016). Since the 90s of 20ty century have been created studies focused on the development of prediction models by neural network methods. The basic stone of this method put Wilson & Sharda (1994), Zhang (1999), Mousavi et al. (2015).

2. Methodology

Chapter provides basic steps of methodology of this paper, it consists of brief review of selected prediction models from four countries; sample and data collection for calculations; data analysis and at the end data verification.

2.1 Sample and Data Collection

The sample for identification the impact of outliers detection techniques on the predictive ability of international prediction models consists of 1,350 financial statements of Slovak companies in 2016. These data were obtained from the database Amadeus.

2.2 Data Analysis – Prediction models

In paper was used 4 prediction models: (i) Gurcik model; (ii) IN05 model; (iii) Poznanski model; and (iv) Virag and Hajdu model. Table 1 shows their elementary theoretical aspects.

Table 1: Theoretical aspects of selected prediction models

Model	Country	Year	Financial Ratios	Limits
Gurcik	SR	2002	retained earnings/total equity and liabilities	$G \geq 1.8$ creditworthy
			EBT/total equity and liabilities	$-0.6 < G > 1$.grey zone
			EBT/total sales	$G \leq -0.6$ bankrupt
			CF/Total equity and liabilities	
			inventory/total sales	
$G = 3.412_{X1} + 2.226_{X2} + 3.227_{X3} + 3.419_{X4} - 2.063_{X5}$				
IN05	CR	2005	assets/liabilities	$IN05 > 1.6$ creditworthy
			EBIT/interest expense	$0.9 < IN01 \leq 1.6$ grey zone
			EBIT/assets	$IN01 \leq 0.9$ bankrupt
			total sales/assets	
			short-term assets/short-term liabilities	
$IN05 = 0.13_{X1} + 0.04_{X2} + 3.97_{X3} + 0.21_{X4} + 0.09_{X5}$				
Poznanski	PL	1996	net income/total assets	$Z_P > 0$ creditworthy
			(short-term assets – inventory)/total liabilities	$Z_P < 0$ bankrupt
			long-term liabilities/total assets	
			net income/total sales	
$Z_P = 3.562_{X1} + 1.588_{X2} + 4.288_{X3} + 6.719_{X4} -2.368$				
Virag-	HU	1996	quick liquidity ratio	$Z_{VH} > 2.6161$ creditworthy

Hajdu			CF/total debts	$Z_{VH} < 2.6161$ bankrupt
			short-term assets/total assets	
			CF/total assets	
$Z_{VH} = 1.3566x_1 + 1.63397x_2 + 3.66384x_3 + 0.03366x_4$				

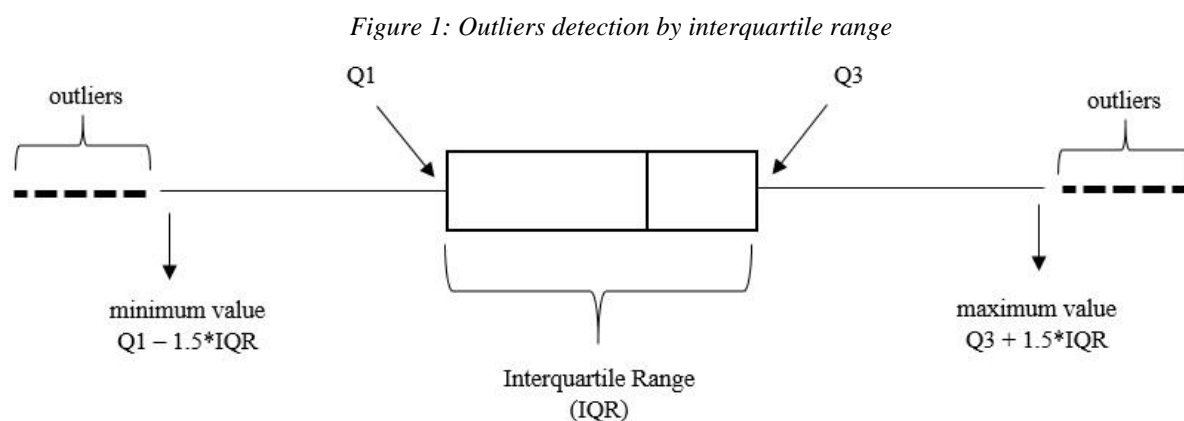
Source: author's compilation according to (Gurcik, 2002; Neumaierova & Neumaier, 2005; Hamrol et al., 2004; Virag & Hajdu, 2001)

2.3 Data analysis - Outliers Detection Techniques

Interquartile range is very popular method for outliers detection, it is the difference between the first and third quartiles. The first quartile (Q_1) is the value in the data set that holds 25 % of the values *below* it. The third quartile, denoted Q_3 , is the value in the data set that holds 25 % of the values *above* it. In other words, it is the distance between the first quartile (Q_1) and the third quartile (Q_3).

$$IQR = Q_3 - Q_1 \quad (1)$$

In this method outliers are values: (i) below $Q_1 - 1.5IQR$; (ii) above $Q_3 + 1.5IQR$. Figure 1 provides this fact.



Source: author's compilation according to (Svabova & Durica, 2016)

2.4 Data Verification

The relevance of the outliers detection was expressed by matrixes of changes. They are based on the results of prediction models, and they classify companies into two categories: (i) creditworthy companies; (ii) bankrupt companies. They work with two types of data:

- (i) Real data – detection according to the positive/negative value of company equity,
- (ii) Model data – detection according to prediction model.

For an expression of total explanatory power of models was used following relation: Overall model accuracy – number of correctly classified companies to total companies ratio.

3. Results

Chapter provides quantification of international prediction models; detection of outliers by interquartile range; at the end data verification and comparison of results.

3.1 Data Analysis - Prediction models

At the first, were quantified financial ratios from selected prediction models: (i) Gurcik model; (ii) IN05; (iii) Poznanski model; and (iv) Virag-Hajdu model. Subsequently, were quantified prediction models as a whole. Table 2 shows results of predictive ability of these models without outliers detection. For verification were used matrixes of changes.

Table 2: Results of prediction models without outliers detection

Gurcik model				
	Model data			Total
Real data		creditworthy	bankrupt	
	creditworthy	289	624	913
	bankrupt	79	358	437
		368	982	1,350
IN05				
	Model data			Total
Real data		creditworthy	bankrupt	
	creditworthy	615	298	913
	bankrupt	46	391	437
		661	689	1,350
Poznanski model				
	Model data			Total
Real data		creditworthy	bankrupt	
	creditworthy	599	314	913
	bankrupt	216	221	437
		815	535	1,350
Virag-Hajdu model				
	Model data			Total
Real data		creditworthy	bankrupt	
	creditworthy	448	465	913
	bankrupt	109	328	437
		557	793	1,350

Source: author's calculation in the sample

According to data (table 2), Gurcik model was right in 647 cases from 1,350 cases. Model determined 289 companies like creditworthy and these companies really had the positive value of equity. In addition, model determined 358 companies like bankrupt companies and these companies really had the negative value of equity. Model was wrong in 703 cases. Total explanatory power of model was 47.93 %. Model IN05 was right in 1,006 cases from 1,350 cases. Model right determined 615 companies like creditworthy companies, 391 companies like bankrupt companies. Model was wrong in 344 cases. Total explanatory power of model was 74.52 %. Poznanski model was right in 820 cases from 1,350 cases. Model right determined 599 companies like creditworthy companies, 221 companies like bankrupt companies. Model was wrong in 530 cases. Total explanatory power of model was 60.74 %. Virag-Hajdu model was right in 776 cases from 1,350 cases. Model right determined 448 companies like creditworthy companies, 328 companies like bankrupt companies. Total explanatory power of model was 57.48 %.

3.2 Data Analysis – Outliers Detection Techniques

In this part were detected outliers in the results of all financial ratios from prediction models. They were detected by interquartile range (IQR). Number of outliers in financial ratios are displayed in table 3.

Table 3: Number of outliers in the sample

Method	Sample Size	Outliers	Adjusted Sample Size
IQR	1,350	281	1,069

Source: author's calculation in the sample

3.3 Data Verification

This part shows re-quantification of prediction models after detection and removal of outliers by interquartile range. Subsequently, prediction models and their predictive ability were quantified again.

Table 4: Results of prediction models with outliers detection by IQR

Gurcik model				
	Model data			Total
Real data		creditworthy	bankrupt	
	creditworthy	431	432	863
	bankrupt	10	196	206
		441	628	1,069
IN05				
	Model data			Total
Real data		creditworthy	bankrupt	
	creditworthy	691	172	863
	bankrupt	19	187	206
		710	359	1,069
Poznanski model				
	Model data			Total
Real data		creditworthy	bankrupt	
	creditworthy	663	200	863
	bankrupt	8	198	206
		671	398	1,069
Virag-Hajdu model				
	Model data			Total
Real data		creditworthy	bankrupt	
	creditworthy	488	415	863
	bankrupt	95	111	206
		583	526	1,069

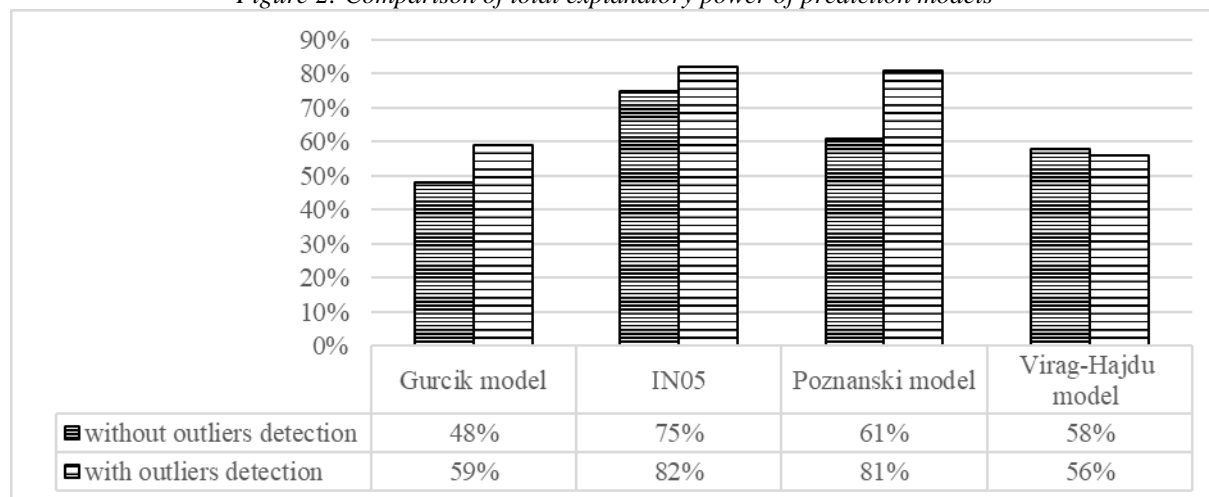
Source: author's calculation in the sample

According to data (table 4), Gurcik model was right in 627 cases from 1,069 cases. Model determined 431 companies like creditworthy and these companies really had the positive value of equity. In addition, model determined 196 companies like bankrupt companies and these companies really had the negative value of equity. Model was wrong in 442 cases. Total explanatory power of model was 58.65 %. Model IN05 was right in 878 cases from 1,069 cases. Model right determined 691 companies like creditworthy companies, 198 companies like bankrupt companies. Model was wrong in 191 cases. Total explanatory power of model was 82.13 %. Poznanski model was right in 861 cases from 1,069 cases. Model right determined 663 companies like creditworthy companies, 198 companies like bankrupt companies. Model was wrong in 208 cases. Total explanatory power of model was 80.54 %. Virag-Hajdu model was right in 599 cases from 1,096. Model right determined 448 companies like creditworthy, 111 companies like bankrupt companies. Total explanatory power of model was 56.03 %.

3.4 Data Verification – Results Comparison

Results from chapters 4.1, 4.2 and 4.3 have shown interesting facts. Research has shown significant impact of outliers to the final results in calculations. Figure 2 captures comparison predictive ability of prediction models in two situations: (i) without outliers detection; and (i) with outliers detection. Predictive ability is expressed through total explanatory power of prediction model, calculated in 4.1 and 4.3.

Figure 2: Comparison of total explanatory power of prediction models



Source: author's compilation in the sample

Except Virag-Hajdu model, higher total explanatory power of prediction model was achieved in all selected prediction models, after the outliers detection and removal. After detection and removal outliers from the sample, Gurcik model, IN05 and Poznanski model achieved better total explanatory power. Gurcik model achieved 11 % better results after removal of outliers than with outliers. IN05 model achieved 7 % better results after removal of outliers than with outliers. Poznanski model achieved 20 % better results after removal of outliers than with outliers. On average, the results improved by 9 %.

4. Discussion

Study research has brought interesting results. Research has shown existence of significant impact of outliers to the final results in calculations. It is possible to assumed, outliers play important role in relevance of calculations. However, it is necessary to highlight various limitations and extension of future research:

(i) Limitations – method of outliers detection and prediction models. In both, theory and practice exist several approach to the detection of outliers in the data, e.g. Z-score, Grubbs test or Dixon test. Different methods bring different results, of course. Choosing the relevant method is always a challenge and an individual matter. Choosing of different international prediction models can bring differences in results.

In addition, this research provides space for new extensions.

(i) Extension – future research could be focused on the impact of various techniques for outliers detection to the relevance of data results.

5. Conclusion

Paper main aim was to capture impact of outliers detection on the predictive ability of international prediction models. Paper worked with one method for outliers detection, namely: interquartile range (IQR). Study assumed the impact of outliers to the predictive ability of selected international prediction models, e.g. (i) Gurcik model; (ii) IN05; (iii) Poznanski model; and (iv) Virag-Hajdu model. In paper were quantified prediction models without detection and removal of outliers, subsequently were identified outliers in data by interquartile range, and at the end were re-quantified prediction models after detection and removal of outliers. Research has shown existence of significant impact of outliers to the final results in calculations. It is possible to assumed, outliers play important role in relevance of calculations. Except Virag-Hajdu model, higher total explanatory power of prediction model was achieved in all selected prediction models, after the outliers detection and removal. Before outliers removal Gurcik model achieved total explanatory power at 48 %; IN05 at 75 %; Poznanski model at 61 %; and Virag-Hajdu model at 58 %. After outliers removal Gurcik model achieved total explanatory power at 59 %; IN05 at 82 %; Poznanski model at 81 %; and Virag-Hajdu model 56 %. On average, the results improved by 9 %. Future research could be focused on the impact of various techniques for outliers detection to the relevance of data results.

Acknowledgment

The research leading to these results has received funding from the project titled "Creation of new paradigms of financial management at the threshold of the 21st century in conditions of the Slovak republic" in the frame of the program of Slovak Scientific Grant Agency VEGA under the grant agreement number VEGA 1/0428/17.

References

- [1] Altman, E. I. (1968). Financial ratios, discriminant analysis and the prediction of corporate bankruptcy. *Journal of Finance*, vol. 23, pp. 589-609.
- [2] Agarwal, V. and Taffler, R. J. (2007). Twenty-five years of the Taffler z-score model: Does it really have predictive ability? *Accounting and Business Research*, vol. 37, no. 4, pp. 285-300.
- [3] Alaminos, D., del Castillo, A. and Angel Fernandez, M. (2016). A global model for bankruptcy prediction. *Plos One*, vol. 11, no. 11.
- [4] Alaka, H. A. et al. (2018). Systematic review of bankruptcy prediction models: Towards a framework for tool selection. *Expert Systems with Applications*, vol. 94, pp. 164-184.
- [5] Bellovary, J., Giacomino, D. and Akers, M. (2007). A review of bankruptcy prediction studies: 1930 – present. *Journal of Financial Education*, vol. 33, pp. 1-42.
- [6] Fabozzi, F. et al. (2010). Tests of the performance of structural models in bankruptcy prediction. *Journal of Credit Risk*, vol. 6, no. 2, pp. 37-78.
- [7] Gurcik, L. (2002). G-index – metóda predikcie finančného stavu poľnohospodárskych podnikov. *Agricultural Economics*, vol. 48, pp. 373–378.
- [8] Hamrol, M., Czajka, B. and Piechocki, M. (2004). Bankruptcy of companies – discriminant analysis model. *Przegląd Organizacji*, vol. 6, pp. 35-39.
- [9] Jakubik, P. and Teply, P. (2011). The JT index as an indicator of financial stability of corporate sector. *Prague Economic Papers*, vol. 20, no. 2, pp. 157-176.

- [10] Karas, M. and Reznakova, M. (2018). Building a bankruptcy prediction model: Could information about past development increase model accuracy? *Polish Journal of Management Studies*, vol. 17, no. 1, pp. 116-130.
- [11] Kral, P. and Bartosova, V. (2016). Importance of company early warning system in globalizing market environment. *Proceedings of the 16th International Scientific Conference Globalization and Its Socio-Economic Consequences*, pp. 1054-1060.
- [12] Krusinskas, R., Lakstutiene, A. and Stankeviciene, J. (2014). The research of reliability of bankruptcy prediction models in Lithuanian companies. *Transformations in Business & Economics*, vol. 13, no. 2, pp. 102-123.
- [13] Mousavi, M. M., Ouenniche, J. and Xu, B. (2015). Performance evaluation of bankruptcy prediction models: An orientation-free super-efficiency dea-based framework. *International Review of Financial Analysis*, vol. 42, pp. 64-75.
- [14] Neumaierova, I., & Neumaier, I. (2005). Index IN05. *Evropske Finanční Systémy*. Brno, Ceska republika, pp. 143-148.
- [15] Oz, I. O. and Simga-Mugan, C. (2018). Bankruptcy prediction models' generalizability: Evidence from emerging market economies. *Advances in Accounting*, vol. 41, pp. 114-125.
- [16] Plihal, T., Sponerova, M. and Sponer, M. (2017). Comparison of bankruptcy prediction models in relation to SME segment in the Czech Republic. *Proceedings of the 20th Annual International Conference on Enterprise and Competitive Environment*. Brno, Czech Republic, pp. 623-631.
- [17] Press, S. J. and Wilson, S. (1978). Choosing between logistic regression and discriminant analysis. *Journal of American Statistical Association*, vol. 73, pp. 699-705.
- [18] Slavicek, O. and Kubenka, M. (2016). Bankruptcy prediction models based on the logistic regression for companies in the Czech Republic. *Proceedings of the 8th International Scientific Conference on Managing and Modelling of Financial Risks Location*. Ostrava, Czech Republic, pp. 924-931.
- [19] Svabova, L. and Durica, M. (2016). Correlation analysis of predictors used in banknote prediction models in Slovakia. *Ekonomicko-Manazerske Spektrum*, vol. 10, no. 1, pp. 76-89.
- [20] Valaskova, K. and Kramarova, K. (2016). Credit risk measurement in conditions of Slovak transport entities. *Proceedings of the 20th International Scientific Conference Transport Means*, pp. 454-458.
- [21] Virag, M. and Hajdu, O. (2001). A Hungarian model for predicting financial bankruptcy. *Society and Economy in Central and Eastern Europe*, vol. 23, no. 1ú2, pp. 28-46.
- [22] Wilson, R. L. and Sharda, R. (1994). Bankruptcy prediction using neural networks. *Decision Support System*, vol. 11, no. 5, pp. 545-557.
- [23] Zavgren, C. V. (1985). Assessing the vulnerability to failure of American industrial firms: A logistic analysis. *Journal of Business Finance & Accounting*, vol. 12, pp. 19-45.
- [24] Zhang, G. et al. (1999). Artificial neural networks in bankruptcy prediction: General framework and cross-validation analysis. *European Journal of Operational Research*, vol. 116, no. 1, pp. 16-32.
- [25] Zmijewski, M. (1984). Methodological issues related to the estimation of financial distress prediction models. *Journal of Accounting Research*, vol. 22, pp. 59-82.

THE INTERNATIONAL TAX TREATMENT IS NOT SUFFICIENT – AN EXAMPLE OF ROAD TAX RELIEF IN THE SLOVAK REPUBLIC

Adela Poliaková^{1,a,*}

¹University of Žilina, Faculty of Operation and Economics of Transport and Communications,
Department of Economics, Slovak Republic

^aadela.poliakova@fpedas.uniza.sk

*Corresponding author

Abstract. The question of ecology, including ecology of transport, resonates all over the world. The European Union generally supports the greening of transport by supporting the modernization of the fleet. However, this support is not internationally adjusted, so there are considerable differences in car charging within the European Union. In the majority of European countries, revenue from specific road transport taxes (i.e. registration and ownership taxes and fuel excise duties, VAT on registration taxes and fuel excise duties) contributes 5% to 10% of total tax revenue. In some countries (Bulgaria, Greece, Lithuania, Slovakia and Slovenia) this share is slightly higher (11% to 14.5%), while in France and Sweden the share is slightly lower (about 4%). There is an effort of the European Union to reduce transport externalities by decreasing the number of old vehicles that have a serious impact on the environment. General determination on the minimum road tax for the Member States is one of mechanisms that is placed to achieve the environmental protection. But is the resulting tax relief sufficient motivation for the modernization of fleet around all the European Union? This article deals with the issue of the motor vehicle tax in the Slovak Republic where the tax relief for younger vehicles is used. The use of new vehicles requires additional hidden costs, and the tax reduction effect is not be sufficient in general.

Keywords: road tax, new vehicle, fleet modernization, costs, tax relief

JEL Classification: H 25, H23, H21

1. Introduction

In countries with heavy goods vehicles charging schemes (Austria, Czech Republic, Germany, Slovakia, Slovenia) and countries with more general road charging schemes (e.g. France, Italy, Croatia) the contribution of tolls to total revenue is significant as well (Fung, 2017). In general, the average revenue in these countries is higher than in countries without a large-scale heavy goods vehicles road charging scheme. The very high average revenue found for Malta can be explained by the low number of tonne kilometres (due to low average trip lengths and low average loads), resulting in high vehicle taxes per tonne kilometre. (Cajchan et al., 2005; Hoen & Schrotten, 2016)

We live in the time period when everything is focused on environmental protection. In transport it is possible to reduce the environmental pollution if the transport operators will

replace their old vehicles with newer and greener vehicles, namely with the modernization of fleet. (Jjugović, 2018; Konecny & Petro, 2017)

In Slovakia a lot of small transport operators have in their fleet mainly older vehicles with the emission limit of EURO 3 that were stopped being produced in 2006. Thus, these vehicles are at least 10 years. Since 2016 the lower tax rate for newer and greener vehicles is introduced in Slovakia. The reduction of tax rate is based on Act Nr. 361/2014 of Collection of laws, which provides the percentage of tax relief for new vehicles and in the case of vehicles older than 12 years is the motor vehicle tax increasing. However, is the motor vehicle tax benefit an enough motivation for transport operator for modernizing his fleet?

2. The motor vehicle tax rates

In the price creation it is necessary to take into account all costs related to the execution of transport. One of these costs is the road tax. Road tax is not united within the EU. It is governed by EU Directive 1999/62/EC. The differences in the basis of taxation are arising in different countries, but the problem is mainly the different tax rates, because the Directive lays down only minimum rates for motor vehicles and road trains. (David, 2017; Ferrer Mur, 2016; Florito, 2017) Till 2014 the motor vehicle tax belonged to the group of “local taxes”, those rates were under control of autonomous municipalities in Slovak Republic. It came to situation when transport operators with same vehicle fleet paid different taxes in different regions in the same country. From 1st January 2016 is this rate determined by the Act Nr. 361/2014 of Collection of Laws that eliminate the non-unified tax rates in different regions. This act places the motor vehicle tax into property taxes that are under control of Ministry of Finance of Slovak Republic. The Act Nr. 361/2014 about motor vehicle tax determines the percentage tax relief for new vehicles. Next table 1 introduces the data of decreasing or increasing of annual tax rate. The level of decreasing or increasing rate depends on number of months from the first vehicle evidence.

Table 1: Decreasing and increasing of annual tax rate

Number of months from the first vehicle evidence	Decreasing /increasing of annual tax rate
1 - 36	-25 %
37-72	-20 %
73 - 108	-15 %
109 -144	0 %
145 - 156	+10 %
157 and more	+20 %

Source: own processing based on Act Nr. 361/2014 Col.

2.1 Road tax rates comparison in selected countries

To compare tax rates in individual countries, let us consider two specific road trains. These road trains differ only in age and emission class. First road train's age is 10 years and is of an emission class EURO 3. The second one is one-year-old and meet the EURO 6 emission class. Both road trains are consisting of a truck with two axles, the maximum permissible axle load is 19,000 kilograms, and with semi-trailer of three axles and the maximum permissible axle load 24,000 kilograms. Unladen weight of the truck according to the registration certificate is 7020 kilograms and the trailer is 7200 kilograms of unladen weight. This unladen weight is

important for the calculation of the tax rate in some countries – for example in Hungary. The road train has a maximum total weight of 40 tons. (Santos, 2017) The basis for comparing the currently applied tax rates, the data arising from the laws of individual countries and other sources were used. Road tax is not united. There are countries where the tax bears a national character and the countries where it bears a local character.

The next table 2 shows the annual tax rate for the considered road trains with EURO 3 and EURO 6. Comparing to other countries, Slovakia has the highest tax for the vehicle with EURO 3 emission limit also for EURO 6 emission limit. The tax rate in Slovak and Czech Republic is different for EURO 3 and EURO 6. This difference is caused by the vehicle age. In Germany and Hungary, this difference is caused by the emission class. In other countries is the tax rate constant, regardless of age or vehicle emission class. In France is the tax rate of the same height as the minimum rate stipulated by the EU directive.

Table 2: Annual tax rates for considered road trains in individual countries.

Country	Annual tax rate in EURs	
	EURO 3	EURO 6
Slovakia	2 233,00	1 674,75
Bohemia	2 086,49	1 084,97
Germany	1 287,24	929,24
Hungary	1 111,67	1 049,27
Austria	980,40	980,40
Poland	946,57	946,57
Italy	885,73	885,73
France	700,00	700,00
EU Directive	700,00	700,00

Source: own processing (David, 2015; Florito, 2017; Ndiaye, 2018; Act Nr. 361/2014 Col.)

2.2 Rate changes depending on the age of vehicles in selected countries

In some countries there are factors affecting the level of rates. Mainly cleaner and newer vehicles are favouring. Next table 3 shows the percentage reductions or increasing tax rate for each of the compared countries. It is possible to see in the table that such changes are provided only in Slovakia and in Czech Republic. In Bohemia, the tax relief is significantly higher and the age over 108 months from the date of first vehicle evidence is the tax rate not increasing as in Slovakia. In Germany and Hungary, the tax rate is influenced by an emission class.

Table 3: Increasing or decreasing road tax rate according vehicle's age

Country	Decreasing/increasing tax rate according the number of months from the first registration (in per cents)					
	0-36	37-72	73-108	109-144	145-156	>157
Slovakia	-25	-20	-15	0	10	20
Czech Republic	-48	-40	-25	0	0	0
Poland/Hungary/Austria/ Germany/Italy/France	-	-	-	-	-	-

Source: own processing (David, 2015; Act nr. 361/2014 Col.)

3. The analysis of costs related to new vehicles operation

In this part of the analysis we pay attention to costs related to the operation of vehicles, because the volume of costs is one of key factors that influence the competitiveness of road

transport. Only the costs that volume is changed in relation with the age of vehicle are analysed. We have considered the costs relating to the place of establishment also the costs, which volume depend on the place of performance. During operation of a new vehicle some costs are decreasing, but another increasing or new costs are created. (Poliak, 2013)

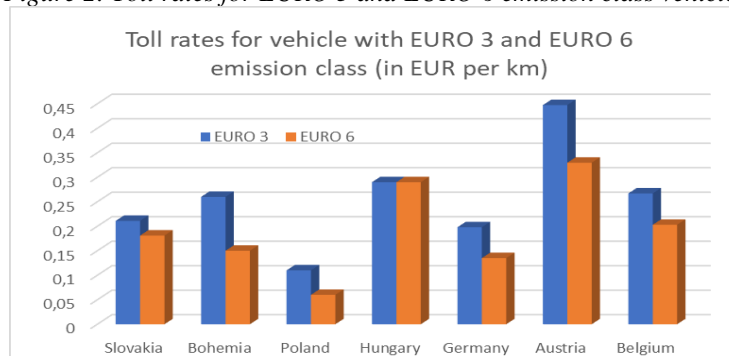
By cost analysing we have considered with defined road trains. Costs for road taxes, regular services, tolls and fuel have been analysed.

3.1 Toll

After cost of fuel, cost of depreciation of vehicle and pay of the driver, fees for using of the road network are major expense in road freight transport and bus transport. (Poliak & Konecny, 2008) However, there are countries that do not use the toll road network, for example Estonia, Montenegro. In other countries it is possible to realize the drive with vehicle in case of paying fees in the form of tolls or time pass. Currently, only few of transport operators perform only internal national transport, so it is necessary to follow this significant cost also abroad. The specified conditions and rates in individual countries are listed in next part.

In Slovakia, fees for using of the road network in the form of electronic toll levied. Toll in Slovakia is an income of The National Highway Company, Inc. and can be paid in cash, bank transfer, credit card or agreed fleet card. Trucks with a total weight over 3.5 tons and busses have to be equipped with on-board unit, which contents pre-loaded map of toll roads.

Figure 2: Toll rates for EURO 3 and EURO 6 emission class vehicles



Source: Own processing

Toll rates depend on the type of vehicle, vehicle weight, number of axles and the emission class of motor vehicle. Fees for the using of roads shall be specified in several ways, taking into account several factors. For us it is essential to compare rates from the point of view of vehicle emission class, because presently the new vehicles are EURO 6 emission class and we compare them with EURO 3 emission class. Figure 2 compares different toll rates in EUR/km driven distance on highways and motorways for vehicles over 12 tons with EURO 3 and EURO 6 emission classes.

3.2 The motor vehicle tax relief in Slovak Republic

With the purchase of a new vehicle the taxpayer is entitled to obtain the relief on the motor vehicle tax under the Act no. 361/2014 Coll. That is provided from the reason of transport operators motivation change own old fleet with newer and greener vehicles. Contrariwise, for older vehicles, the annual rate of motor vehicle tax is increasing. The tax decreasing or

increasing is dependent on the first month of first registration of the vehicle. (Konecny et al., 2016)

In the case of purchase of the new road train the taxpayer is entitled to obtain a relief of 25 per cent from motor vehicle tax rate, especially for a tractor and for a trailer. In the case of a 10-year-old road train, the tax rate is 2 233 EUR. For road train, which was registered twelve months ago, the tax rate is 1 674.75 EUR. In this case, a tax credit in amount of € 558.25 is originated to the taxpayer.

3.3 Regular services controls

During operation of a vehicle costs associated with regular service control are originating. Service inspections are executed on the basis of written service document, designated by the vehicle manufacturer for the vehicle to be maintained in good condition. SCANIA truck manufacturer has distributed service controls into three groups S, M, L. For service control “S” the interval is set at 60,000 km and following every 120,000 km. For service control “M” the interval is every 140,000 kilometres and “L” every 240,000 km. These controls are different only in exchange of some filters and during service control “L” the gear oil and adjusting of valves and injectors is also changed and controlled.

The content of these controls is the same for both vehicles but in the case of EURO 6 is also being replaced SCR filter. Price service inspections is individual for each type and brand of vehicles, so it is impossible to determine the exact price difference between the selected road trains. Service facility did not provide accurate information about the price of controls, but claimed that service inspections of EURO 6 vehicles are more expensive. In the case of the service control “S” is a difference around 100 EUR, service control “M” is around 200 EUR and price for a most extensive control “L” the price is higher, to about 600 EUR.

3.4 Fuel and technical additives consumption

Fuel consumption in trucks cannot be find somewhere in tables as in the case of passenger cars. This is because the consumption is influenced by a number of factors that have a significant effect on changes. That are factors such as load weight, route profile, speed, the traffic, the weather, the ambient temperature and to a large extent, also the driver's driving style. Therefore it is not possible to determine the exact fuel consumption. SCANIA car manufacturer states that the new EURO 6 vehicles comparing to existing vehicles EURO 3 have fuel saving by up to 8 per cent. Figure 8 shows the fuel economy of vehicles SCANIA. This saving is caused due to continuous improvement of engine, gearbox, aerodynamics etc.

Annually, several test drives that compare the technical urea and fuel consumption, and speed of trucks of various types of brands is carried out. In the case of EURO 6 consumption is about 28.5 litres / 100 km and the EURO 3 about 31 l / 100 km.

Vehicles meeting the emission standards EURO 4, EURO 5 and EURO 6 must be equipped with EGR (exhaust gas recirculation), SCR (selective catalytic reduction) or with a combination both. These systems are used to reduce harmful emissions from diesel engines, and thus it is achieved that the engine is more environmentally friendly. SCANIA engines are equipped with SCR system only where it is necessary to use an aqueous solution of technical urea known as the AdBlue. In this case, although a vehicle has a higher consumption of technical urea, but lower fuel consumption compared with engines equipped with a combination of SCR and EGR systems. The dosage of urea, which is stored in a separate tank

in vehicles, is operating fully automatically, against the control unit demand. It is sprayed into the exhaust gases and together pass to the catalyst where it comes to a chemical reaction. Dangerous exhaust gas is then converted into harmless nitrogen and water vapor, because of the presence of technical urea. (www.adblue-sk.eu) Average consumption of AdBlue in the case of EURO 4 corresponds to about 3-4% of the amount of fuel consumed, for EURO 5 the consumption is 5-6%, for EURO 6 is the consumption to 7-8%. Vehicles with EURO 3 are not yet equipped with SCR and thus there is no need to draw a technical urea. But in the case of new vehicles this new cost is arising and that is the already mentioned technical urea. On the one hand, a new cost, but on the other hand, there is a reduction in fuel costs.

For the purposes of this study we compare the cost of fuel and technical urea for vehicles with average fuel consumption of 31 l / 100 km (EURO 3) and 28.5 l / 100 km (EURO 6). For EURO 6 vehicle, it is considered with a consumption of 7% of AdBlue, it is 2 l / 100 km. In this case, the transport operator has in his company the available technical urea in large IBC containers that means during driving per 100 kilometres a cost arises from the AdBlue in the amount of 0.40 EUR. Thanks to reduced fuel consumption, also in the case of this transport operator, 1.97 EUR per 100 km of drive is saved. It was considered with the price of € 0.95 /l of diesel. From this perspective, if the transporter has a EURO 6 vehicle with the considered annual driving performance of 130,000 km per year, he could save nearly 2 600 EUR.

4. Conclusion

The analysis shows that not all countries offer the possibility of applying a tax rate reduction. The tax relief can be applied in Slovakia, the Czech Republic, Hungary and Germany. In Slovakia and the Czech Republic this relief depends on the age of the vehicle and in the other two countries depends on the emission class of vehicle. Highest tax in compared countries in both cases is applied in the Slovak Republic, for vehicle with EURO 3 emission class it is 2,233 EUR and for vehicle with EURO 6 emission class the rate is 1,674.75 EUR. Compared to the Directive, the tariff in Slovakia is more than three times higher. Even in the case where a 25% relief is provided, the tax is the highest in the compared countries, despite the fact that in Austria, Poland, Italy and France in both cases is the same tax rate. These countries do not provide any tax reduction.

Fees for use of the road network are selected in various ways in the form of vignettes or electronic tolls. Only in Slovakia, tractor and trailer can be together calculated, when is used in one road train and downgraded from category as it originally belonged according to the total weight and number of axles. In the case of a new EURO 6 road train it arises tax relief of 25 per cent for taxpayer, in the case of EURO 3 vehicle there is no relief. Relief arising in a case of a new vehicle is in the amount of € 558.25 per year.

The last cost item where there comes to a change of costs related to the operation of new vehicle, is a fuel consumption for new vehicles and consumption of technical urea in case of new vehicles. Newer vehicles are more economical in terms of fuel consumption. Thanks to the continuous improvement of engine, gear, aerodynamics etc. SCANIA manufacturer claims up to 8% of fuel saving. Secondly, the vehicles are equipped with an SCR, when is necessary to draw to the vehicle fuel and in addition the technical urea. This is a costs arisen only with vehicles with emission categories up EURO 4. In the case of a vehicle EURO 3 the cost of technical urea does not arises. The consumption of technical urea is based on the average fuel

consumption amounting to 7-8% for EURO 6 vehicle emission class. Taking into account that fuel consumption of EURO 3 vehicle is around 31 l / 100 km, of EURO 6 is about 28, 5 l / 100 km and additionally there is consumption of technical urea: 2 l / 100 km. The new vehicle with EURO 6 emission class is still more economical in terms of costs. For a distance of 100 km, almost 2 EUR can be saved, which in the case of an annual driving performance above 130,000 km can be nearly 2,600 EUR.

The aim of this study was to assess whether the resulting tax relief is motivation for buying a new car. Taking into account only the cost that are increasing, we can say that tax relief is not a sufficient motivation. As may be observed in Figure 7, the resulting tax benefit will not cover the cost of the service inspections and technical urea. To be able to say that the tax relief is motivation for buying a new car, this relief would have to at least cover these costs already mentioned. It would be achieved if the tax relief was higher than for example in the Czech Republic, where the relief is up to 48 per cent. It can be said that despite the fact that tax relief is not motivation for new vehicles, lower costs of operation are connected with, although the cost of the vehicle is high enough.

The created tax relief will not cover the cost of service inspections and technical urea for one year. It means that 25 per cent of reduction is not sufficient motivation for transport operators for the fleet modernization. One solution could be if the amount of this relief was higher and cover the minimum cost of service inspections and technical urea. At that case, it would be ideal to modernize the fleet also with a view to tolls and fuel consumption saving.

References

- [1] Act Nr. 361/2014 Col. Motor Vehicle Tax Act – Slovakia
- [2] Anderson, S. and Salle, J. M. (2016). Designing Policies to Make Cars Greener. *Annual review of resource economics*, vol. 8, pp. 157-180.
- [3] Cajchan, J., Ponisciakova, O. and Poliak, M. (2005). Slovak road transport from the point of view of sustainable development. *Komunikácie*, vol. 7, no. 3, pp. 68-71.
- [4] David, P. (2017). Environmental Tax. Are Vehicle Registers in the EU Prepared? *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, vol. 65, no. 1, pp. 273-282.
- [5] David, P. (2015). Fair and effective environmental road tax on passenger vehicles. Model spravlivé a efektivní environmentální silniční daní z osobních vozidel. *Ekonomický časopis*, vol. 63, no. 5, pp. 524-541.
- [6] Ferrer Mur, S. (2016). A suitable example of road pricing? | ¿Un ejemplo adecuado de tarificación vial? *Carreteras*, vol. 4, no. 207, pp. 5-17.
- [7] Florito, G. (2017). Carbon taxes to reduce CO2 emissions from road transport in Italy: Estimating and simulating province-level fuel demand. *International Journal Of Transport Economics*, vol. 44, no. 1, pp. 137-152.
- [8] Fung, Ch. (2017). Can we decentralize transport taxes and infrastructure supply? *Economics of Transportation*, vol. 9, pp. 1-19.

- [9] Hoen, M. and Schroten, A. (June 2016). Road taxation and spending in the EU. [Online]. Available: https://www.cedelft.eu/publicatie/road_taxation_and_spending_in_the_eu/1899
- [10] <https://www.emyto.sk/sk/elektronicke-myto/sadzby-myta-a-zlavy>
- [11] <http://www.myto.cz.eu/sk/mytny-system-2/sadzby-myta/index.html>
- [12] <http://www.adblue-sk.eu/adblue/informacie-o-adblue>
- [13] Jjugović, T P. (2018). Current carbon tax role in the choice of ecologically more acceptable transport mode. *European Transport: International Journal of Transport Economics, Engineering & Law*, vol. 97, pp. 493-499.
- [14] Konecny, V. and Petro, F. (2017). Calculation of Selected Emissions from Transport Services in Road Public Transport. *MATEC Web of Conferences*, vol. 134, 00026.
- [15] Konecny, V., Gnap, J. and Simkova, I. (2016). Impact of Fiscal Decentralization on Motor Vehicle Taxation in the Slovak Republic. *Transport and Telecommunication*, vol. 17, no. 1, pp. 28-39.
- [16] Ndiaye, Y. (2018). Road tax interactions among local governments: a spatial panel data analysis of the French case over the period 1984–2000. *Applied economics*, vol. 50, no. 38, pp. 4182-4196.
- [17] Poliak, M. (2013). The relationship with reasonable profit and risk in public passenger transport in the Slovakia | Vzťah primeraného zisku a rizika v hromadnej osobnej doprave na Slovensku. *Ekonomický časopis*, vol. 61, no. 2, pp. 206-220.
- [18] Poliak, M. and Konecny, V. (2008). Factors determining the electronic tolling scope of road network | Faktory determinujúce rozsah spoplatnenia cestnej infraštruktúry elektronickým mýtom. *Ekonomický časopis*, vol. 56, no. 7, pp. 712-731.
- [19] Poliakova, A. (2010). *Dane a poplatky v doprave a zasielateľstve*. Žilina, SK: EDIS – vydavateľstvo Žilinskej univerzity.
- [20] Santos, G. (2017). Road fuel taxes in Europe: Do they internalize road transport externalities? *Transport Policy*, vol. 53, pp. 120-134.
- [21] SCANIA R 450 journalistic test. <http://www.verkehrsrundschau.de/der-alte-will-es-noch-mal-wissen-1753637.html>
- [22] Sejkora, F. (2018). Analysis of impact of registration fee in the Czech Republic. *Analysis of impact of registration fee in the Czech Republic*, vol. 17, pp. 2118-2122.

IMPORTANCE OF AN EARLY-DETECTION INDEX IN THE ANALYSIS OF PUBLIC DEBT IN THE GLOBAL ECONOMY

Agnieszka Przybylska-Mazur^{1,a,*}

¹Department of Statistical and Mathematical Methods in Economics, University of Economics in
Katowice ul. 1 Maja 50, 40-287 Katowice, Poland

^aagnieszka.przybylska-mazur@ue.katowice.pl

*Corresponding author

Abstract. In conditions of globalization, in the face of increasing public debt, excessive deficit of the public finance sector, unfavorable demographic, social and ecological phenomena in many countries, the main problem is maintaining fiscal stability. The effects of high public debt are: increase of unemployment, decrease of GDP, lower wages, which inhibit the country economic growth. Many countries are aware of the negative economic consequences of excessive public debt. The early warning system has an important role in identifying excessive public debt. The excessive public debt has a negative impact on the global economy. It allows quick response on changes and it allows to counteract negative effects of excessive public debt, which often becomes a brake in the development of economies. Therefore, the aim of this paper is to use the early-detection index of fiscal stress taking into account fiscal variables and variables affecting the macroeconomic equilibrium. The fiscal stress index presented in this paper provides a signaling tool to assess exposure to fiscal sustainability risks and helps identify the factors underlying changes in fiscal stress risks. This is important tool to assess vulnerabilities. The results speak that the analysis of an early-warning composite index of fiscal stress is better than the analysis of individual variables. The fiscal risk thresholds are determined based on a signals approach. The analysis is based on the G7 countries, Russia and China.

Keywords: globalization, public debt, early-detection index, fiscal stress, global economy

JEL Classification: C60, E62, F65, H60, H63, O23

1. Introduction

In the realization of fiscal policy in the global economy, the attention of fiscal policy makers focuses on maintaining fiscal stability. To achieve this goal, it is important to determine the optimal level of public debt to limit the negative impact of excessive debt on the functioning of the state and the economy. We can read about successful debt reduction in different papers (see example: Baldacci et al., (2012)). Cherif and Hasanov analyze public debt dynamics (Cherif & Hasanov, 2017). Bussière (2013) write about debt in the aftermath of the financial crisis whereas Collard, Habib, Rochet analyze debt sustainability in advanced economies (Collard et al. 2015).

In addition the knowledge about fiscal stress signals is also important. The other authors write also about different aspect of fiscal stress and about fiscal episodes (see for example:

Afonso & Jalles, (2014), Magkonis & Tsopanakis (2016), Masten & Gnip, (2016), Thimmaraya & Venkateshwarlu, (2018)).

In this paper we used an early-warning indicator of fiscal stress incorporating fiscal variables to predict the fiscal stress episode. In this paper we used approach base on the signals analysis. The signals approach is based on the idea that economies behave in a systematically different way in periods preceding fiscal stress.

The focus is on the design of a possible early-warning system for group of countries that are one of the most important countries in the world in economic terms: the G7 countries, Russia and China. In defferent paper we can see the use of early warning system approach (see for axample: Dawood, Horsewood and Strobel (Dawood et al., 2017), Fuertes and Kalotychou (Fuertes & Kalotychou, 2006), (Fuertes & Kalotychou, 2007), Holopainen and Sarlin (Holopainen & Sarlin, 2015), Tsai (Tsai, 2013)).

2. Methods

The applied method requires four steps:

- 1) We have to precise definition of fiscal stress that is adopted in analysis;
- 2) We have to choose the set of variables which are thought to be relevant for prompting fiscal stress;
- 3) We have to determine critical thresholds for fiscal risk for each variable included in the analysis in order to maximize the signalling power of the model based on a selected mathematical criterion;
- 4) We have to calculate the composite early-warning indicator of fiscal stress.

All the steps are described below.

2.1 The definition of fiscal stress

There are various definitions of fiscal stress in the literature. For example for the purposes of the Fiscal Stress Monitoring System, Office of the State Comptroller (OSC) has defined fiscal stress as the inability of an entity to generate enough revenues within the current fiscal period to meet its expenditures. The System assesses each entity's budgetary solvency and it places units into one of four categories: significant fiscal stress, moderate fiscal stress, susceptible to fiscal stress and no designation. Because in the economic literature, fiscal stress is often defined as a debt crisis, we take into account this definition.

2.2 The variable used for the analysis

For analysis, we take into account general government gross debt to GDP ratio, as well as variables that have a significant impact on the level of general government debt:

- general government structural balance
The occurrence of general government balance and general government structural balance in subsequent periods are an important reasons for the rise of public debt.
- inflation

The higher inflation rate, the lower real debt servicing costs and the higher budget revenues. In addition, inflation increases the nominal GDP without increasing the nominal debt. Low inflation and deflation impede the public debt repayment.

- interest rate

The increase of interest rates is a threat for the budget and also affects the nominal debt servicing costs.

- GDP per capita
- GDP growth
- GDP in \$ current prices

We give often the public debt to GDP ratio, when we assess the level of public debt. When the GDP is higher, the public debt to GDP ratio is lower.

- the general government revenues
- the general government expenditures.

2.3 Methodology based on the signals approach

We determine the thresholds of fiscal stress for each of the variables using the signals approach. We calculate these optimal thresholds as the values that maximises the ability to predict fiscal stress episodes. We say that variable will send a fiscal-stress signal when the values of this variable are above (below) the optimal threshold for this variable, while a signal of no fiscal stress will send in the opposite case i.e. when the values of variable are below (above) the threshold. Based on historical data, signals sent by the variable for the different years and countries are compared to the historical record of fiscal stress episodes. We say that a signal is correct when k years ahead the variable signalled a fiscal stress or the variable signalled no-fiscal stress and this was indeed based on historical evidence. However, the signal is wrong when, a k years ahead, the variable did not signal the fiscal stress and the fiscal stress occurs (type II error) and when k years ahead the variable signaled a fiscal stress that did not occur (type I error). The four possible combinations of events are presented in Table 1.

Table 1: Possible cases based on type of signal sent by the variable at time $t-k$ and state of the world at time t

	Fiscal stress episode (FS)	No-fiscal stress episode (Nfs)
Fiscal stress signal	True Positive signal	False Positive (FP) signal (type I error)
No-fiscal stress signal	False Negative (FN) signal (type II error)	True Negative signal

Taking into account the specificity of the economies of individual countries, we determine optimal thresholds for individual variables and for individual countries. This distinguishes our analysis from the research of other authors.

For each variable i and for each country j the optimal threshold t_{ij}^* is the solution of minimization problem of total misclassification error for variable i and for country j . Therefore t_{ij}^* is the solution of following problem:

$$TME_{ij}(t_{ij}) \xrightarrow{t_{ij} \in T_{ij}} \min \quad (1)$$

The total misclassification error $TME_{ij}(t_{ij})$ for variable i and for country j is the sum of percentage of the error occurrence type II in fiscal stress episodes and the percentage of occurrence of error I type in the no - fiscal stress episodes. Thus we solve the following problem

$$\frac{FN_{ij}(t_{ij})}{Fs_{ij}} + \frac{FP_{ij}(t_{ij})}{Nfs_{ij}} \xrightarrow{t_{ij} \in T_{ij}} \min \quad (2)$$

where

T_{ij} - set of all values taken by variable i over all years in the panel and for given country j ,

$FN_{ij}(t_{ij})$ - total number of false negative signals sent by variable i over all years in the panel and for given country j based on threshold t_{ij} ,

$FP_{ij}(t_{ij})$ - total number of false positive signals sent by variable i over all years in the panel and for given country j based on threshold t_{ij} ,

Fs_{ij} - total number of fiscal stress episodes recorded in the data for variable i and for given country j ,

Nfs_{ij} - total number of no - fiscal stress episodes recorded in the data for variable i and for given country j ,

n - total number of variables used in the analysis.

In this paper we take into account total number of fiscal stress episodes and total number of no – fiscal stress episodes for individual variables because in practice these numbers vary across variables. This distinguishes our analysis from the studies carried out by the other authors (see for example Berti, Salto and Lequien (Berti et al., December 2012))

Next, for each variable i ($i = 1, 2, \dots, n$) and for each country j we calculate the signaling power z_{ij} from the following formula:

$$z_{ij} = 1 - \left(\frac{FN_{ij}(t_{ij}^*)}{Fs_{ij}} + \frac{FP_{ij}(t_{ij}^*)}{Nfs_{ij}} \right) \quad (3)$$

Since in Linear Time-Invariant (LTI) systems that we used for analysis, each discrete signal can be presented as a weighted sum of unit impulse sequences, so before defining the formula for a composite early-warning indicator of fiscal stress we define the following zero-one variables, which we will call the unit impulse sequences (Orfanidis, 1998):

$$d_{jt}^i = \begin{cases} 1 & \text{if a fiscal stress signal is sent at time } t \text{ by variable } i \text{ for country } j \\ & \text{for } t + k \text{ year} \\ 0 & \text{otherwise} \end{cases} \quad (4)$$

Thus we calculate a composite early-warning indicator of fiscal stress SO_{jt} for country j and year t from the following formula (Berti et al., December 2012):

$$SO_{jt} = \sum_{i=1}^n w_{ij} \cdot d_{jt}^i \quad (5)$$

where:

weights w_i are following:

$$w_{ij} = \frac{z_{ij}}{\sum_{k=1}^n h_{jt}^k \cdot z_{kj}}, \quad (6)$$

n - total number of variables used in the analysis,

z_{ij} - signaling power for variable i and for country j ,

h_{jt}^k is an indicator variable:

$$h_{jt}^k = \begin{cases} 1 & \text{if variable } k \text{ is observed for country } j \text{ at year } t \\ 0 & \text{otherwise} \end{cases} \quad (7)$$

Using signals approach we have to choose a signalling window k , i.e. the horizon ahead of the observation of the variables over which the fiscal stress prediction will be extended. We assume in our analysis the signalling window equals to $k = 1$. This means that the value of the variable at time t sed to predict fiscal stress one year ahead, at $t + 1$.

3. Results

In this paper we analyze the general government gross debt and variables that affect this debt and they are listed in chapter 2.2. We analyze the largest advanced economies in the world: countries from the G7 group (France, Japan, Germany, the United States, the United Kingdom, Italy, Canada), Russia and China. The analysis was based on data from the periods for wich data is available for all countries studied in this paper:

- general government gross debt to GDP ratio from periods 1992 - 2017
- inflation from periods 1992 - 2017
- GDP in \$ current prices from periods 1992 - 2017
- GDP per capita from periods 1992 - 2017
- GDP growth from periods 1990 - 2017
- general government structural balance from periods 2001 - 2017
- the general government revenues from periods 2001 - 2017
- the general government expenditures. from periods 2001 – 2017

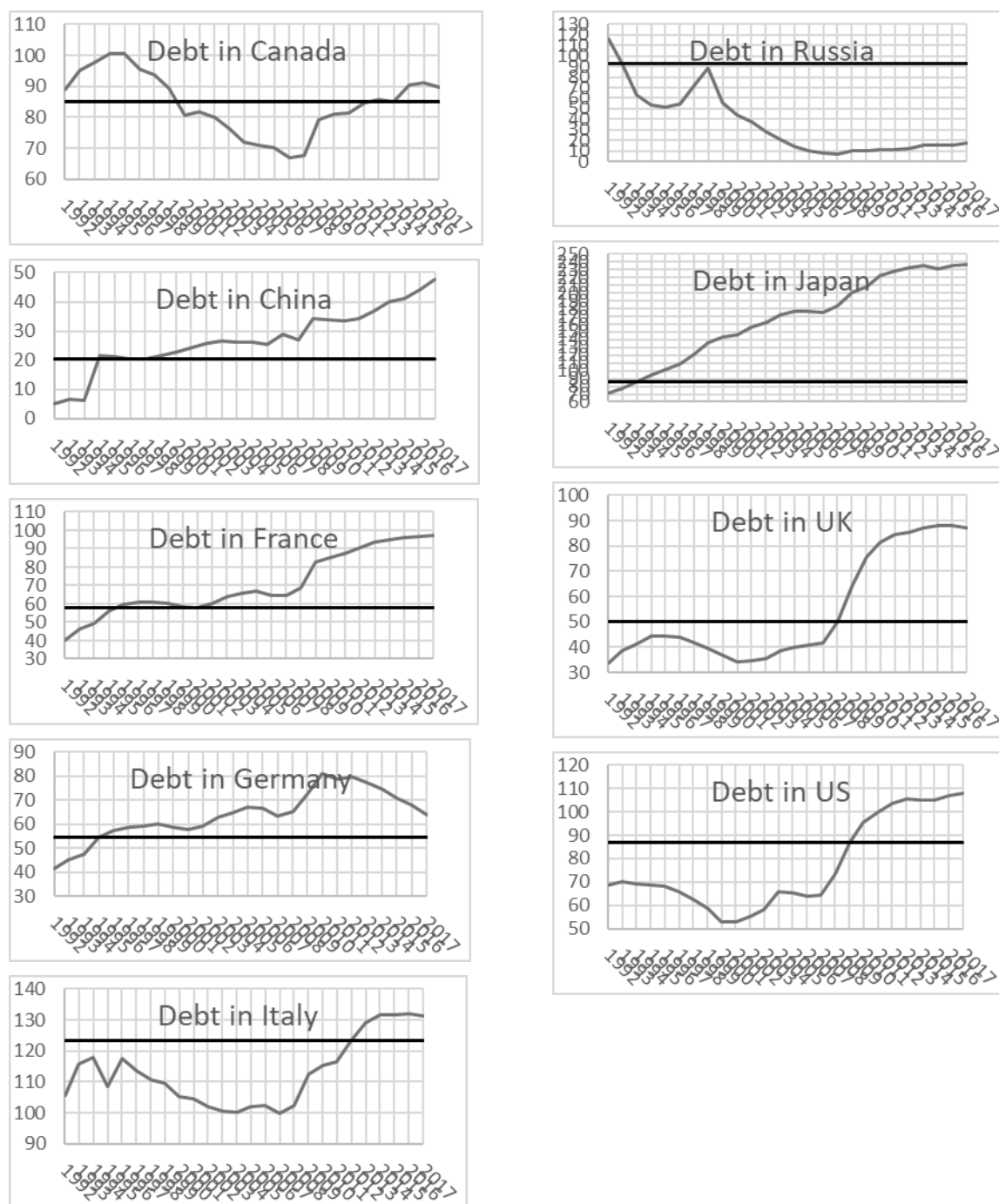
All these data comes from the database of the International Monetary Fund (source: <https://www.imf.org/en/Data>).

- interest rate from periods 2000 – 2017 (sources: <https://www.quandl.com/data>,

<https://www.global-rates.com/interest-rates>

We can see that Japan and Italy have the worst situation about the general government gross debt-to-GDP ratio, while the lowest ratios are in Russia, China, and in Germany since 2011. Since levels of general government gross debt to GDP ratios are significantly different in the analyzed countries, we calculate the optimal thresholds for individual countries. The real values of general government debt and the optimal thresholds for debt are presented in the following figure (the optimal thresholds are drawn with a black horizontal line)

Figure 2: The general government gross debt (as % GDP)



Source: Own calculation

Therefore we calculate the early-detection index for individual countries in the period 2002-2017. These results are presented in the table below.

Table 1: The early-detection index

Year	Early-detection indices in								
	Canada	China	France	Germany	Italy	Japan	Russia	UK	US
2002	0.55	0.63	0.88	0.79	0.61	0.50	0.44	0.43	0.43
2003	0.55	0.53	0.79	0.79	0.61	0.50	0.52	0.43	0.49
2004	0.42	0.41	0.55	0.79	0.36	0.50	0.32	0.43	0.49
2005	0.42	0.41	0.55	0.74	0.36	0.50	0.41	0.43	0.49
2006	0.42	0.41	0.55	0.74	0.36	0.60	0.32	0.43	0.43
2007	0.42	0.41	0.55	0.60	0.36	0.70	0.32	0.35	0.43
2008	0.42	0.41	0.55	0.52	0.24	0.70	0.32	0.35	0.55
2009	0.42	0.53	0.55	0.57	0.30	0.74	0.32	0.45	0.33
2010	0.40	0.53	0.55	0.54	0.30	0.78	0.30	0.52	0.52
2011	0.40	0.53	0.55	0.48	0.24	0.53	0.30	0.45	0.52
2012	0.40	0.53	0.44	0.39	0.24	0.53	0.30	0.45	0.52
2013	0.32	0.63	0.44	0.45	0.52	0.53	0.30	0.45	0.52
2014	0.44	0.63	0.53	0.45	0.52	0.61	0.30	0.36	0.55
2015	0.53	0.63	0.53	0.45	0.46	0.83	0.30	0.36	0.55
2016	0.53	0.47	0.53	0.45	0.46	0.83	0.30	0.36	0.55
2017	0.53	0.47	0.53	0.45	0.46	0.73	0.40	0.36	0.55

Source: Own calculation

5. Discussion

Analyzing the values of the calculated composite early-warning indicator of fiscal stress, we note that the true signals indicating a fiscal stress episode in the following year were sent in Japan in almost the entire period 2002-2017. The general government gross debt exceeded the optimal threshold for this country since 1994. The fewest signals were sent in Italy and in Russia (the composite early-warning indicators are the smallest in these countries). This is related to the fact that the real values of general government gross debt were lower than the optimal thresholds in these countries.

When we analyze each country in terms of the composite early-warning indicator, we can obtain information about ability to generate fiscal stress signals. We can see that the values of the early-warning indicator have increased in recent years in the US. This suggests increase the signaling power of the variables in this country. In addition, we observe an increase in general government gross debt in the US that is higher than the optimal threshold calculated for this country. An increasing number of variables that send the true fiscal stress signals occurs also in France and in China. In these countries there are also a upward debt trend. Moreover, the analyzed variables had the smallest signaling power in the UK and in Russia.

Therefore, we see that the composite early-warning indicator is an important signaling tool to assess exposure to fiscal stress and it indicates the existence of threats of fiscal stability. Therefore we calculate the early-detection index for individual countries in the period 2002-2017. These results are presented in the table below.

References

- [1] Afonso, A. and Jalles, J. T. (2014). Assessing fiscal episodes. *Economic Modelling*, vol. 37, pp. 255-270.
- [2] Baldacci, E., Gupta, S. and Mulas-Granados, C. (2012). Reassessing the fiscal mix for successful debt reduction. *Economic Policy*, vol. 27, no. 71, pp. 365-406.
- [3] Berti, K., Salto, M. and Lequien, M. (december 2012). An early-detection index of fiscal stress for EU countries. *Economic Papers*, 475.
- [4] Bussière, M. (2013). Sovereign Debt and Fiscal Policy in the Aftermath of the Financial Crisis: Introduction. *The Economic Journal*, vol. 123, no. 566.
- [5] Cherif, R. and Hasanov, F. (2017). Public debt dynamics: The effects of austerity, inflation, and growth shocks. *Empirical Economics*, vol. 54, no. 3, pp. 1087-1105.
- [6] Collard, F., Habib, M. and Rochet, J. (2015). Sovereign Debt Sustainability In Advanced Economies. *Journal of the European Economic Association*, vol. 13, no. 3, pp. 381-420.
- [7] Dawood, M., Horsewood, N. and Strobel, F. (2017). Predicting sovereign debt crises: An Early Warning System approach. *Journal of Financial Stability*, vol. 28, pp. 16-28.
- [8] Fuertes, A. and Kalotychou, E. (2006). Early warning systems for sovereign debt crises: The role of heterogeneity. *Computational Statistics & Data Analysis*, vol. 51, no. 2, pp. 1420-1441.
- [9] Fuertes, A. and Kalotychou, E. (2007). Optimal design of early warning systems for sovereign debt crises. *International Journal of Forecasting*, vol. 23, no. 1, pp. 85-100.
- [10] Holopainen, M. and Sarlin, P. (2015). Toward Robust Early-Warning Models: A Horse Race, Ensembles and Model Uncertainty. *SSRN Electronic Journal*.
- [11] Magkonis, G. and Tsopanakis, A. (2016). The financial and fiscal stress interconnectedness: The case of G5 economies. *International Review of Financial Analysis*, vol. 46, pp. 62-69.
- [12] Masten, I. and Gnip, A. G. (2016). Stress testing the EU fiscal framework. *Journal of Financial Stability*, vol. 26, pp. 276-293.
- [13] Orfanidis, S. J. (1998). Introduction to signal processing. Place of publication not identified: Prentice Hall.
- [14] Thimmaraya, R. B. and Venkateshwarlu, M. (2018). Dynamics of Financial Stress and Economic Performance.
- [15] Tsai, B. (2013). An Early Warning System of Financial Distress Using Multinomial Logit Models and a Bootstrapping Approach. *Emerging Markets Finance and Trade*, vol. 49 (Sup 2), pp. 43-69.

IMPACT OF GLOBALIZATION ON THE TRANSFER PRICING AFTER BEPS

Peter Rakovský^{1,a,*}

¹Univerzita Komenského v Bratislave, Právnická fakulta, Slovakia

^apeter.rakovsky@flaw.uniba.sk

*Corresponding author

Abstract. In the recent period of development in the international tax law area, new, revised versions of Base erosion was adopted and profit-shifting project (BEPS) was developed by the Organisation for Economic Co-operation and Development (OECD). BEPS refers to tax avoidance strategies that exploit gaps and mismatches in tax rules to artificially shift profits to low or no-tax locations. Under the inclusive framework, over 100 countries and jurisdictions are collaborating to implement BEPS measures and tackle BEPS. OECD transfer pricing guideline incorporates substantial revisions made in 2016 to reflect clarifications and revisions agreed in 2015. The main topic of this article is to provide a new view on the transfer pricing regulation after the revision of the transfer pricing guideline. This article consists of new rules, restrictions, which have in mind to protect tax incomes of states. Those rules must be applied and respected, so it is necessary to implement those rules to domestic tax laws of all OECD member states. Partial topics of this article include analysis of the principles connected with the risk assessment, applying the arm's length principle and other areas of the guideline, which contain many special anti-avoidance rules. An article also deals with the state aid and its connection with transfer pricing. It is necessary to provide a research of those rules to make sure that they will be applicable and helpful for tax administrations.

Keywords: transfer pricing, BEPS, arm's length principle, multinational enterprises, guideline

JEL Classification: K2 Regulation and Business Law

1. Introduction

The fact that the topic of the international taxation is today one of the most discussed among a legal professional public cannot be denied. Expertise in the European Union and OECD is a huge activity in the area of direct taxes, which is designed to protect the tax revenues of states and to prevent the transfer of profits to countries with a lower tax burden. Transfer pricing is can be defined as the price charged for transferring a corporation's intangible and tangible assets, goods or services, or raw materials between responsibility centres, segments or departments of the same company (Perčević & Hladika, 2017). The transfer pricing regulation has undergone a change in recent years, mainly due to the implementation of the transfer pricing rules that emerged in OECD/G20 project called BEPS.

2. Transfer pricing after BEPS

Because transfer pricing affects the economic welfare of a country as well as corporate tax revenue, governments in free economy countries pay considerable attention to the transfer price.

However, tax authorities in a country usually encounter difficulty when auditing internal transfer prices because MNEs have a strong incentive for tax evasion, attempting to retain as much profit as possible in a division located in a low tax jurisdiction by manipulating transfer prices (Matsui, 2011).

BEPS, as a tool for improvement transparency and tax collection, addressed (i) the way in which multinational enterprises (MNE) must and will have to take into account their already established transfer pricing processes while respecting the "where value was created" rule performed by members of the MNE; ii) the documentation process that must reflect the allocation of revenues, incomes and relevant economical activities; (iii) the ability of tax administrations to use transfer pricing rules as valuation provisions that are beneficial to a revenue sharing in different jurisdictions or as a tool against aggressive revenues transfer strategies. All measures in BEPS are aimed at a single bridging goal: reconciling the jurisdiction in which an income is reported for tax purposes with the place where the value is created (Cottani, 2018) (from which tax revenue is reported). For related companies, it is assumed that internal business relationships are not determined predominantly by the competing interests normally prevailing between unrelated third parties. Since transfer prices affect the tax burden in individual countries, the problem arises of the appropriateness of transfer prices between cross – border related companies. To address this, evaluation criteria as well as possibilities and guidelines for adjusting income were created (Ivanova, et al. 2017).

In general, it can be argued that the issue of transfer pricing is that it is a technically neutral concept (United Nations, 2013), but often referred to as abusive practice by MNE, which allows them to transfer profits to the so-called tax havens through incorrect transfer prices (Tavares et al., 2016).

There is a huge debate (Pankiv, 2009) in tax theory about the fact, if ALP is just a principle or an anti-avoidance rule too. The view that ALP is not an anti-avoidance rule is argued that it has been misidentified as the main tool to prevent the abusive behaviour of international companies. It is only referred to as a general rule or principle of the international tax law and tax treaties and its interpretation should be based on the general principles of interpretation laid down in of the Vienna Convention on the Law of Treaties (Lang, 2013). However, it is worth noting that the purpose of transfer pricing is not only to prevent abuse and avoidance tax liability. Its aim is also to prevent a double taxation.

The increased attention has been paid to transfer pricing since the year 2009, when the obligation of taxpayers to maintain a documentation of used transfer pricing method has been anchored (Váryová & Košovská, 2016). However, nowadays it is not easy to answer the question of where the transfer pricing adjustment should be. Its cornerstone - the arm's length principle (ALP) has also maintained the last revision of OECD transfer pricing guideline (guideline), which reflects the recommendations in the BEPS, and thus OECD member states have expressed their approval to continue to apply this principle. The decision to stay has striking consequences. Continuing risks of misuse of financial operations are therefore still

active and it is the role of states to cooperate with others and the task of the European Union and OECD to harmonize laws of countries as this is what the author of this article regards as key way to minimize tax evasion and thus abuse of financial transactions within MNE. On the other hand, there are also opinions, which argue that the arm's length principle plays a double role. On the one hand, it is an instrument to establish markets within hierarchical corporate structures. There is enough evidence to suggest that the arm's length principle is a failure in market creation, demonstrated by the slow but steady shift of transfer pricing rules from the search for comparables to other pricing methods (Ylönen & Teivainen, 2017).

One of the main goals of transfer pricing rules is to ensure that profit is taxed in countries where economic value is generated. The transfer pricing functionality is based on adjustments to the tax base by the difference that prices and conditions in controlled transactions differ from prices and conditions in uncontrolled transactions. We call this mechanism for the purpose of transfer pricing a primary adjustment to the tax base. In order to avoid undesirable consequences of a transfer pricing in the form of a double taxation in its economic or legal sense, it is necessary to refer simultaneously to the so-called corresponding adjustment to the tax base that balances the effects of applying ALP on the other side of the controlled transaction. An increase in a taxable tax base of one affiliated taxpayer should therefore also allow reduce a tax base of a second affiliated taxpayer, if the statutory conditions are met.

2.1 Abuse in transfer pricing

According to the European Commission, 72% of transfers of profits is taking place in the European Union through transfer pricing channels and the location of an intellectual property (European Commission. 2015). It is also recognized that less than whole ownership of subsidiaries generally makes MNEs want to shift profits away from minority shareholders. The literature on profit shifting, therefore, indicates that if co-owners of foreign production units are located in different jurisdictions, a transfer pricing problem arises (Gabrielsen, 1999).

The fact that the previous guideline was also vulnerable to manipulation and misuse was also noted by OECD itself (OECD, 2015). The amendment to the guideline combats its abuse by stricter rules for transactions involving intangible assets, the distribution of risk and the resulting assignment of profits to those risky transactions, which, however, often do not have to correspond to actual activities. It also sets new rules for restructuring transactions that are not commercially rational, fees, etc. It also deals with the subject of capital-rich entities, but without any other relevant business activities (cashboxes) that cannot control investment and risk and therefore under the guideline will not be entitled to excessive profits (Dessy et al., 2016). Cash boxes are companies with large equity and which perform no or minimum economically relevant activities, are mostly located in low-tax countries (Musselli, 2017) and have a minimum or no number of employees. We can see that tax rate is not the only one crucial factor in a simple newsvendor problem off for example off shoring (government behaviour, enforceability of law), but it influences the decisions of MNE considering the existence of after-tax profit (Wang, 2013.). Their typical activities are to provide loans to companies within the group or to finance the development of intangible assets. This is one of the risks involved in ensuring that transfer pricing results are in line with the value creation. Currently, the cash box definition can be taken vaguely and the answer now is, where a clear

line between the cash box and the empty shell is (Brauner, 2016). According to the OECD, cashboxes should be one of the greatest risks of international taxation (OECD, 2016).

Profits that such a company will be able to keep will not be equivalent or larger than a risk-free financial return. In addition, if this income will be qualified as an interest or other economically equivalent payment, rules set out in the fourth action of the BEPS will be applied.

From the first point of view, there are two contradictory facts - companies have large capital and do not carry out an economically relevant activity for which they receive excessive profits compared to the free market. In addition, such a company will not even take control of the financial risk of the transaction. Revenues may also be lower than risk-free financial returns, for example if the transaction is not economically rational. In this case, the transactional non-recognition rules may be applied. If such a company would like to receive a reward in the amount of a risk-linked return, it would have to perform the risk control functions. The responsibility for the risk and therefore the allocation of profits is allocated to the company in the group that carries out such activity, respectively. is able to perform.

In cases where taxpayers conclude a precisely defined transaction that does not capture its true economical nature or the determination of an independent price is too difficult it will not be considered for transfer pricing purposes and can be replaced by the tax authority. Non-recognition of the transaction may, moreover, be subject to dispute and double taxation. Therefore, any attempt to determine the transaction price in accordance with ALP must be commercially rational and that which would have been concluded between independent parties under comparable economic circumstances and not that we could only observe among independent parties (OECD, 2017). Non-recognition of transaction cannot occur if a comparative transaction between non-perpetrators is available.

2.2 State aid

Certain risks for ALP may also be tax incentives, agreements or otherwise state aid. This is the so-called selective tax advantage granted to a particular entity. The European Parliament notes that most member states spend large sums on tax incentives to provide businesses with a competitive advantage, but the European Commission believes that these attempts are threatened by the consequences of international tax planning in the three of the four Member States surveyed in the study (European Commission, 2015). The European Commission notes that such effects give small and medium-sized enterprises a competitive disadvantage, despite the high costs associated with a tax spending to support them, and that such results weaken the will of national policy-makers. It further notes that, due to tax planning, cross-border businesses are favoured over companies located in just one country because they do not use aggressive tax practices. Notes with concern that, with the equality of the other conditions, resulting lower tax liabilities to multinational companies, higher post-tax profits of MNE, creating unequal conditions compared to competitors in the single market who do not use aggressive tax planning and maintain the link between a place where they generate profits and place of taxation. It points out that this breach of the same conditions in favour of MNE is contrary to the basic principle of the single market (European Parliament, 2015). This affects the effective taxation of MNE. Avoidance of tax liability distorts competition, a non-optimal redistribution of tax revenues within the European Union which affects economic growth and employment. Currently, there are several state aid investigations. For example, on 21 October

2015 the European Commission officially alleged the Netherlands of granting illegal State aid to Starbucks Manufacturing in EU Decision SA. 38374. The Advance Pricing Agreement (APA) concluded between the Dutch tax administration and Starbucks Manufacturing would not be following European law. Remarkable however is that the European Commission, for the first time, alleges a Member State of providing State aid based on a misapplication of the so called „general principle of equal treatment in taxation “(Bram, 2018).

Must be noted, that dispute in the European Commission's tax investigations is not whether the national tax administrations can agree APAs with MNE as it is acknowledged that such rulings can often produce a more certain and thus better taxation environment, but rather whether the national tax administrations concluded APAs amount to illegal state aid prohibited under European union law (Gormsen, 2016).

3. Conclusion

Anti-avoidance rules and anti-avoidance measures are the prerogative of national legislations based on the application of a certain development of a legal doctrine and on the application of the doctrine of the superiority of content over the form and are applied unilaterally. Arm's length principle is a bilateral concept primarily aimed at an appropriately allocating (and adjusting) of profits between source countries and countries of residence/registered seat. Arm's length principle cannot be used only to deal with tax evasion practices. The role of arm's length principle in the context of the Model Tax Convention on Income and on Capital is to place the affiliated persons on the same tax basis as independent persons, regardless of the abusive or avoiding behaviour of any of these parties. Independently, however, it should be noted that the purpose of transfer pricing is not just to prevent abuse and avoidance. Its aim is also to prevent double taxation. Cooperation between countries in matter of preventing double taxation and non-taxation is necessary. States must act in favour of law and maximally reliable to protect their and also other states tax incomes. Must be said that for example OECD List of Unco-operative Tax Havens is really good way to make it happen. Transfer pricing rules must be applied responsibly and then structures which purpose is just tax avoidance, must be revealed.

Acknowledgment

This paper is an output of the science project APVV-16-0499, s názvom „Zabezpečenie efektívneho výberu daní v kontexte informatizácie. “

References

- [1] Brauner, Y. (2016). Changes? BEPs, Transfer Pricing for Intangibles, and CCAS. *Legal Studies Research Paper*. pp. 13. Available: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2744730
- [2] Cottani, G. (2017). *Transfer Pricing*. IBFD. pp. 2. Available: <http://www.africataxjournal.com/wp-content/uploads/2018/04/An-Overview-of-Transfer-Pricing-by-IBFD.pdf>

- [3] Dessy, M., et al. (2016). The Risky Side of Transfer Pricing: The OECD Base Erosion and Profit Shifting Reports Sharpen the Rules on Risk Allocation under the Arm's Length Standard. *IBFD*, no. 3-4, pp. 113.
- [4] European Commission. (2015). Staff working document. Corporate Income Taxation in the European Union. (SWD (2015) 0121). Available: https://ec.europa.eu/taxation_customs/sites/taxation/files/resources/documents/taxation/company_tax/fairer_corporate_taxation/swd_2015_121.pdf
- [5] European Commission. (2015), SME taxation in Europe – an empirical study of applied corporate income taxation for SMEs compared to large enterprises. Available: <http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+REPORT+A8-2015-0317+0+DOC+XML+V0//EN>
- [6] European Parliament. (2015). European Parliament resolution of 25 November 2015 on tax rulings and other measures similar in nature or effect (2015/2066 (INI)). p. 8,19,57. Available: <http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P8-TA-2015-0408+0+DOC+XML+V0//EN>
- [7] Gabrielsen, T., S. and Schjelderup, G. (1999). Transfer Pricing and Ownership Structure. *Scandinavian Journal of Economics*, vol. 101, no. 4, pp. 673.
- [8] Gormsen, L, L. (2016). EU State Aid Law and Transfer Pricing: A Critical Introduction to a New Saga. *Journal of European Competition Law & Practice*, vol. 7, no. 6, pp. 371.
- [9] Ivanova, N. G. et al. (2017). Transfer Pricing in Russia and Germany: Similarities and Differences. *45 Intertax*, no. 2, pp. 182.
- [10] Lang, M. (2013). Introduction to the Law of Double Taxation Conventions, 2nd ed., Linde, pp. 41.
- [11] Matsui, K. (2011). Intrafirm trade, arm's-length transfer pricing rule, and coordination failure. *European Journal of Operational Research*, vol. 212, no. 3, pp. 570.
- [12] Musselli, A. (2017). Transfer Pricing OECD Anti-Abuse Rules on Intangibles Clash with Economics of Contracts. At Arm's Length, Who Has the Right to Intangibles' Revenues When the Funder (Cash Box) of the Development Lacks Capability to Monitor the Developer's Activity? Available: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3035218
- [13] OECD. (2015). BEPS. Frequently Asked Questions, p. 53. Available: <http://www.oecd.org/ctp/beps-frequentlyaskedquestions.htm>
- [14] OECD. (2017). Inclusive Framework on BEPS. Progress report, pp. 16. Available: <https://www.oecd.org/tax/beps/inclusive-framework-on-BEPS-progress-report-july-2016-june-2017.pdf>
- [15] OECD. (2017). Transfer Pricing Guidelines for Multinational Enterprises and Tax Administrations. Available: https://read.oecd-ilibrary.org/taxation/oecd-transfer-pricing-guidelines-for-multinational-enterprises-and-tax-administrations-2017_tpg-2017-en#page1
- [16] Pankiv, M. (2017). Post-BEPS Application of the Arm's Length Principle to Intangibles Structures. *IBFD*, no. 11-12, pp. 12.

- [17] Perčević, H. and Hladika, M. (2017). Application of transfer pricing methods in related companies in Croatia. *Economic Research-Ekonomska Istraživanja*, pp. 613.
- [18] Tavares, R.J.S. et al. (2016). The Intersection of EU State Aid and U.S. Tax Deferral: A Spectacle of Fireworks, Smoke, and Mirrors, 21 Fla. *Tax Rev.*, no. 3, pp. 180.
- [19] United Nations. (2013). United Nations Practical Manual on Transfer Pricing for Developing Countries, para. 3.2.1. Available: <http://www.un.org/esa/ffd/wp-content/uploads/2017/04/Manual-TP-2017.pdf>
- [20] United Nations. (2005). *Vienna Convention on Law of Treaties*, 1969, Treaty Series, vol. 1155. Available: http://legal.un.org/ilc/texts/instruments/english/conventions/1_1_1969.pdf
- [21] Váryová, I. and Košovská, I. (2016). Transfer pricing of transactions between related parties in the Slovak Republic. *International Scientific Days 2016. The Agri-Food Value Chain: Challenges for Natural Resources Management and Society*, pp. 430.
- [22] Vos, B. (2018). State Aid, Taxation & Transfer pricing: Illegal Fiscal State Aid Granted to Starbucks ? *EC tax review*, vol. 27, no. 2, pp. 113.
- [23] Wang, Z. et al. (2016). Impact of taxation on international transfer pricing and offshoring decisions. *Annals of Operations Research*, vol. 240, no. 2, pp. 685.
- [24] Ylönen, M. and Teivainen, T. (2018). Politics of Intra-firm Trade: Corporate Price Planning and the Double Role of the Arm's Length Principle. *New Political Economy*, vol.23, no. 4, p. 445.

MERGER AND ACQUISITION EFFECTIVENESS: GLOBAL TRENDS AND DEVELOPMENT IN THE CZECH REPUBLIC

Mária Režňáková^{1,a,*}, Jan Pěta^{2,b}

^{1,2}Brno University of Technology, Faculty of Business and Management, Department of Finance,
 Kolejní 4, 612 00 Brno, Czech Republic

^areznakova@fbm.vutbr.cz, ^bpeta@fbm.vutbr.cz

*Corresponding author

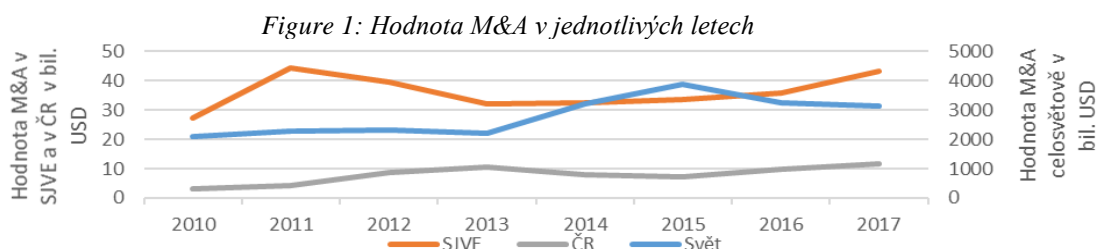
Abstract. Efforts to succeed in the global environment push companies to search for growth paths and sources. One option includes inorganic development in the form of a merger with another company, i.e. the merger or acquisition (M&A). The number and value of worldwide M&As are steadily increasing. Moreover, the results show an increased activity of Czech entities in terms of sales to foreign companies and purchasing foreign companies by Czech entities. This paper focuses on the M&A analysis in the Czech Republic in relation to the development on the global scale, emphasising the M&A effectiveness. As for the economic theory, the M&A should provide the owners with an increase in the value of a new company. Previous research used calculations based on the net present value or various cost-effectiveness calculations to determine the merged company value. Our research is based on a sample of 50 transactions occurring from 2004 to 2011. Their effectiveness was judged by whether the merger resulted in an increase in the value of the newly established company compared to the sum of two separate companies. This required determining the value before and after the merger. The paper discusses issues of company valuation, proposing methods of addressing them.

Keywords: merger and acquisition, global trends, effectiveness, company valuation,

JEL Classification: G34, G32, L25, F69

1. Introduction

Vývoj v oblasti fúzí a akvizic (M&A) ve světě i ve středoevropském regionu naznačuje neustálý růst zájmů i uzavřených obchodů. Hodnota realizovaných M&A je od roku 2014 vyšší než 3 bil. USD. Podobný trend je možné pozorovat i na vývoji v regionu střední a jihovýchodní Evropy (dále jen CEE), ve kterém se Česká republika pohybuje mezi třemi nejaktivnějšími zeměmi v regionu (společně s Polskem a Tureckem) – viz obrázek 1.



Source: vlastní zpracování dle EY (2012, 2014, 2016, 2018, A) and MergerMarket (2018)

Při hodnocení vývoje v regionu CEE můžeme konstatovat, že v ČR dosahuje podíl objemu investic do M&A k velikosti HDP nejvyšších hodnot a to již nepřetržitě od roku 2012. Celosvětový vývoj za první pololetí roku 2018 (1 939 bil. USD) naznačuje, že v letošním roce bude hodnota investovaných peněz do spojování podniků nejvyšší v dosavadní historii. Tato, dle našeho názoru již sedmá vlna, byla zřejmě vyvolaná nízkými úrokovými sazbami a přebytkem volného kapitálu, který vznikl u určitých typů subjektů. Obdobné závěry plynou i z výzkumu realizovaného společností EY (2018, B) v ČR koncem loňského roku. Každý pátý manažer uvedl, že v letošním roce vidí jako nejdůležitější bod svého programu identifikaci růstových příležitostí a to i v podobě M&A. Tomu nahrává i prognóza hospodářského vývoje v ČR (i když ji může ovlivnit zvyšování základní úrokové sazby ČNB, která naposledy proběhla na začátku srpna 2018, kdy byla tato sazba zvýšená na hodnotu 1,25 %). Dle vyjádření manažerů podniků jsou nejvýznamnějším důvodem pro spojování podniků inovace a získání odborných pracovníků. Jen 27 % manažerů hodlá investovat na tuzemském trhu. Zbytek hodlá realizovat transakci v zahraničí a dokonce 44 % manažerů hodlá investovat mimo region střední Evropy (EY, 2018, B). Toto částečně potvrzují i data za realizované transakce v minulém roce. Tuzemských investic bylo méně než polovina, investice plynoucí ze zahraničí do ČR a naopak jsou takřka vyrovnané (EY, 2017). Skutečné výsledky po spojení nepotvrzují ve všech případech dosažení prezentovaných (očekávaných) záměrů. Některé výzkumy dokonce uvádí, že synergie plynoucí ze spojení neexistují. Martynova a Renneboog (2008) provedli analýzu studií zabývajících se M&A a zjistili, že 14 z 26 studií identifikovalo pokles hodnoty nově vzniklé společnosti. Gugler a kol. (2003) zkoumali 1 250 M&A z let 1981 - 1998. Pět let po spojení došlo průměrně ke snížení tržeb o 14,5 % oproti hodnotě, která byla před transakcí. Cartwright a Schoenberg (2006) ve svém výzkumu zjistili, že jen 35 – 45 % transakcí dosáhne růstu výnosů dva až tři roky po realizaci spojení. Otázkou efektivnosti M&A jsme se zabývali i v našem výzkumu, který je zaměřen na vyčíslení hodnoty synergie. Cílem tohoto příspěvku je prezentovat návrh postupu stanovení hodnoty synergií při spojení veřejně neobchodovatelných společností.

2. Stanovení hodnoty synergií

Na základě literární rešerše je možné identifikovat dva základní způsoby identifikace synergií dosažených realizací M&A. Prvním je výzkum na základě sledování finančních poměrových ukazatelů, které prokazují změny ve vývoji nově vzniklé společnosti po fúzi. Druhým je zvýšení hodnoty nově vzniklé společnosti oproti součtu hodnot spojovaných samostatně stojících společností (tato bude dále označovaná jako teoretická hodnota).

2.1 Synergie identifikována na základě finančních poměrových ukazatelů

Tento směr výzkumu je zaměřen na zjištění, zda nastala statisticky významná změna v hodnotách sledovaných finančních ukazatelů. Často byly analyzovány ukazatele rentability (např. Houston a kol., 2001; Harford, 2005 nebo Shim, 2011). Healy a kol. (1992) svůj výzkum zaměřili na zkoumání změn v ukazatelích peněžního toků, které by měly být dosaženy v důsledku růstu provozní ziskové marže, obrátkovosti aktiv nebo poklesem nákladů na zaměstnance. Pozitivní efekt spojení se projevil pouze u snížení počtu zaměstnanců. Sedláček a kol. (2013) se také zaměřili na analýzu finančních ukazatelů, konkrétně hodnoty celkových aktiv, obchodní marže, nerozděleného zisku minulých let, osobních nákladů a dalších ukazatelů. Jejich výzkum nepotvrdil předpokládaný růst hodnoty celkových aktiv;

zvýšení bylo dosaženo v ukazatelích nerozděleného zisku a obchodní marže zkoumaných společností. Negativní efekt identifikovali u osobních nákladů, tj. jejich zvýšení (Sedláček a kol., 2013).

2.2 Synergie identifikována na základě její hodnoty

Ke stanovení hodnoty synergií vede několik metod. Mařík (2011, str. 455) využívá k výpočtu **čistou současnou hodnotu** (dále jen „ČSH“). Hodnotu synergií podle něj je možné zjistit jako rozdíl ve zvýšení hodnoty nově vzniklé společnosti oproti součtu dvou samostatných společností tj. hodnota synergie = hodnota_(AN) – (hodnota_(A) + hodnota_(N)). Přičemž je hodnota spojovaných podniků (A, N) i nově vzniklého podniku (AN) stanovena metodou diskontovaných peněžních toků. V souladu s Damodaranem (2002, str. 984) předpokládá, že peněžní toky by se měly realizací fúze zvýšit, především z důvodu dosažení úspor nákladů a daní, přírůstku výnosů a změn ve financování. Ke stanovení hodnoty synergie je potřebné vypočítat hodnotu kupované, kupující a nově vzniklé společnosti. Sedláček a kol. (2013) uvádí, že při výpočtu hodnoty synergie vzniklé spojením by měly být zohledněné náklady na spojení společností, tj. ČSH = Hodnota_{AN} – Platba_N – Hodnota_A. Tento přístup naráží na skutečnost, že hodnota uzavřených obchodů není zpravidla zveřejňována. Obdobný přístup k výpočtu hodnoty synergií použili i Houston a kol. (2001) kteří zkoumali současnou hodnotu uspořené nákladů, resp. získaných výnosů po dani z příjmů a porovnávali ji s náklady spojenými s restrukturalizací společnosti.

Nejrozšířenějším přístupem ke stanovení hodnoty synergií je prognóza cash flow na základě **volného cash flow** generovaném firmou (FCF). FCF je možné počítat následujícím způsobem - viz Damodaran (2002):

$$FCF = PVH \cdot (1 - d) + O - \Delta SA - \Delta PK \quad (1)$$

kde *PVH* je provozní výsledek hospodaření, *d* je sazba daně z příjmů právnických osob, *O* jsou odpisy, *ΔSA* jsou investice do stálých aktiv (dlouhodobého majetku), *ΔPK* je změna (investice do) pracovního kapitálu.

Další metodou ke stanovení hodnoty synergií je metoda **kapitálového cash flow** (CCF), navrženým autory Kaplan a Ruback (1995). Na rozdíl od předešlé metody je samostatně vyčíslen úrokový daňový štít. Tento postup následně využívá Devos a kol. (2009), který jej počítá dle vzorce:

$$CCF = [T \cdot PM \cdot (1 - d)] - I + (D \cdot i_{SD} \cdot d) \quad (2)$$

kde *T* jsou tržby, *PM* je provozní zisková marže, *d* je sazba daně z příjmů, *I* jsou investice do dlouhodobého majetku a pracovního kapitálu po odečtení odpisů (investice netto), *D* je dlouhodobý dluh a *i_{SD}* je výnosová míra 10 letých dluhopisů.

Uvedený výpočet vychází z předpokladu, že zápůjční a výpůjční úroková míra je stejná a odpovídá hodnotě výnosové míry z desetiletých státních dluhopisů. Stejný postup použili i Gilson a kol. (2000); na rozdíl od předešlých autorů zdůrazňují nutnost upravit provozní výsledek hospodaření o odpisy, odložené daně a výnosy z prodeje aktiv (po zdanění); další postup je již stejný.

Hodnota podniku je pak současnou hodnotou budoucích kapitálových cash flow – viz Devos a kol. (2009):

$$PV(CCF) = \sum_{t=0}^n \frac{CCF_t}{(1+i)^t} + \frac{CCF_n \cdot (1 + Inf)}{(i - Inf) \cdot (1 + i)^n} \quad (3)$$

kde i jsou náklady na vlastní kapitál, Inf je míra inflace, t jsou jednotlivé roky a n je počet let, za které se synergie hodnotí.

3. Metodologie

Jak již bylo uvedeno, v našem výzkumu jsme se zaměřili na stanovení hodnoty synergie vzniklé fúzí. K tomu je nutné určit hodnoty samostatně stojících společností před fúzí a hodnotu nově vzniklé společnosti po fúzi. Výzkum jsme realizovali na základě dat podniků v České republice, které nejsou veřejně obchodovatelné. Výzkumný vzorek byl stanoven na základě následujících kritérií:

- fúze byla realizována společnostmi se sídlem v České republice v letech 2004 až 2011;
- fúze byla pro každou společnost jediná v období 7 let (tři roky před fúzí, rok fúze a tři roky po fúzi).
- finanční výkazy kupované i kupující společnosti jsou veřejně dostupné (zveřejněny na portálu www.justice.cz).

Podle databáze Bisnode splnilo výše uvedená kritéria 614 fúzí, přičemž takřka třetina jich byla ve zpracovatelském průmyslu, který zahrnuje 24 rozmanitých odvětví. Ve snaze eliminovat odlišný vývoj jsme se zaměřili jen na strojírenství (CZ-NACE 25 a 28). V uvedených oborech definované kritéria splňovalo 50 fúzí, do kterých bylo zapojeno celkem 102 podniků. Polovina fúzí proběhla formou horizontální integrace, tj. spojením subjektů působících ve stejném oboru a polovina formou vertikální integrace, tj. spojením mezi dodavateli a odběrateli.

Hodnota společností byla stanovena metodou diskontovaného CCF. CCF jsme stanovili podle následujícího postupu (Ruback, 2002; Devos a kol., 2009):

$$CCF = [T \cdot PM \cdot (1 - d)] - \Delta DM - \Delta \check{C}PK + (i_d \cdot d \cdot D) \quad (4)$$

kde T jsou tržby, PM je provozní marže, d je sazba daně z příjmů, ΔDM je meziroční změna v hodnotě dlouhodobého majetku, $\Delta \check{C}PK$ je meziroční změna čistého pracovního kapitálu, D je dluh a i_d je výnosová míra 10 letých dluhopisů. Hodnota $T \cdot PM \cdot (1 - d)$ vyjadřuje provozní zisk po zdanění a $i \cdot d \cdot D$ úrokový daňový štít.

Hodnota společnosti byla vypočtena pro každou společnost zvlášť k 31. prosince roku $t-1$, tj. rok před fúzí na základě vzorce (3). Míra inflace odpovídala ČR a byla převzata z dat MMF. Hodnota spojovaných společností byla stanovena na základě predikce budoucího vývoje následujícím postupem:

- hodnoty ukazatelů tržeb a provozní marže byly lineárně interpolovány,
- investice do dlouhodobého majetku, ČPK a hodnota úrokových nákladů byly vypočítány v souladu s Maříkem (2011, str. 137) jako průměr za tři roky před fúzí a
- sazba daně z příjmů odpovídá sazbě daně z příjmů platné v konkrétním roce.

Hodnota společnosti vzniklé fúzí (H_{AN}) je stanovena na základě skutečných hodnot jednotlivých ukazatelů, které byly čerpány z účetních výkazů společnosti. Při výpočtu

pokračující hodnoty jsme předpokládali růst hodnoty CCF na úrovni očekávané inflace. Tento postup je v souladu s postupem, který použil Devos a kol. (2009). Stejní autoři tvrdí, že společnosti po fúzi by měly být schopny využít možností daňového štítu, zvýšení pákového efektu nebo jiných výhod vedoucích ke zvýšení zisku pro vlastníky. Z tohoto důvodu je využita metoda diskontování na úrovni vlastních nákladů metodou CAPM. Jelikož je výzkum zaměřen na hodnotu společností, které nejsou veřejně obchodovány, byl použit koeficient beta investorů, kteří nedokážou diverzifikovat své portfolio na kapitálovém trhu, tzv. total beta v oboru strojírenství pro Evropu ve výši 3,17 (Damodaran, 2012). Hodnota synergie byla následně stanovena jako rozdíl mezi hodnotou společnosti vzniklé fúzí oproti součtu dvou samostatně stojících společností, tj. hodnota synergie = $hodnota_{(AN)} - (hodnota_{(A)} + hodnota_{(N)})$.

4. Výsledky výpočtu synergií

Hodnota synergií byla vypočtena podle výše uvedeného postupu pro všechny společnosti, které byly zapojeny do výzkumu. Celkem byla stanovena hodnota 152 společností (102 vstupujících do fúze, 50 nově vzniklých společností). Postup stanovení hodnoty společnosti před fúzí je naznačen v tabulce č. 1.

Table 1: Postup stanovení hodnoty společnosti

Roky	Skutečná data			Prognóza				Pokračující hodnota
	-3	-2	-1	0	1	2	3	
Tržby	123 805	124 282	122 412	121 727	121 046	120 368	119 694	
VH po dani	10 689	12 279	17 402	17 082	16 986	16 891	16 796	
DM netto	31 022	36 870	29 415	31 955	31 776	31 598	31 421	
Investice do DM	x	5 848	-7 455	2 540	-179	-178	-177	
ČPK	26 750	23 853	40 044	29 828	29 661	29 495	29 330	
Investice do ČPK	x	-2 897	16 191	-10 216	-167	-166	-165	
Nákladové úroky	1 100	345	0	723	723	723	723	
Daň z příjmů PO				0,24	0,21	0,20	0,19	
CCF				20 832	13 917	14 001	14 084	
Diskontní sazba				0,21	0,21	0,20	0,18	0,16
Diskontované CCF				17 232	9 570	8 192	7 273	43 466

Source: vlastní zpracování

Z výpočtu vyplývá, že předmětná společnost měla v posledním roce před fúzí výrazně navýšenou hodnotu ČPK. Způsobeno to bylo nárůstem oběžných aktiv o 10 mil. Kč (zejména zásoby) a poklesem závazků o 6 mil. Kč, při mírně klesajících tržbách (- 0,56 %). Pokud by tento trend byl zachován i v budoucnosti, podnik by plýtl svým kapitálem jeho vázáním v oběžném majetku. Takovýto vývoj by byl dlouhodobě ekonomicky neúnosný. Jak již bylo uvedeno, prognóza ČPK byla provedena na základě průměrných hodnot před fúzí. To by znamenalo, že by společnost měla v roce realizace fúze mít ČPK ve výši 29 828 tis. Kč, tj. desinvestovat částku 10,2 mil. Kč. U dlouhodobého majetku by mělo dojít k investici 2,5 mil. Kč, a to především z důvodu desinvestice (vyřazení majetku) v posledním roce před fúzí. Vzhledem k tomu, že se jednalo o stanovení hodnoty společnosti, která byla koupená v roce 2008, byla hodnota stanovena k 31. 12. 2007, a to ve výši 85,7 mil. Kč. Obdobně byla stanovena hodnota kupující společnosti k 31. 12. 2007 a to ve výši 77,5 mil. Kč. U této společnosti docházelo ke značným investicím před fúzí (zejména do samostatných movitých věcí), což se projevilo v hodnotě koeficientu investiční náročnosti: koeficient investiční náročnosti do DM převyšoval trojnásobně průměrné hodnoty kupujících společností.

Teoretická hodnota nově vzniklé společnosti je součtem hodnot kupované a kupující společnosti, tj. je ve výši 163,2 mil. Kč. U 50 nově vzniklých společností (po realizaci fúze) byla hodnota stanovena na základě skutečných dosažených dat zveřejněných v účetních výkazech. Tento postup bylo nutné zvolit z důvodu, že se jednalo o nově vzniklé společnosti, tj. neexistují informace o minulém vývoji. Skutečný vývoj nové společnosti vzniklé spojením výše popsaných firem byl nevyrovnaný – viz tab. č. 2.

Table 2: Skutečné hodnoty, podle kterých byla stanovena hodnota nově vzniklé společnosti

Roky	-1 ^{*)}	0	1	2	3
VH po dani	36 113	-2 125	264	5 081	15 757
DM netto	118 254	92 522	80 727	69 630	62 454
Investice do DM	x	-25 732	-11 795	-11 097	-7 176
ČPK	92 464	51 071	35 025	37 647	46 888
Investice do ČPK	x	-41 393	-16 046	2 622	9 241

^{*)} hodnoty za rok -1 představují součet za spojované společnosti rok před fúzí

Source: vlastní zpracování

Důvodem poklesu VH po dani bylo snížení tržeb o 102 mil. Kč vůči roku před fúzí, přičemž náklady neklesaly proporcionálně především z důvodu pomalejšího poklesu výkonové spotřeby a mzdových nákladů. Společnost v roce realizace fúze snížila hodnotu dlouhodobého majetku prostřednictvím odpisů, opravných položek a přeceněním dlouhodobého majetku. Obdobně snížila i ČPK o více než 41 mil. Kč. Hodnota společnosti po realizaci fúze je 132 mil. Kč, což je o 19,15 % méně, než by měla být teoretická hodnota, tj. byla realizována negativní synergie ve výši 31,2 mil. Kč. Poznamenáváme, že pokud by ke snížení majetku nedošlo, hodnota by klesla ještě víc. Stejným způsobem byla stanovena hodnota synergických efektů u všech společností. U většiny zkoumaných synergií došlo k negativní synergii, což nekorespondovalo s výsledky hodnocení dle finančních poměrových ukazatelů (viz Režňáková a Pěta, 2016). Důvody lze shrnout následovně:

- negativní vývoj tržeb před fúzí vedl k predikci, která způsobovala snižování tržeb, tj. útlum činnosti společnosti,
- historický podíl dlouhodobého majetku, resp. ČPK na tržbách vedl k nelogickému vývoji v rámci predikce,
- predikce hodnoty CCF pro poslední rok první fáze ovlivňovala výši pokračující hodnoty a to tak, že tvořila více než 90 % z celkové hodnoty společnosti.

5. Návrh úprav metody stanovení hodnoty společností pro účely výpočtu hodnoty synergie

I když ke stanovení hodnoty podniků byl použitý stejný postup, zjistili jsme, že z důvodu rozmanitosti zkoumaných společností není možné postup úplně standardizovat. Při stanovení hodnoty některých spojovaných podniků bylo potřebné postup výpočtu upravovat, protože vývoj před fúzí by nebylo možné v budoucnosti dlouhodobě udržet. Stanovená hodnota podniků na základě extrapolace minulých výsledků by pak byla značně zkreslena. Lze se domnívat, že podniky se již několik let před fúzí připravovaly na spojení, svůj majetek i náklady konsolidovaly, případně výrazně investovaly do obnovy majetku. Na základě výše popsaných problémů nebylo možné postupovat jednotně při určování hodnoty synergie. Hlavním důvodem těchto nedostatků bylo použití historického lineárního trendu při stanovení hodnoty společností, který jsme použili v souladu s Devos a kol. (2009). Tyto problémy je nutné odstranit na základě podrobné analýzy minulého vývoje a identifikací anomálií, které jej

způsobují. Navrhujeme následující postup úprav výpočtu hodnoty parametrů vstupujících do ocenění společností:

- **vývoj tržeb** – v případě klesajících tržeb v důsledku nepříznivého vývoje externího prostředí (pokles celého odvětví) byla prognóza tržeb korigována na základě skutečného vývoje odvětví pro období prognózy CCF ohodnocované společnosti.
- **vývoj dlouhodobého majetku** – některé společnosti před fúzí odprodávaly svůj majetek. Predikce jeho vývoje byla provedena na základě koeficientu investiční náročnosti tržeb, čímž došlo k predikci minulého trendu do budoucna, což vedlo k prognóze záporných investic. Tento trend byl však dlouhodobě neudržitelný. Z toho důvodu jsme navrhli korigován vývoj majetku podle historického poměru odpisů k tržbám konkrétního podniku. Kromě toho, ve vzorku byly společnosti, které měly koeficient investiční náročnosti příliš vysoký. Zachování jeho hodnoty do budoucna by naopak vedlo k příliš vysokým investicím, které by společnost nebyla schopna plně využívat a generovat z něj odpovídající tržby. Z toho důvodu byly hodnoty koeficientu nahrazeny průměrnými hodnotami za skupinu kupujících (25 % z tržeb) a kupovaných společností (33 % z tržeb).
- **poměr čistého pracovního kapitálu k tržbám** – příliš vysoká hodnota tohoto poměru znamená, že podnik drží vysoká oběžná aktiva, případně byla hodnota koeficientu záporná. U jednotlivých společností bylo nutné zkoumat, o kterou část oběžných aktiv se jedná a jakým způsobem je možné jejich přebytek snížit, případně provést analýzu výše krátkodobých závazků. Opět jsme použili stejnou úpravu jako v předešlém případě, tj. použili jsme průměrnou hodnotu ukazatele, která byla u kupovaných i kupujících společností stejná (13 % z tržeb).

6. Conclusion

V našem výzkumu jsme zjišťovali, zda pro stanovení hodnoty společností, resp. pro výpočet hodnoty synergií je možné používat stejné předpoklady, jako použili jiní autoři (konkrétně extrapolace minulého vývoje lineárním trendem). Po stanovení hodnoty společností zapojených do fúze uvedeným způsobem se vyskytlo několik problémů. U kupované, resp. kupující společnosti především z důvodu historického vývoje jednotlivých ukazatelů, u společností nově vzniklých realizací fúze na základě skutečného vývoje v letech po fúzi. U všech tří typů společností se problémy vyskytovaly hlavně u predikce tržeb, dlouhodobého majetku a čistého pracovního kapitálu. Proto jsme navrhli pro výpočet investic do dlouhodobého majetku a čistého pracovního kapitálu použití průměrných hodnot za skupinu podniků, které byly předmětem analýzy, případně odvětvové hodnoty (v případě prognózy růstu tržeb).

Acknowledgment

Příspěvek je výstupem projektu specifického výzkumu „Predikční modely ve financích: analýza faktorů a predikce bankrotu, výkonnosti a hodnoty podniku“, financovaného Interní grantovou agenturou Vysokého učení technického v Brně s registračním číslem FP-S-18-5234.

References

- [1] Cartwright, S. and Schoenberg, R. (2006). Thirty Years of Mergers and Acquisitions Research: Recent Advances and Future Opportunities. *British Journal Of Management*, vol. 17, no. 1, pp. S1 - S5.

- [2] Damodaran, A. (2002). *Investment Valuation: Tools and Techniques for Determining the Value of any Asset*, 2nd ed. New York: John Wiley.
- [3] Damodaran, A. (2012). Total Beta Europe 11 [Online]. Available: <http://www.stern.nyu.edu/~adamodar/pc/archives/totalbetaEurope11.xls>
- [4] Devos, E., Kadapakkam, P. R. and Krishnamurthy, S. (2009). How Do Mergers Create Value? A Comparison of Taxes, Market Power, and Efficiency Improvements as Explanations for Synergies, *Review of Financial Studies*, vol. 22, no. 3, pp. 1179 - 1211.
- [5] EY. (2012). M&A Barometer 2011 [Online]. Available: <https://1url.cz/@MA2011CSE>
- [6] EY. (2014). M&A Barometer 2013 [Online]. Available: <https://1url.cz/@MA2013CSE>
- [7] EY. (2016). M&A Barometer 2015 [Online]. Available: <https://1url.cz/@MA2015CSE>
- [8] EY. (2017). M&A Barometer 2017 [Online]. Available: <https://1url.cz/@MA2017CZE>
- [9] EY. (2018,A).M&A Barometer 2017 [Online]. Available: <https://1url.cz/@MA2017CSE>
- [10] EY. (2018,B). Barometr investiční důvěry [Online]. Available: <https://1url.cz/@BID>
- [11] Gilson, S. C., Hotchkiss, E. S. and Ruback, R. S. (2000). Valuation of Bankrupt Firms. *Review of Financial Studies*, vol. 13, no. 1, pp. 43 - 74.
- [12] Gugler, K., Mueller, D. C., Yurtoglu, B. B. and Zulehner, C. (2003). The Effects of Mergers: an International Comparison. *International Journal of Industrial Organization*, vol. 21, no. 5, pp. 625 - 653.
- [13] Harford, J. (2005). What Drives Merger Waves? *Journal of Financial Economics*, vol. 77, no. 3, pp. 529 - 560.
- [14] Healy, P. M., Palepu, K. G. and Ruback, R. S. (1992). Does Corporate Performance Improve after Mergers? *Journal of Financial Economics*, vol. 31, no. 2, pp. 135 - 175.
- [15] Houston, J. F., James, C. M. and Ryngaert, M. D. (2001). Where do Merger Gains Come from? Bank Mergers from the Perspective of Insiders and Outsiders. *Journal of Financial Economics*, vol. 60, no. 2 - 3, pp. 285 - 331.
- [16] Kaplan, S. N. and Ruback, R. S. (1995). The Valuation of Cash Flow Forecasts: An Empirical Analysis. *The Journal of Finance*, vol. 50, no. 4, pp. 1059 - 1093.
- [17] Martynova, M. and Renneboog, L. (2008). A Century of Corporate Takeovers: What have we Learned and Where do we Stand? *Journal of Banking*, vol. 32, no. 10, pp. 2148 - 2177.
- [18] Mařík, M. (2011). *Metody oceňování podniku: proces ocenění - základní metody a postupy* (3. upr. a rozš. vyd.). Praha: Ekopress.
- [19] MergerMarket. (2018). Global & Regional M&A Report FY 2017 [Online]. Available: <https://1url.cz/@MAreport>
- [20] Režňáková, M. and Pěta, J. (2016). Efficiency of Mergers of Mechanical Engineering Companies in the Czech Republic. *Review of Economic Perspectives*, vol. 16, no. 4, 361-374.
- [21] Ruback, R. S. (2002). Capital Cash Flows: A Simple Approach to Valuing Risky Cash Flows. *Financial Management*, vol. 31, no. 2, pp. 85-103.
- [22] Sedláček, J., Valouch, P. and Konečný, A. (2013). Synergic Motives and Economic Success of Mergers of Czech Companies. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, vol. 61, no. 7, pp. 2721 - 2727.
- [23] Shim, J. (2011). Mergers & Acquisitions, Diversification and Performance in the U.S. Property-Liability Insurance Industry. *Journal of Financial Services Research*, vol. 39, no. 3, pp. 119 - 144.

STRATEGIC COST MANAGEMENT IN BUSINESSES

Žaneta Rylková^{1,a,*}, Jarmila Šebestová^{2,b} and Petra Krejčí^{3,c}

¹Silesian University in Opava, SBA Karvina, Czech Republic

²Silesian University in Opava, SBA Karvina, Czech Republic

³Silesian University in Opava, SBA Karvina, Czech Republic

^arylkova@opf.slu.cz, ^bsebestova@opf.slu.cz, ^ckrejci@opf.slu.cz

*Corresponding author

Abstract. Strategic management through which business management directs its enterprise to a strategic goal is an important prerequisite for the success of an enterprise in globalization. Particular importance has the strategic cost management where cost monitoring and cost management are perhaps the most important prerequisites for the successful development of business entities. Business costs affect business performance, growth and market position. Business entities should be able to identify factors that influence cost management and should manage these factors as well. It is important to note that not every enterprise that achieves a positive economic result works economically. Many enterprises do not have system of cost management and control, which may be related to their economic literacy. Based on an analysis of secondary sources it was found, that small and medium-sized enterprises do not implement forward-looking cost calculations, which would be directed to targeted cost control and should be an incentive for cost-effective business utilization. The aim of the contribution is to identify the key factors of business management, especially in the area of economic literacy, which have an impact or can influence the management of the corporate costs. In addition, the article aims to identify deficiencies in the company cost management. The study proposes areas, which could be improved in cost management through the analysis of secondary sources and the results of the survey carried out among enterprises in the Czech Republic in 2017. The primary study is based on the results of 270 small and medium-sized enterprises in the Czech Republic.

Keywords: strategic management, cost management, business performance

JEL Classification: M21, M29, O12

1. Introduction

Every business or businessman is trying to get the right profit and also want to maximize the market value of business. In principle, there lead two paths - either by increasing the volume of outputs (revenue) or by reducing costs. Increasing revenue is naturally a better way of doing business. It is never possible to achieve success simply by cutting costs. This can only achieve short-term positive effects, but not long-term positive effects and sustainable growth of the company. On the other hand, the mere increase in revenue and performance is not the universally right way. In addition, this always entails a certain increase in additional costs. The company may come across market saturation or competition entry. For companies, it is important to increase revenue as well as to keep costs down, and that is the main subject

of cost management. Well-managed cost management often distinguishes successful companies from those less successful. The main goal of cost management is not to achieve minimal costs, but to reduce costs while maintaining performance and quality of service or performance. It is, therefore, an increase in efficiency of operations in order to achieve the maximum possible profit. Instead of pushing at the lowest cost, proper cost management is centered on the highest value for each crown spent. Therefore, the goal of the paper is to find key factors which have an impact or can influence the cost management based on the secondary and primary studies. The article also identifies deficiencies in the business cost management.

2. Theoretical framework

The microeconomic cost theories are presented as a basic solution for company management (Lazar & Matuskova, 2012). The paper of Tavakoli et al. (2018) lies in its ability to determine the optimal point between the operational cost and management resilience. In other words, this work analyses an optimal cost management system. The article of Mijoc et al. (2014) gives an overview of contemporary cost management methods (target costing, activity-based costing method, total quality management), and presents the benefits of introducing them to business practices. This empirical study is a first step in investigating the relationship between contemporary cost management methods and business performance. The aim of the research is to clarify the conceptual and methodological ambiguities surrounding the justification of using adopted measurement scales. This study is based on the outcomes of a questionnaire completed by a representative sample of 48 Croatian limited companies. The findings of Mijoc et al. (2014) highlight the influence of contemporary cost management methods on the business performance and are the basis for recommendations to management accountants moreover the findings raise more questions for future research. Financial management in a company and estimation of the cost of capital have great significance in the area of strategic management (Michalak, 2016). The cost of capital affects the key decisions of the management concerning the scale of investment projects. The author indicates the place of the cost of capital in assessing the effectiveness of management in a company (Michalak, 2016). Based on their research the cost of capital is a parameter in the effectiveness assessment of financial management in a company. The article constitutes a reason for further empirical research which could analyse in more detailed way the cost types of company, cost centres, financial management and business performance development. The paper of Fereshtehnejad & Shafieezadeh (2018) presents a new hazard lifecycle cost analysis framework and accounts for effects on the future performance of systems. Considering that the space of scenarios for multi-hazard occurrences and the impacts over the lifetime of infrastructure systems is significantly large, a recursive algorithm is proposed to efficiently determine the lifecycle cost of the system. This framework is applied to determine the optimal retrofit plan that reduces the overall lifecycle cost. Labunska et al. (2017) have made the proposals related to the ways of enhancing innovation management in businesses. Their study grounds the proposed approaches to the identification and accurate assessment of companies' costs and intangible assets arising from commercialization of innovative implementations. The paper discloses the position upon recognition of cost and expenses in financial accounting and management system, grounds benefits and suggests justified solutions for different cases depending on the nature of innovation process. The proposed optimization approach of Klansek & Psunder (2010) enables the insight into the interdependence between the project

duration and the total innovation project cost. The decision-maker can more effectively estimate the effect of the innovation project on a total innovation project cost. An application example and an example of the cost trade-off analysis are presented in their paper to demonstrate the advantages of the proposed approach (Klansek & Psunder, 2010). If we focus on implicit cost and we use the liquidity measure, than Mazza & Petitjean (2018) show that implicit transaction costs exhibit intraday regularities around specific price change. Based on their research not only transaction costs follow a reverse J-shape but they also decrease significantly around specific patterns of price dynamics. By focusing on these signals, the businesses may detect opportunities during which implicit transaction costs are lower. The study of Wang et al. (2018) examines the drivers and consequences of supply chain management practices. They write that cost and customer drivers influence internal and external practices and enhance environmental performance. Based on a study of 246 businesses in multiple countries, the results indicate that both cost drivers and customer drivers significantly influence internal and external practices, which in turn contribute to business performance. Moreover, the impacts of cost and customer drivers on internal and external practices are influenced by firm size: the impacts of cost drivers are greater for large firms than for small firms, while those of customer drivers are lower for large firms than for small firms. Their findings have both theoretical and managerial implications for the cost management literature and practice. The paper of Rehacek (2017) presents the essence and usefulness of a quality management system in the process of managing a company which should lead to production growth, guaranteeing liquidity and cost optimisation as well as a stable position of businesses on the competitive market. The author highlights that quality costs analysis enable quality improvement and increase of business performance effectiveness, and are an important instrument for an assessment of system effectiveness. The paper shows the essence of quality costs, a calculation and analysis of quality costs as well as conditions for their introduction, pointing at their usefulness in decision making. The author discusses the importance of an account of quality costs and their cost accounting system from the point of view of practical experience of the businesses. The cost accounting systems are the subject of analysis for two reasons: they relatively successfully describe the causality principle between cost drivers and cost objects and represent two different approaches of cost calculation within the activity-oriented concept. The efficiency of these systems is contingent on the value chain activity to which the systems were applied (Marjanovic et al., 2011). The study of Rehacek (2017) emphasised that an assessment of the effectiveness of a quality management system in an enterprise is performed on the basis of an analysis of realisation of goals contained in the strategic management and through the cost analysis. Successful development of information systems has been a source of competitive advantage for many organizations. According to Plenkina et al. (2018) companies are currently using modeling as a key tool when making strategic managerial decisions. The model of Gary et al. (2018) promotes a system's view of maintenance costs that include its dynamic consequential costs as the combined result of several interacting maintenance levels throughout the constituent feedback structures. The paper of Sanchez & Terlizzi (2017) proposes the cost and time management success, an essential measure in this context because businesses must dynamically address cost and time under an agreed strategic management. The goal of their paper is to identify the management practices within information systems through which the organizations can optimize costs. Umpfenbach et al. (2017) present a mixed-integer linear programming formulation to provide effective decision support and directional guidance to strategic costs.

If we summarize the above mentioned secondary resources, than we can identify deficiencies in the company's cost management because the authors analyse them. These authors write what could be managed in better way, they write about that what is not managed appropriately. The authors highlight to manage cost analysis especially operational costs, fixed and variable costs (Lazar & Matuskova, 2012) and different types of costs (Latuska et al., 2017), maintenance costs, cost of capital (Michalak, 2016), based on their studies it is needed to build cost accounting system and cost management system, information system to optimize costs (Rehacek, 2017, Marjanovic et al., 2011, Sanchez & Terlizzi, 2017, Umpfenbach et al. (2017) increasing the business performance. In order to manage the business performance this is needed to find a more complex system of how to manage the cost strategic management system effectively.

3. Methods

The used research study is a part of the research focused on the selected aspects of the business performance management of Czech enterprises. The objective of the research study is to present the results of the primary research focused on the management of Czech businesses regarding especially the cost management which is very important part of business performance management. As the principal instrument applied for researching the knowledge regarding the cost management there was used the method of the oral questioning and a structured questionnaire. The research was carried out in the Czech Republic in the period between September 2017 and January 2018. The research sample consists of 270 enterprises located in the Czech Republic. Selection of enterprises was based on the method of non-probability purposive sampling, by occasional selection. The research was focused on private enterprises. The structured questionnaire with closed, semi-closed and open questions was designed on the basis of information from experts from business entities, previous researches. Questions, related to the business performance management and cost management, used the Likert-type scale. The questionnaire included four questions to get to know the enterprise background that means the type of the business sector, the size of the enterprise measured the number of employees, the year of establishment and the revenue. Also, the questionnaire was pretested for the instrument validity by fifteen managers. Businesses were asked to respond to the items measuring the theoretical construct and to identify any ambiguities revealed in the questionnaire draft. The procedure of questioning resulted in 365 matched questionnaires, out of which 95 questionnaires were eliminated due to the incompleteness of responses. Thus 270 (a response rate of 73.0%) questionnaires were used in the subsequent data analysis and statistical processing. The sample consists of 8.6% micro enterprises, of 34.4% small enterprises, of 47.0% medium enterprises, and of 10.0% large enterprises. Within the sample there are 48.5% of enterprises representing manufacturing, 27.4% of service enterprises, and 24.1% of commercial enterprises.

4. Results

Table 1 summarizes the values of mean and standard deviation for cost management. For the purpose of the paper there were used 15 items (factors) related to this variable. All items were designed in 10-point Linkert-type rating scale to ease the respondents in making their

choice by simply rating “out of ten”. Specifically, 1 denoted “strongly disagree”, 5 meant “slightly disagree”, 6 “slightly agree”, 10 “strongly agree”.

The individual mean value for all items was above 6.00 (slightly agree). The overall mean was 7.56 and the standard deviation was 1.27. Three items were found to have a mean higher than 8.00, they were item 1 ($M = 8.12$, $S.D. = 1.74$), item 8 ($M = 8.23$, $S.D. = 2.01$), item 12 ($M = 8.31$, $S.D. = 1.66$). The lowest mean was recorded by item 2 “Number of cost types” ($M = 6.39$). The highest mean obtained item 12 “Information for cost management” ($M = 8.23$). In general, the results indicated that respondents agreed that they possessed positive or favourable cost management attitude.

Table 1: Mean and standard deviation for cost management

Item	Description	M	S. D.
1	Elaborated calculation system	8.12	1.74
2	Number of cost types	6.39	2.24
3	Number of cost centres	7.46	2.07
4	Contribution margin accounting	7.14	2.02
5	Motivating employees	7.63	1.36
6	Cost accounting system	7.89	1.64
7	Aggregation of processes	6.42	2.33
8	Cost management system	8.23	2.01
9	Cost planning	7.95	1.44
10	Cost control	7.33	2.31
11	Performance creation	7.71	1.96
12	Information for cost management	8.31	1.66
13	Break-even point analysis	7.22	1.76
14	Have a feedback to items 1-13	7.84	1.72
15	Measurement and management of items 1-13	7.79	1.61
Overall Value		7.56	1.27

Source: own processing

Items of cost management in the table 1 are evaluated as important for the analysed enterprises and they have positive effect on cost management. The analysed enterprises have positive attitude to the cost management. The development of enterprises within the area of strategic cost management should build the process of effective strategic cost management system (Figure 1) based on the survey results.

According to the secondary and primary research the businesses should implement the process of the strategic cost management system development and it should be fulfilled in step like progression from strategic plan and cost planning to effective business performance management (see fig. 1).

Figure 1: Effective strategic cost management system



Source: own processing

The process of effective strategic cost management system can be seen as a catalyst for the continual challenge of an enterprise in globalization and as important prerequisite for the success development of business entities.

5. Discussion

The studies of mentioned authors in the chapter Theoretical framework propose areas which could be improved in the cost management. The authors Hopland & Kvamsdal (2018) show that the typical approach of inquiring about importance of cost factors by various authors leads to a different ranking of cost factors. The authors Hopland & Kvamsdal (2018) look in particular at a ranking of questions with equal weights to importance of different cost factors and cost efficiency. The authors also find that many factors, when controlling for sampling error, should be ranked equally, and that further considerations need to be consulted when priorities are decided. Our primary research involved 15 factors related to the costs, these factors influence the cost management (see tab. 1). Based on studies Byun et al. (2018) and expert opinions, the objectives of a strategic management are classified into main evaluation categories such as strategy-oriented, cost-oriented, resource-oriented and learning-oriented. We think that these categories should develop hand in hand. It is expected that our study could support the economic literacy of business entities and to promote the development of a business model based on the categories of Byun et al. (2018) and to create sustainable competitive advantages in the future open globalization, and to contribute to the creation of corporate and national profits. That is why the paper offers a guide on how to build effectively strategic cost management systems in businesses (see fig. 1).

6. Conclusion

Cost management includes all activities in the company that aim to improve the efficiency and performance of business processes and the company as a whole. This is not only a cost reduction, but an overall increase in company efficiency. It is important not to confuse cost

management with cost-saving or cost-cutting. Cost management is not a one-time activity or project; it is a constant effort to achieve high efficiency. Companies with well-developed cost management are therefore not only more successful but also more resilient to commercial risks and globalization. Cost management is not just a cost reduction but a continuous long-term strategic management of all cost items across the enterprise. This study provides new insight on cost management as an important strategic initiative and indicates the steps how to start to build strategic cost management via the figure “Effective strategic cost management system” for the businesses based on the secondary and primary research.

Acknowledgment

This paper is an output of the science project of the Silesian University in Opava SGS 6/2018 “Economic Literacy of Business Entities”.

References

- [1] Byun, J., Sung, T. and Park, H. (2018). A network analysis of strategic alliance drivers in ICT open ecosystem: with focus on mobile, cloud computing, and multimedia. *Multimedia tools and applications*, vol. 77, no. 12, pp. 14725-14744.
- [2] Fereshtehnejad, E. and Shafieezadeh, A. (2018). A multi-type multi-occurrence hazard lifecycle cost analysis Framework for infrastructure management decision making. *Engineering Structures*, vol. 167, pp. 504–517.
- [3] Gary, L., Amos, N. and Tehseen, A. (2018). Towards strategic development of maintenance and its effects on production performance by using system dynamics in the automotive industry. *International Journal of Production Economics*, vol. 200, pp. 151-169.
- [4] Hopland, A. and Kvamsdal, S. (2018). On the ranking of critical success factors. The role of cost efficiency and score uncertainty for public facilities management. *Journal of facilities management*, vol. 16, no. 1, pp. 26-37.
- [5] Klansek, U. and Psunder, M. (2010). Cost Optimization of Time Schedules for Project Management. *Ekonomika Istrazivanja-Economic Research*, vol. 23, no. 4, pp. 22-36.
- [6] Labunska, S., Petrova, M. and Prokopishyna, O. (2017). Asset and cost management for innovation activity. *Economic Annals-XXI*, vol. 165, no. 5-6, pp. 13-18.
- [7] Lazar, J. and Matuskova, S. (2012). Variable and fixed costs form the enonomic theory and company management perspective. *Politicka ekonomie*, vol. 60, no. 2, pp. 245-264.
- [8] Marjanovic, V., Gavrilovic, J. and Stanic, N. (2011). US American versus German Activity-based Costing. Effects on Business Decision Management in the Automotive Industry. *Ekonomika Istrazivanja-Economic Research*, vol. 24, no. 2, pp. 99-111.
- [9] Mazza, P. and Petitjean, M. (2018). Implicit transaction cost management using intraday price dynamics. *Applied Economics*, vol. 50, no. 39, pp. 4264-4274.
- [10] Michalak, A. (2016). The Cost of Capital in the Effectiveness Assessment of Financial Management in a Company. *Oeconomia Copernicana*, vol. 7, no. 2, pp. 317-329.

- [11] Mijoc, J., Starcevic, D. and Mijoc, I. (2014). Investigation of the relationship between contemporary cost management methods and improvement in financial performance. *Economic Research-Ekonomska Istrazivanja*, vol. 27, no. 1, pp. 393-413.
- [12] Plenkina, V., Andronova, I., Deberdieva, E., Lenkova, O. and Osinovskaya, I. (2018). Specifics of strategic managerial decisions-making in Russian oil companies. *Entrepreneurship and Sustainability Issues*, vol. 5, no. 4, pp. 858-874.
- [13] Rehacek, P. (2017). Quality Costs as an Instrument of verifying the Effectiveness of Quality Management System. *Quality-Access to Success*, vol. 18, no. 161, pp. 109-112.
- [14] Sanchez, O., Terlizzi, M. and de Moreas, H. (2017). Cost and time project management success factors for information systems development projects. *International journal of project management*, vol. 35, no. 8, pp. 1608-1626.
- [15] Tavakoli, M., Shokridehaki, F., Akorede, M. F., Marzband, M., Vechiu, I. and Pouresmaeil, E. (2018). CVaR-based energy management scheme for optimal resilience and operational cost in commercial building microgrids. *International Journal of Electrical Power & Energy Systems*, vol. 100, pp. 1-9.
- [16] Umpfenbach, E., Dalkiran, E., Chinnam, R. and Murat, A. (2018). Promoting sustainability of automotive products through strategic assortment planning. *European Journal of Operational Research*, vol. 269, no. 1, pp. 272-285.
- [17] Wang, Z., Wang, Q., Zhang, S. and Zhao, X. (2018). Effects of customer and cost drivers on green supply chain management practices and environmental performance. *Journal of cleaner production*, vol. 189, pp. 673-682.

USE OF TAX HAVENS BY CZECH COMPANIES IN CONDITIONS OF GLOBALIZATION

František Sejkora^{1,a,*}, Renata Myšková^{2,b}, Josef Novotný^{3,c} and Vít Jedlička^{4,c}

^{1,2,3,4}University of Pardubice, Faculty of Economics and Administration, Czech Republic,

^afrantisek.sejkora@upce.cz, ^brenata.myskova@upce.cz, ^cjosef.novotny@upce.cz,
^dvit.jedlicka@student.upce.cz

*Corresponding author

Abstract. Nowadays, in the context of the ever-changing globalization of the world, the question of international tax relations becomes important. It is absolutely natural that business entities want to optimize their tax liability and seek ways to achieve it. In today's globalized world, with an easy way of remote communication, more and more business entities are considering optimizing their tax obligations using tax havens that are more tax-friendly and more accommodating than their home countries. Tax havens are carried away by movable subjects from domestic tax jurisdictions, and the state is therefore losing considerable sums that would otherwise become revenue to the state budget. In view of the increasing indebtedness of states, they are trying, together with international organizations, to fight against tax havens and to attract leaking entrepreneurs back or to increase their ability to remain through different tax advantages on the one hand or different legal constraints on the other. The article deals with an overview of measures that are acquired worldwide and also in the Czech Republic to combat the growing phenomenon of tax havens. An analysis of the development of the number and characteristics of Czech companies controlled from tax havens was made. It further analyses the motives of companies for relocation into tax havens.

Keywords: tax havens, fight against tax havens, corporate income tax

JEL Classification: H87, H25, K10

1. Introduction

The elimination of trade barriers and almost uncontrolled capital movements are consequence of the process of globalization and market integration and capital placement is affected by tax burden besides other things. Businesses are trying to move their tax bases to countries with a more favourable tax policy. In general, this behaviour can be considered beneficial as it puts pressure on government expenditure cuts and greater efficiency in the state administration. But on the other hand, if this behaviour of economic subjects starts to prevail, it can endanger the tax revenues of states and their economic growth. Especially with the move of mobile factors, most states deal the question of how to eliminate their placements mostly in tax havens and advantageous tax preferential regimes.

1.1 Tax havens

Despite the frequency of occurrence of the notion of tax havens in various articles, scientific texts and publications, its official and uniform interpretation cannot be found.

According to (Slemrod, 1998), the tax haven is all areas in which certain activities or assets or certain entities are not taxed. According to (Hines 2010), tax havens are countries or territories with very low or no tax burdens, a favourable legal environment, and a lower level of administrative and financial burdens during company formation and management. Dharmapala & Hines (2009) provide empirical support to the widespread opinion that tax havens are, above all, small, rich island countries with a population of less than 1 million and quality protection of property rights.

It views as predominantly negative in literature analysing the impact of tax havens on the world economic or national economics of individual states.

Hines (2010) emphasizes that tax havens provide an opportunity for international tax planning and promote tax evasion by multinational corporations which seek the reduction of the tax base in high tax jurisdictions. By attracting these activities, tax havens are involved in the erosion of the tax base and the loss of tax revenues of countries with high tax rates (Dharmapala, 2008).

Several authors have attempted to quantify the amount of tax revenue loss due to the existence of tax havens. Klinger et al. (2010) reports that banks and multinational corporations pay \$ 37 billion less for corporate income tax. Zucman (2014) states that tax revenue losses are primarily due to the transfer of profits and tax base. He estimates that transferred profit to low-tax states reduce corporate income tax by almost 20%. Janský & Prats (2015) report that multinational corporations with links to tax havens reported 1.5% lower earnings, paid 17.4% less on tax per unit of property and 30.3% less per unit of profit versus corporations unrelated on tax havens. Tax havens also allocate a high share of foreign direct investment (Dharmapala, 2008). According to Palan et al. (2010), approximately 30% of world foreign direct investment goes into tax havens. The negative effects of investments are pointed out by Myšková et al. (2013) as well.

Tax havens also contribute to rising income inequality in the world. Empirical studies show that the profits that multinational corporations move to tax havens are significantly higher in developing countries than in developed ones. Loss of tax revenue consequently limits the economic growth of these countries (Johannesen et al., 2016). Rose & Spiegel (2007) report that tax havens support tax evasion, money laundering or increased incentives to corruption in their countries of origin. With specific suggestions of how to combat tax havens deals e.g. Johannesen (2014), Novotný (2015), Konrad (2016).

Despite the fact, that individual countries fear tax havens, there are also opposing views that point out the benefits for countries with a high tax rate. Hines (2010) emphasizes that tax havens are small, but rapidly evolving economies with the potential to influence the economic activity of nearby countries through positive impulses. He states that countries that are close to tax havens are showing faster growth than the more distant countries. Desai et al. (2006) report that corporations that are using tax havens are expanding their activities near countries with high tax rates. Blanco (2009) notes that foreign direct investments in developing countries are positively correlated with the inflow of foreign direct investment in the nearest tax haven.

2. Use of tax havens by Czech companies and legislative measures

Table 1 shows that the number of Czech companies, which are often only formally controlled from tax havens, has been continuously decreasing since 2016. In the first half of 2018, the number of Czech companies in the tax haven reached 12,970. Compared to 2015, there was a decrease of 449 companies, which represents a decrease of 3.35 %. At present, 2,7 % of Czech companies are audited in tax havens.

In the monitored period most of the Czech companies were in Hong Kong (105 companies), Malta (78 companies), the United States of America (74 companies), great interest was in Cyprus with 69 new companies or Marshall Islands with 69 companies. We can only deduce the motives of a significant increase in the number of companies in Hong Kong and the United States of America. One of the reasons may be that some companies may not be able to withstand international competition in the Czech Republic and therefore their move abroad gives them the opportunity to expand to the international market, branding, prestige and thus profit. Interest in the United States can be expected mainly from companies dealing with information technologies and their applications. Another motive may be lower logistical and other transaction costs, provided the use of benefits of free trade zones, customs warehouses and areas. Hong Kong is primarily used for trading with China.

The most common motives for using tax havens will include tax motives. In his empirical study, Gumpert et al. (2011) confirms that higher tax rates mean higher tax probability in tax havens.

In 2016 there was a change and the number of Czech companies in tax havens began to decline. The largest outflow of firms occurred in the Netherlands, where 508 firms dropped in the first half of 2018 compared to 2015, and in Luxembourg, where there was a decline of 154 companies. The Netherlands is primarily known for its excellent law enforcement. In the past, the Czech Republic has often been criticized for poor law enforcement. If the reason for companies exit from the Netherlands is related to improving the legal environment, especially the protection of property and assets in the Czech Republic, it would be a positive trend.

Among other motives for leaving companies for tax havens can be classified anonymity and privacy. The Czech legal system requires companies to disclose certain information such as financial statements, owners and their business share. Revealing these data to the public may be misused by certain groups. Contrarily, the non-disclosure of the real owner of a company may be undesirable in certain cases due to the increased risk of corruption, money laundering and tax evasion.

Political instability can also lead to the uncertainty of business entities in future developments. It is not just about uncertainty about taxation but also about legislative changes that have a negative impact on society.

Table: 1: Number of Czech companies with owner of tax havens

Country	2. Q 2018	Change 2018-2015	Change (%) 2018-2015	2017	2016	2015	2014
Bahamas	39	-2	4.88%	37	39	41	42
Belize	203	9	4.64%	196	203	194	161
Bermuda	5	0	0.00%	4	5	5	5
British Virgin Islands	367	-66	15.24%	384	414	433	452

Gibraltar	66	-6	8.33%	69	72	72	75
Guernsey (Great Britain)	19	-12	38.71%	23	25	31	28
Hongkong	202	105	108.25%	191	137	97	102
Jersey (Great Britain)	37	-6	13.95%	38	39	43	43
Cayman Islands	11	-9	45.00%	14	18	20	30
Cyprus	2220	69	3.21%	2205	2175	2151	2097
Liechtenstein	198	-27	12.00%	210	216	225	226
Luxembourg	914	-154	14.42%	929	968	1068	1120
Malta	301	78	34.98%	302	259	223	177
Monaco	70	9	14.75%	67	63	61	72
Marshall Islands	158	68	75.56%	150	133	90	55
Netherlands Antilles	9	-8	47.06%	9	13	17	15
Netherlands	3685	-509	12.14%	3755	3912	4194	4208
Panama	235	-12	4.86%	224	239	247	243
Man Island	33	-6	15.38%	32	34	39	40
Seychelles	779	-107	12.08%	803	873	886	827
United Arab Emirates	355	63	21.58%	342	313	292	270
United States of America	3064	74	2.47%	3047	3035	2990	2959
Total:	12970	-449	3.35%	13031	13185	13419	13247

Source: Bismad

Since tax havens represent a problem for a number of countries, which deprives them of tax revenues, this issue is dealt not only by individual states themselves, but it is primarily dealt transnationally. One of the most significant organization that acts against the profit transfer to preferential regimes and tax evasion is the OECD. The OECD has created a new standard in the form of automatic exchange of information between countries. This standard has been undertaken to apply by less than 100 jurisdictions by 2018 at the latest. The OECD also presented an action plan to combat base erosion and profit shifting (BASE – Base Erosion and Profit Shifting). This document contains 15 specific actions to be taken to ensure that states have the instruments and the ability to combat tax evasion. In the context of globalization, the European Union offers effective instruments for solving cross-border tax issues, consisting primarily of individual directives that are gradually applied by individual member states. The EU allows co-operation between tax authorities of individual countries in various ways and several expert groups have been established.

The Czech Republic has incorporated the following legislative measures in relation to cross-border taxation. It is council directive on the common system of taxation applicable in the case of parent companies and subsidiaries of different member states (2011/96/EU), on a common system of taxation applicable to mergers, divisions, transfers of assets and exchanges of shares in the assets of companies of member states (2009/133/ES), on a common system of taxation applicable to interest and royalty payments made between associated companies of different member states (2003/49/ES) a directive on taxation of savings income in the form of interest payments (2015/2060/EU).

Other measures against tax evasion which seek how to prevent or at least limit the use of low-tax jurisdictions include (1) transfer pricing rules, (2) low capitalization rules, and (3) tax residence rules based on the concept of a true place of management. Transfer pricing demands

that specific rules, defined as the principles of market distance are followed among all related parties of transactions. This principle requires prices in related party transactions to correspond to prices that would be agreed between independent persons in comparable business relationships. In cases where the transfer price is not defined as a market price and the accounting unit cannot substantiate any relevant economic reason, the tax administrator will adjust the tax base to the difference in prices.

Low capitalization rules are related to financial costs (interest and associated costs) on loans from associated parties. Costs are not tax allowable if the amount of debt to equity exceeds four or six times for banks and insurance companies.

International exchange of information (TIEA – Tax Information Exchange Agreement) is another very important instrument in the fight against international tax evasion. The international exchange of information is based on three forms of information exchange: exchange of information on request, provision of information on its own initiative and regular exchange of information. At present, the Czech Republic has concluded agreements on the exchange of information in tax matters with the following countries: Jersey, Bermuda, Man Island, Guernsey, San Marino, British Virgin Islands, Cayman Islands, Andorra, Bahamas, Monaco, Aruba, Belize and Cook Islands.

Other measures that can be included in the anti-tax evasion instruments are double taxation avoidance agreements. These contracts deal with collisions between domestic and foreign tax legislation. The Treaties lay down clear rules that allow only one taxation in the case of international investment and there is no double or multiple taxation in both the country of the owner and the country of investment. However, it is not at the discretion of a taxpayer to choose a country where his income or property will be taxed more favourably. At present, the Czech Republic has concluded double taxation avoidance agreements with 88 states. There are also contracts that are concluded with states that are considered tax havens.

At present, tax changes related to cross-border taxation are being discussed in the Czech Republic, which should be reflected in the income tax act and the tax code. Tax laws will now include these rules: (1) rule for limiting the deductibility of borrowing costs, (2) rule for taxation at leaving, (3) rule for controlled foreign companies (CFC rule), (4) hybrid mismatches and (5) general rule against abuse of the tax regime.

The authors (Markle & Robinson, 2012) have empirically tested the CFC rules and confirmed that these rules prevent the outflow of tax revenue into tax havens, and it can therefore be expected to have a positive impact since its implementation into Czech tax law.

3. Discussion

Individual countries tackle the fight against tax havens, above all through the various international conventions and rules they have committed themselves to. The Czech Republic also gradually applies the relevant EU directives on cross-border taxation into its legislation. We see great potential in the form of signed agreements on the exchange of information in tax matters between the Czech Republic and the states that are considered tax havens. By observing set rules, transparency and co-operation of individual countries, the practice of tax havens will be prevented.

It is positive that there has been a turnaround in the number of Czech companies whose owner is based in tax haven. We can only deduce the factors behind this decline. In 2016, electronic revenue records and control reports were introduced. These instruments are restricting fraudulent practices that generate untaxed profits, which is later transferred into tax havens. In the Czech Republic there are many loopholes in which untaxed profit arises. Measures such as the implementation of property declarations, prohibition of anonymous shares or inheritance taxation is for much of the political spectrum unacceptable. Positive can be seen a change in the public procurement act, where companies based in tax havens have restricted access to public procurement. Among other instruments which would limit the resettlement of Czech companies in tax havens is primarily legislation. The Czech Republic is famous for its heavy administrative burden. It takes a leading position in the world in statistics measuring the administrative burden associated with tax obligations. Tax can be considered as another aspect. Any reduction in the already low corporate tax rates would seem to have led to anger from other European countries.

4. Conclusion

The existence of international capital in the global world contributes to the activity of tax havens. Tax havens are characterized by a low tax rate, discretion and unwillingness to work with the authorities of advanced states to combat tax evasion. The impact of tax havens on the global economy is difficult to assess. There is a negative attitude towards tax havens, but according to some authors tax havens have positive effect as they force national governments to become more effective. Individual countries tackle the fight against tax havens especially through the conventions and rules they have committed to. In the fight against tax havens, however, there is a need for a uniform definition that does not exist globally. For the definition of tax havens plays a role criteria, to which each state gives a different level of importance. Switzerland, Luxembourg are countries that are considered tax havens and at the same time members of the OECD, an organization that stands out against tax havens. The number of Czech companies registered in tax havens peaked in 2015 and has been steadily declining ever since. Time will show whether this trend is only temporary, or whether the measures taken by the Czech Republic will be effective and tax havens will be the past.

Acknowledgment

This contribution was made with the financial support of SGS_2018_013.

References

- [1] Blanco, L. R. and Rogers, C. L. (2009). Are Tax Havens Good Neighbors? *An LDC Perspective*. Available: <http://ssrn.com/abstract=1432630>
- [2] Desai, M. A., Foley, C. and Hines Jr. (2006). Do Tax Havens Divert Economic Activity? *Ross School of Business Paper*, no. 1024, pp. 1-12. Available: <https://ssrn.com/abstract=704221>
- [3] Dharmapala, D. (2008). What Problems and Opportunities are Created by Tax Havens? *Oxford Review of Economic Policy*, vol. 24, pp. 661-679.

- [4] Dharmapala, D. and Hines, J. R. (2009). Which countries become tax havens? *Journal of Public Economics*, vol. 93, pp. 1058-1068.
- [5] Gumpert, A., Hines, J. and Schnitzer, M. (2011). The Use Of Tax Havens In Exemption Regimes. *NBER Working Papers 17644*, National Bureau of Economic Research, Inc. Available: <http://www.nber.org/papers/w17644>
- [6] Hines Jr., J. R. (2010). Treasure Islands. *Journal of Economic Perspectives*, vol. 24, pp. 103-126.
- [7] Janský, P. and Prats, A. (2015). International Profit-Shifting out of Developing Countries and the Role of Tax Havens. *Development Policy Review*, vol. 33, pp. 271–292.
- [8] Johannesen, N. (2014) Tax evasion and Swiss bank deposits. *Journal of Public Economics*, vol. 111, pp. 46-62.
- [9] Johannesen, N., T. Tørsløv, T., Wier, L. (2016). Are less developed countries more exposed to multinational tax avoidance? Method and evidence from micro-data. Working Paper, United Nations University.
- [10] Klinger, S., Collins, C. and Sklar, H. (2010). Unfair Advantage: The Business Case Against Overseas Tax Havens. Available: <http://bit.ly/W5TO9G>
- [11] Konrad, K. A. and Tim, B.M.S. (2016) Coordination and the fight against tax havens. *Journal of International Economics*, vol. 103, pp. 96–107.
- [12] Markle, K., Robinson, L. (2012). Tax Haven Use Across International Tax Regimes. Working Paper. Oxford University Centre for Business Taxation. [Online]. Available: http://www.sbs.ox.ac.uk/sites/default/files/Business_Taxation/Events/conferences/symposia/2012/markle.pdf
- [13] Myšková, R., Obršálová, I., Čenčík, P. and Šatera, K. (2013). Assessment of Environmental and Economic Effects of Environmental Investment as a Decisions Problem. *WSEAS Transaction on Environment and Development*, vol. 9, pp. 268-277.
- [14] Novotný, J. and Kruml, L. (2015). Development of tax havens due to globalization processes and their impact on Czech Republic. *Globalization and its Socio-Economic Consequences: 15th International Scientific Conference*. Žilina, Slovakia, pp. 531-537
- [15] Palan, R., Murphy, R. and Cavagneux, C. (2010). A Tax Havens: How globalisation really works. Cornell University Press.
- [16] Slemrod, J. (2009). Tax competition with parasitic tax havens. *Journal of Public Economics*, vol. 93, pp. 1261-1270.
- [17] Rose, A. and Spiegel, M. (2007). Offshore financial centres: Parasites or symbionts? *Economic Journal*, vol. 117, pp. 1310-1335.
- [18] Zucman, G. (2014). Taxing across Borders: Tracking Personal Wealth and Corporate Profits. *Journal of Economic Perspectives*, vol. 28, pp. 121-148.

FINANCIAL DISTRESS PREDICTION MODELS: INTERNATIONAL REVIEW

Anna Siekelova^{1,a,*}, Ivana Podhorska^{2,b}

¹University of Zilina, Faculty of Operation and Economics of Transport and Communications,
Department of Economics, Univerzitna 1, 010 26 Zilina, Slovak Republic

²University of Zilina, Faculty of Operation and Economics of Transport and Communications,
Department of Economics, Univerzitna 1, 010 26 Zilina, Slovak Republic

^aanna.siekelova@fpedas.uniza.sk, ^bivana.podhorska@fpedas.uniza.sk

*Corresponding author

Abstract. The aim of the contribution is a literature review of international prediction models focusing on their development and comparison. Predicting bankruptcy is a topic that has been the subject of many economists around the world for many years. Under the influence of globalization, the attractiveness of this theme is still increasing considerably. The first prediction models were developed in the United States of America in the 1930s. Initial efforts to monitor and predict the financial health of a business are therefore a response to financial collapse during the Great Depression. Since then, many models have been developed not only in the US but also in other countries in the world. The article focuses on the analysis of historical development of prediction models. We focused on comparing the methods used in models, the year and the country of origin, as well as the number and content of the variables used to predict the financial health. Finally, we calculated prediction models on the sample of enterprises. For the calculation, we chose models that differ with the year and country of origin, the number of variables and used methods. Based on the realized calculations we point out different results that are obtained by using different models. The contribution also includes a graphically processed comparison of the best-known internationally-used prediction models, which are clearly elaborated in the tables.

Keywords: financial distress, prediction models, prediction ability, globalization

JEL Classification: C01, F60, G00

1. Introduction

The financial-economic analysis is used to identify the financial health of the company. The main aim is evaluation of the current financial situation in the company. Many Slovak and foreign authors deal with this extensive issue. (Valaskova & Zvarikova, 2014; Virag & Kristof, 2005; Zvarikova et al, 2017; Zavgren, 1985, Johnes, 1987; Mousavi et al, 2015) The authors (Cisco & Klietnik, 2013) distinguish the ex-post analysis and ex-ante analysis. Ex-post analysis means analysis financial data retrospectively. In this case, causes of current financial situation can be identified. On the other hand ex-ante analysis is a view to the future. Ex-ante analysis includes various prediction techniques and methods that were created of various financial ratios and assigned weights of importance for assessing financial health and business stability. Most commonly, these methods are classified as creditworthy models,

bankruptcy models and non-financial models based on artificial intelligence. (Kubenka & Slavicek, 2014; Balthazar, 2006)

Financial health of company can significantly influence all economic subjects which are in mutual relation (directly or indirectly) with a company. In order to prevent it, financial distress prediction models are used to alert them the upcoming bankruptcy and company can take the necessary action in a timely manner. There is a plethora of these models. The aim of the contribution is a literature review of international prediction models focusing on their development and comparison.

2. Literature review

The beginnings of the prediction models are mainly related to the United States. The first works originated in the 30s of the 20th Century. We find very interesting fact - that predictive models were not the result of any economic crisis or other external factors that would have a significant impact on the functioning of the country's economy but the natural development of financial management research. One of the oldest mention about issue of entity's financial failure is a contribution „*A Comparison of the Ratios of Successful Industrial Enterprises Those of Failed Companies*“ written by FitzPatrick (1932). He dealt with identification of financial failure based on accounting of 40 enterprises. He did not perform statistical analysis as is now common, but he thoughtfully interpreted the ratios and trends in the ratios. His interpretation was effectively a complex, multiple variable analysis. Later Beaver (1966) developed the first model. He applied t-tests to evaluate the importance of individual ratios within a similar pair-matched sample. (Beaver, 1967) Probably the most famous models are made by Altman. His Z-Score started an expansion of business failure modelling in 1968. Unlike Beaver Altman used multiple discriminant analysis. He took into account five financial ratios and assigned weights of its importance. At the same time, with the creation of methodology, He also examined its reliability. Erroneous ratings were divided into two types: Error α - Error Type I, in which non-prosperous businesses are ranked as prosperous and Error β - Error Type II, in which prosperous businesses are ranked as non-prosperous. Altman is considered as a pioneer in the field of research. (Wardayanti et al, 2017; Grublova, 2010)

After publishing the above mentioned works, there has been a rapid development in the area of creation new financial distress prediction models not only in US but worldwide.

Among the greatest critics of multiple discriminant analysis used by Altman, Eisenbeis (1977), Ohlson (1980) or Jones (1987) (Plihal et al, 2017; Azayite & Achchab, 2017) can be considered. After 1980 first Logit (Ohlson, 1980) and Probit (Zmijewski, 1984) models were developed. Authors Peter and Martin Gurny (2010) dealt with a comparison of Logit and Probit models and explained methods of its calculation in their contribution. In general, we can say that Probit models are less used because its calculation is more difficult. (Slavicek, 2015; Stutzer, 2018)

Many authors emphasize that taking non-financial factors into consideration can significantly increase the effectiveness of risk-management systems and decision-making processes (Kazakov & Kolyshkin, 2018). Financial prediction models use only quantitative and easily available financial data. That is reason why the financial prediction models are so popular.

Slavicek (2015) emphasizes that the most famous bankruptcy models are usually generic, which do not reflect the specifics of individual industries. As was mentioned above, new prediction models were mostly developed in US, but other national business environments or different types of accounting systems led to specification of models by applying to other national economies. In the Czech Republic, IN95 and IN05 models are the best known bankruptcy models. There may be a premise that mainly financial distress prediction models created in Visegrad Four are able to reflect the specifics of our economic environment. Based on it we focused on calculation of the most commonly used prediction models and comparison of its results. We chose models that differ with the year and country of origin, the number of variables and used method.

3. Data and methodology

In this contribution, we work with a database consisting of 500 financial statements of Slovak enterprises that capture the years 2017. The database is made up of companies that are filtered by ownership. We set private ownership as a criterion for the type of ownership. Within the database we also work exclusively with companies whose legal form is a limited liability company. The resulting database was also cleared from the accounting units that reported negative assets in the balance sheet, as well as those that caused a division by zero within the selected financial indicators. Finally, we removed the units that were abolished during the reporting period. Brief characteristics of the database are found in Tables 1 and 2.

Table 1: Regional representation of enterprises in the database

REGION	NUMBER OF ENTERPRISES (ABSOLUTE VALUE)	NUMBER OF ENTERPRISES IN %
Bratislava	96	19,20
Trnava	53	10,60
Trenčín	58	11,60
Nitra	69	13,80
Žilina	32	6,40
Banská Bystrica	74	14,80
Presov	55	11,00
Kosice	63	12,60
Sum	500	100,00

Source: Authors

Table 2 shows the five most represented regions in terms of number of enterprises. We do not further specify the other sectors and summarize the number of enterprises that are in them in the "other".

Table 2: Economic sector representation of enterprises in the database

ECONOMIC SECTOR	NUMBER OF ENTERPRISES (ABSOLUTE VALUE)	NUMBER OF ENTERPRISES IN %
Wholesale and retail trade, repair of motor vehicles and motorcycles	125	25,00
Construction	101	20,20
Industrial production	83	16,60
Accommodation and catering services	69	13,80
Information and communication	55	11,00

Other	67	13,40
Sum	500	100,00

Source: Authors

Finally, we calculate prediction models on the sample of enterprises. For the calculation, we chose models that differ with the year and country of origin, the number of variables and used method. Based on the realized calculations we point out different results that are obtained by using different models. The following table 3 summarizes used prediction models.

Table 3: Used prediction models

PREDICTION MODELS	YEAR	COUNTRY OF ORIGIN	USED METHOD	NUMBER OF VARIABLES
Altman model	1983	US	Multiple discriminant analysis	4
Hurtosova model	2009	Slovak Republic	Logistic regression	4
IN 05	2006	Czech Republic	Multiple discriminant analysis	5
Zmijewski model	1984	US	Logistic regression	3
Ohlson model	1980	US	Logistic regression	9
Virag-Hajdu model	1996	Hungary	Multiple discriminant analysis	4
Springate model	1983	US	Multiple discriminant analysis	4
“Poznanski” model	2004	Poland	Multiple discriminant analysis	4
Altman model	1995	US	Multiple discriminant analysis	4
Gulka model	2016	Slovak Republic	Logistic regression	7

Source: Authors based on (Oz & Simga-Mugan, 2018; Tebaldi et al, 2018; Abiodun et al, 2017; Gulka, 2016, Gurcik, 2002)

4. Results

Following Table 4 shows results.

Table 4: Results (Year 2017)

PREDICTION MODELS	PROSPEROUS	NON-PROSPEROUS
Altman model	388	112
Hurtosova model	355	145
IN 05	325	175
Zmijewski model	333	167
Ohlson model	401	99
Virag-Hajdu model	295	205
Springate model	368	132
“Poznanski” model	395	105
Altman model	356	144
Gulka model	334	166

Source: Authors

As we can see above different model have identified different results. According to § 3 of Act no. 7/2005 Coll. on Bankruptcy and Restructuring Amendment, as amended, and Act no.

513/1991 Coll. The Commercial Code, as amended,¹⁶ we set some criteria for dividing our sample of companies to two groups: prosperous and non-prosperous. According to the selected criteria, we propose to designate these companies as non-prosperous:

All of which apply: (regardless of the second condition)

$$assets - (liabilities + liabilities accruals) < 0 \quad (1)$$

Those for which the inequality of the first condition does not apply, but all three following conditions apply at the same time:

$$L_3 < 1 \quad (2)$$

$$earning\ after\ tax \leq 0 \quad (3)$$

$$\frac{equity}{liabilities + liabilities\ accruals} < 0,06 \text{ (or } 0,08 \text{ from year 2018)} \quad (4)$$

According to these criteria we compare the results we obtain to results of prediction models calculation and identify predictive ability of selected models. Predictive ability of selected models is then determined as a percentage of correctly classified businesses as you can see in table 6. False Positives expresses how many non-prosperous businesses were classified as prosperous (Error Types I). False Negatives expresses how many prosperous businesses were classified as non-prosperous (Error Types II).

Table 5: Predictive ability of selected models

PREDICTION MODELS	NUMBER OF PROPERLY CLASSIFIED ENTERPRISES	TYPE I ERROR	TYPE II ERROR	PREDICTIVE ABILITY (%)
Altman model	385	88	27	77,00
Hurtosova model	299	58	143	59,80
IN 05	396	62	42	79,20
Zmijewski model	356	41	103	71,20
Ohlson model	332	72	96	66,40
Virag-Hajdu model	358	83	59	71,60
Springate model	364	85	51	72,80
“Poznanski” model	283	86	131	56,60
Altman model	360	92	48	72,00
Gulka model	299	39	162	59,80

Source: Authors

¹⁶ It comes with a new institute – a company in crisis, that came into force on 01.01.2016, which we can also consider when assessing the client's creditworthiness. The company is in a crisis when it is in decline or in a risk of decline. Company in decline is defined in Act no. 7/2005 Coll. on Bankruptcy and Restructuring Amendment, as amended. Companies are at risk of decline if their equity and liabilities ratio is less than 8 to 100. Under the transitional regulation, the ratio of 8 to 100 will only be used after 2018. Until then, the rules will be even less strict. In 2016, the ratio of equity and liabilities will be 4 to 100 and in 2017 ratio 6 to 100. We suggest using a ratio of 6 to 100 and from the next year to use the recommended ratio of 8 to 100 for the verification.

5. Conclusion

In our paper we focused on a literature review of international prediction models focusing on their development and comparison. We chose best-known and often used prediction models different from each other by year, country of origin, used method and number of variables. We calculated them and compare their prediction ability. Based on the results, it can be stated that the higher prediction ability has IN 05 and the lowest “Poznanski” model. Based on the data of our database we can state that the year, country of origin, used method or number of variables do not have any impact on prediction ability. We cannot state that earlier models or models with higher amount of variables are better. We recommend using more models to predict future financial situation.

Acknowledgment

The research leading to these results has received funding from the project titled "Creation of new paradigms of financial management at the threshold of the 21st century in conditions of the Slovak republic" in the frame of the program of Slovak Scientific Grant Agency VEGA under the grant agreement number VEGA 1/0428/17.

References

- [1] Act no. 7/2005 Coll. on Bankruptcy and Restructuring, as amended
- [2] Act no. 513/1991 Coll. The Commercial Code, as amended
- [3] Azayite, F.Z. and Achchab, S. (2017). The impact of payment delays on bankruptcy prediction A comparative analysis of variables selection models and neural networks. *3rd International Conference of Cloud Computing Technologies and Applications*. Rabat, Morocco, pp. 193-199.
- [4] Abiodun, S., Ullrich, F. and Mueller, K. (2017). Financial issues challenging sustainability of rural pharmacies. *American Journal of Medical Research*, vol. 4, pp. 147-161.
- [5] Balthazar, L. (2006). *From Basel 1 to Basel 3: The Integration of State-of-the-Art Risk Modeling in Banking Regulation*. Palgrave Macmillan, New York.
- [6] Beaver, W. (1967). Financial ratios as predictors of failures. Empirical Research in Accounting: Selected Studies – 1966. *Journal of Accounting Research*, vol. 4, pp. 71-111.
- [7] Cisko, S. and Kliestik, T. (2013). *Financny manazment podniku II*. EDIS Publishers, Zilina.
- [8] Fitzpatrick, F. (1932). A Comparison of Ratios of Successful Industrial Enterprises with Those of Failed Firm. *Certified Public Accountant*, vol. 6, pp. 727-731.
- [9] Grublova, E. (2010). Attitudes to risk and ability to take risky decisions. *Ekonomicko-manazerske spektrum*, vol. 4, no 2, pp. 58-63.
- [10] Gulka, M. (2016). Model predikcie upadku obchodnych spolocnosti podnikajucich v podmienkach SR. *Biatec*, vol. 2, pp. 5-9.
- [11] Gurcik, L. (2002). G-index – metoda predikcie financneho stavu poľnohospodarskych podnikov. *Agricultural Economics*, vol. 48, pp. 373–378.

- [12] Jones, F. L. (1987). Current techniques in bankruptcy prediction. *Journal of Accounting Literature*, vol. 6, pp. 131-164.
- [13] Kazakov, A.V. and Kolyshkin, A.V. (2018). The development of bankruptcy prediction models in modern Russian economy. *Vestnik Sankt-Peterburgskogo Universiteta-ekonomika-St Petersburg university journal of economic studies*, vol. 34, no. 2, pp. 241-266.
- [14] Kubenka, M. and Slavicek, O. (2014). Detection of Cognation between Creditworthy Models and Bankruptcy Models. *Proceedings of Managing and Modelling of Financial Risks*. Ostrava, Czech Republic, pp. 426-433.
- [15] Mousavi, M. M., Ouenniche, J. and Xu, B. (2015). Performance Evaluation of Bankruptcy Prediction Models: An Orientation-free Super-efficiency DEA-based Framework. *International Review of Financial Analysis*, vol. 42, pp. 64-75.
- [16] Oz, I.O. and Simga-Mugan, C. (2018). Bankruptcy prediction models' generalizability: Evidence from emerging market economies. *Advances in accounting*, vol. 41, pp. 114-125.
- [17] Plihal, T., Sponerova, M. and Sponer, M. (2017). Comparison of Bankruptcy Prediction Models in Relation to SME segment in the Czech Republic. *20th Annual International Conference on Enterprise and Competitive Environment*. Brno, Czech Republic, pp. 623-631.
- [18] Slavicek, O. (2015). The predictive model of financial health for companies in the construction sector. *10th International Scientific Conference Proceedings*. Ostrava, Czech Republic, pp. 1166- 1173.
- [19] Stutzer, M. (2018). The bankruptcy problem in financial networks. *Economics letters*, vol. 170, pp. 31-34.
- [20] Tebaldi, E., Nguyen, H. and Zuluaga, J. (2018). Determinants of emerging markets' financial health: A panel data study of sovereign bond spreads. *Research in international business and finance*, vol. 45, pp. 82-93.
- [21] Valaskova, K. and Zvarikova, K. (2014). Prediction of Credit Risk by Selected Theoretical Rating Models. *Advances in Social and Behavioral Sciences*, vol. 5, pp. 160-
- [22] Virag, M. and Kristof, T. (2005). Neural Networks in Bankruptcy Prediction: A Comparative Study on the Basis of the First Hungarian Bankruptcy Model. *Acta Oeconomica*, vol. 55, pp. 403-426.
- [23] Wardayanti, A., Sutopo, W., Hisjam, M. and Rasli, A. (2017). Bankruptcy Prediction Using Altman Z-Score Model and 5W+1H Approach to Elaborate Strategy (Case Study: Spin Off Company). *Advanced science letters*, vol. 23, no. 9, pp. 8664-8667
- [24] Zavgren, C.V. (1985). Assessing the vulnerability to failure of American industrial firms: a logistic analysis. *Journal of Business Finance & Accounting*, vol. 12, pp. 19-45.
- [25] Zvarikova, K., Spuchlakova, E. and Sopkova, G. (2017). International comparison of the relevant variables in the chosen bankruptcy models used in the risk management. *Oeconomia Copernicana*, vol. 8, no. 1, pp. 143-155.

IMPACT OF THE BANKING GLOBALIZATION ON THE COOPERATIVE BANKS: EVIDENCE FROM POLAND

Andrzej Sołoma^{1,a,*}, Jarosław Skorwider-Namiołko^{2,b} and Artur Wyszynski^{3,c}

^{1,2,3}University of Warmia and Mazury in Olsztyn, Faculty of Economics, Oczapowskiego 4, 10-719
Olsztyn

^asoloma@uwm.edu.pl, ^bskorwider@uwm.edu.pl, ^carturwy@uwm.edu.pl

*Corresponding author

Abstract. This paper focuses on Poland experience with large foreign bank penetration and changes in banks' ownership structures since the early 1990s. The purpose of this paper is to evaluate the impact of globalization of the banking on lending and performance of Polish cooperative banks. Research methods cover the comparative analysis of scientific literature documents and reports as well as statistical data. The paper points out that over the last several years the profits of cooperative banks have been decreasing thereby limiting their ability to increase equity through accumulation of profit. The main source of funding for cooperative banks are deposits from the non-financial sector. Liquidity risk or funding risk refers to the ability of funds when needed. The bank liquidity risk was reduced by implementation of Institutional Protection Scheme (IPS) based on associations of Polish cooperative banks. However, over 12% of cooperative banks stayed out of IPS at the end of 2017 and 4 cooperative banks failed to carry out this minimum capital requirements set up by Polish Financial Supervision Authority. We further find that bank ownership structures influence their lending behaviors. The availability of subsidized agriculture loans and cooperative bank lending policies are an important source of funding for the agriculture sector and the rural community.

Keywords: cooperative banks, globalization, bank profitability, capital requirements

JEL Classification: G21, G28, F65, P34

1. Introduction

In their pursuit of business all over the globe, banks follow their international customers, search for higher revenues and reduced risk exposure through geographic diversification. The purpose of this paper is to evaluate the impact of globalization of the banking on lending and performance of Polish cooperative banks. Research methods cover the comparative analysis of scientific literature documents and reports as well as statistical data. Cooperative banks are own by their members, who are also their customers. They are not just focusing on the profit maximization. Compare to shareholders banks, cooperative banks are also focus on social goals, contributing to a development of local communities. They count for a large percentage of loans to the small and medium sized companies in Poland. The analysis of the operations of cooperative banks was based on data provided by Polish Financial Supervision Authority (KNF), National Bank of Poland (NBP) and European Association of Cooperative Banks.

This paper assess the impact of changes in banks' ownership structure in Poland on cooperative banks in Poland, between the years 2008 and 2017.

2. Literature review

The extent of banking sector openness toward the foreign banks in a host country varies across the world. There are both favorable and unfavorable aspects of banking sector globalization. On the one hand, foreign banks presence increase the inflow of capital for domestic lending, boost efficiency by introducing new technology and improve the quality of services. On the other hand, credit activity of foreign banks may focus on the most profitable customers, leaving the domestic banks to serve other, riskier customers and withdrawing rapidly from host countries in the face of a crisis (Ghosh, 2016). Some research suggests that foreign banks can be a transmission channel of external shocks, introducing more volatilities in the host markets and new banking market entrants are exposed to such drawbacks as higher ratio of non-performing loans to outstanding loans due to informational disadvantage at the start-up stage and agency problems between the headquarters and their foreign affiliates (Chen et al., 2017). It is commonly acknowledged that the story of banking in Central and Eastern Europe region is a process of institutions building and transformation: from government-owned to foreign-controlled banking sectors (Bonin & Schnabel, 2011, Haselmann et al., 2016). This may be specifically true in a case of Poland. Early in the transition period to a market economy, foreign banks in Poland brought modern technology, improved the efficiency of domestic banks and encouraged market competition. Foreign banks entering local market were treated like important source of direct capital investment, helping to stabilize the sector. There is recognition in the literature that diversity of ownership structures in the banking industry (co-operative banks operating alongside other ownership types) is beneficial for the stability of the financial system (Fiordelisi & Mare, 2014; Groeneveld & Vries, 2009; Mercieca et al. 2007). According to Barry et al. (2016) when banks' ownership structure is widely dispersed, a conflict of interest between managers and shareholders is known to arise and managers can engage in corrupt behavior to maximize their own interest. For example, the bankruptcy of SK bank (one of the largest Polish cooperative banks) at the end of 2015 and over 2 billion zlotys payment of guaranteed deposits by the Bank Guarantee Fund, highlighted the linkages between bank corporate governance and lending corruption (Sołoma, 2017).

The studies on the relationship between ownership structure and bank performance in emerging markets find ambiguous results. Historically, foreign bank entry has been considered a positive development for CEE countries because an urgent need to both recapitalize and restructure state-controlled banks (Allen et al. 2017). According to Havrylchyk & Jurzyk (2011) foreign banks in Central and Eastern European countries were more profitable due to cost efficiency and had higher capital ratios. Yet, Claessens & Van Horen (2014) show that foreign banks in emerging European countries reduced credit more compared to domestic banks during the recent financial crisis. Additionally, the lending growth of European cooperative banks was less affected by the global financial crisis compared to shareholder banks (Meriläinen, 2016).

The literature supports the contention that cooperative banks, as ethical banks, provide funding to local businesses and also persons that have frequently experienced financial exclusion (Caldarelli et al. 2016). The Annual Report of European Association of Cooperative

Banks (2018) finds that cooperative banks have a lower risk appetite than shareholder-based banks because they adopt less risky strategies focus on retail banking with close links to the real economy and local communities. Moreover, banking systems characterized by a higher share of cooperative banks are more stable. Groeneveld (2017) states that, average domestic market shares of European co-operative banking groups on both customer loans and deposits is around 22%. According to Clark et al. (2018), European cooperative banks create value through the unique nature of their relationships not only with the borrowers, but also with the local environment where they operate.

3. Results and discussion

3.1 Foreign banks in Poland

According to Polish law regulations, we define a status of bank as foreign owned if more than 50% of its capital is held by foreign financial institutions organizations or individuals. The high foreign ownership in the Polish banking sectors have been attractive for international financial institutions. As noted by Allen et al. (2017), changes in banks' ownership structure in Poland as well as in other CEE countries, were also fostered by the preparation for EU accession and full membership. The banking sector in Poland post-transition economy became primarily foreign investor-controlled. The most dominant entry mode of foreign banks into Polish market was associated with M&A of domestic commercial banks.

Table 1: Selected indicator of the Polish banking sector in the years 2008-2017

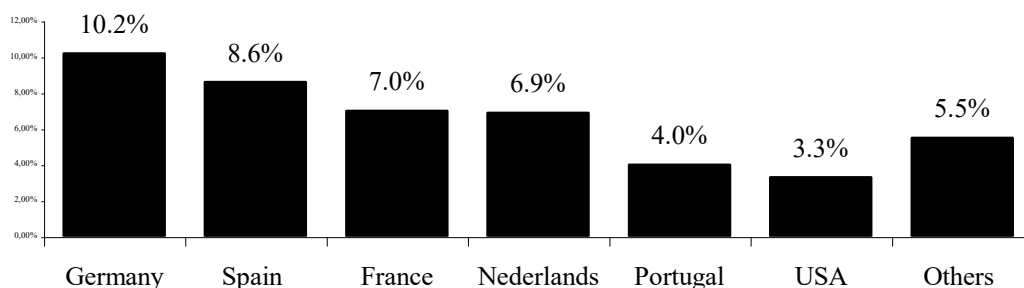
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Number of entitles dealing with banking operations, including:	649	643	646	642	642	640	631	626	621	616
-commercial banks	52	49	49	47	45	41	38	38	36	35
-branches of credit institutions	18	18	21	21	25	28	28	27	27	28
-cooperative banks	579	576	576	574	572	571	565	561	558	553
Share of banks controlled by domestic investors in the sector assets	27.7%	31.9%	33.8%	35.0%	36.4%	36.8%	38.5%	41.0%	43.4%	54.5%
Share of banks controlled by foreign investors in the sector assets	72.3%	68.1%	66.2%	65.0%	63.6%	63.2%	61.5%	59.0%	56.6%	45.5%

Source: Own elaboration based on the data of Polish Financial Supervision Authority and National Bank of Poland.

In the years 2008 through 2017, share of banks controlled by domestic investors increased in the total assets of the sector. The data indicate that foreign banks' share dropped to 45.5% of total assets of the sector at the end of 2017 (Tab.1). The result in 2017 was, however, to a large extent driven by one large transaction - the takeover of Pekao Bank from Italian UniCredit by a state-run insurer PZU. This was the result of the Polish government policy to increase local ownership of the banking sector through acquisitions of foreign-owned banks.

The Polish cooperative banks have gradually undergone restructuring processes. The number of cooperative banks decreased from 1664 at the end of 1990 to 553 at the end of 2017 (Tab.1). The main reason for the decreasing number of cooperative banks in Poland were consolidation processes, mergers and acquisitions. In 2017, cooperative banks' market share for the total bank branches in Poland was 38%. The domestic investors controlled 14 commercial banks and all cooperative banks. Altogether, share of banks controlled by domestic investors accounted for 54,5% of sector assets. This contrasts sharply with the corresponding figure of 27.7% in 2008. In 2017, the foreign investors controlled 21 commercial banks and all branches of the credit institutions. Controlling interest was held by investors representing 19 different countries, the majority of them being from Germany and Spain (Fig.1).

Figure 1: Foreign investors in Polish banking sector, 2017(%)



Source: Polish Financial Supervision Authority (KNF 2017)

3.2 Polish cooperative banks' lending activity

Following the global financial crisis of 2007, the Basel 2 Accord for credit risk was enforced in European countries and for major international banks. Regulations were stringent, but “holes” remained. As Bessis (2010) points out, the scope of regulation does not extended to the entire industry. For example, management of hedge funds was left to self-discipline. Additionally, Jovanović et al.(2017) showed that European cooperative banks have to deal with various issues, such as: a new capital requirements laid down in new EU regulations (CRD IV, CRR) changing customer behavior, as well as globalization and the associated increased competition from foreign direct banks. And in this regard, it is not surprising to find that Polish Financial Supervision Authority placed tighter control on the expansion of foreign banking activity inside Poland's borders. In 2015, Institutional Protection Schemes (IPS), was introduced in Poland on the basis of associations of cooperative banks, in order to guarantee solvency and liquidity to all members. Cooperative banks continued to increase their regulatory capital, maintaining its high level. In 2017, the total Capital Ratio (TCR) for the Polish cooperative banking sector was 17.2% compared to 17.1% in 2016. However, over 12% of cooperative banks stayed out of IPS at the end of 2017 and four cooperative banks failed to carry out this minimum capital requirements set up by Polish Financial Supervision Authority. Although the current condition of the Polish cooperative banks is satisfactory, putting in place IPS should support the growth in the security of the sector.

Small and medium enterprises (SMEs) play an important role in the economy of Poland. SMEs contribute to 60 % of Poland's GDP. As noted by Castellani (2018) European SMEs remained very dependent on domestic banks for credit, in spite of high level of banking sector

globalization. Polish cooperative banks help to overcome credit rationing in agricultural loan market. Prior research has suggested that good lending relationships between local banks and SMEs are particularly relevant for enterprise owners (Musa et al., 2016). Furthermore, some studies show that, in some cases, no alternative lending source for SMEs exists in rural areas other than cooperative banks (Yamori et al.2016).

Table 2: The structure and loan quality of Polish cooperative banks (non financial sector and local government loans only)

	2010	2011	2012	2013	2014	2015	2016	2017
Loans granted to :								
- Small and medium-sized enterprises (SMEs)	24.6%	27.6%	30.0%	31.7%	27.8%	28.3%	27.7%	26,7
- Individual entrepreneurs	16.2%	16.5%	16.8%	16.7%	15.0%	14.6%	14.3%	13,9
- Individuals	25.7%	23.4%	21.7%	21.1%	19.8%	20.7%	22.2%	23,5
- Individual farmers	32.6%	31.5%	30.6%	29.6%	26.9%	26.2%	25.6%	24,9%
- Local government	-	-	-	-	9.7 %	9.4%	9.3%	10,1%
-Non-commercial institutions	0.9%	1.0%	0.9%	0.9%	0.8%	0.8%	0.9%	0.9%
The share of non-performing loans:								
- SMEs	9.4%	9.6%	9.7%	10.2%	11.7%	11,9%	14,9%	16,7%
- Individual entrepreneurs	7.5%	7.7%	8.8%	9.3%	9.3%	9.5%	10.7%	11.0%
- Individuals	5.2%	5.2%	5.7%	5.4%	4.7%	4.1%	3.7%	3.4%
- Individual farmers	1.8%	1.9%	2.0%	1.9%	1.8%	1.7%	2.1%	2.8%
- Local government	-	-	-	-	0.0%	0.0%	0.1%	0.0%

Source: Own elaboration based on the data of Polish Financial Supervision Authority and National Bank of Poland.

In 2017, loans granted to farmers, SMEs and individual entrepreneurs accounted for 65,5 % of receivables from the non-financial sector (Tab.2). In Poland, as in other countries of the region the asset structure of cooperative banks is dominated by loans to the nonfinancial private sector (more than 50 percent). The availability of subsidized agriculture loans play important role in the development of Polish rural communities. One of the weakness of Polish cooperative banks is adverse trend in the age structure of banks' clients and systematic decline in the number of shareholders. Yet, those banks try to search for a balance between maximisation of local communities' access to banking services and minimisation of risks to shareholders and depositaries. The quality of farmer loans remains high compared to other types of loans. In 2017, non-performing farmer loans accounted for 2.8% of the total value (Tab.2). The main source of funding for cooperative banks are deposits from the non-financial sector. In 2017, as in previous years, the Polish cooperative banks had a negative funding gap (excess of deposits over loans). By comparison, the majority of Polish commercial banks had a positive funding gap (excess of loans over deposits). At the same time, loans to SMEs (accounted for nearly PLN 19 billion), were the largest item of cooperative banks' assets. However, the quality of loans from small and medium-sized enterprises has decreased. Additionally, according to KNF data, ratio of non-performing loans granted to SMEs in large cooperative banks with assets above PLN 500 million was higher than the average for small and medium banks.

4. Conclusion

In 2016, the Polish government started a new financial policy to increase local ownership of the banking sector through acquisitions of foreign-owned banks by state-owned financial institutions. Retained profits were the main source of capital in domestic banking sector in recent years. Poland has a diversified banking sector, with long tradition and high presence of cooperative banks. Our results show that a strong position for Polish cooperative banks matter for SME access to bank loans. Since Poland's accession to the EU, cooperative banks have undergone restructuring in order to adjust to the EU capital requirements. Polish cooperative banks mostly fulfill the supervisory and liquidity requirements. Yet, the fact that a number of cooperative banks remain outside the IPS is a negative development. The decreased profitability of cooperative banks and low efficiency associated with the sector's model are subject to the same threats and challenges as in other countries.

References

- [1] Allen, F., Jackowicz, K., Kowalewski, O. and Kozłowski, Ł. (2017). Bank lending, crises, and changing ownership structure in Central and Eastern European countries. *Journal of Corporate Finance*, vol.42, pp. 494–515.
- [2] Annual Report 2017, European Association of Co-operative Banks. (2018). Brussels, Available: <http://www.eacb.coop>
- [3] Barry, T.A. , Lepetit, L. and Strobel , F. (2016). Bank ownership structure, lending corruption and the regulatory environment. *Journal of Comparative Economics*, vol. 44 pp. 732–751.
- [4] Bessis, J. (2010). *Risk Management in Banking*, Chichester, U.K.: John Wiley & Sons Ltd, pp. 9-11.
- [5] Bonin, J.P. and Schnabel, I. (2011). The great transformation: From government-owned to foreign- controlled banking sectors A symposium on banking in transition. *Economic of Transition*, vol. 19, pp. 397–405.
- [6] Caldarelli, A., Fiondella, C., Maffei, M. and Zagaria, C. (2016). Managing risk in credit cooperative banks: Lessons from a case study. *Management Accounting Research*, vol. 32, pp. 1–15.
- [7] Castellani, D. (2018). Mortgage-backed Securitization and SME Lending During the Financial and Economic Crisis: Evidence from the Italian Cooperative Banking system. *Economic Notes: Review of Banking, Finance and Monetary Economics*, no. 1, pp. 187–221.
- [8] Chen, M., Wu, J., Jeon, B. N. and Wang, R. (2017). Do foreign banks take more risk? Evidence from emerging economies. *Journal of Banking and Finance*, vol. 82, pp. 20–39.
- [9] Claessens, S. and van Horen, N. (2014). Foreign Banks: Trends and Impact. *Journal of Money, Credit and Banking*, vol. 46, pp. 295–326.
- [10] Clark, E. , Salvatore Mare E. and Radic' N. (2018) Cooperative banks: What do we know about competition and risk preferences? *Journal of International Financial Markets, Institutions & Money*, vol. 52, pp. 90–101.

- [11] Fiordelisi, F. and Mare, D.S. (2014). Competition and financial stability in European cooperative banks. *Journal of International Money and Finance*, vol. 45, pp. 1-16.
- [12] Ghosh, A. (2016). Banking sector globalization and bank performance: A comparative analysis of low income countries with emerging markets and advanced economies. *Review of Development Finance*, vol. 6, pp. 58–70.
- [13] Groeneveld, H. and Vries, B. de, (2009). European co-operative banks: First lessons of the subprime crisis. *The International Journal of Cooperative Management* vol. 4/2, pp. 8-21.
- [14] Groeneveld, H. (2017) . European co-operative banks in 2016: a concise assessment. In: Research Letter European Co-operative Banks, October 2017, Available: http://www.v3.globalcube.net/clients/eacb/content/medias/publications/research/final__20171013_tias_research_letter_european_cooperative_banks_201____.pdf
- [15] Haselmann, R. , Wachtel, P., Sobott, J. (2016). Credit Institutions, Ownership and Bank Lending in Transition Economies. In: Beck, T., Casu, B. (Eds.). *The Palgrave Handbook of European Banking*. Palgrave Macmillan London, pp. 623-644.
- [16] Havrylchyk, O. and Jurzyk E. (2011). Profitability of foreign banks in Central and Eastern Europe: Does the entry mode matter? *Economics of Transition*, vol.19, no. 3, pp. 443–472.
- [17] *Informacja o sytuacji banków spółdzielczych i zrzeszających w latach 2008-2017r.* (2008; 2017). Urząd Komisji Nadzoru Finansowego, Warszawa, Available: <http://www.knf.gov.pl>
- [18] Jovanović T., Arnold C. and Voigt K-I. (2017). Cooperative banks in need of transition: The influence of Basel III on the business model of German cooperative credit institutions. *Journal of Co-operative Organization and Management*, vol. 5, pp. 39–47.
- [19] Mercieca, S., Schaeck, K. and Wolfe, S. (2007). Small European banks: Benefits from diversification? *Journal of Bank and Finance*, vol. 31, no. 7, pp. 1975–1998.
- [20] Meriläinen, J.M. (2016). Lending growth during the financial crisis and the sovereign debt crisis: the role of bank ownership type. *Journal of International Financial Markets, Institutions and Money*, vol. 41, pp. 168-182.
- [21] Musa, H., Strokova, Z. and Musova, Z. (2016). Financing of Slovak small and medium sized enterprises in globalising environment. *Conference Proceedings of the 16th International Scientific Conference Globalization and its socio-economic consequences*. Rajcke Teplice, Slovak Republic, pp. 1458-1465.
- [22] Sołoma, A. (2017). The cooperative banking sector in Poland: do UE risk reduction measures and capital adequacy requirements affect performance and stability? *Conference Proceedings of the 17 th International Scientific Conference Globalization and its socio-economic consequences*. Rajcke Teplice, Slovak Republic, pp. 2432-2438.
- [23] Szczepańska, O. (ed.), (2017). Financial stability report. NBP, Warszawa. *Financial Stability Department*, Available: <http://www.nbp.pl>, pp. 1-146.
- [24] Yamori, N, Harimaya, K. and Tomimura, K. (2017). Corporate governance structure and efficiencies of cooperative banks. *International Journal of Economics and Finance*, vol. 22, pp. 368–378.

GLOBALIZATION OF ACCOUNTING PROFESSION IN SHARED SERVICES CENTERS

Matej Stanovský^{1,a,*}

¹Comenius University – Faculty of Management, Slovak Republic

^amatej.stanovsky@fm.uniba.sk

*Corresponding author

Abstract. The purpose of the academic article is to analyze the impact of outsourcing on accounting profession and identify the key factors for the successful creation and operation of a shared service center. The shared services centers create a multicultural working environment and create jobs with a higher level of qualification and expertise. The shared services centers emphasize the standardization of the accounting processes. The centers of shared services face many problems such as fluctuation caused by stereotypical work, overtime working schedule and working across different time zones. Globalization has allowed companies to grow internationally, and outsourcing has become the rising trend in recent years. Certain iterations are the shared services centers where re-localizing processes in different areas such as finance, customer support, IT, marketing, etc. Shared services centers allow for a higher concentration of qualified staff in a specific area. Production Outsourcing allows you to create factories with state-of-the-art technology in one place where mass production is located. Both trends have different benefits, and one of the most important are saving company costs and improving the quality of the service delivered, while continuing to maintain the knowledge remaining within the company hierarchy.

Keywords: share service center, outsourcing, accounting, globalization

JEL Classification: Q56 F65 F66

1. Introduction

Globalization has increased not only the speed and importance of cooperation, but thanks to international relations between countries as well as between businesses, competition has also increased. (Adamko & Siekelova, 2017) Globalization allowed companies to grow internationally which has significant impact on functions, processes, structure, system how companies are operating in recent years. Outsourcing in general become trend due to many reasons, main drivers are cost reduction and focus on quality. The cost savings have been the main focus of early adopters of outsourcing and offshoring for a long time. A SSC can be viewed as a particular kind of sourcing arrangement having a long-term and strategic impact (Bergeron, 2003).

Outsourcing activities could categorize based on functions. For example: manufacture, logistics, research & development, customer support, human resource management, services (finance, legal, IT, etc.) For instance, PWC define outsourcing as the transfer of a business activity or function to a third party, usually along with people and/or know how. (PricewaterhouseCoopers, 2008, p. 4). Outsourcing involves the sourcing of goods and services previously produced internally within the sourcing organization from external

suppliers. The term outsourcing can cover many areas, including the outsourcing of manufacturing as well as services. The term outsourcing is most commonly used in relation to switching of the supply of product or service activities to external suppliers. Outsourcing can involve the transfer of an entire business function to a supplier. Alternatively, outsourcing may lead to the transfer of some activities associated with the function whilst some are kept in-house. Outsourcing can also involve the transfer of both people and physical assets to the supplier. Outsourcing is not just a straightforward financial or purchasing decision. In many cases, outsourcing is a major strategic decision that means implications for the entire organization. (McIvor, 2005, p. 11).

Outsourcing could be external or internal form of collaboration. External outsourcing means that certain business activity is done by third part. Internal outsourcing (captive) represents that certain business activity is done within company. Offshoring is international outsourcing. Offshoring means relocating certain business process from one country to another. Certain iterations of outsourcing are the shared services centers which are categorized as internal outsourcing and in mostly cases as international outsourcing (offshoring). Definition of share service center (SSC): establishing a SSC entails the consolidation of support functions (e.g. finance and accounting, human resource management, IT, procurement) from several organizations (e.g. agencies and/or ministries) into a single organizational entity, supported by a sharing arrangement (see, e.g. Burns & Yeaton, 2008; Joha & Janssen, 2011; Miskon et al., 2010; Schulz & Brenner, 2010).

Share service centers are rising trend in recent years. Their dynamic growth can be observed especially in Central and Eastern Europe (CEE) that makes perfect places to locate investments (Ślusarczyk & Golnik, 2015, p. 94). The consolidation of processes in business service centers (BSCs) allows companies to benefit from economies of scale, standardization of processes, sharing of resources, and processes transfer to less expensive locations (Boglund et al., 2011). The SSCs industry growth rate in the country is even faster than in India, and the industry mainly achieves the expansion through increase of existing centers, with only 10% from new center arrivals (Stewart, 2015).

2. Theoretical concept

The most important prerequisites for creating SSCs are cost saving and enhance quality of work. This premise is mentioned by many authors in academic literature. (see, e.g. Wagenaar, 2006; Borman & Janssen, 2013; Raudla & Tammel, 2015).

Standardization of processes are also mentioned in academic literature as important factor of successfully functioning SSC. Some SSC due to merge and acquisitions performs accounting processes in multiple IT systems. Standardization of systems and technology may allow the SSC to employ cheaper junior staff but, conversely, the scale and new focus of the SSC should also enable it to recruit and concentrate top experts and professionals. Over time, this creates new core competencies to support and enhance the overall organization. (Herbert et al., 2012). However, standardization is also not only in IT related, but also it links to standardization of accounting processes and reporting.

SSC are oriented for certain activity for example finance and accounting which become one of the core tasks. Commonly in academic literature is also used term BPO (Business Process Outsourcing) which indicate that these operations are transferred to SSC and create

administrative business center for these operations. (Janssen et al., 2012; Dollery et al., 2009; Janssen & Joha, 2006; Wagenaar, 2006). Also, author Maja Letica (2016) categorized focus on core activities as indicators for the variable, related to outsourcing.

3. Methodology

Through many sources from the literature review, I identified the 7 key factors for the efficient operation of the Shared Services Center, which are presented in Table 1. The method used in the article is a questionnaire. The analysis uses data collected from the employees which are working or has been working in SSC environment in Slovakia. The questionnaire contains closed and multiple-choice responses. Survey collected the data via using Google forms and questionnaire was distributed to people which has SSC working experience.

Table 1: Summary of research questions. Critical factors of successful share service center

Question 1	Could we assume that cost-saving is one of critical factor of successful SSC?
Question 2	Could we assume that improve quality of work is one of critical factor of successful SSC?
Question 3	Could we assume that standardization makes work less complex and easier and efficient is one of critical factor of successful SSC?
Question 4	Could we assume that SSC is specialized on core task is on of critical factor of successful SSC?
Question 5	Could we assume that system and people are on of critical factor of successful SSC?
Question 6	Could we assume that ethic and constant training is on of critical factor of successful SSC?
Question 7	Could we assume that establishment and development of good working relationship with key external and internal partners is on of critical factor of successful SSC?

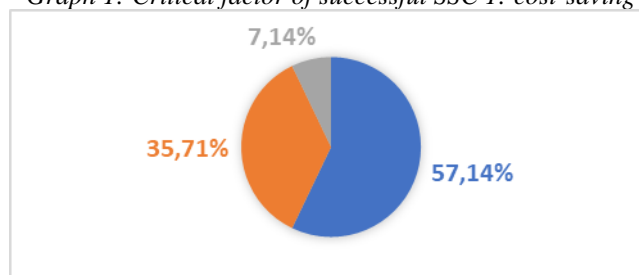
4. Results

Results are based on a survey based on the survey Respondents responded on a scale of 1 to 5. The scale is as follows: 5 - totally agree, 4 - agree, 3 - not sure, 2 - disagree, 1 - totally disagree. For presenting the data, the pie chart is used and the data in the graph is in percentage.

4.1 Critical factors of successful SSC

Firstly, critical factors of successful SSC is cost saving. Based on the results of the questionnaire are the following results 57,14% respondents answered 5 - totally agree, 35,71 % 4 – agree, 7,14% 3 - not sure.

Graph 1: Critical factor of successful SSC 1: cost-saving

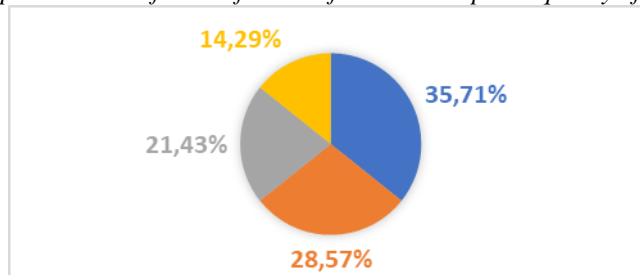


Source: result from questionnaire – own research

Cost savings is one of the basic prerequisites for the establishing a shared service center. As the level of wages differs in different EU countries, moving labor from the country from high wages to a country where the wage level is lower brings considerable cost savings.

Secondly, critical factor of successful SSC 2: improve quality of work. The following facts are from the questionnaire: 35,71% respondents answered 5 - totally agree, 28,57% 4 – agree, 21,43%, 3 - not sure a 14,29 2 – disagree.

Graph 2: Critical factor of successful SSC 2: improve quality of work

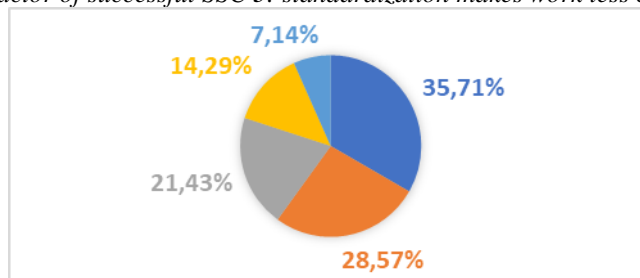


Source: result from questionnaire – own research

Even though the quality of the work is crucial, the views from shared services center employee perspective are different. From the point of view of employees, the quality orientation is questionable. Some believe that for better KPIs such as number reconciling items and aging of them, it would be more suitable to have a higher number of employees to make the even quality higher.

Thirdly, critical factor of successful SSC 3: standardization makes work less complex and easier and efficient. The answer to this question is the following: 35,71% answered 5 - totally agree, 28,57% 4 – agree, 21,43% 3 - not sure, 14,29% 2 – disagree a 7,14 % 1 - totally disagree.

Graph 3: Critical factor of successful SSC 3: standardization makes work less complex and efficient

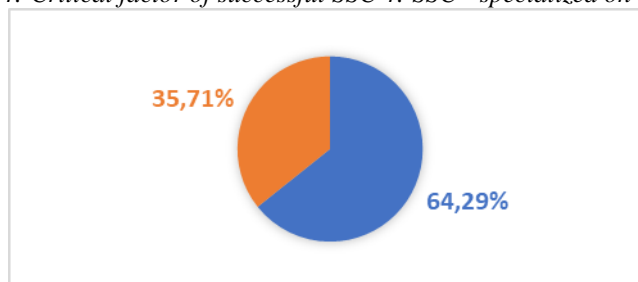


Source: result from questionnaire – own research

Majority of respondents agree with this claim. It is important to note that this effect is in the long run would be effective. However, in the short run, it can cause duplication of some tasks. Also, some employees think that change may not always lead to processes improvement. Hence, the answers to this research question are diverse. In the long run, after implementing a solution, it could leads to positive results. Most positions in the shared services centers are partial accounting, more complex and more complicated tasks are in senior positions.

Fourthly, critical factor of successful SSC 4: SSC - specialized on core task. Based on responses, the results are as follows: 64,29% 5 - totally agree, 35,71% 4 – agree.

Graph 4: Critical factor of successful SSC 4: SSC - specialized on core task

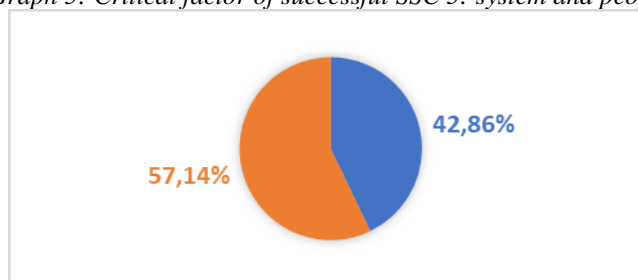


Source: result from questionnaire – own research

This theoretical assumption can be considered true. As well as the manufacturing plant is focused on manufacturing, the SSC is focused on a certain service which could be considered as core task. The shared services center is focused, for example, on accounting for the EMAE region where the majority of operations are performed in the center of shared services.

Fifth critical factor of successful SSC 5: system and people. For this critical success factor, the results are as follows: 42,86% 5 - totally agree a 57,14% 4 – agree.

Graph 5: Critical factor of successful SSC 5: system and people

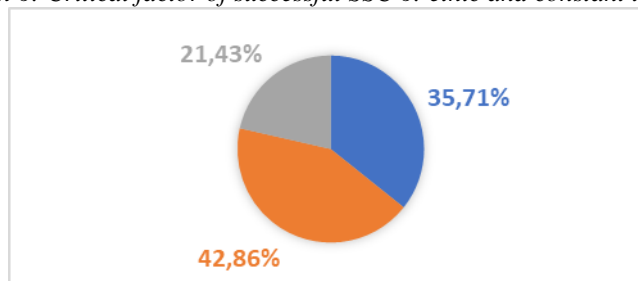


Source: result from questionnaire – own research

The system of operation is crucial for the successful operation of the corporation. Properly configured organizational structure and configuration of information systems are inherently important. Equally important are people working in the centers of shared services.

Sixth Critical factor of successful SSC 6: ethic and constant training. For this key factor, the results are as follows: 35,71% 5 - totally agree, 42,86% 4 – agree, 21,43% 3 - not sure.

Graph 6: Critical factor of successful SSC 6: ethic and constant training



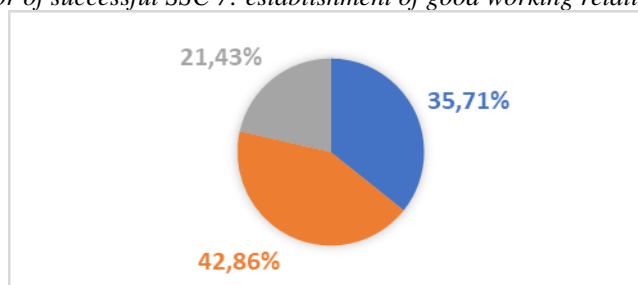
Source: result from questionnaire – own research

This theoretical assumption based on responses can be considered as positive because most 78.57% agree with this assumption. 21.43% is not fully identified with this factor. In the centers of shared services, the work is relatively simple due to standardization and the less demanding positions do not need training. In the case of senior positions, the situation is the opposite and the centers of shared services support the acquisition of international accounting

certification such as ACCA, CPA, CIA, CMA. For this reason, some may be convinced that this factor is not completely appreciated.

Seventh critical factor of successful SSC 7: establishment and development of good working relationship with key external and internal partners. The latest research questions have the following results: 5 - totally agree, 35,71% 4 – agree, 42,86% 3 - not sure, 21,43%.

Graph 7: Critical factor of successful SSC 7: establishment of good working relationship with key partners



Source: result from questionnaire – own research

As most respondents agree 85.71%, we can assume that this theoretical concept is true. Good relationships are clearly important for building a successful shared service center. Ethical behavior, although it is always declared not a hundred percent guarantee that it works in practice.

5. Conclusion

The purpose of the article is to analyze the impact of outsourcing on accounting profession and identify the key factors for the successful creation and operation of a shared service center. Based on the literature review, the SSC's critical factory success has been formulated from the perspective of employees so that we can better assess these theoretical concepts.

Globalization and offshoring allowed corporations to expand internationally. In recent years, SSCs have become a trend and a new way of organizing a structure that, besides saving costs, provides many other benefits. SSC has created an entirely new form of employment for accountants. They offer a wide range of different job positions and, given the competitive environment, the SSC seeks to offer various forms of benefits in addition to a relatively high salary rating. In general, large companies, in terms of scope and stability, offer better paid work than accounting firms, and work in accounting companies requires far more complex and demanding knowledge. The current organizational structure in SSC requires fragmentation of complex accounting to partial. Shared services centers enable career growth, whether horizontally or vertically. Through rotation they allow employees to gain new experience. Alternatively, get to the team leader or other management posts. The SSC decides to have a significant impact on labor market accountants as this market is constantly growing.

Acknowledgment

The contribution was written within the research project VEGA 1/0647/18 "Determinants of the target process orientation and financial management within the purview of development of the present business environment".

References

- [1] Adamko P. and Siekelova, A. (2017). "An ensemble model for prediction of crisis in Slovak companies. *Globalization and Its Socio-Economic Consequences*, Zilina, Slovakia, vol. 17, pp. 37-43.
- [2] Bergeron, B. (2003). *Essentials of shared services*. Hoboken, NJ: Wiley
- [3] Boglind, A., Hallsten, F. and Thilander, P. (2011). HR transformation and shared services Adoption and adaptation in Swedish organization. *Personnel Review*, vol. 40, pp. 570–588.
- [4] Borman, M. and Janssen, M. (2013). Reconciling two approaches to critical success factors: the case of shared services in the public sector. *International Journal of Information Management*, vol. 33, pp. 390-400.
- [5] Burns, T.J. and Yeaton, K.G. (2008). Success Factors for Implementing Shared Services in Government. *IBM Center for the Business of Government*, Washington, DC.
- [6] Dollery, B., Akimov, A. and Byrnes, J. (2009). Shared services in Australian local government: rationale, alternative models and empirical evidence. *Australian Journal of Public Administration*, vol. 68, pp. 208-219.
- [7] Herbert, I.P. and Seal, W.B. (2012). Shared services as a new organisational form: Some implications for management accounting. *British accounting review*, vol. 44, pp. 83-97.
- [8] Janssen, M. and Joha, A., (2016). Motives for establishing shared service centers in public administrations. *International Journal of Information Management*, vol. 26, pp. 102-115.
- [9] Janssen, M., Kamal, M., Weerakoddy, V. and Joha, A. (2012). Shared services as a collaboration strategy and arrangement in public service networks. *Proceedings of the 2012 45th Hawaii International Conference on System Sciences*, IEEE, pp. 2218-2227.
- [10] Joha, A. and Janssen, M. (2011). Types of shared services business models in public administration. *Proceedings of the 12th Annual International Conference on Digital Government Research*, ACM, pp. 26-35.
- [11] Koval, O., Nabareseh, S., Klimek, P. and Chromjakova, F. (2016). Demographic preferences towards careers in shared service centers: A factor analysis. *Journal of business research*, vol. 69, pp. 4798-4803.
- [12] Letica, M. (2016). The effect of outsourcing activities selection on the benefits of outsourcing. *Management-journal of contemporary management issues*, vol. 21, pp.77-97.
- [13] McIvor, R. (2005). *The Outsourcing Process*. New York: Cambridge University Press. [Online]. Available: <https://pdfs.semanticscholar.org/77d6/21e99e03de15ada9e13420acf125f0a0dfd0.pdf>
- [14] Miskon, S., Bandara, W., Fielt, E. and Gable, G. (2010). Understanding shared services: an exploration of the IS literature. *International Journal of E-Services & Mobile Applications*, vol. 2, pp. 373-384.

- [15] PricewaterhouseCoopers. (2008, December). Outsourcing comes of age: The rise of collaborative partnering. [Online] Available: <https://www.pwc.com/gx/en/operations-consulting-services/pdf/outsourcingcomesofage.pdf>
- [16] Raudla R. and Tammel K. (2015). Creating shared service centres for public sector Accounting. *Accounting auditing & accountability journal*, vol. 28, pp. 158-179.
- [17] Raudla R. and Tammel K. (2015). Accounting auditing & accountability journal. *Accounting auditing & accountability journal*, vol. 28, pp. 158-179.
- [18] Schulz, V. and Brenner, W. (2010). Characteristics of shared service centers. *Transforming Government: People, Process and Policy*, vol. 4, pp. 210-219.
- [19] Stewart,P.(2015). Shared service centres in Central and Eastern Europe - Moving up the value curve [Online]. Available: http://pwc.blogs.com/growth_markets/2015/06/shared-service-centres-in-central-and-eastern-europe-moving-up-the-value-curve.html
- [20] Ślusarczyk, B. and Golnik, R. (2014). The recruitment process in transnational corporations. *Polish Journal of Management Studies*, vol. 10, pp. 189-197.
- [21] Wagenaar, R.W. (2006). Governance of shared service centers in public administration: dilemmas and trade-offs. *Proceedings of the 8th International Conference on Electronic Commerce: The New E-Commerce: Innovations for Conquering Current Barriers, Obstacles and Limitations to Conducting Successful Business on the Internet*, ACM, pp. 354-363.

CONSEQUENCES OF APPLYING THE EQUITY METHOD IN FINANCIAL REPORTS IN THE FACE OF GLOBALIZATION ON THE EXAMPLE OF LISTED COMPANIES IN POLAND

Marzena Strojek-Filus^{1,a,*}

¹University of Economics in Katowice, Department of Accounting, Poland

^amarzena.strojek@ue.katowice.pl

*Corresponding author

Abstract. In terms of the globalization process and internationalization of capital, it is important to adequately demonstrate capital ties between various entities in the financial statements prepared by them, in particular the consolidated ones. The equity method is used to measure shares in specific capital relations and to demonstrate consolidated capital. In accordance with subsequent amendments to IAS/IFRS, this method is applied more increasingly and generally regards the largest business entities, including capital groups. However, the next result of using this method is also the “concealment” of acquired goodwill, which, as an asset of a business entity and a capital group, is becoming more and more important in the light of the accuracy of assessing changes in the global economy. The aim of the paper is to indicate the advantages and disadvantages of the equity method and to demonstrate the effects of adopting this method in the context of globalization processes. The paper examines financial reports of companies using this method, listed in the WIG 30 index on the Warsaw Stock Exchange. The paper shows that the equity method presents the effects of the investor’s acquisition of shares in another entity in an insufficiently clear and transparent manner. This can be a disinformation factor for investors. The trend to expand the scope of this method for different types of capital relations may be a dangerous factor in the assessment of capital globalization processes. The qualitative analysis of financial reports for the years 2015-2016 and comparative analysis were used in the research.

Keywords: equity method, financial statement, goodwill, capital group, IAS/IFRS

JEL Classification: M41, F60, F69

1. Introduction

The globalization processes are conducive to combining different types of business entities. One entity, by acquiring interests in other entities, becomes the owner or co-owner of other entities. In this way, increasingly complex, extensive holding structures, often of an international character, are created. Such entities are among the largest organisms in the global economy, and, at the same time, they can be characterized by high volatility of the capital and ownership structure. Most of these entities are capital groups under which the parent company controls subsidiaries. However, entities within the group often become parties to other capital relations, in particular significant influence and joint control. Particular importance is

attributed to the significant influence relationship. The investor can treat this relationship as a transitional state to obtain full control over another entity. It can also be used to 'lead out' a subsidiary from the consolidated group. Exerting significant influence may also be an end in itself for the investor.

In terms of accounting, it is important to recognize that a given entity – an investor acquiring interests in another entity becomes a party to the capital relation and it is important to correctly identify the type of the relationship. It is the investor's obligation to correctly account for it and present the effects of this relationship in the financial statement, most commonly in the consolidated financial statement. This, in turn, requires clear, transparent accounting principles, and according to Nobes (2005) is still missing.

Accounting for a given type of capital relation involves the application of an appropriate method. The full consolidation method, by means of which consolidated financial statement is prepared (IFRS 3, IFRS 10), is the most important one. However, especially in the last dozen or so years, the equity method applied in the case of significant influence and joint venture has become increasingly important. A special role is also assigned to this method in the changes introduced within EPSAS - European Public Sector Accounting Standards (Bergmann et al., 2016). Research carried out by Bergmann et al. (2016) in the Organization for Economic Co-operation and Development countries has shown that although the importance of consolidated financial statement is growing, the equity method is still of great importance as a transitional stage in the process of implementing consolidation of financial statements in the public finance sector. The literature presents the results of research on the assessment of the impact of applying the accounting method for the capital relation on the view of the financial position of an enterprise or capital group and on meeting the information needs of other investors (e.g. Singhvi & Desai, 1971; Bauman, 2007; Knapp, 2013; Lopes et al., 2013). The results of most studies indicate the importance of the type and scope of these disclosures in the financial statement. This problem is an element of a broader issue of the valuation model selection in accounting (Sulik-Gorecka et al., 2017).

The paper aims to indicate the advantages and threads associated with the application of the equity method and to demonstrate the effects of using this method in the context of globalization processes.

2. The equity method as valuation method of interests

The equity method is a variant of the adjusted purchase price method. The investor initially recognizes the value of acquired interests in the financial statement at their purchase price. Then, the value according to the purchase price is adjusted for any changes in the investor's net assets of that entity that occur after the acquisition date. Changes may occur due to the distribution of profit for dividend payment, profit or loss for the financial year, increase in share capital, etc. The investor's result includes its interests in the result of this entity. This also applies to other comprehensive income. The remaining total income of the investor includes its interests in the other comprehensive income of the entity in which it invested. The dividends paid by this entity, in part attributable to the proportion of interests held by the investor, reduce the value of these interests.

A characteristic feature of this method is to take into account the acquired company value. The net assets of the entity in which the interests were acquired are valued as at this day

according to the fair value parameter. As a result of the comparison of the investment cost (interests' purchase price) with the net asset value of the entity in the part attributable to the investor, a positive difference is obtained, representing goodwill or a negative difference – a profit on an occasional purchase. In the case of the current version of the equity method according to IAS 28 '*Investments in associates and joint ventures*', the goodwill acquired is not recognized as a separate item in the statement of financial position. It is part of the reported value of the investment. However, it is subject to an impairment settlement as in the case of full consolidation.

The equity method also includes adjustments for unrealized profit from transactions made between the investor and the entity in which the investment was made. Similarly, as in the case of the full and proportional consolidation method, the direction of the transaction is important to determine the amount of profit subject to elimination. In this case, the question is whether the investor was the acquiring or selling party, so-called 'downstream' and 'upstream' transactions (Gierusz & Gierusz, 2016). It should be emphasized that the reporting basis of this method is the investor's financial statement. Items from this report are subject to adjustments resulting from the mentioned changes. The main item subject to adjustments in respect of the interests in other entities, the equity method is called line-by-line consolidation method (Dyson, 2000). In the main investor's report, i.e. after introducing changes due to the application of the equity method, the assets of the entity in which the investment was made are not presented. This effect differs in a fundamental way from the full consolidation method and the proportional method. However, the equity method leads to the disclosure of consolidated equity in the main investor's report, which is a significant advantage.

The literature also indicates other advantages of this method, such as much simpler procedures and the use of fair value to determine the net assets of the entity in which the interests were purchased (EY, 2015). A significant advantage of this method is the elimination of the effects of abrupt changes in the market price of interests (shares), if the entity is admitted to public trading (Graham et al., 1998). In turn, the threat is the lack of a sufficiently transparent presentation of information about the acquired goodwill and its further settlement.

Part of the research indicates that for the assessment of the financial situation of the entity in which the interests were purchased, it is not important whether they are accounted for using the equity method or using the proportional method. In both cases, the same level of consolidated equity is shown (e.g. Ginger Inchausti et al., 2017). However, the effects of applying both methods are different from the point of view of the view created by means of the financial statement. The different scope and type of information is presented (Bushee & Noe, 2000). Similar results were obtained by Remlein (2016) comparing both methods on the basis of listed companies in Poland in regard to the joint control relationship. In the case of the proportional method, the higher balance sheet total was shown, while the value of interests in the jointly controlled entity was higher using the equity method.

Part of the research concerned the effects of applying the equity method in relation to the full consolidation method. Research conducted by Scholer (2015) in Denmark showed that in the case of applying the equity method, there was a lower stock volatility in relation to full consolidation. It is also important whether this method is used in the case of large differences between the equity of the parent company and the equity of the capital group. The application of the equity method also affects the EPS (earnings-per-share) ratio calculated on the basis of the report (Lee et al., 2013). Researchers explain this phenomenon by, among others,

asymmetry of information about the entity in which the investment was made between the entity that settles the investment and the user of its financial statement.

3. Application of the equity method in the light of IAS/IFRS

The equity method – in general – is used to present the investor's interests in entities that are not subsidiaries in the consolidated financial statement, on which the investor, however, has a significant impact. IAS 28 '*Investments in Associates and Joint Ventures*' and IAS 27 '*Consolidated and Separate Financial Statements*' also allow the use of this method if the investor does not hold interests in other entities which it controls and therefore does not prepare the consolidated financial statement. In this case, the equity method is applied in the investor's separate report, which, after applying this method, becomes the main report.

The equity method, pursuant to IAS 28 and IFRS 11 '*Joint arrangements*', is used for the settlement and presentation of investment reporting in associates and joint ventures.

Both standards allow for cases in which the investor is exempted from the obligation to use this method. One of them is to have – directly or through high risk capital management organizations – mutual funds, trust funds, insurance funds with investment programs or other similar entities. The scope of disclosures regarding this method is specified in IFRS 12 '*Disclosures of interests in other entities*'. The basic capital relationship, for which the equity method should be used, is the significant influence of the investor on another entity, the so-called associated entity. It is crucial to recognize this relationship correctly. In practice, this often comes down to determining whether the investor has a significant influence or is already under control of another entity. On the other hand, it is relatively easy to recognize the manifestations of significant influence, which means that one cannot treat interests as an 'ordinary' investment.

IAS 28 defines significant impact as an investor's ability to participate in decisions regarding the financial and operating policy of the investee. However, the investor's influence on this entity cannot be control relation. From the point of view of the definition of significant impact, it is important to specify in IAS 28 percentage share of the investor's interest in the associate. The basic manifestation of this relationship is that the investor holds, directly or indirectly, 20% or more of the voting rights in that entity. However, if it is necessary to rule out the possibility of controlling it, the upper limit of this range is 50%. Of course, the significant impact may also occur in the case of smaller or larger interests, if other premises indicate it. These include, among others:

- a) sitting on the board of directors or an equivalent body managing the unit in which the investment was made,
- b) participation in the creation of the entity's policy (e.g. participation in decisions regarding dividends or other payments from capital),
- c) conducting significant transactions between the investor and this entity,
- d) mutual exchange of managerial staff,
- e) mutual access to relevant technical information.

The second capital relation, which should be accounted for using the equity method, is a joint venture. IFRS 11 defines this relationship as a joint arrangement in which the parties exercising control over it have rights to the net assets of that contractual arrangement. A characteristic feature of this relationship is the necessity to conclude a contract by the partners,

under which they undertake to jointly control another entity. In this case, joint control consists in the partners agreeing on a common position in all the key decisions for the jointly controlled entity regarding the operating, financial and investment activities. It should be stressed that the joint control relationship may also occur in the case of a diversified number of interests held by partners, if they undertake to participate on an equal footing in the decision-making process. In the case of joint contractual arrangements, it is important to distinguish the joint venture from the joint operation. In the first case, only the net assets determined on the basis of the financial statement prepared by the jointly controlled entity are subject to control. In the second case, each of the partners may control its assets and regulate the liabilities related to the action. The method by which the joint operation is accounted for is the proportional method.

It should be emphasized that misidentification of the capital relation may lead to incorrect settlement and presentation in the consolidated financial statement or the main investor report. In the case of intentional avoidance by the parent company of the obligation to prepare the consolidated financial statement or avoiding consolidation of a given entity, the degree of impact on that entity may be classified as a significant influence, but not control. As a result, the parent company will not show the assets and liabilities of that entity, but only the final value of interests in terms of the equity method. The resolution of a joint arrangement may also be problematic, in which a joint venture or joint operation may occur. In the event of a separate entity preparing the financial statement, it may be difficult or intentional to resolve whether it is a joint operation or a joint venture. In this case, the question arises whether the equity method or proportional method should be applied. The conducted research shows that the scope and type of disclosures on capital relations is important for the users of financial statements (e.g. Barron & Byard, 2002; Lopes et al., 2013; Knapp, 2013). Research carried out by Bushee and Noe (2000) concerned the impact of the type and scope of disclosures regarding capital relations on investors, especially institutional ones, and on stock exchange reactions. Research has shown that entities with high AIMR disclosures rankings have greater institutional ownership. Due to the fact that the equity method consists in showing in the assets of the statement of financial position of the investor (consolidated statement of financial position of the entity – the investor) the residual value of interests only, without specifying the reporting items, the mandatory disclosure on it becomes particularly important. In accordance with IFRS 12, an investor is required to disclose a range of information regarding the relationship with an associate or joint venture. Due to a number of eliminations, which are carried out under this method, the investor is also required to disclose aggregate data before exclusions, e.g. regarding transactions between the investor and the associate or joint venture.

Information on the goodwill and its write-downs under the equity method is of particular importance. As emphasized in the previous part, in the current simplified version of this method, the acquired goodwill is not recognized as a separate asset item. The user of the report cannot directly read this information as part of the statement of financial position of the entity. Taking into account the specificity and controversy regarding this asset as well as the complex processes of testing for possible impairment, it seems that the equity method is not transparent enough (Strojek-Filus, 2013). The user of the report, without additional disclosures, often dispersed, is not able to assess the effects of the entity's acquisition of interests from the point of view of goodwill. As a result, the impression of 'hidden' value of the company arises (Strojek-Filus & Maruszewska, 2016). In this context, disclosures on the

company's goodwill and the impairment test become fundamental. Gaps in the disclosures on this subject can effectively prevent proper interpretation of the results of the application of the equity method.

4. Methods of research

The study investigated companies – capital groups – of the WIG 30 index listed on the Warsaw Stock Exchange and examines its financial reports for the years 2015-2016 in respect of equity method information. The qualitative and comparative analysis of financial reports were used. The selection of the research sample results from the fact that they are the largest entities in Poland listed on the public market, forming extensive holding structures. There are various capital relations in these entities. Bank and insurance capital groups were omitted in the study. The analysis includes the following information:

Information 1 (I1) – adoption of the equity method

Information 2 (I2) - information on the application of the equity method in the reporting item

Information 3 (I3) – information on capital relations

Information 4 (I4) – assessment of the depth of information on capital relations

Information 5 (I5) – information on the occurrence of goodwill related to equity method

5. The results

The results of the comparative analysis are summarized in Table 1.

Table 1: Comparison of disclosures on the equity method in the consolidated financial statements of companies from the WIG 30 index

Company's name	I 1		I 2		I 3		I 4		I 5	
	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016
Lotos	Y	Y	Y	Y	Y	Y	GI	GI	NI	NI
PGNiG	Y	Y	Y	Y	Y	Y	DI	DI	NG	NG
CCC	N	N	NA	NA	Y	Y	DI	DI	NA	NA
CyfrPolsat	Y	Y	P	P	Y	Y	GI	GI	NG	NG
CDProjekt	N	N	NA	NA	Y	Y	GI	GI	NA	NA
DINOPL	N	N	NA	NA	Y	Y	DI	DI	NA	NA
ENEA	N	N	NA	NA	Y	Y	DI	DI	NA	NA
ENERGA	Y	Y	Y	Y	Y	Y	DI	DI	DI	DI
AZOTY	Y	Y	N	N	Y	Y	DI	DI	DI	DI
EUROCASCH	Y	Y	Y	Y	Y	Y	DI	DI	DI	DI
JSW	Y	Y	N	N	Y	Y	GI	GI	NI	NI
KGHM	Y	Y	Y	Y	Y	Y	DI	DI	DI	DI
KRUK	N	N	NA	NA	Y	Y	DI	DI	NA	NA
LPP	N	N	NA	NA	Y	Y	DI	DI	NA	NA
ORANGEPL	N	N	NA	NA	Y	Y	DI	DI	NA	NA
PGE	Y	Y	Y	Y	Y	Y	DI	DI	NI	NI
PKNORLEN	Y	Y	Y	Y	Y	Y	DI	DI	DI	DI
PKP Cargo	Y	Y	Y	Y	Y	Y	DI	DI	DI	DI
PLAY	Y	Y	N	N	Y	Y	DI	DI	DI	DI
TAURONPE	N	N	NA	NA	Y	Y	DI	DI	NA	NA

Source: own study

Explanation to the table 1: Y – Yes; N – No; GI – general information; NI – no information; DI – detailed information; NG – no goodwill; NA – not applicable

The presented analysis shows that the majority of surveyed companies (60%) used the equity method in the audited period. However, not all companies in this group indicated directly this method in the consolidated statement of comprehensive income and in the consolidated statement of financial position. Several of them indicated the type of capital relation, e.g. interests in joint ventures, interests in associates. All of the surveyed companies included information on the use of this method in the footnotes. Almost all companies provided detailed information on existing capital relations. The above list also shows that only 7 companies contained references to the goodwill created under the equity method.

6. Conclusion

The equity method is of particular importance in accounting for capital relations. Its wider scope of application is supported by such advantages as preservation of the effect of capital consolidation, simplicity resulting from omitting the presentation of assets of an associate or joint venture. It is also important to take into account adjustments due to unrealized profits. However, this method also has a disadvantage, or rather a threat, from the point of view of users of financial statements related to the lack of sufficiently transparent information on the acquired goodwill. Although the information on write-downs on this account falls within the scope of mandatory disclosures, it is difficult to interpret and not always detailed enough. This can be a misinforming factor for investors. An important threat may be the difficulty in identifying the capital relation. The intention may arise on the part of the parent company to avoid full consolidation of a subsidiary and settlement with the use of the equity method. The relative assessment of manifestations of significant influence may favor this. The paper shows that the equity method presents the effects of the investor's acquisition of shares in another entity in an insufficiently clear and transparent manner. The trend to expand the scope of this method for different types of capital relations may be a dangerous factor in the assessment of globalization processes as far as the capital is concerned.

References

- [1] Barron, O.E., Byard, D. and Kim, O. (2002). Changes in analysts' information around earnings announcements. *The Accounting Review*, vol. 77, no. 4, pp. 821-846.
- [2] Bauman, M. (2007). Proportional consolidation versus equity method: additional evidence on the association with bond ratings. *International Review of Financial Analysis*, vol. 16, no. 5, pp. 496-507.
- [3] Bergmann, A., Grossi, G., Rauskala, J. and Fuchs, S. (2016). Consolidation in the public sector: methods and approaches in Organisation for Economic Co-operation and Development countries. *International Review of Administrative Sciences*, vol. 82, no. 4, pp. 763-783.
- [4] Bushee, B.J. and Noe, C.F. (2000). Corporate disclosure practices, institutional investors, and stock return volatility. *Journal of Accounting Research*, vol. 38, suppl: S, pp. 171-202.
- [5] Dyson, R. A. (2000). Recent changes in recognizing equity method losses. *The CPA Journal*, vol. 70, no. 6.

- [6] Ginger Inchausti, B., Iniquez Sanchez, R. and Poveda Fuentes, F. (2017). Does the interaction between the accounting method choice and disclosure affect financial analysts' information environment? The case of joint ventures under IAS 31. *Spanish Journal of Finance and Accounting*, vol. 46, no. 3, pp. 298-326.
- [7] Gierusz, A. and Gierusz, M. (2016). Konsolidacja sprawozdań finansowych według MSSF, oddk, Gdańsk.
- [8] Graham, R.C., Lefanowicz C.E., and Petroni K.R. (1998). Value-relevance of fair value disclosures for investments in securities accounted under the equity method, *SSRN*. Available: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=137398, (15.07.2018).
- [9] Knapp, J. (2013). A reconsideration of consolidation accounting requirements and pre-acquisition dividends. *Australian Accounting Review*, vol. 23, no. 3, pp. 190-207.
- [10] Lee S., Pandit S. and Willis R.H. (2013). Equity method investments and sell-side analysts' information environment. *The Accounting Review*, vol. 88, no. 6, pp. 2089-2115.
- [11] Lopes, A.J., Lourenco, I. and Soliman, M. (2013). Do alternative methods of reporting non-controlling interests really matter? *Australian Journal of Management*, vol. 38, no. 1, pp. 7-30.
- [12] Nobes, Ch. W. (2005). Rules – based standards and the lack of principles in accounting. *Accounting Horizons*, vol. 19, no. 1, pp. 25-34.
- [13] Remlein M. (2016). Wpływ metody wyceny współkontrolowanego podmiotu na sytuację finansową wspólnika. *Studia Ekonomiczne Uniwersytetu Ekonomicznego w Katowicach*, no. 285, pp. 49-58.
- [14] Singhvi, S.S. and Desai H.B. (1971). An empirical analysis of the quality of corporate financial disclosure. *The Accounting Review*, vol. 46, no. 1, pp. 129-138.
- [15] Financial reporting developments. A comprehensive guide – equity method investments (2015), EY, Available: www.ey.com/Publication/vwLUAssets/FinancialReportingDevelopments_BB2634_E, (15.07.2018).
- [16] Scholer, F. (2015). Stock volatility consequences when using the equity method in parent company. *Proceedings of 3rd International Conference IFRS: Global Rules and Local use*, Prague, Czech Republic.
- [17] Strojek-Filus, M. and Maruszewska, E., (2016). New Intangible Assets Derived From Goodwill - Globalization Of Polish Entities' Accounting Practice And Its Socio-Economic Consequences. 16th International Scientific Conference *Globalization and its socio-economic consequences*, Rajecké Teplice, Slovakia, pp. 2151-2158.
- [18] Strojek-Filus M. (2013). *Determinanty oraz skutki wynikowo-bilansowe identyfikacji i rozliczania wartości firmy w grupie kapitałowej*, Wydawnictwo Uniwersytetu Ekonomicznego w Katowicach, pp. 98-102
- [19] Sulik-Gorecka, A., Strojek-Filus, M., and Maruszewska E. (2017). IFRS valuation models vs. business entities practice - a case of Polish publicly traded enterprises. *Proceedings of the 14th International Scientific Conference on European Financial Systems 2017*, Brno, Czech Republic, pp. 356-364.

PSYCHOLOGICAL ASPECTS OF CONTROLLING IN BUSINESS AND GLOBALISING ENVIRONMENT

Zuzana Stroková^{1,a,*}, Jarmila Klementová^{2,b}

^{1,2}Technical University in Zvolen, Faculty of Wood Sciences and Technology, Department of
Business Economics, T.G.Masaryka 24, 960 53 Zvolen, Slovak Republic

^azuzana.stroкова@tuzvo.sk, ^bjarmila.klementova@tuzvo.sk

*Corresponding author

Abstract. The main catalysts for the development of controlling are ongoing globalization and the persisting global economic crisis, which constantly verifies the corporate behaviour in a difficult situation under the current conditions. Several surveys have shown that enterprises with well-functioning controlling can better manage crisis situations. Implementation and adoption of controlling is long-term, demanding, and complex process, which is specific and inimitable for each enterprise. The process is influenced by psychological factors that provoke positive and negative feelings in internal stakeholders. The objective of this paper was to determine the key psychological factors, which influence the perception of financial and non-financial benefits and barriers in the phase of implementing and promoting of controlling in Slovak enterprises from the owner's point of view. Surveying the given problem was performed in Slovak enterprises by questioning method via questionnaire. Based on the achieved results, positive and negative psychological factors were identified and recommendations were proposed. The aim of these recommendations was that owners try to induce positive factors in other internal stakeholders in the phase of implementing and promoting of controlling, and on the other hand, to eliminate negative factors. If they achieve this, their enterprises will be prosperous, and the implementation of controlling will be successful.

Keywords: globalization, psychological aspects, controlling, owners

JEL Classification: F64, G01, M12, M21, M29

1. Introduction

Nowadays, controlling in enterprises is becoming an increasingly used and implemented area. In the course of globalization and modernisation the demands in controlling changed rapidly (Ruda & Dackiw, 2013). The impact of globalized markets isn't just a challenge for large enterprises but also affects more and more small and medium-sized enterprises. New globalization trends in management, focusing on socio-economic factors for introducing changes into enterprises are increasingly being applied in micro, small and medium-sized enterprises (Klementová, 2017).

According to Havlíček (2016), Blahutová & Sedláčiková (2017) controlling is the efficient tool for managing the enterprise's future combining several management and information subsystems the duty of which is the creation of basis for determining the enterprise's

objectives, planning, checking the plan fulfilment, revealing of deviations, examination and proposal of measures. According to Sedliačiková et al. (2015), Šatanová & Sedliačiková (2015) controlling is carried out in enterprises in the various functional areas, the area of cost – cost controlling, the area of investment – investment controlling, finance area – financial controlling, etc. The aim of controlling is to prepare adequate decision-making environment for the company managers and to provide high-quality information in real time and with high predictive value. Therefore, we need to identify facts and obstructions that may appear during the implementation of controlling into practice (Chodasová et al., 2013).

Medium sized enterprises and manufacturing enterprises mostly recognized the benefits of financial controlling as a supporting tool for the financial management and financial health of the company. On the other side, small manufacturing enterprises exhibited the least appreciation for the usefulness of financial controlling (Sedliačiková et al., 2016).

Controlling does not only act as a tool which supports planning, coordination and control of activities (external influence), but also acts as the internal process that affects the behaviour and actions of all people in the enterprise (Fischer & Sawczyn, 2013). As Seemann (2016) states, psychology makes it possible to understand the perception, thinking, emotions, learning, and the activation of processes. The implementation of controlling in the enterprise is very demanding process success depends not only on the timetable and its application, but also from the many psychological factors (Sedliačiková et al., 2012). In corporate practice, the fact that this tool greatly affects the internal stakeholders in an enterprise, is often forgotten. The owners, managers, but mainly the employees, are influenced by various psychological aspects, which have a significant effect on the efficiency and effectivity of controlling (Steiger and Lippmann, 2012; Sedliačiková et al., 2017, A). The successful implementation of controlling into an enterprise is accompanied by psychological aspects, which are related to motivation, communication, feedback, building trust in the given tool, but also in the controller himself, and the way of enforcing change and preparing for it (Eschenbach et al., 2004; Klementová et al., 2017).

According to Matuleviciene & Stravinskienie (2015) there have been found two basic factors of stakeholder trust in the scientific literature – these are corporate reputation and organizational trustworthiness. Such factors as inborn or acquired during growth; factors related with the environment where the person lives, emotions, propensity to trust, experience with the organization, sociocultural factors had been analysed fragmentary, and only recently they have received a special attention from scientists. The organization can control those factors that are related to the organization (corporate reputation and organizational trustworthiness), while psychological, personality and situational factors (inborn factors or acquired during growth, factors related with the environment where the person lives, emotions, propensity to trust, experience with the organization, sociocultural factors and other factors) cannot be controlled by the organization.

The aim of this paper is to determine the key psychological factors which influence the perception of financial and non-financial benefits and barriers in the phase of implementing, and promoting of controlling in Slovak enterprises from the owner's point of view.

2. Methods

It was necessary to divide the contribution into *three key stages*. *In the first stage* of the solution, it was necessary to carry out a literary research based on the analysis of secondary sources, in order to define the theoretical basis of the problem.

In the second phase, attention was paid to controlling in context of its psychological impacts on enterprise owners and the implementation of empirical survey in subject area. An empirical survey was conducted on a sample of micro, small and medium and large enterprises. The questionnaire method was used for the collection of primary research data and overall 417 questionnaires were processed in the evaluation. Data from the empirical survey were evaluated by descriptive and graphical methods.

In terms of enterprise size, 61% of micro and 34% of small businesses were involved in the research. Medium enterprises accounted for 3% and large enterprises 1%. From the point of view of the sectoral structure, the enterprises involved in the wholesale and retail trade (23%), the enterprises specialized in scientific and technical activities (13%) and enterprises providing administrative and support activities (10%) were involved. From the point of view of the legal form of business, 44% of limited liability enterprises, 24% of joint stock enterprises and the 21% of self-employed persons were participated in the research.

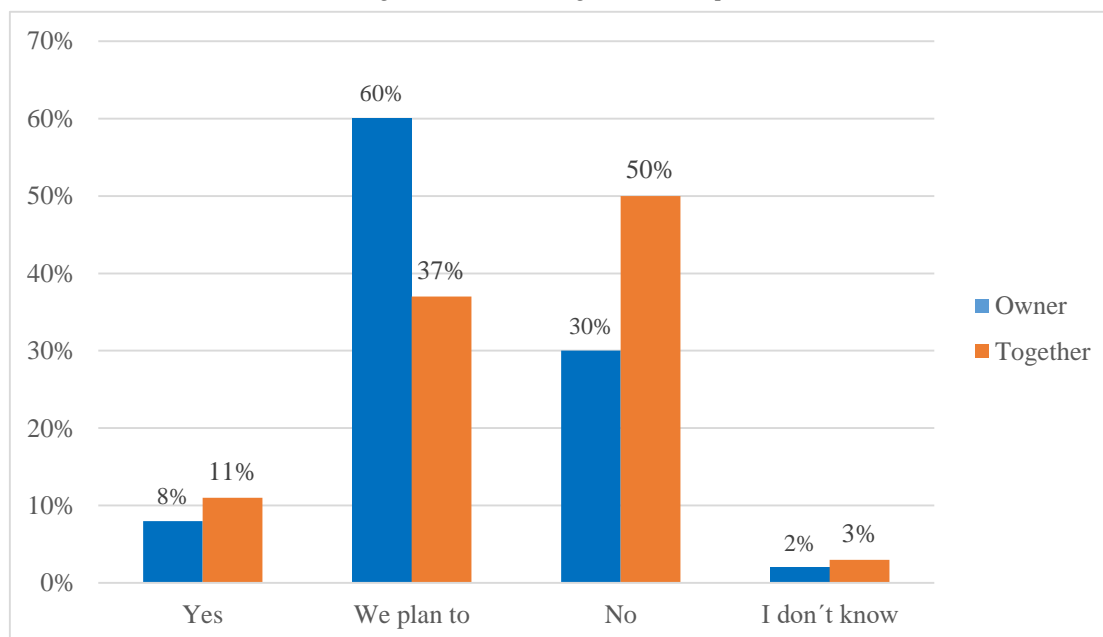
At the final stage, using the analogy, findings and summary of the findings, the results achieved and the conclusions drawn were evaluated.

3. Results and discussion

The main part of the questionnaire was aimed at identifying the working position of the respondents, respectively the percentage of internal stakeholders in the research. Most employees account for the major share of 42% and managers account for the share of 33%. The owners are represented by share of 25%. Given the focus of the contribution to identifying psychological factors from the internal stakeholder's point of view, we focus only on the owner's point of view in the next evaluation of the questionnaire survey.

Figure 1 shows that only 11% of respondents have implemented controlling into their enterprises and only 8% of owners. Enterprises that are planning / not implementing the controlling have a much higher percent stake in the survey. From **the owner's point of view**, 60% of respondents plan to implement controlling into their enterprises and 30 % of respondents do not have implemented controlling. Overall, 50% of all respondents do not have implemented controlling.

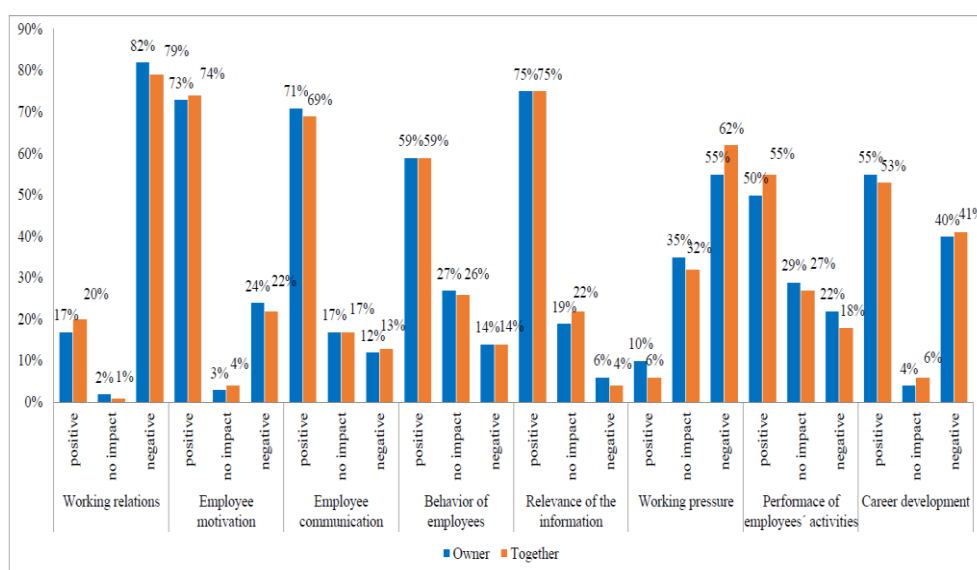
Figure 1: Controlling in the enterprise



Source: author

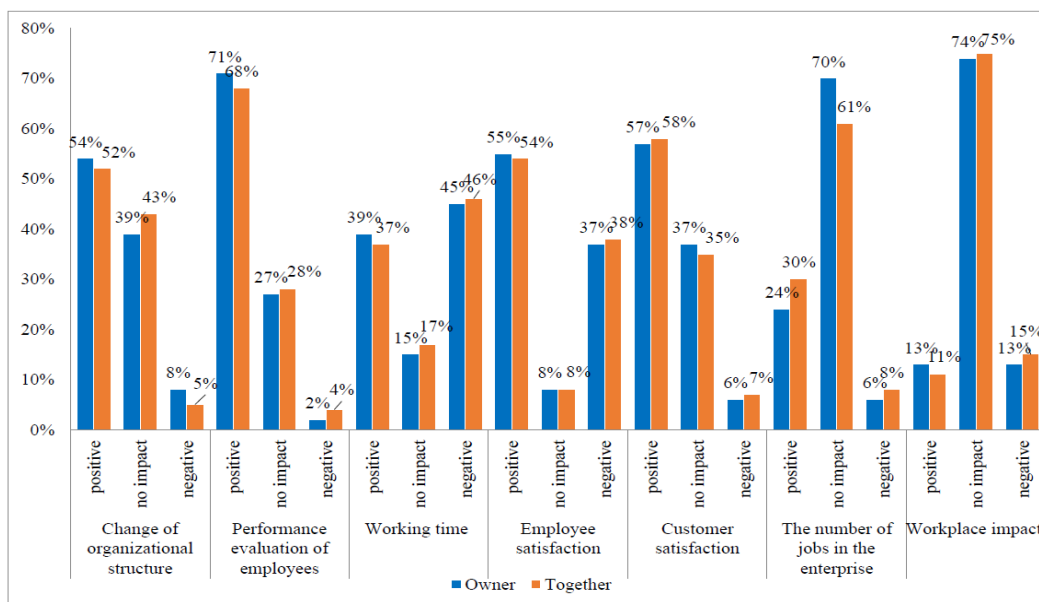
The following part of questionnaire survey was aimed at identifying factors that influence the introduction of controlling into an enterprise. The obtained data are captured in the two following figure 2 and 3. Respondent's answers show that the introduction of controlling into an enterprises influences mainly relevance of information (75%), employee motivation (73%), employee communication (71%) and performance evaluation of employees (71%). Next follows behaviour of employees (59%), customer satisfaction (57%), employee satisfaction (55%) and change of organizational structure (54%). Owners perceive these factors as **positive**. Working relations (82%) and working pressure (55%) belong among **negative factors**. Owners do not consider workplace impact (74%) and number of jobs (70%) as factors influencing the introduction of controlling into an enterprise.

Figure 2: Impact of controlling implementation 1



Source: author

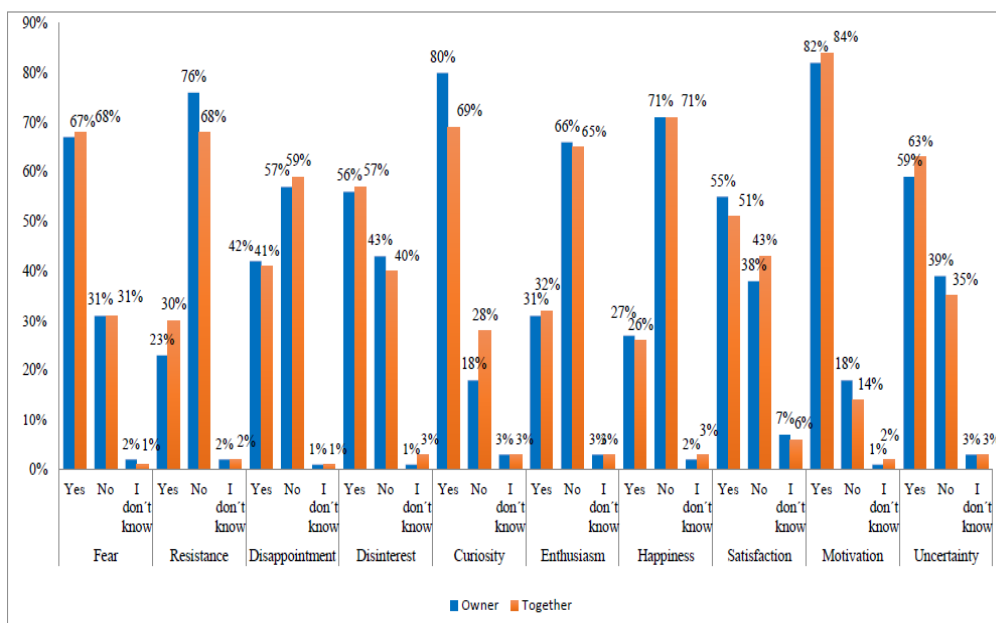
Figure 3: Impact of controlling implementation 2



Source: author

The last part of the questionnaire survey was aimed at detecting feelings which the introduction of controlling triggered in the respondents (owners). These are feelings like fear, resistance, disappointment, disinterest, curiosity, enthusiasm, happiness, satisfaction, motivation and uncertainty. Figure 4 shows that motivation (82%), curiosity (80%), fear (67%) and uncertainty (59%) are **the most common feelings** which the introduction of controlling triggered in respondents. Resistance (76%), happiness (71%), enthusiasm (66%) and disappointment (57%) represent feelings which controlling does not wake up in respondents.

Figure 4: Feelings of controlling implementation



Source: author

Through empirical survey, it was found out which key psychological factors are working on perceiving in the financial and non-financial benefits and controlling barriers in the enterprise from the owner's point of view. *Motivation, curiosity and satisfaction* are the key *positive psychological factors*. *Negative psychological factors* of controlling introduction are *fear, uncertainty, disinterest and disappointment*.

The results of the empirical survey are the same as those of the survey it carried out Sedliačiková et al. (2017, B). The last question of the survey focused on the feelings evoked among individual respondents by building a controlling system in their enterprise. Among the most frequent *positive feelings* were *curiosity, motivation and satisfaction*. The most significant *negative feelings*, as viewed by the internal stakeholders, are *uncertainty, lack of interest and fear*.

It is necessary to know the expectations and concerns of the internal stakeholder prior the implementation of controlling. Based on the research results, the following recommendations for practice can be formulated:

- to inform and prepare staff in good time of changes planned,
- to inform employees of the individual stages of controlling implementation,
- preparing controlling manual and trainings for staff in the concerned area,
- change the motivation system of the enterprise, taking into account the needs of internal stakeholders,
- take account of the psychological factors of addressing concerns,
- building trust-based relationships between the manager and controller.

Strišš & Vodák (2006) confirm the essence of previous recommendations for practice because controlling to be successful requires primarily to the proper implementation of the management work. Controlling requires that the board management of organization should set clear, definite, binding and realistic goals. It should also recommend the company's employees to receive further systematic training as an efficient mode of discovering internal resources necessary for the satisfaction of the employees' needs.

The results of the empirical survey conducted by Klementová & Sedliačiková (2017) confirm and emphasize that timely information from owners and managers about planned changes is very important for the employees not to draw their own conclusions and attitudes based on partial information that penetrated into the lower hierarchical levels of the enterprise, thereby creating distorted picture of the planned or introducing changes.

4. Conclusion

Factors that influence the introduction of controlling into an enterprise are positive, negative, and undue. Owners consider positive factors the relevance of information (75%), employee motivation (73%) and performance evaluation (71%). Working relations (82%) and working pressure (55%) are negative factors. The impact on workers (74%) and the number of jobs (70%) are neutral factors. Introducing controlling into an enterprise provokes a sense of motivation, curiosity, but also fear and uncertainty. On the contrary, they do not cause feelings such as resistance, happiness, enthusiasm and disappointment.

Owners are trying to create and support positive psychological factors in managers and employees. On the contrary, the negative factors tend to be reduced and completely eliminated. Owners use motivation, curiosity and satisfaction in implementing and promoting

of controlling. On the other side, they must to fight with feelings like fear, uncertainty and disinterest.

The goal of enterprise owners should be to induce positive factors in other internal stakeholders in the implementation and promoting of controlling in the enterprise and, on the other hand, to eliminate negative factors. If they achieve this, their enterprises will be prosperous and the introduction of controlling into the enterprise will be successful.

Emotional intelligence may help owners or managers solve problems by using logic and emotions, be more flexible in changing conditions, help colleagues at the workplace express their needs, think and respond to problematic employees with consideration, maintain positive and optimistic attitude, and constantly learn how to improve themselves, as well as their relations at the workplace, which is fundamental for success of the enterprise (Minárová et al., 2015).

Acknowledgment

This paper is an output of the science project VEGA MŠ SR č. 1/0010/17.

References

- [1] Blahutová, S. and Sedliačiková, M. (2017). Benefits versus barriers of controlling in medium enterprises. *Proceedings of Global Scientific Conference Management and Economics in Manufacturing*. Zvolen, Slovak Republic, pp. 131-138.
- [2] Eschenbach, R. et al. (2004). *Controlling*. ASPI Publishing, Praha. pp. 816.
- [3] Fischer, T. M. and Sawczyn, A. (2013). The relationship between corporate social performance and corporate financial performance and the role of innovation: Evidence from German listed firms. *Journal of Management Control*, vol. 24, no 1, pp. 27-52.
- [4] Havlíček, K. (2016). The main parameters of controlling in a small or medium-sized enterprises. *Proceedings of International Conference European Entrepreneurship Forum*. Prague, Czech Republic, pp. 66-74.
- [5] Chodasová, Z., Tekulová, Z. and Jacková, A. (2013). Controlling – the Current Management Tools in the Enterprise. *Nierówności społeczne a wzrost gospodarczy*, no. 31, pp. 392-402.
- [6] Klementová, J. (2017). Globalization trends in the enterprise with an emphasis on the socio-economic factors. *Proceedings of international scientific conference Globalization and its socio-economic consequences*. Rajecké Teplice, Slovak Republic, pp. 945-952.
- [7] Klementová, J., Benčíková, D. and Sedliačiková, M. (2017). Psychological aspects of controlling in micro and small enterprise. *Proceedings of Global Scientific Conference Management and Economics in Manufacturing*. Zvolen, Slovak Republic, pp. 102-109.
- [8] Klementová, J. and Sedliačiková, M. (2017). Kontroling v kontexte jeho psychologických vplyvov na zamestnancov podniku. *Zborník vedeckých príspevkov z medzinárodnej vedeckej konferencie Sociálne, ekonomické a spoločenské aspekty súčasnej spoločnosti*. Prešov, Slovak Republic, pp. 47-62.

- [9] Matuleviciene, M. and Stravinskiene, J. (2015). Identifying the Factors of Stakeholders Trust: A Theoretical Study. *Proceedings of International Scientific Conference Economics and Management*. Kaunas, Lithuania, pp. 599-604.
- [10] Minárová, M., Malá, D. and Sedliačiková, M. (2015). Emotional Intelligence of Managers. *Procedia economics and finance: 4th World Conference on Business, Economics and Management*. Kusadasi, Turkey, pp. 1119-1123.
- [11] Ruda, W. and Dackiw, B. (2013). Characteristics of Controlling in Small and Medium-sized Enterprises in Germany – An Empirical Study. *Proceedings of International Conference on Management, Enterprise and Benchmarking*. Budapest, Hungary, pp. 25-37.
- [12] Seemann, P. (2016). *Psychológia v práci manažéra*. EDIS – vydavateľské centrum ŽU, Žilinská univerzita v Žiline. pp. 170.
- [13] Sedliačiková, M., Šatanová, A. and Foltínová, A. (2012). Financial controlling in theory and praxis of small and medium size enterprises. *Journal of Economics*, vol. 60, no. 9, pp. 949-966.
- [14] Sedliačiková, M., Vacek, V. and Sopková, E. (2015). How Slovak small and medium enterprises perceive financial controlling. *Procedia economics and finance: 4th World Conference on Business, Economics and Management*. Kusadasi, Turkey, pp. 82-85.
- [15] Sedliačiková, M., Hajdúchová, I., Krištofík, P., Viszlai, I. and Gaff, M. (2016). Improving the Performance of Small and Medium Wood-Processing Enterprises. *BioResources*, vol. 11, no. 1, pp. 439-450.
- [16] Sedliačiková, M., Moresová, M. and Malá, D. (2017, A). How the internal stakeholders of large corporations perceive the implementation of controlling. *Proceedings of Global Scientific Conference Management and Economics in Manufacturing*. Zvolen, Slovak Republic, pp. 60-67.
- [17] Sedliačiková, M., Moresová, M., Bikár, M. and Benčíková, D. (2017, B). How the internal stakeholders perceive the implementation of controlling. *Ekonomicko-manažérske spektrum*, vol. 11, no. 2, pp. 32-44.
- [18] Steigert, T. and Lippmann, E. (2012). *Psychologie pro manažery: jak ovládnout umění vest*. BizBooks, Brno. pp. 371.
- [19] Strišš, J. and Vodák, J. (2006). Corporate Identity as one of the important Management Activity. *Scientific Papers of the University of Pardubice*, no. 11, pp. 109-124.
- [20] Šatanová, A. and Sedliačiková, M. (2015). Model for Controlling the Total Costs of Quality. *Procedia economics and finance: 4th World Conference on Business, Economics and Management*. Kusadasi, Turkey, pp. 2-6.

POSSIBILITIES OF HARMONISATION OF INVESTMENT FUNDS FINANCIAL REPORTING STANDARDS. A VIEW FROM POLAND

Aleksandra Sulik-Górecka^{1,a,*}

¹University of Economics in Katowice, Faculty of Finance and Insurance, Poland

^asulik_gorecka@ue.katowice.pl

*Corresponding author

Abstract. The issue of adopting International Financial Reporting Standards to the accounting of investment funds has been broadly discussed since the last financial crisis. The widespread adoption of International Financial Reporting Standards facilitates the harmonization of accounting and financial reporting standards all over the world, but there are also some concerns that IFRS does not provide an appropriate financial reporting framework for investment funds. International Financial Reporting Standards may not only improve access of investment funds to foreign markets, but also globally accepted set of accounting standards may encourage investors to look for investment opportunities at foreign markets. Investors can benefit from uniform reporting standards and funds can more easily benchmark with peers and competitors on the global market. The aim of the study is to survey the level of harmonisation of financial reporting standards in investment funds in Europe and evaluate future possibilities in this respect. The study describes the main advantages of accounting harmonisation and mentions some disadvantages. The analysis of implementation of international financial reporting standards into investment funds in different countries is the empirical part of the study. The paper uses the method of legal regulations review and the analysis of the results of published studies concerning the scope of investment funds accounting and reporting standards.

Keywords: investment funds, international financial reporting standards, globalisation, accounting,

JEL Classification: M41, F60, F69

1. Introduction

Investment funds are formally organised entities whose main objective is to invest funds entrusted by fund participants. Investing funds within a collective investor usually allows fund's participants to achieve a higher level of investment security than in the case of self-investment of funds, mainly due to the reduction of investment risk through portfolio diversification.

The scope of reporting that investors can use is an important factor influencing investment decisions. The results of investment funds presented in financial statements are assessed by investors in terms of comparability of investment offers and protection of future interests. Lists of measures of funds' performance assessment and forecasts of future results prepared by professional analysts are also created on the basis of financial statements.

In the face of the globalization of capital markets and the growing importance of the standardisation of reporting principles, the question arises as to whether all sectors of the economy are subject to similar relationships in the scope of harmonisation and standardisation of financial reporting.

The study aims at analysing the level of harmonisation of financial reporting standards in investment funds in Europe and assessing future possibilities in this respect. The study describes the main advantages of accounting harmonisation and mentions some disadvantages. The analysis of implementation of international financial reporting standards into investment funds in different countries is the empirical part of the study. The current level of harmonisation and standardisation of investment fund reporting requires a critical assessment and directions for the future. The paper uses the method of legal regulations review and the analysis of the results of published studies concerning the scope of investment funds accounting and reporting standards.

2. The growth of investment funds' assets

The importance of investment funds is increasing due to the accumulation of increasingly high value of financial surpluses in financial markets. Most assets are accumulated in investment portfolios of the so-called UCITS Funds (UCITS), regulated at the European (Community) level in the form of EU Council directives, *inter alia*, by Council Directive 85/611/EEC¹⁷ (European Union Law). Further regulations include directives known as UCITS III¹⁸, a directive known as UCITS IV¹⁹ and a directive known as UCITS V²⁰ that entered into force in March 2016 and set out regulations in the so-called Alternative Investment Funds (European Union Law). The intensity of investment funds' development is one of the parameters of the assessment of economic growth and the level of societal wealth. According to the report of one of the international organisations 'The International Investment Funds Association' (IIFA), the value of net assets of open investment funds (UCITS) in the world at the end of 2017 was EUR 41 102 015 million, an increase of 163% compared to 2008 year when the net asset value amounted to EUR 15 626 902 million (The International Investment Funds Association Report, 2017). Table 1 shows the net asset value of the UCITS European Funds, detailing their value in individual countries in 2017 and the first and second quarter of 2108, based on a report by another international organisation.

¹⁷ Directive 85/611/EEC¹⁷ of 20 December 1985 on the coordination of laws, regulations and administrative provisions relating to undertakings for collective investment in transferable securities (UCITS)

¹⁸ Directive 2001/107/EC of the European Parliament and of the Council of 21 January 2002 amending Council Directive 85/611/EEC on the coordination of laws, regulations and administrative provisions relating to undertakings for collective investment in transferable securities (UCITS) with a view to regulating management companies and simplified prospectuses

¹⁹ Directive 2009/65/EC of the European Parliament and of the Council of 13 July 2009 on the coordination of laws, regulations and administrative provisions relating to undertakings for collective investment in transferable securities

²⁰ Directive 2014/91/EU of the European Parliament and of the Council of 23 July 2014 amending Directive 2009/65/EC on the coordination of laws, regulations and administrative provisions relating to undertakings for collective investment in transferable securities (UCITS) as regards depositary functions, remuneration policies and sanctions

Table 1: Net Assets of the European UCITS Industry (EUR mln)

End Q2 2018	End Q2 2018		End Q2 2018	
EUR mn	EUR mn	% chg (1)	EUR mn	% chg (2)
9,823,583	9,675,245	1.5%	9,730,792	1.0%

(1) End Q2 2018 net assets compared to end Q1 2018 net assets

(2) End Q2 2018 net assets compared to end Q4 2017 net assets

Source: Efama, 2018,

3. The scope of accounting harmonisation and standardisation in the light of international conditions

Two different accounting philosophies have evolved in the world in an evolutionary way. There are distinguished continental type accounting (this applies to Europe as a continent) and Anglo-Saxon accounting. The first group includes Germany, France, Austria, Belgium, Spain, Italy, Switzerland, Poland, the Czech Republic, Hungary, the Baltic States and outside Europe – Japan. The second group includes the United Kingdom, the United States of America, Canada, Australia, New Zealand and the Netherlands. The literature often makes the thesis that the International Accounting and Financial Reporting Standards are oriented towards continental accounting, where the conservative attitude, the prudence principle, the stability of business transactions and the law primacy over facts principle prevail. In turn, US GAAP supports Anglo-Saxon accounting, where the true and fair view of the company is the overarching purpose of accounting. This is dominated by the orientation on the capital market and investors, and the substance-over-form principle. The conceptual assumptions of both US GAAP and IAS/IFRS take the assumption of a true and fair financial view that should be included in the financial statement. However, in accounting theory, two different conceptual models were created for the overarching objective of the financial statement: transaction cost theory and value theory (Turyna, 2003). According to the transaction theory, the created financial view covers only transactions executed in accordance with the matching principle of costs and revenues and the prudence principle. The emphasis is on the presentation of the achieved profitability, and the valuation of balance sheet categories is of secondary importance, therefore assets are often valued at residual value. The income statement is of fundamental importance. In turn, in the value theory, the correct value of equity (net assets) as at the balance sheet day is considered to be the basic source of information for investors. The balance prepared in accordance with the substance-over-form principle, based on fair value measurements, is of the greatest importance in the value theory. IAS/IFRS are leaning in their assumptions to the value theory, while US GAAP are closer to the transaction cost theory.

Despite the influence of various accounting theories and regional conditions on the accounting and reporting regulations, the world is undergoing a process of harmonisation and standardisation in this area. Accounting harmonisation should be understood as reducing the number of applied accounting practices by defining such a set of them, under which economic operators can make a choice. Standardisation, on the other hand, means the process of accepting identical or similar accounting practices (templates) by interested parties. (Walińska 2005). Undertaking attempts to harmonise accounting and reporting in countries with different legal systems, it is possible to develop uniform standards covering the principles of recognition, measurement, valuation and presentation of the components of the financial statement. Standards are designed to facilitate transactions carried out on a global scale due to the comparability and transparency of financial statements of companies from different

countries, with different cultural traditions and socio-economic conditions as well as legal systems.

Organisations dealing in the harmonisation of accounting and reporting include: International Federation of Accountants (IFAC), resident in New York, International Accounting Standards Board (IASB), resident in London, Financial Accounting Standards Board (FASB) resident in Norwalk, Connecticut, European Union. IASB, which develops International Accounting Standards (IAS) and International Financial Reporting Standards (IFRS), has adopted the following objectives: to bring transparency by enhancing the international comparability and quality of financial information, enabling investors and other market participants to make informed economic decisions, to strengthen accountability by reducing the information gap between the providers of capital and the people to whom they have entrusted their money, to offer of globally comparable information and to give example to regulators around the world,

The mission of FASB, working on Generally Accepted Accounting Principles (GAAP), is: ‘to establish and improve financial accounting and reporting standards to provide useful information to investors and other users of financial reports and educate stakeholders on how to most effectively understand and implement those standards’.

The complex and multi-stage process of setting standards involves various actors: accountants, financiers, business, stock exchanges, state authorities and academia. The formal procedures for the implementation of accounting and reporting standards are of particular importance for the European Union countries. According to Regulation (EC) No 1606/2002 of the European Parliament and of the Council of 19 July 2002 on the application of international accounting standards, listed companies (those whose securities are traded on a regulated market) must prepare their consolidated financial statements in accordance with a single set of international standards called IFRS – International Financial Reporting Standards (European Union Law). Moreover, EU countries can opt to extend the use of IFRS to annual financial statements and non-listed companies as well. Pursuant to Regulation (EC) No 1606/2002, the European Commission is responsible for IFRS endorsement process together with the European Financial Reporting Advisory Group (EFRAG) and Accounting Regulatory Committee (ARC), which are consultative and advisory organisations. Based on Regulation (EC) No 1126/2008 of 3 November 2008 adopting certain international accounting standards in accordance with Regulation (EC) No 1606/2002, the Commission codifies IFRS as adopted and publishes an amending regulation which is directly applicable in all EU countries (European Union Law).

Table 2 presents IASB data on the use of International Financial Reporting Standards (IFRSs) in their consolidated financial statements for external financial reporting as the primary GAAP by domestic listed companies of the Group of Twenty (G20) and domestic listed and unlisted companies in 175 jurisdictions. When analysing the data, as well as the literature (De George et al., 2016; Giner et al., 2016; Kaya & Pillhofer 2013; Wingard, 2016; Gao & Sidhu, 2018; Walton 2015), it should be emphasised that IAS/IFRS play a leading role in the harmonisation of domestic listed companies. However,. It should be noted that investment funds are specific investment entities and are not subject to the definition of ‘domestic listed company’.

Table 2: Use of IFRS by jurisdiction

For 20 jurisdictions for domestic listed companies (G20):	For 175 jurisdictions for domestic listed companies (totals without China):	For 175 jurisdictions in table for unlisted companies (totals without China):
<ul style="list-style-type: none"> – IFRSs or Standards that differ from IFRSs (as issued by the IASB) to a certain degree required for all – 12 jurisdictions – IFRSs or Standards that differ from IFRSs (as issued by the IASB) to a certain degree required for most – 4 jurisdictions – IFRSs or Standards that differ from IFRSs (as issued by the IASB) to a certain degree permitted – 1 jurisdictions – IFRSs not permitted – 3 jurisdictions IFRS (as issued by the IASB) are not permitted in India, Indonesia and United States. 	<ul style="list-style-type: none"> – IFRSs not permitted – 22 jurisdictions – IFRSs permitted – 25 jurisdictions – IFRSs required for some – 9 jurisdictions – IFRSs required for all – 98 jurisdictions – No stock exchange – 21 jurisdictions 	<ul style="list-style-type: none"> – IFRSs not permitted – 28 jurisdictions – IFRSs permitted for all or some – 47 jurisdictions – IFRSs required for some – 38 jurisdictions – IFRSs required for all – 30 jurisdictions – We do not have information – 32 jurisdictions

Source: <https://www.iasplus.com/en/resources/ifrs-topics/use-of-ifrs>

4. Critical assessment of implementation possibilities of international financial reporting standards into investment funds

The importance of harmonisation in Poland increased along with strengthening the role of International Accounting Standards since 1 January 2002. Until then, these standards were known only among accounting public companies, as the Securities and Exchange Commission set the requirements for the presentation of comparative data according to International Accounting Standards. On 1 January 2002, an amendment to the Accounting Act came into effect, which directly refers to International Accounting Standards in matters not regulated by the law and national accounting standards. Poland's accession to the European Union enforced compliance with EU provisions regarding regulations related to International Accounting Standards. Subsequent amendments to the Polish accounting law took into account the legal regulations of the European Union and from 1 January 2005 obliged banks and issuers of securities admitted to trading on one of the regulated markets of the European Economic Area to prepare consolidated financial statements according to the IFRS.

Many studies were carried out into the impact of IFRS implementation on the financial reporting of companies in Poland and the impact of transitioning to IFRS on the financial standing of companies in Poland (Jaruga et al., 2007; Waniak-Michalak et al., 2012; Grabiński & Kędzior, 2007; Szychta & Kabalski, 2016). There were also analysed issues arising from the adoption of IFRS by companies in Poland, including the organisational, social and cultural dimensions.

In Poland, an intense development of open-end investment funds has been observed for a long time, even in short-term (Sulik-Górecka, 2015). In accordance with the accounting law applicable in Poland, organisational units operating under the provisions on investment funds, regardless of the amount of revenues, are obliged to use, among others of the following provisions: Act on Investment Funds and Alternative Investment Funds of 27 May 2004, Accounting Act of 29 September 1994 and Regulation of 2007 of the Minister of Finance on special accounting principles of investment funds.

The financial statement of an investment fund is prepared in Polish zlotys (PLN), rounded up to one thousand zlotys, and includes such elements as: introduction to the financial statement, list of investments, balance sheet, statement of operating profit, statement of changes in assets, cash flow statement – with the exception of open-end investment fund's financial statement – notes, footnotes. The need to measure assets and settle liabilities at a reliably estimated fair value is crucial in the investment fund investment valuation (Sulik-Górecka et al., 2017).

The financial statement of investment funds according to IFRS is not subject to separate regulations. It consists of the following elements: Statement of financial position, Statement of comprehensive income – by nature of expense, Statement of changes in net assets attributable to holders of redeemable shares, Statement of cash flows, Notes to the financial statements (PWC, 2017). In some countries, investment funds use IFRS. For example, the impact of IFRS implementation on the performance of the UK investment closed-end trust funds with domestic equity was analysed (Rubanov & Nnadi, 2018).

However, the scope of IFRS investment fund reporting is subject to numerous criticisms of international organisations associating investment funds, e.g. EFAMA (IFRS Application to Investment Funds, 2007). According to EFAMA, most European jurisdictions do not apply IFRS to investment funds. In the view presented by EFAMA, the regulations should be different for the investment company industry and not based on those applicable to corporate entities. The arguments are quoted that financial statements prepared in accordance with IFRS are less meaningful and less transparent than reports prepared with local regulations, e.g. US GAAP (<https://www.sec.gov/comments/s7-20-07/s72007-60.pdf>).

In addition, some disclosures required by US regulations are not necessary according to IFRS, which significantly reduces the usability of the information presented. For example, in the US GAAP, a Schedule of Investments is required, where all the investments that constitute more than 1 percent of the net assets and the minimum, the 50 largest investments, should be specified. Investments must be categorised by type (e.g., common stock, preferred stock, bonds, etc.) and by industry or country. A similar function is fulfilled according to the Polish regulations of the list of investments. Detailed presentation of the investment provides investors with valuable knowledge about the actual allocation of funds. According to US GAAP, it is also necessary to present financial highlights not required by IFRS (under Polish regulations – the statement of changes in assets), which provide, on a per share basis: initial net asset value, net investment income/loss, realized and unrealized gain/loss, total from investment operations, distributions, and net asset value at the end of the period. Moreover, valuable information, not required by IFRS, is such measures as: total return, income ratio, expense ratio and portfolio turnover. Without establishing the value of these measures, it is not possible to compare the fund performance.

The Income Statement prepared in accordance with IFRS and the Statement of operating profit required by Polish regulations are significantly different. According to IFRS, it is allowed to combine interest and dividend income with gains/losses on securities to determine net income. In Polish and American regulations, there is a need for the presentation of investment income (i.e. dividends and interest) and gains/losses on investment securities. This separate presentation enables the presentation of the fund's net investment income (i.e. dividends and interest less expenses) – the basis for assessing the fund performance. The IFRS also does not include the need to present the realized gain/loss on investment securities and

the net increase/decrease in unrealized gain/loss on investments, which are obligatory under the Polish and American regulations.

5. Conclusion

The financial statement remains the most important source of information for investors intending to invest in units of investment funds. At the same time, globalization of capital markets is a factor strongly determining the work of international organisations, which influence the shape of financial reporting in the world. The growing popularity of IAS/IFRS in the financial statements of listed companies discussed in the paper may lead to the implementation of IFRS also in the reporting of investment funds. The critical arguments advanced regarding IFRS implementation to investment fund reporting should be the basis for further discussion on the scope of harmonisation. Investment funds are characterised by excessive diversity and specificity of functioning in order to make it possible to apply the current IAS/IFRS without losing the usefulness of investor reports.

References

- [1] Accounting Act of 29th September 1994 (2018). *Journal of Laws*, Item 395.
- [2] Act on Investment Funds And Alternative Investment Fund Management of 27 May 2004 (2004). *Journal of Laws*, no. 146, item 1546.
- [3] Baril, Ch. P., Betancourt, L. and Nichols N. (2015). The New SEC Rules for Money Market Funds: Financial Reporting and Tax Consequences. *Journal of Corporate Accounting & Finance*, vol. 26, no. 6, pp. 47-53.
- [4] De George, E. T., Li, X. and Shivakumar, L. (2016). A review of the IFRS adoption literature. *Review of Accounting Studies*, vol. 21, no. 3, pp. 898-1004.
- [5] Rubanov, D. and Nnadi M. (2018). The impact of international financial reporting standards on fund performance. *Accounting Research Journal*, vol. 31, no. 1, pp.102-120.
- [6] Efama, (2018). Trends in the European Investment Fund Industry in the First Quarter of 2018. Available: <http://www.efama.org>
- [7] European Union Law. Available: <https://eur-lex.europa.eu>
- [8] Gao, R. and Sidhu, BK. (2018). Convergence of accounting standards and financial reporting externality: evidence from mandatory IFRS adoption. *Accounting and Finance*, vol. 58, no. 3, pp. 817-848.
- [9] Giner, B., Hellman, N., Jorissen, A., Quagli, A. and Taleb, A. (2016). On the Review of Structure and Effectiveness of the IFRS Foundation: the EAA's Financial Reporting Standards Committee's View. *Accounting in Euurope*, vol. 13, no. 2, pp. 285-294.
- [10] <https://www.iasplus.com/en/resources/ifrs-topics/use-of-ifrs>
- [11] <https://www.pwc.com/ky/en/services/assets/illustrative-ifrs-financial-statements-2017.pdf>
- [12] <https://www.sec.gov/comments/s7-20-07/s72007-60.pdf>

- [13] IFRS Application to Investment Funds, (2007). EFAMA Discussion Paper. Available: <http://www.efama.org/Plone>.
- [14] Jaruga A., Fijałkowska J., Jaruga-Baranowska M. and Frendzel M. (2007). The Impact of IAS/IFRS on Polish Accounting Regulations and their Practical Implementation in Poland. *Accounting in Europe*, vol. 4, no. 1, pp. 67 – 78.
- [15] Kaya, D. and Pillhofer, JA. (2013). Potential Adoption of IFRS by the United States: A Critical View. *Accounting Horizons*, vol. 27, no. 2, pp. 271-299.
- [16] PWC (2017). Illustrative IFRS financial statements 2017. Investment funds. available: <https://www.pwc.com/ky/en/services/assets/illustrative-ifs-financial-statements-2017.pdf>
- [17] Regulation of the Minister of Finance on special accounting principles of investment funds. *Journal of Laws 2007*, no. 249, item 1859.
- [18] Sulik-Górecka A. (2015). The critical analysis of significance of investment funds on the global financial market, *Proceedings of 2nd International Multidisciplinary Scientific Conference on Social Sciences and Arts SGEM2015*, book 2, vol. 2, Albena, Bulgaria, pp. 427-434.
- [19] Sulik-Górecka, A., Strojek-Filus, M. and Maruszewska, E.W. (2017). IFRS valuation models vs. business entities' practice - a case of Polish publicly traded enterprises, in: Nesleha, T., Plihal, K., Urbanovsky. *Proceedings of the 14th International Scientific Conference European Financial Systems 2017*, Brno, Czech Republic, pp. 359-367.
- [20] Szychta A. and Kabalski P. (2016). Poland. Implementation of IFRS in Poland: Main Effects and Problems. *IFRS in a Global World. International and Critical Perspectives on Accounting*, Springer, New York, pp. 373 – 391.
- [21] The International Investment Funds Association Report: World Historical Assets and Flows for Regulated Open-End Funds, (2017). Available: <http://www.efama.org/Pages/IIFA-ANNOUNCES-NEW-REPORT-OF-HISTORICAL-DATA-ON-WORLDWIDE-OPEN-END-FUNDS.aspx>
- [22] Turyna J. (2003). Standardy Rachunkowości. MSR – US GAAP – Polskie Ustawodawstwo, Difin, Warszawa.
- [23] Walton, P. (2015). IFRS in Europe - An Observer's Perspective of the Next 10 Years. *Accounting in Europe*, vol. 12, no. 2, pp. 135-151.
- [24] Waniak-Michalak H., Czajor P. and Michalak J. (2012). Impact of mandatory IFRS implementation on earnings quality. Evidence from the Warsaw Stock Exchange. *Zeszyty Teoretyczne Rachunkowości*, vol. 68, no. 124, pp. 63 – 82.
- [25] Wingard, C. and Bosman Amisi, B. (2016). The legitimacy of IFRS An assessment of the influences on the due process of standard-setting. *Meditari Accountancy Research*, vol. 24, no. 1, pp. 134-156.

IMPACT OF FINANCIAL RATIOS ON INTERNATIONAL BANKRUPTCY PREDICTION MODELS

Lucia Svabova^{1,a,*}, Katarina Kramarova^{2,b} and Katarina Valaskova^{3,c}

^{1,2,3}Department of Economics, Faculty of Operation and Economics of Transport and
Communications, University of Zilina, Univerzitna 1, 010 26 Zilina, Slovakia

^alucia.svabova @fpedas.uniza.sk, ^bkatarina.kramarova@fpedas.uniza.sk,

^ckatarina.valaskova@fpedas.uniza.sk

*Corresponding author

Abstract. Predicting of financial troubles of companies is a matter that has been globally solved by many scientists in many countries around the world over the last decades. The first prediction models originated in the 1960s and many of them are still internationally used today. Multivariate statistical methods such as discriminant analysis and logistic regression were used to form them. The use of these methods has unquestionable advantages: the methods are easy to apply and the results are easy to use and interpret. In recent years, bankruptcy prediction has expanded all over the world to include more modern methods such as classification trees or forests, genetic algorithms, neural networks. These methods often achieve better classification results, which has been confirmed by studies of several authors all over the world, however, they tend to be difficult to interpret and use. In this article, we focused on evaluating the impact of financial ratios in different international bankruptcy prediction models. Based on the real data of companies from different countries over the world we analyse the models developed by using methods of discriminant analysis, logistic regression and classification trees and assess the results obtained in terms of the variables that have the most important influence in formed models.

Keywords: bankruptcy prediction models, failure prediction, financial ratios, multivariate statistical methods

JEL Classification: C38, G33, F69

1. Introduction

Theme creation of prediction models, since the time of Fitzpatrick and Altman, who often tend to be labelled as pioneers in this field, is dedicated to many scientists and economists in many countries. Prediction of bankruptcy, is even today still very popular, because prediction of impending financial problems is very useful for all stakeholders. The company's financial difficulties could affect not only the company's management but also other entities such as employees, creditors, suppliers, and so on (Valaskova et al., 2015). That is why the prediction of bankruptcy is very current topic even today. Various methods and techniques are used worldwide to create predictive models. Historically the first and most used statistical methods can be considered discriminatory analysis and logistic regression. Over time, several more modern methods have been used, as well as classification trees or forests, neural networks,

genetic algorithms. In many cases, in order to create the best possible prediction model method and combined or applied some rarely used methods such as Bayesian estimator, or multi- econometric time series models. Created prediction models of bankruptcy of companies use various characteristics of companies, most often the role of predictors play the financial-economic characteristics in the form of ratios (Durica & Adamko, 2016). Prediction models in different countries of the world contain several different ratios. Some of them are more commonly used in a number of prediction models, some authors also use less frequently applied ratios. The aim of this article is to analyze the impact of ratios used in prediction models created for different countries of the world. We will focus on models created using the method of discriminant analysis, the method of logistic regression, and the method of classification and regression trees. The contribution of the article is not only the creation of new prediction models with sufficiently high classification capabilities but also the comparison of the models in terms of the impact of predictors that occur in them.

This article consists of three main parts. The introduction highlighted the reasons for the implementation of this study, as well as its contribution to the problems of prediction models. Also included is a literature review of studies by other authors in the field. The second part, methodology, briefly summarizes the main features of discriminatory analysis, logistic regression, and classification trees used to implement this study. In the third part of the article presents the results of studies investigating the impact of various financial ratios in the developed prediction models.

1.1 Literature review

The prediction of bankruptcy is a topic that has been analyzed in recent years by economists in different countries of the world. For example, Jabeur & Fahmi (2017) compared three models of predicting corporate financial distress of French companies created by discriminant analysis, logistic regression and random forests. The results showed that the best classification results gives the method of random forest. Jing & Fang (2017) compared the logit model and data mining models in the field of prediction of bank failures in the USA. They found, that the logit model predicts bank failures less precisely than data mining models, Zikovic (2017) in his study used discrete-time hazard models to demonstrate, that the probability of distress is influenced not only by firm-specific variables, but also by macroeconomic variables. Barkar (2017) by using discriminant analysis and logistic regression developed models of crisis diagnostics for Russian companies renting commercial real estate. Herman (2017) compared prediction ability of the bootstrapping method and the multivariate discriminant analysis models created for specific industry with general models created in Poland. Szetela et al. (2015) found that discriminant analysis is the most suitable method for insolvency prediction, compared to other methods like probit and logit model. Lohk and Siimann (2016) prepared a model to predict the risk of encountering financial difficulties in Estonia by using discriminant analysis and logit analysis. Dima & Vasilache (2016) focused their study to a credit risk modeling for prediction of default of companies operating in Romania using logistic regression, and Artificial Neural Networks method. Brozyna et al. (2016) applied linear discriminant analysis and logistic regression and furthermore classification trees and the method of nearest neighbours to analyze possible bankruptcy signals and to evaluate the financial condition of the entities from Poland and Slovakia.

Several prediction models have in the last few years also been created in Slovakia. In addition to already known models of Gurcik and Chrastinova (Kliestikova et al., 2017), several authors have tried to create a prediction model with the best classification ability. Kovacova & Kliestik (2017) developed models for bankruptcy prediction of Slovak companies by using logit and probit method and provide the comparison of overall prediction ability of the two developed models. Karas & Reznakova (2017a) focused on the design of bankruptcy models, specifically the selection of suitable predictors to verify, whether bankruptcy predictors are industry-specific. In another research paper, Karas and Reznakova (2017b) developed prediction model for Slovak companies operating in the construction industry, by using the method of classification and regression trees. Gavurova et al. (2017) analyzed the impact of trend variables on the prediction ability of the models constructed using discriminant analysis and decision trees. They developed a new model for Slovak companies by using the decision tree technique. Mihalovic (2016) also dedicated his study to development of bankruptcy prediction models in Slovak Republic. The study is focused on the comparison of overall prediction performance of the two developed models: the first one is estimated via discriminant analysis, and another is based on a logistic regression.

2. Methodology and data

The prediction models of the company's financial difficulties are trying to explain its prosperity, or rather to reveal the imminent financial difficulties that could result in bankruptcy of the company, based on the knowledge of the financial and economic characteristics of the company. Financial ratios thus serve as discriminatory or explanatory variables in prediction models, and prosperity, respectively, the company's lack of prosperity is a dependent variable. This dependent variable Y is binary and gets a value of 0 for a prosperous company and a value of 1 for a company that is non-prosperous (threatened by bankruptcy, in financial difficulties, etc.). At this point it is important to mention the criteria that have been applied to determine the company's lack of prosperity. This criteria have been determined based on the valid legislation of the Slovak Republic. According to them, the company is marked to be non-prosperous in case, that: the value of "current ratio" is less than 1; the value of "solvency ratio" is less than 0.04 and the company was in the loss. If these conditions were not met, the company is marked as prosperous. (Svabova et al., 2018)

As mentioned earlier, for the analysis of the impact of financial ratios in the bankruptcy prediction models we applied methods of discriminant analysis, logistic regression and method of classification and regression Trees (CART). These methods are globally widely used for prediction models creation and the resulting models achieve very good prediction results. The quality of the models being created is always judged from various points of view, the classification ability of the model is quantified using the classification table and also by the ROC curve and region AUC calculation.

The multivariate discriminant analysis method is a well-known and historically one of the most widely used techniques for creating corporate bankruptcy prediction models. This method is very simple for the application and the models created with it have very good prediction results. Its aim is to create a linear combination Y of the p explanatory variables, which will form the discriminant function

$$Y = \mathbf{v}^T \mathbf{x}, \quad (1)$$

where $\mathbf{v}^T = [v_1, v_2, \dots, v_p]$ is the vector of parameters and $\mathbf{x} = [x_1, x_2, \dots, x_p]$ is the vector of financial ratios in the role of explanatory variables (Tuffery, 2011). This discriminant function is designed to ensure the best possible separation of companies into the two groups of prosperous and non-prosperous companies. Classification of company into one of the groups is based on the calculation of its discrimination score as a value of function (1). By comparing the score with the weighted average of the group centroids, which is zero in this case, the company is included in one of the groups. The negative value of the discrimination score (1) means prosperity of the company, and the positive value indicates that the company belongs to the group of non-prosperous. Since the aim of this study is to analyze the impact of individual financial ratios in prediction models, it is necessary to assess the impact of the individual explanatory variables that are statistically significant in the resulting discriminant model. This can be expressed by normalized coefficients of discriminant function and also by correlation coefficients between the individual explanatory variables and the resulting discriminant function. On the basis of the value of standardized coefficients of canonical discriminant function, we determine the order of variables due to their ability to classify companies into one of the prosperous and non-prosperous groups. The impact of explanatory variables on the discriminant ability of the created model is also quantified by the correlation coefficient between the discriminant function and the explanatory variable. These correlation coefficients provide information not only about the influence of the variables on the total value of the discriminant score but also on the direction of this influence given by the sign of the correlation coefficient. (Kliestik et al., 2018)

The method of logistic regression is similarly easy to apply and is simply interpretable as a discriminant analysis. Additionally, its use brings several benefits, for example, there is no need to meet a set of entry conditions and assumptions that require the application of discriminant analysis. The main role of the logistical model is to estimate the probability that the firm will not prosper, based on the knowledge of the values of its financial ratios. In this case, we model the conditional probability of the value of the variable Y (prosperity / non-prosperity) depending on the explanatory variables. Then

$$\pi = P(Y = 1 | \mathbf{X}) \quad (2)$$

is the conditional probability that the company is non-prosperous, with the condition of its values of financial ratios are X_1, X_2, \dots, X_k in the role of the independent variables. Then the logistic regression function is given by the expression

$$\text{logit}(\pi) = \ln \frac{\pi}{1 - \pi} = \beta_0 + \beta_1 X_1 + \dots + \beta_k X_k \quad (3)$$

and the probability that the company will be non-prosperous is (Tuffery, 2011)

$$\pi = \frac{e^{\beta_0 + \beta_1 X_1 + \dots + \beta_k X_k}}{1 + e^{\beta_0 + \beta_1 X_1 + \dots + \beta_k X_k}} = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_1 + \dots + \beta_k X_k)}} \quad (4)$$

Classification of the company in one of the groups is done by calculating the value of the function (4). Breakpoint for groups is at the level of 0.5, where lower probability means that

the company is prosperous and higher values of (4) indicates that the company belongs to a non-prosperous group. The influence of the individual explanatory variables in the generated regression model is evaluated using their statistical significance, and also according to the regression coefficient of the financial ratio.

The decision tree algorithm are one of the most intuitive and most commonly used datamining methods, especially since this approach provides explicit classification rules that are very simple and especially easy to interpret, leading to a rapid evaluation of the results. When creating predictive models, decision trees are the main competitors of classic two methods mentioned above. To create a decision tree to classify cases into m classes we use Gini index to select classification variable. To form a decision tree we use an algorithm of Classification and Regression Trees (CART), which in this case is appropriate because of the dichotomous output variable (Tuffery, 2011). It is one of the most effective and the world's most widely used algorithms generating decision trees. To avoid overfitting we use the tree pruning.

For implementation the above mentioned three methods, it was necessary to create the database of companies. For this purpose we used the financial and statistical indicators from the Amadeus database for 2015 and 2016. In modeling, we used data from several countries, namely transition economies. The database contained data on companies operating in the countries: Slovakia, Czech Republic, Poland, Hungary, Romania, Bulgaria, Lithuania, Latvia, Estonia, Slovenia, Croatia, Serbia, Russia, Ukraine, Belarus, Montenegro, Macedonia. The database contained data from 2,359,731 companies, of which 1,802,027 are prosperous and 557,704 belong to a group of non-prosperous. (Kliestik et al., 2018) Companies are characterized by variables as the country in which the company operates, the region in that country, the category of economic activity based on the NACE classification, the size of the company, GDP of the country (Altman, 2014). The input or explanatory variables for modeling were, on the one hand, these qualitative characteristics of the companies, but mainly the quantitative data on companies in the form of financial ratios. In the creation of models a total of 24 financial ratios were included, the same as in the study (Svabova et al., 2018), which were selected based on a study of several authors as the most relevant variables, predicting the financial health of companies.

3. Results

For the creation of prediction models of financial health of companies using discriminant analysis, logistic regression and CART algorithm we used as an output variable the prosperity respectively non-prosperity of the company, according to the criteria mentioned above. We used all 24 financial ratios but also the other variables that characterize the company, such as the country, the NACE sector of economic activity, the size of the company and the GDP of the country. In this study, we focus on the resulting prediction models of financial health in terms of the variables that are in the final models the most important, most influential and most significant.

3.1 International discriminant model for transitive economics

An international model for transitive economies created by multidimensional discriminatory analysis is evaluated in terms of variables and their impact on the resulting

discriminatory function. A complete prediction model is presented in (Kliestik et al., 2018). The discriminant ability of three most important predictors in this model is quantified in Table 1.

Table 1: Variables with the most important discrimination capability in international discriminant model

Variable	Method of calculation	Stand. canonical coeff.	Correlation coeff.
x_{10}	(Non-current + current liabilities) / Total assets	.679	.794
x_{15}	Current liabilities / Total assets	.318	.724
x_{28}	Return on equity	-.348	-.273
x_{35}	Profit margin	-.166	-.370

Source: own elaboration

Taking into account the values of standardized coefficients of canonical discriminant function, the greatest effect has the x_{10} , x_{15} and x_{28} . While the first two have a positive effect on the discriminant function, thus increasing the value of these characteristics are increasing the discriminant score of the company, contributing to its inclusion in the group of non-prosperous companies. On the contrary, the said third ratio has a negative effect, thus increasing its value decreases discriminant score, which is heading to a higher chance of inclusion of the company into the group of prosperous companies. In the case of correlation coefficients, for the ratios x_{10} and x_{15} , there is a moderate correlation with discriminant function (both direct dependence) and a moderate indirect correlation for the x_{35} variable. The variable x_{10} has from both perspectives in the model the strongest impact. All of these conclusions are globally valid at the international level, given that a prediction model for all transitive economies has been created.

3.2 International model of logistic regression for transitive economics

In the logistic regression model, if we only focus on the financial ratios that are included in the model as predictors, the three variables with the strongest influence according to the coefficient value are x_{27} (Return on assets), x_{35} and x_{12} (Cash and cash equivalents / Total assets). All three of them have a negative coefficient, so increasing their value reduces the chance that the company will be included in a group of non-prosperous companies. Among other qualitative variables, the international model of logistic regression, predicting the probability of financial difficulties of companies, has a significant influence in the dummy variable determining the country of origin of the company, as well as in the dummy variables indicating the sector of the national economy in which the company operates. It is interesting to note that the country code has (except the Czech Republic, Latvia, Romania and the Russian Federation) a negative coefficient and the variables giving the NACE code have all positive regression coefficient.

3.3 International CART based model for transitive economics

In the decision tree model, the variable x_{10} was also identified as the most important classification variable. In this case, the break point has a value of 1. At this point, companies whose x_{10} is less than or equal to 1 are classified as non-prosperous. The group of companies

classified as non-prosperous is further banned using criterion x_{28} . In this branch tree, the variable x_{30} (Solvency ratio (liability based)) and x_{36} (Net current assets) are also used as the dividing criterion. The second branch of a tree, leading to the classification of the company to a group of prosperous, is further divided by x_4 ratio (Net income / Shareholders equity). A complete decision tree model is described in Klietk et al. (2018). The variables x_{10} and x_{28} have been identified as one of the most important discrimination variables in the prediction model created by the discriminant analysis.

4. Conclusion

In this study, we focused on models of predicting the financial difficulties of enterprises in transition economies. International models were created through discriminant analysis, logistic regression, and classification trees. As the data on companies operating in all these countries were included in the modeling, the conclusions reached are internationally valid. We have explored the international models we have created in terms of predictors that have the strongest impact. By comparing the models created using the three methods we can say that they match in several variables, which are the most important predictors in the models. The discriminant analysis model has with the logistic regression model the common variables x_{28} (Return on equity) and x_{35} (Profit margin), with the CART model variables x_{10} ((Non-current + current liabilities) / Total assets) and x_{28} (Return on equity). The logistic regression model coincides with the CART model in the variables x_{28} (Return on equity) and x_{30} (Solvency ratio (liability based)). Thus, it is clear that the most influential predictor group is common to international models created by different methods.

Acknowledgment

This research was financially supported by the Slovak Research and Development Agency – Grant NO. APVV-14-0841: Comprehensive Prediction Model of the Financial Health of Slovak Companies.

References

- [1] Altman, E. I., Iwanicz-Drozdowska, M., Laitinen, E. K. and Suvas, A. (2014). Distressed Firm and Bankruptcy Prediction in an International Context: A Review and Empirical Analysis of Altmans Z-Score Model. *SSRN Electronic Journal*.
- [2] Barkar, A. A. (2017). Development of instruments of financial diagnostics of crisis. *St Petersburg University Journal of Economic Studies*, vol. 33, no.4, pp. 658-672.
- [3] Brozyna, J., Mentel, G. and Pisula, T. (2016). Statistical methods of the bankruptcy prediction in the logistics sector in Poland and Slovakia. *Transformations in Business & Economics*, vol. 15, no. 1, pp. 93-114.
- [4] Dima, A.M. and Vasilache, S. (2016). Credit risk modeling for companies default prediction using neural networks. *Romanian Journal of Economic Forecasting*, vol. 19, no. 3, pp. 127-143.

- [5] Durica, M. and Adamko, P. (2016). Verification of MDA bankruptcy prediction models for enterprises in Slovak Republic. *Proceedings of The 10th international days of statistics and economics*, Prague, Czech Republic, pp. 400-407.
- [6] Gavurova, B., Janke, F., Packova, M. and Pridavok, M. (2017). Analysis of Impact of Using the Trend Variables on Bankruptcy Prediction Models Performance. *Ekonomicky casopis*, vol. 65, no. 4, pp. 370-383.
- [7] Herman, S. (2017). Industry specifics of joint-stock companies in Poland and their bankruptcy prediction. *Proceedings of The 11th Professor Aleksander Zelias International Conference on Modelling and Forecasting of Socio-Economic Phenomena*, Cracow, Poland, pp. 93-102.
- [8] Jabeur, S. B. and Fahmi, Y. (2017). Forecasting financial distress for French firms: A comparative study. *Empirical Economics*, vol. 54, no. 3, pp. 1173-1186.
- [9] Jing, Z. and Fang, Y. (2017). Predicting US bank failures: A comparison of logit and data mining models. *Journal of Forecasting*, vol. 37, no. 2, pp. 235-256.
- [10] Karas, M. and Reznakova, M. (2017). The stability of bankruptcy predictors in the construction and manufacturing industries at various times before bankruptcy. *E M Ekonomie a Management*, vol. 20, no. 2, pp. 116-133.
- [11] Karas, M. and Reznakova, M. (2017). Predicting the Bankruptcy of Construction Companies: A CART-Based Model. *Engineering Economics*, vol. 28, no. 2.
- [12] Klietnik, T., Valaskova, K., Klietnikova, J., Kovacova, M. and Svabova, L. (2018). *Predikcia finančného zdravia podnikov tranzitívnych ekonomík*. Zilina, Slovakia: Edis.
- [13] Klietnikova, J., Misankova, M. and Klietnik, T. (2017). Bankruptcy in Slovakia: International comparison of the creditor's position. *Oeconomia Copernicana*, vol. 8, no. 2, pp. 221.
- [14] Kovacova, M. and Klietnik, T. (2017). Logit and Probit application for the prediction of bankruptcy in Slovak companies. *Equilibrium*, vol. 12, no. 4, pp. 775-791.
- [15] Lohk, P. and Siimann, P. (2016). Predicting the Risk of Encountering Financial Difficulties by the Example of Estonian Municipalities. *Proceedings of the 5th International Conference on Accounting, Auditing, and Taxation (ICAAT 2016)*.
- [16] Mihalovic, M. (2016). Performance Comparison of Multiple Discriminant Analysis and Logit Models in Bankruptcy Prediction. *Economics & Sociology*, vol. 9, no. 4, pp. 101-118.
- [17] Svabova, L., Durica, M. and Podhorska, I. (2018). Prediction of Default of Small Companies in the Slovak Republic. *Economics and Culture*, vol. 15, no. 1, pp. 88-95.
- [18] Szetela, B., Mentel, G., & Brożyna, J. (2016). In search of insolvency among European countries. *Economic Research-Ekonomska Istraživanja*, vol. 29, no. 1, pp. 839-856.
- [19] Tuffery, S. (2011). *Data Mining and Statistics for Decision Making*, 1st ed. Chichester, U.K.: Wiley.
- [20] Valaskova, K., Kramarova, K. and Bartosova, V. (2015). Multi Criteria Models Used in Slovak Consumer Market for Business Decision Making. *Procedia Economics and Finance*, vol. 26, pp. 174-182.
- [21] Zikovic, I.T. (2017). Challenges in Predicting Financial Distress in Emerging Economies: The Case of Croatia. *Eastern European Economics*, vol. 56, no. 1, pp. 1-27.

GLOBAL FINANCIAL MARKET REGULATIONS AND THEIR IMPACT ON PRICE CONVERGENCE IN EU COUNTRIES

Włodzimierz Szkutnik^{1,a,*}, Weronika Szkutnik^{2,b}

¹Department of Labour Market Research and Forecasting, University of Economics in Katowice,
Katowice, 1 Maja 50 street, 40-287, Poland

²UBS AG, Corporate Center / Group Ops, AMO Trade Processing CH Zurich, Switzerland

^aszkutnik@ue.katowice.pl, ^bweronika.szkutnik@gmail.com

*Corresponding author

Abstract. The aim of the paper is to analyse global flows of commodities and services as well as financial transfers that secure these flows. They affect negatively the economic and social sphere because of poor regulations regarding financial markets and established in 1970s. Nowadays we can observe that incompatibility of the above-mentioned regulations within the EU may be one of the reasons for economic migration that aims at equalization of living standards inside, as well as outside the EU. The authors also indicate the complexity of globalization processes from historical point of view in the sense of integration and liberalization observed on particular markets, i.e. capital markets, labour markets and commodity markets. This complexity is especially apparent while observing global transformations. Thus, the paper is focused on critical analysis of the above-mentioned globalization features. The authors state that the domination of international corporations as well as too extensive institutionalization of many spheres, including economy, may cause numerous social problems that may be difficult to solve in a short or long term. This may cause intensification of development of many activities in EU, but also have a multiplied effect in the areas surrounding Europe, mainly in Africa. Indicating the reason for disappearance of the convergence phenomenon, especially convergence of prices of commodities and services, has a catastrophic character at this point. Therefore, the analysis showing the reasons of economic and social degradation in the specific aspect – the aspect of moral hazard in financial structures - is an additional subject of the paper consideration.

Keywords: global flows, commodities, services, financial transfers, convergence

JEL Classification: F02, F22, F69

1. Introduction

The paper discusses the issues related to differences in the growth rate and the level of economic development in selected countries and regions. The question whether there are theoretical and empirical premises to believe that diversification declines in longer periods, and there is a trend that levels of development converge, i.e. convergence trend, or inversely - the diversification intensifies and there is a trend of divergence is raised. There are many various concepts of convergence and diverse ways in which it is defined, therefore such an analysis is not easy.

The main goal of the paper is to refer the deliberations to currently functioning approach regarding the regulations in the pursuit of balance in the level and quality of life, at least in the European countries against the background of intracontinental image, but not only, and increased external migration caused by war conflicts.

1.1 Classification of convergence

In a synthetic approach, the notion of economic convergence with respect to countries and regions can be interpreted in two ways: 1) as a sigma (σ) type convergence, when the diversification of income level per capita (e.g. GDP per capita) declines; 2) as a beta (β) type convergence, when economic systems of a lower development level show higher growth rate in comparison with more developed economic systems, i.e. when there is a reverse relationship between the initial income level (GDP per capita) and the growth rate. The β type convergence is a necessary but not sufficient condition for the occurrence of σ type convergence. The fact that less developed countries show a higher rate of growth does not guarantee that income diversification will be decreasing (Barro, Sala-and-Martin 1990). Furthermore, absolute (unconditional) convergence of β type where poor countries or regions develop faster than the rich ones regardless of their initial conditions and levels of development, as well as conditional convergence, where convergence processes concern a group of relatively homogenous countries or regions (of similar income or structural parameters) are also distinguished. Such a classification is explicitly referred to economic growth that considers additional determinants performing a monitoring role (Garipey F. 2018).

1.1.1 Economic convergence and divergence processes in the light of growth theory

In contemporary and constantly developing growth theory, two groups of models can be distinguished: neoclassical, represented by the R.M. Solow's model (Solow, 1956; Solow, 1980), and its further modifications, mainly consisting in extending the concept of capital into tangible and human capital, as well as endogenous models, that emerged and developed in the 1980s and 1990s as a result of critical analysis of neoclassical models, initiated by P. Romer (1986). In neoclassical models that presume constant scale effects and exogenous character of technological progress, it is assumed that the growth rate depends on the rate of investment in the capital resources (material and/or human) and capital intensity. The analysis of these models allows to form the conclusion about the existence of the trend of convergence in the level of development of countries as a result of achievement of higher growth rate by less developed countries. In these models, the possibility of convergence resulted mainly from the compliance and adoption of operation of the law of diminishing marginal revenues obtained from capital, according to which higher marginal capital productivity should characterize economic systems less abundant in this determinant, i.e. poorer. Such systems can achieve higher growth rates if they are characterized by the same investment rates as economies of rich countries (Tokarski, 2007). To implement the last condition and reduce development disparities between countries, the assumed direction of capital flow is of the key importance. In the conditions of the operating law of diminishing revenues, highly developed areas must ensure higher marginal productivity of this resource, which should encourage investments in them. Neoclassical approach that is the basis for making conclusions about occurrence of an objective trend of convergence in the level of development has been undermined in the new reality of endogenous approach.

In the latest discussions on convergence, the view is presented that econometricians working in economic growth have identified an extensive list of variables that are controlled (individually or collectively). This implies a significant impact of convergence gap on real growth. The investment rate, the level of education or education, the share of trade in GDP, financial enhancement and public consumption are found among the most common indicators on the list. The estimated ratio of the initial income regression model usually becomes negative and statistically significant if only any combination of these variables is considered on the right side of the growth regression equation.

1.1.2 Negation of recognised convergence characteristics

Convergence has many meanings (Aghda et al., 2018), and in economic terms, it is explained by the pursuit of outlier economies measured mainly by the level of GDP per capita against the level of developed economies. Such a model cannot be achieved without significant raw material resources, intellectual level of society, but also synergy of various processes. There are no exceptions, and many examples can be quoted (Islam, 1995; Islam, 2003). In this case, complete negation of process convergence is appropriate. However, absolute existence of the basis of the phenomena supporting convergence in a broad meaning cannot be denied. Possible convergence of economies in the sense defined by the above-mentioned types of convergence do not always have a logical justification resulting from the applied models.

There are many reasons for that, and opponents find convincing justifications (Rodrik, 2011):

- in each case convergence is at the same time divergence, which results from the competitive processes on markets.
- developed markets do not allow to abolish the barriers; each of such attempts is a reaction caused by aggression, also including acts of war,
- claiming that the law of diminishing returns is the basis for convergence, is in general case groundless. It is denied by a lot of empirical studies that contradict the neoclassical theory including Solow's model. However, it constitutes the basis for the division and classification of convergence, but nothing else. While stimulating processes that reactivate disclosure of the mechanisms of this law, large economic players act only on particular interests.

It should be strongly emphasized that decreasing income per capita results from excessive, unnecessarily stimulated employment and this, without causing a reduction in corporate profits, causes a wave of low income. Globalization (Mellis A. M., 2018), which in a sense is an inspiration for convergence, in this context does not stand the test of a positive example if social organisms compete only for existential reasons.

2. New growth theory

Formal grounds for economic growth models have been evolving throughout the nineteenth century up to the present day (Samuelson & Nordhaus, 2012). In the development of formalized thought - in science describing the real world in symbol models, the translation of economic conditions led to models of economic growth. Generally, the convention of models' division outlines the dichotomy of growth into endogenous and neoclassical models classified

as the new growth theory. Neoclassical growth models by Solow, Ramsey and Diamond, from the 1950s and later in the 20th century, that derived from the classical construction, and applied the main indicators of economic growth, form a class of contemporary models trying to explain unexpectedly occurring economic effects that were not predicted by formal models constructed before.

2.1 Endogenous versus neoclassical models

Basic endogenous models include the Romer's *learning-by-doing* model, the Lucas's model, Rebelo's model, models with increasing number of goods, and models with improving quality of goods. The new growth theory also includes modification of Solow's model, or the model of Mankiw-Romer-Weil, that is its extension. However, it is comprised in the new growth theory because it includes the new element, the human capital. Neoclassical models with neoclassical production function constitute the basis for deriving the law of diminishing returns. It is important that they explain what is still functioning not only in Africa and other regions that even though entering the stage of technological and IT development, are still underdeveloped, but they also explain the economic behaviours of "giants" such as the USA or other western countries. This is because such power as the USA is still applying rather mundane methods of influence on other countries. On the other hand, in endogenous models there are at least constant incomes from reproducible factors of productions. What is more important, in endogenous models - in contrast to neoclassical ones - determinants of long-term economic growth are well explained. However, this growth in individual models of this group depends on a range of factors.

2.2 Endogenous models

What results from their very name, endogenous models explain economic growth in the way resulting from changes in the factors occurring in the model. This feature is the opposite of the neoclassical growth theory, where long-term growth depended on exogenous technological progress introduced into the model together with other assumptions. Achievement of endogenous economic growth is possible thanks to the departure from neoclassical production function that assumes decreasing revenues from reproducible factors of production. In the group of endogenous models, there are at least constant revenues generated by these factors. The practice of experiences from recent decades refers to the strongly-worded statements formulated earlier. There is always "something" negating the assumptions of neoclassical, endogenous and Mankiw-Romer-Weil's models which contradicts transition from non-competitive economy to the group of developed economies. Even though absolute growth is observed, despite higher rate of growth of weaker economies this "distance" is not stimulating the gap reduction because of variability of measurements evaluating "modernity". Furthermore, "catching up" economies are intellectually "drained" by the developed ones, which practically, with only a few exceptions of raw material powers, will not allow these economies to achieve authentic convergence outside their group. It must be mentioned that the above models are adapted for the study of diminishing differences between developed economies that have the roots of early capitalist development at their basis. They are for example, Poland, the Czech Republic, Slovenia, Slovakia, Hungary and other countries of the present EU that were stopped by political processes. The situation is completely different in the group of highly exploited countries, such as post-colonial countries or those having expansive traditions dating back to the Latin and South American conquistador times.

In the case of such powers as the USA, exploration of intellectual force of Asian countries and Europe is important (Horstmann et al., 2018). The above-mentioned "brainwashing" with research and development base, typical of North America, cannot be discounted in the countries of Central and Eastern European countries with any investments on this form of influence on the gap reduction. The same is observed in many countries of Africa, Asia or South America but in much intensified form. It is significant for the study of convergence, i.e. increase in the level of unification of social and economic differences in a sense, but not a gap reduction, to indicate the occurrence of this phenomenon by the model while showing the coefficient of convergence or converging to the state of long-term equilibrium. Attention is focused on ascertainment of the state of dynamic (long-term) inefficiency by the model.

3. Globalisation process in growth models

Assuming the influence of a rational individual defined as a sensible being (Van Ewijk S. 2018), capable of scientific synthesis, rapid civilization progress is possible. Such a process is currently realised with certain limitations, whereas its origins go back to the Enlightenment era since when humanity has experienced many failures (Gariepy, 2018). Processes of progress and global development tend to turn back from the path of development and turn its trajectory in the opposite direction. At the same time, extremely negative phenomena destroying the environment and threatening civilisation with destruction in anticipatory vision of the future are observed (Klein N., 2008; Paltan et al., 2018). The choice between justice and efficiency is not easy.

3.1 Essential symptom of exogenous and endogenous models – price convergence

It is seen in real conditions that there are differences between the prices of goods sold in the countries where they are manufactured and the prices in the countries in which they are sold (Klein, 2007). Another aspect of convergence occurs here, i.e. the price convergence. It should operate in the EU countries but is not commonly observed. In many cases, prices are a synergy of low production costs, and at the same time the rate discounting the prices of the product sold in individual EU countries (Koellner et al., 2018) They may slightly (sometimes) differ but they are balanced by the currency exchange rate if the countries are not in the Euro zone, or by the level of productivity of individual economies. This phenomenon is called the Samuelson-Balassa effect. The hypothesis assumes combination of price differentiation caused by different level of productivity.

3.2 Inefficiency of the monetary system

In the situation of imbalance regarding wages and prices of goods that are subject to trade, as well as non-tradable goods (Kraus et al., 2017), the situation contrary to the Balassa-Samuelson effect can be faced. For example, tradable goods that can be easily sold in other countries may not be perceived as expensive on other markets. However, non-tradable services and goods could bear the prices and wages reflecting their local economies. This can happen regardless of the level of productivity, and it results from the lack of economic balance in more developed countries. The impact that real exchange rate has on emerging economy depends on the real exchange rate, both fixed and floating, in a given country (Islam, 2003).

There is an extreme belief that competition between currencies is an absurd for the monetary system that destroys it and actually causes the fact that apart from speculative function of this system, there is no other sensible mechanism explaining the need for its existence (Kostakis et al., 2018). It is an active attack on the prevailing system created in 1971 after the departure from the Bretton Woods agreement.

3.3 Convergence in the face of market inefficiency – Mankiw-Romer-Weil's methodology

The Mankiw-Romer-Weil's model (M-R-W) was developed, among others to show that neoclassical growth theory well explains the differences in the level of income between countries and the phenomenon of conditional convergence. Therefore, the results of empirical studies verifying the truthfulness of conclusions from the Solow's models (basic and extended) expressed in the Mankiw-Romer-Weil's model (M-R-W) will be presented now. Apart from physical capital (K) and efficient labour resource, human capital (H) is the third factor of production in this model (Jabłoński, 2011). The equation - obtained from extended Solow's model - shows the most crucial factors determining the level of income in individual countries (Wang Fenghui et al., 2017).

3.4 Numerical exemplification of the convergence on the example of selected countries

The face of convergence is becoming a challenge for research and methods, which is the effect of estimating the GDP of individual economies in the analysed period (Islam, 1995). Provided results of model measurement of real convergence are presented on the basis of research conducted with the use of Mankiw-Romer-Weil's models (Mankiw et al., 1992), in terms of two culturally diverse groups of countries in Africa and Central-Eastern Europe. In the case of Africa (Johnson, 2017; Tavenner et al., 2018), the most developed economies were included in the analysed period of 1990-2004, while referring them to the type of similarity: β type absolute convergence, β type conditional convergence and σ type convergence, with the degree of convergence and determination coefficient. The results are shown in table 1.

Table 1: Convergence research with the use of Mankiw-Romer-Weil's model

Number of countries	Data of	Convergence type	Convergence occurrence	R^2
	1990-2004	Abs. β	1,84%	0,65
12		Conditional β	3,23%	0,72
		σ	yes	

Source: Own case study based on data World Bank

In β type conditional convergence model, regression is an extended Solow's model with physical and human capital as well as the time effect. For the group of 8 countries (excluding Romania and Bulgaria) of Central and Eastern Europe, between 2005 and 2015, the occurrence of absolute convergence (speed of convergence) is observed on the level of 3.19%. The rate is lower than the one achieved in other research between 1993 and 2004. *Sigma* type convergence was also found, which proves the reduced income differences between the studied economies.

Table 2. Research with the use of Mankiw-Romer-Weil's model

Number of countries	Data of	Convergence type	Convergence occurrence	R^2
---------------------	---------	------------------	------------------------	-------

	2005-2015	Abs. β	3,19%	0,58
8		Conditional β	3,23%	0,67
		σ	yes	

Source: Own case study based on data World Bank

On the basis of many studies known from the literature, and from what is confirmed by the results obtained here, it can be concluded that small groups of countries are developing according to the hypothesis of convergence. This is proved by both the absolute, as well as conditional type of convergence

4. Conclusions

The main results concerning the goals of the paper focus on the analysis of convergence with respect to convergence processes in selected countries of Africa and Central-Eastern Europe. References regarding the main objective of conducted considerations may lead to the conclusion that the phenomenon of convergence raises certain methodological controversies resulting from the way in which the very method of estimating GDP per capita is approached. Various sources that often estimate specific economic indicators in a different way prove that the contribution of human capital in Africa followed what has not always been positive in other regions of the world. Studies of the convergence of EU countries are widely analysed in the literature. For this reason, these issues have not been widely discussed here. It can only be stated with a high degree of probability that as a result of the transformation processes, Central and Eastern European countries gained most in the context of convergence processes in other parts of the world. In the context of the analysed convergence of the group of African countries, the paper presents the region of the world that needs special attention due to its overall neglect and, at the same time, huge opportunities for potential development. The attention focused on the price convergence was limited to considerations based on the opinions of various intellectual groups and reduced to the presentation of critical remarks known from the literature. In terms of methodology used in the paper, a model very close to the Solow's model was selected. This is a justified approach, because of the results obtained by other authors with application of this model. It also allows for comparison of results.

References

- [1] Aghda, A. S. F., Hosseini S. M. and Tahmasebi M. (2018). Convergence and non-negativity preserving of the solution of balanced method for the delay CIR model with jump. *Journal of Computational and Applied Mathematics*, vol. 344, pp. 676-690.
- [2] Barro, S. M. (1990). A Spatial Mankiw–Romer–Weil model: theory and evidence. *The Annals of Regional Science*, vol. 47, no. 2, pp. 419–436.
- [3] Gariepy, F. (2018). The moral realism and the convergence of beliefs. *Phares-Revue Philosophique Etudiante del Universite*, vol. 18, pp. 171-192.
- [4] Horstmann, G. M., Schiepel, D. and Wagner, C. (2018). Experimental study of the global flow-state transformation in a rectangular Rayleigh-Benard sample. *International Journal of Heat and Mass Transfer*, vol. 126, pp. 1333-1346.
- [5] Islam, N. (1995). Growth Empirics: A Panel Data Approach. *Quarterly Journal of Economics*, no. 110, pp. 1127-1170.

- [6] Islam, N. (2003). What Have we Learnt from the Convergence Debate? *Journal of Economics Surveys*, no. 17, pp. 309-362.
- [7] Jabłoński, Ł. (2011). Human Capital in Selected models of Economic Growth. *Gospodarka Narodowa*, no. 1-2, pp. 81-103.
- [8] Johnson, S. (2017). Competing Visions of Financial Inclusion in Kenya: The Rift Revealed by Mobile Money Transfer. *Canadian Journal of Development Studies – Revue Canadienne D Etude du Developpement*, vol. 38, no. 2, pp. 296-296.
- [9] Klein, N. (2007). The Shock Doctrine. The Rise of Disaster Capitalism. *Copyright by Naomi Klein*.
- [10] Kostakis, V., Latoufis, K., Liarokapis, M. et al. (2018). The convergence of digital commons with local manufacturing from a degrowth perspective: Two illustrative cases. *Journal of Cleaner Production*, vol. 197, pp. 1684-1693.
- [11] Koellner, T., Schroeter, M., Schulp, C.J.E. et al. (2018). Global flows of ecosystem services. *Ecosystem Services*, vol. 31, pp. 229-230.
- [12] Kraus, M. and Feuerriegel, S. (2017). Decision support from financial disclosures with deep neural networks and transfer learning. *Decision Support Systems*, vol. 104, pp. 38-48.
- [13] Mankiw, N., Gregory, D., Romer, D. and Weil, N. (1992). A Contribution to the Empirics of Economic Growth. *Quarterly Journal of Economics*, vol. 107 pp. 407 - 437.
- [14] Mellis, A. M., Athamneh, L. N., Stein J. S. et al. (2018). Less is more: Negative income shock increases immediate preference in cross commodity discounting and food demand. *Appetite*, vol. 129, pp. 155-161.
- [15] Paltan, H., Haustein, K. et al. (2018). Global implications of 1.5 degrees C and 2 degrees C warmer worlds on extreme river flows. *Environmental Research Letters*, vol. 13, no. 9.
- [16] Rodrik, D. (2011). Paper prepared for 2011 The Jackson Hole Symposium of the Federal Reserve Bank in Kansas City, Published by Harvard University, pp. 25-27.
- [17] Samuelson, P. and Nordhaus, W. (2010). Economics. Nineteenth Edotion. *The McGraw-Hill Companies, Inc.*
- [18] Solow, R. M. (1956). A Contribution to the Theory of Economic Growth. *The Quarterly Journal of Economics*, vol. 70, no. 1, pp. 65-94.
- [19] Solow, R. M. (1980). The Story of a Social Experiment and Some reflections. *Economic and Social Research Institute*.
- [20] Tavenner, K. and Crane, T. A. (2018). Gender power in Kenyan dairy: cows, commodities, and commercialization. *Agriculture and Human Values*, vol. 35, no. 3, pp. 701-715.
- [21] Tokarski, T. (2007). Efekty skali a wzrost gospodarczy. *Gospodarka Narodowa*, no. 1-2, pp. 9-31.
- [22] Van Ewijk, S. J. A. and Ekins, P. (2018). Global Life Cycle Paper Flows, Recycling Metrics, and Material Efficiency. *Journal of Industrial Ecology*, vol. 22, no. 4, pp. 686-693.
- [23] Wang F., and Xu, H.K. (2017). Weak and Strong Convergence of Two Algorithms for the Split Fixed Point Problem, Conference: *Workshop on Computational Mathematics and Scientific Computing*, Macau.

VARIABILITY OF FINANCIAL RESULTS OF SELECTED INDUSTRIES IN SLOVAKIA IN AN ENVIRONMENT OF GLOBALIZATION OF ECONOMICS

Alena Tothova^{1,a}, Maria Kozakova^{2,b,*}

^{1,2} Department of Business Finance, Faculty of Business Management, University of Economics in
Bratislava, Dolnozemska cesta 1, 852 35 Slovakia

^aalena.tothova@euba.sk, ^bmaria.kozakova@euba.sk,

*Corresponding author

Abstract. The financial results (financial indicators) of Slovak companies usually differ from one another, mainly due to their different activities, legal structure, size, the stage of the business life and economic cycle, the globalization trend. Globalization influences the possibilities to obtain financial resources and the cost of financial resources. It is removing barriers in the business environment, which provides better conditions for increasing in revenues, profits or introducing innovations and achieving cost savings due to the free movement of labour. All of these aspects are necessarily reflected in the value of the enterprise financial indicators. The level of financial indicators denotes the financial performance of the companies and therefore it is necessary to confront these indicators in a set of comparable enterprises. Only in this way, the judgment about the financial results of Slovak companies can be objective. However, the large differences between financial indicators complicate the conclusions and company evaluation. The contribution is therefore focused on examining the variability of the Slovak sectoral financial indicators, especially on the quantitative definition of the variability of the sectoral financial results, on identifying the trends of the variability in the last decade, on measuring the dependence between the variability of the financial indicators of the sectors and the macroeconomic indicators and looking for indicators that most and least distribute Slovak companies across the different sectors. Through the correlation, the reasons for the variability of financial results will be the examined in relation to the development in the Slovak Republic and abroad.

Keywords: sectoral financial indicators, macroeconomic indicators, variability of results, interquartile range, quartile deviation, correlation.

JEL Classification: E20, G30, M21 M41

1. Introduction

Globalizácia je definovaná ako proces ekonomickej, finančnej a trhovej integrácie (Eden & Lenway, 2001). Súvisí s prechodom na znalostnú ekonomiku (Mohaghegh, 2016); (Dobrescu, 2013) či s inovatívnymi procesmi a možno povedať, že ide o proces medzinárodnej integrácie, pričom vývoj globalizácie je spôsobený zvýšenou výmenou produktov, služieb atď. (Surugiu & Surugiu, 2015). V minulom desaťročnom období sme boli na svetovej či už politickej, alebo ekonomickej scéne svedkami viacerých turbulentných zvrátov. Globálna hospodárska a

finančná kríza prerušila éru neustáleho rastu ekonomík, čo znefunkčnilo tradičné fungovanie trhového mechanizmu. Východiská z danej situácie sa hľadali veľmi ťažko, a to najmä kvôli dosiahnutej úrovni vzájomného prepojenia krajín a ich ekonomík spôsobenou globalizáciou vo svete. Na riešenie mimoriadnej situácie bolo potrebné prijať množstvo mimoriadnych opatrení. Napriek tomu i napriek čoraz intenzívnejšiemu zameraniu spoločnosti na spotrebu, je dnes vo svete síce znovu nastolený trend rozvoja, ale tento trend je v porovnaní s predkrízovým obdobím o niečo pomalší. Jednotlivé krajiny a podnikateľské subjekty až v poslednom období začínajú viac profitovať ako strácať z globalizačných trendov. Globalizácia priniesla vedecký a technický pokrok (Thomassen a kol., 2017), rozvinula medzinárodných obchod, rozšírila predajné trhy, hospodársku integráciu (Suntsova, 2012), čím prispela k rýchlejšiemu rozvoju krajín a ich ekonomík (Chang & Lee, 2011; Rao & Vadlamannati, 2011; Gurgul & Lach, 2014). Popri nesporných výhodách nesmieme ale opomenúť negatíva globalizačného procesu, ako nárast nepredvídateľných foriem rizika, sociálnych nerovností (Mastalerz-Kodzis et al., 2016). Procesy globalizácie prispievajú i k nárastu vzájomnej závislosti národných ekonomík (Kramarova & Valaskova, 2015). Všetky citované aspekty globalizácie sa nevyhnutne premietajú do finančných ukazovateľov či už na mikro, alebo makro úrovni. Dôkazom našich tvrdení o novom pozvoľnom štarte výkonnosti ekonomík je tabuľka 1 a v nej zobrazené makroekonomické dáta reprezentujúce európsku 28.

Table 1: % zmena HDP vyjadreného v trhových cenách (ročné údaje)

geo\time	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Belgium	3,4	0,8	-2,3	2,7	1,8	0,2	0,2	1,3	1,4	1,4	1,7
Bulgaria	7,3	6	-3,6	1,3	1,9	0	0,9	1,3	3,6	3,9	3,6
Czech Republic	5,6	2,7	-4,8	2,3	1,8	-0,8	-0,5	2,7	5,3	2,5	4,3
Denmark	0,9	-0,5	-4,9	1,9	1,3	0,2	0,9	1,6	1,6	2	2,3
Germany	3,3	1,1	-5,6	4,1	3,7	0,5	0,5	2,2	1,7	2,2	2,2
Estonia	7,7	-5,4	-15	2,3	7,6	4,3	1,9	2,9	1,9	3,5	4,9
Ireland	5,3	-4,4	-5	1,9	3,7	0,2	1,3	8,8	25,1	5	7,2
Greece	3,3	-0,3	-4,3	-5,5	-9,1	-7,3	-3,2	0,7	-0,3	-0,2	1,4
Spain	3,8	1,1	-3,6	0	-1	-2,9	-1,7	1,4	3,4	3,3	3,1
France	2,4	0,3	-2,9	1,9	2,2	0,3	0,6	1	1,1	1,2	2,2
Croatia	5,3	2	-7,3	-1,5	-0,3	-2,3	-0,5	-0,1	2,4	3,5	2,9
Italy	1,5	-1,1	-5,5	1,7	0,6	-2,8	-1,7	0,1	1	0,9	1,5
Cyprus	4,8	3,9	-1,8	1,3	0,3	-3,1	-5,9	-1,4	2	3,4	3,9
Latvia	10	-3,5	-14	-3,9	6,4	4	2,4	1,9	3	2,2	4,5
Lithuania	11,1	2,6	-15	1,6	6	3,8	3,5	3,5	2	2,3	3,8
Luxembourg	8,4	-1,3	-4,4	4,9	2,5	-0,4	3,7	5,8	2,9	3,1	2,3
Hungary	0,4	0,9	-6,6	0,7	1,7	-1,6	2,1	4,2	3,4	2,2	4
Malta	4	3,3	-2,5	3,5	1,3	2,7	4,6	8,1	9,6	5,2	6,4
Netherlands	3,8	2,2	-3,7	1,3	1,6	-1	-0,1	1,4	2	2,2	2,9
Austria	3,7	1,5	-3,8	1,8	2,9	0,7	0	0,8	1,1	1,5	3
Poland	7	4,2	2,8	3,6	5	1,6	1,4	3,3	3,8	3	4,6
Portugal	2,5	0,2	-3	1,9	-1,8	-4	-1,1	0,9	1,8	1,6	2,7
Romania	6,9	8,3	-5,9	-2,8	2	1,2	3,5	3,4	3,9	4,8	6,9
Slovenia	6,9	3,3	-7,8	1,2	0,6	-2,7	-1,1	3	2,3	3,1	4,9
Slovakia	10,8	5,6	-5,4	5	2,8	1,7	1,5	2,8	3,9	3,3	3,4
Finland	5,2	0,7	-8,3	3	2,6	-1,4	-0,8	-0,6	0,1	2,5	2,8
Sweden	3,4	-0,6	-5,2	6	2,7	-0,3	1,2	2,6	4,5	3,2	2,3
United Kingdom	2,5	-0,3	-4,2	1,7	1,6	1,4	2	2,9	2,3	1,8	1,7

Source: databáza Eurostat

Vyšším tempom rastu výkonnosti v porovnaní s rokom 2007 sa aktuálne môžu pochváliť len krajiny ako je Dánsko, Írsko, Maďarsko, Malta a Portugalsko. Náš príspevok je však prioritne zameraný na mikroekonomickú úroveň, preto sa v jeho ďalšej časti sústreďujeme na skúmanie finančných ukazovateľov slovenskej podnikovej sféry.

2. Metódy skúmania

Výskum podnikových finančných ukazovateľov (výsledkov) sme realizovali postupným rozborom celkových výsledkov vykázaných za SR až na úroveň príslušných sektorov slovenskej ekonomiky. Zvolený postup nášho vedeckého bádania súvisel s poznaním, že úroveň podnikových finančných ukazovateľov je v jednotlivých odvetviach rozdielna. Rozdielna v dôsledku charakteru podnikateľských aktivít, právnej formy subjektov, ich veľkosti, etape podnikateľského života a hospodárskeho cyklu, prebiehajúcim globalizačným trendom. Úroveň finančných ukazovateľov naznačuje vitalitu podniku a preto je ich potrebné navzájom konfrontovať. Iba tak môže byť úsudok o finančných výsledkoch slovenských podnikov objektívny. Veľké rozdiely medzi finančnými ukazovateľmi však výsledné závery hodnotenia podnikov komplikujú. Napríklad výrazne pozitívne finančné výsledky sa totiž dajú dosiahnuť zásluhou aktivít a schopností podniku, alebo pomocou nadmernej podpory zo strany štátu, či cieľenou úpravou zverejňovaných dát. Zámerom predkladaného príspevku je vyhodnotenie celkovej finančnej kondície slovenských podnikov, skúmanie variability odvetvových finančných ukazovateľov. Predovšetkým nám ide o meranie závislosti medzi variabilitou finančných ukazovateľov odvetví a vybranými makroekonomickými ukazovateľmi, určenie ukazovateľov, ktoré najviac a naopak najmenej rozdeľujú slovenské podniky naprieč jednotlivými odvetvami. K hodnoteniu finančných výsledkov sme využili štatisticky spracované dáta za celé Slovensko aj za odvetvia. Podklady sme čerpali z komerčnej databázy CRiBiS.sk Univerzálny register, spoločnosti CRIF – Slovak Credit Bureau s.r.o. Kvantily nám slúžili ku kvantifikácii ukazovateľov variability ako kvartilové rozpätie, priemerná kvartilová odchýlka a relatívna miera variability. K takémuto kroku sme pristúpili preto, lebo sme nepoznali všetky znaky sledovaných súborov dát, ale iba hlavné. Korelačnou analýzou sme skúmali tesnosť závislosti medzi variabilitou podnikových výsledkov a makroekonomickým prostredím. Grafickým zobrazením najdôležitejších faktov o podnikoch sme chceli dosiahnuť prehľadnú interpretáciu výsledkov výskumu. Spracovanie úsudku o finančnej kondícii slovenských podnikov si vyžiadalo použitie aj základných teoretických a logických metód ako analýza, syntéza, dedukcia, indukcia, komparácia, analógia, abstrakcia i konkretizácia.

3. Výsledky a diskusia

Naše úvodné vedecké skúmanie smerovalo k formulácii odpovedí na otázky ako napríklad: Ako korešpondujú finančné výsledky slovenských podnikov s fázami hospodárskeho cyklu, charakterizujúcimi predošlé desaťročné obdobie? Ako sa vyvíjala finančná situácia typického, mediánového slovenského podniku? Čiastkové výsledky výskumu sú obsiahnuté v tabuľke 2. V prvom riadku je uvedená veľkosť štatisticky spracovanej vzorky slovenských podnikov.

Table 2: Mediánové hodnoty finančných ukazovateľov slovenských podnikov za obdobie 2007-2016

Počet podnikov	69200	85753	88574	109730	103090	119429	144226	144779	154432	160074
Ukazovatele/obdobie	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Likvidita 2	1,15	1,14	1,12	1,12	1,15	1,18	1,33	1,24	1,34	1,42
Likvidita 3	1,34	1,32	1,32	1,30	1,34	1,37	1,52	1,41	1,52	1,61
Doba obratu zásob	0,32	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
DIKP z OS	43,20	36,10	41,16	41,75	39,99	40,51	40,34	38,38	34,06	32,40
DSKZ z OS	36,99	31,00	34,28	33,31	28,78	29,68	29,58	25,11	19,81	18,11
Obrat aktív	1,00	1,01	0,94	0,94	0,94	0,88	0,79	0,95	0,96	0,94

Celková ZA	62,13	62,50	63,74	65,37	64,03	63,59	58,66	62,00	58,51	56,01
Dlhodobá ZA	0,07	0,05	0,08	0,05	0,04	0,02	0,00	0,01	0,01	0,00
Úrokové krytie	5,90	3,94	1,31	1,93	2,00	1,74	1,98	21,22	43,38	49,19
Tokové zadĺženie	10,46	11,16	19,66	17,89	18,16	22,75	20,88	12,56	10,33	9,00
ROE	3,67	2,34	0,00	0,12	0,11	0,00	0,00	4,31	7,22	7,43
ROS prevádzková	2,70	2,10	0,89	1,18	1,07	0,91	1,02	3,82	4,75	4,97
Podiel NVH v T	2,36	1,79	0,64	0,98	0,94	0,84	1,03	4,02	4,99	5,06
Podiel PH v T	17,63	16,52	14,76	14,51	13,90	13,11	12,64	19,32	20,89	21,94

Source: *vlastné spracovanie na základe údajov z databázy CRiBis.sk Univerzálny register*

Vysvetlivky: DIKPzOS – doba inkasa krátkodobých pohľadávok z obchodného styku, DSKZOS – doba splatnosti krátkodobých záväzkov z obchodného styku, ZA – zadĺženosť aktív, PRT- prevádzková rentabilita tržieb, NVH – novovytvorená hodnota, T – tržby, PH – pridaná hodnota, zvýraznené bunky – obsahujú priaznivejšie hodnoty v porovnaní s rokom 2007

Na základe konfrontácie údajov z tabuľky 1 a 2 môžeme uviesť nasledovné fakty. Pokles HDP v krajinách európskej 28 sa začína objavovať už v roku 2008. Najslabším rokom z pohľadu výkonnosti týchto ekonomík bol rok 2009 a rok 2010 sa už stal zlomovým. Ekonomika vo väčšine krajín (s výnimkou Grécka, Chorvátska, Lotyšska a Rumunska) začala napredovať pozitívnym smerom, no žiaľ nie bez problémov. V rokoch 2012, 2013 krajiny znovu zápasili s útlmom svojho národného hospodárstva a niektoré zaznamenali až prepád výkonnosti. K rozsiahlejšiemu ukludneniu situácie v EÚ došlo až od roku 2014. Slovensko môžeme zaradiť medzi úspešnejšie krajiny EÚ, pretože výkonnosť našej ekonomiky pravidelne stúpa až do dnes (hoci rovnako s kolísavou intenzitou). V zhode s vyššie popisovaným trendom HDP sa vyvíjali aj finančné ukazovatele slovenských podnikov. Už v roku 2010 sa niektoré hodnoty ukazovateľov začali zlepšovať, no na úroveň z predkrízového obdobia, prípadne ešte priaznivejšiu sa čiastočne dostali až v roku 2011 (pozri zvýraznené bunky v tabuľke 2) a väčšina z nich až po roku 2014. Ako môžeme celkovo vnímať finančnú situáciu mediánového slovenského podniku za vybrané obdobie? Mediánový podnik bol po celú dobu prekapitalizovaný. Typické podniky majú efektívne riadené svoje skladové hospodárstvo, pretože zásoby skoro vôbec nedržia na sklade. To nás vedie k úvahe, že rezervy na úhradu krátkodobých záväzkov majú pravdepodobne prevažne v podobe krátkodobých pohľadávok. Inkaso krátkodobých pohľadávok ale po celú dobu trvá o niečo dlhšie ako je splatnosť krátkodobých záväzkov. Pre podniky je výhodnejšia opačná pozícia, no našťastie nie je tento rozdiel v zásade dramatický. Na čo treba upozorniť je skutočnosť, že využitie celého majetku dodnes nedosahuje úroveň z predkrízového obdobia. Mediánové podniky vykazujú nižšiu obrátkovosť aktív. Druhé upozornenie súvisí so zadĺženosťou podnikov a schopnosťou splatiť tieto dlhy. Hoci ich celková zadĺženosť nikdy neprekročila prijateľnú hranicu, deklarované splácanie dlhov je neúmerne dlhé napriek tomu, že drvivá väčšina dlhov má krátkodobý charakter. Takýto nepriaznivý stav najviac súvisí s rentabilitou mediánových podnikov. Vlastníci mohli byť spokojnejší so zhodnotením svojich vkladov až od roku 2014. V krízovom období sa javila typická ziskovosť slovenských podnikov dokonca až dramaticky, a to na všetkých stupňoch. Väčšinou z nízkej pridanej hodnoty zostávala podnikom len zanedbateľná novovytvorená hodnota, čo sťažovalo dosahovanie zisku. Konečný finančný efekt pre vlastníkov od roku 2014 mierne navyšovalo výhodnejšie financovanie, o ktorom svedčí pri danom rozsahu dlhov i veľmi slušné finančné krytie úrokov. Vyššie úrokové krytie od roku 2014 ešte pravdepodobne môžeme spojiť so širším rozsahom používania neúročených cudzích zdrojov.

Pri skúmaní výkonnosti najvýznamnejších odvetví sme sa sústredili prevažne na hodnotenie variability finančných ukazovateľov. Overovali sme, či sa variabilita výsledkov

menila zhodne s fázami hospodárskeho cyklu. Testovaním finančných ukazovateľov sme sa snažili identifikovať tie z nich, ktoré najviac a naopak najmenej rozdeľujú slovenské podniky. Najskôr sme z databázy CRiBiS vybrali odvetvové finančné výsledky za obdobie 2008 – 2016, teda medián, dolný a horný kvartil odvetvia. Potom sme vyčíslili kvartilové rozpätie, priemernú kvartilovú odchýlku a relatívnu mieru variability finančných ukazovateľov. Zvolili sme si stupnicu členenia relatívnych odchýlok podľa veľkosti (pozri tabuľku 3), čo nám umožnilo identifikovať ukazovatele najmenej a najviac rozdeľujúce podniky vybraných odvetví. Nakoniec sme pomocou korelačnej analýzy zisťovali pevnosť vzťahu medzi vývojom variability finančných ukazovateľov najvýznamnejších odvetví (A – poľnohospodárstvo, lesníctvo a rybolov, C – priemyselná výroba, F – stavebníctvo, J – informácie a komunikácia, K – finančné a poisťovacie činnosti, L – činnosti v oblasti nehnuteľností) a HDP.

Table 3: Stupnice variability

Relatívna miera variability	Hodnotenie variability	Relatívna miera variability	Hodnotenie variability
0,0 - 0,4	zanedbateľná	1,2 – 1,6	veľká
0,4 - 0,8	malá	1,6 – 1,9	veľmi veľká
0,8 – 1,2	stredná	1,9 - ...	extrémne veľká

Source: vlastné spracovanie

Tabuľka 4 obsahuje prehľad odvetvových finančných ukazovateľov, u ktorých bola kvantifikovaná relatívna miera variability maximálne 0,8, teda podľa tabuľky 3 spadala do pásiem zanedbateľná a malá. Bunky, v ktorých nie je uvedený žiaden ukazovateľ naznačujú, že v danom odvetví a období mali všetky relatívne miery variability vyššiu hodnotu ako bola vymedzená.

Table 4: Prehľad ukazovateľov najmenej rozdeľujúcich odvetvové podniky

Odvetvie	2008	2009	2010	2011	2012	2013	2014	2015	2016
A	CZA= 0,57	CZA=0,55	CZA=0,65	CZA=0,68	x	x	CZA=0,74	CZA=0,79	CZA=0,77
C	CZA=0,46, PH/T=0,68 OA=0,71	CZA=0,47, OA=0,74, PH/T=0,78	CZA=0,46, OA=0,75, PH/T=0,79	CZA=0,48 OA=0,74	CZA=0,51 OA=0,79	CZA=0,58	CZA=0,55, OA=0,74, PH/T=0,75	CZA=0,56 OA=0,75, PH/T=0,7	CZA=0,57 OA=0,72, PH/T=0,73
F	CZA=0,48	CZA=0,52	CZA=0,50	CZA=0,50	CZA=0,64	CZA=0,57	CZA=0,55, OA=0,74, PH/T=0,75	CZA=0,57	CZA=0,60
J	CZA=0,76	x	CZA=0,76	CZA=0,80	x	x	CZA=0,79, OA=0,78	OA=0,78	OA=0,75
K	CZA=0,74	CZA=0,76	CZA=0,79	x	x	x	CZA=0,75	x	x
L	CZA=0,66	CZA=0,63	CZA=0,58	CZA=0,61	CZA=0,60	CZA=0,65	CZA=0,55, O	CZA=0,60	CZA=0,60

Source: vlastné spracovanie

Vysvetlivky: CZA – celková zadlženosť aktív, OA – obrat aktív, PH – pridaná hodnota, T – tržby

Vidíme, že väčšinou ide o celkovú zadlženosť aktív, ktorá najmenej rozdeľuje prvú ¼ podnikov (podnikov s najnižšími výsledkami) od poslednej ¼ podnikov (podnikov s najvyššími výsledkami). Jedine v priemyselnej výrobe (C) majú podniky ešte podobné využitie majetku (obrat aktív) a pomerne vyrovnanú schopnosť tvoriť pridanú hodnotu (podiel pridanej hodnoty v tržbách). Takáto vyššia zhoda v 3 ukazovateľoch sa dosiahla i v stavebníctve (F), ale iba v roku 2014. Protipól, ukazovatele najviac rozdeľujúce odvetvové podniky, sme identifikovali na základe hodnoty relatívnej miery variability, ktorá podľa tabuľky 3 zodpovedá extrémne veľkej miere. Tabuľka 5 obsahuje zoznam daných ukazovateľov za každé sledované odvetvie a roky 2008 až 2016. Môžeme konštatovať, že v zozname najviac rozdeľujúcich ukazovateľov sa všade vyskytujú ukazovatele rentability

s výnimkou podielu pridanej hodnoty v tržbách (PH/T). Takmer všetky ukazovatele sú neporovnateľné v odvetviach (K) finančné a poisťovacie činnosti a (L) činnosti v oblasti nehnuteľností, čo sa javí ako akési ich špecifikum. Splatnosť krátkodobých záväzkov z obchodného styku zasäva viac rozdeľuje poľnohospodárske podniky a podniky patriace do odvetvia (J) informácie a komunikácia. Výraznejšie iná doba obratu zásob je charakteristická pre priemyselnú výrobu. U poľnohospodárskych podnikov sa tento fenomén vyskytoval iba v rokoch 2010 až 2013. V tabuľke chýba dlhodobá zadlženosť aktív a tokové zadlženie, pretože v zdrojových podkladoch tieto údaje absentovali vo väčšine odvetví. Môžeme však potvrdiť, že ak boli k dispozícii, tak patrili do skupiny ukazovateľov s najvyššou variabilitou.

Table 5: Prehľad ukazovateľov najviac rozdeľujúcich odvetvové podniky

	2008	2009	2010	2011	2012	2013	2014	2015	2016
A	rentabilita okrem PH/T	rentabilita okrem PH/T	DOZ rentabilita okrem PH/T	DOZ rentabilita okrem PH/T L2	DOZ rentabilita okrem PH/T L2 ,L3 DSKZzOS	DOZ rentabilita, L2 ,L3 DSKZzOS	rentabilita okrem PH/T DSKZzOS	rentabilita okrem PH/T DSKZzOS	rentabilita okrem PH/T DSKZzOS
C	rentabilita okrem PH/T	rentabilita okrem PH/T	rentabilita okrem PH/T DOZ	rentabilita okrem PH/T DOZ	rentabilita okrem PH/T DOZ	rentabilita okrem PH/T DOZ	rentabilita okrem PH/T DOZ	rentabilita okrem PH/T DOZ	rentabilita okrem PH/T DOZ
F	rentabilita okrem PH/T	rentabilita okrem PH/T DOZ	rentabilita okrem PH/T	rentabilita okrem PH/T	rentabilita okrem PH/T	L2,3 rentabilita okrem PH/T	DSZ rentabilita okrem PH/T	rentabilita okrem PH/T	rentabilita okrem PH/T
J	DSKZzOS rentabilita okrem PH/T	DSKZzOS rentabilita okrem PH/T	DSKZzOS rentabilita okrem PH/T	DSKZzOS rentabilita okrem PH/T	DSKZzOS rentabilita okrem PH/T L2	DSKZzOS rentabilita okrem PH/T, L2,3	DSKZzOS	DSKZzOS	DSKZzOS
K	všetky okrem CZA	všetky okrem CZA, L3	všetky okrem CZA, L2,3	všetky okrem CZA	všetky okrem CZA	všetky okrem CZA	všetky okrem CZA, L2,3	všetky okrem CZA, OA, L2,3	všetky okrem CZA, OA, L2,3, ROE,ROA DSKPzOS
L	všetky okrem CZA	všetky okrem CZA	všetky okrem CZA	všetky okrem CZA	všetky okrem CZA	všetky okrem CZA	všetky okrem CZA, PH/T	všetky okrem CZA, PH/T	všetky okrem CZA, PH/T

Source: vlastné spracovanie

Vysvetlivky: DOZ – doba obratu zásob, L2,3 – likvidita 2. a 3. stupňa DSZ – doba splatnosti záväzkov, CZA – celková zadlženosť aktív

Výsledky nášho výskumu uzatvárajú korelačná a regresná analýza, ktorými sme zisťovali, či existuje závislosť medzi vývojom variability finančných ukazovateľov a odvetvovým HDP. Závislá premenná Y (vysvetľovaná) je variabilita finančných ukazovateľov a nezávislá premenná X (vysvetľujúca) je HDP. Za každé odvetvie boli spracované ukazovatele s výnimkou tých, ktoré dosahovali nulovú hodnotu. Tabuľka č. 6 zobrazuje výsledky týkajúce sa korelačnej analýzy. Hodnota Multiple R (korelačný koeficient) je zobrazená pre každé odvetvie a to v prípade, kedy dosahuje najnižšiu hodnotu a kedy najvyššiu. Táto hodnota čím je bližšie k 1, tým je závislosť silnejšia.

Vysoký korelačný koeficient figuruje pri ukazovateľoch: PRT - prevádzková rentabilita tržieb (odvetvie C), OA (odvetvie K), DSKZ z OS (odvetvie L). Naopak, najnižšiu hodnotu vykazujú ukazovatele: L2 (odvetvie A), OA (odvetvie C, F, J), L3 (odvetvie K). Hodnoty pohybujúce sa okolo 0 značia, že ide veľmi slabý vzťah a teda slabú lineárnu závislosť. Hodnota R Square je hodnota koeficientu determinácie, Adjusted R-square (upravený

koeficient determinácie) zohľadňuje aj počet odhadovaných parametrov a počet meraní. Standard Error (chyba strednej hodnoty) by mala byť čo najmenšia.

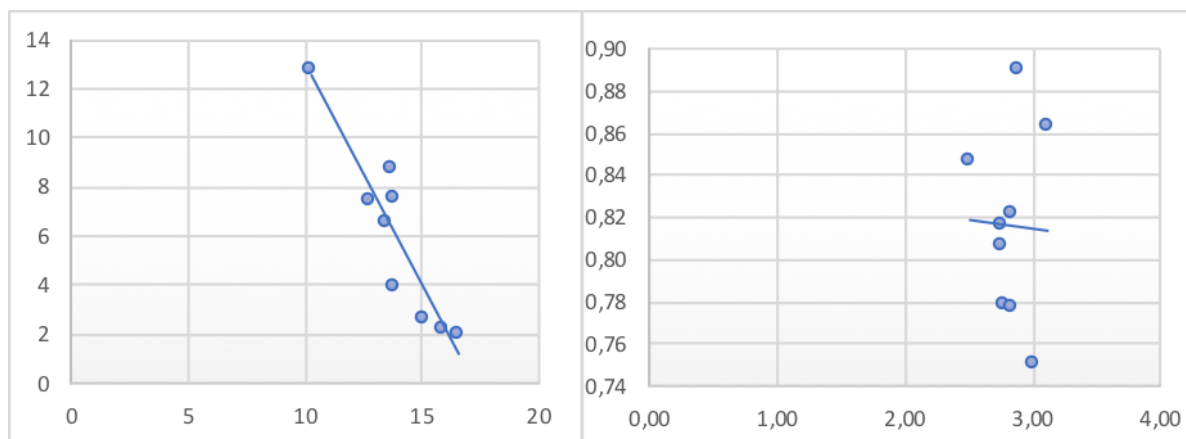
Table 6: Regresná a korelačná analýza odvetvových ukazovateľov a HDP

Odvetvie	Regression Statistics											
	A		C		F		J		K		L	
	L2	OA	OA	PRT	OA	CZA	OA	CZA	L3	OA	DSKP z OS	DSKZ z OS
Multiple R	0,15	0,77	0,13	0,92	0,06	0,49	0,03	0,58	0,08	0,81	0,34	0,91
R Square	0,02	0,59	0,02	0,85	0,00	0,24	0,00	0,33	0,00	0,66	0,12	0,83
Adjusted R Square	-0,12	0,54	-0,12	0,83	-0,14	0,13	-0,14	0,24	-0,14	0,61	-0,01	0,80
Standard Error	0,59	0,04	0,04	1,49	0,08	0,05	0,05	0,04	0,59	0,29	0,32	0,14

Source: vlastné spracovanie

Pre grafické zobrazenie sme si vybrali ukazovatele s krajnou najvyššou a najnižšou hodnotou, teda OA (odvetvie J), kde korelačný koeficient dosahuje hodnotu blízku nule a ukazovateľ PRT (odvetvie C), ktorý naopak, dosahuje hodnoty blízko 1, čiže ide o veľmi silný vzájomný vzťah.

Figure 1: Regresná a korelačná analýza OA a PRT s HDP



Source: vlastné spracovanie

4. Conclusion

Globalizačný efekt a prepojenie ekonomík sa naplno prejavil v nami sledovaných ukazovateľoch, pretože trend zmeny HDP Slovenska bol rovnaký ako v prípade krajín EÚ 28. Tento trend sa automaticky prenáša do pomerových finančných ukazovateľov. Výskumom odvetvových výsledkov sa preukázala pomerne značná variabilita finančných ukazovateľov. V príspevku prezentujeme analýzou potvrdené ukazovatele najviac a najmenej rozdeľujúce prvú a poslednú štvrtinu odvetvových podnikov. Korelačnou a regresnou analýzou sme nakoniec zistili, že tesná väzba medzi variabilitou finančných ukazovateľov a HDP existuje len v malej skupine ukazovateľov.

Acknowledgment

Tento príspevok je čiastkovým riešením projektu VEGA MŠ SR č. 1/0066/17 „*Manažment finančnej výkonnosti podniku v post-krízovom prostredí vybraných krajín EÚ*“ vo výške 100%.

References

- [1] CRiBiS (2018). [Online]. Available: <https://www2.cribis.sk/Home.aspx>
- [2] Dobrescu, E. M. (2014). Theories Regarding the Role of the Growth Poles in the Economic Integration. *Procedia Economics and Finance*, vol. 8, pp. 262-267.
- [3] Eden, L. and Lenway, S. (2001). Introduction to the Symposium Multinational: The Janus Face of Globalization. *Journal of International Business Studies*, vol. 32, no. 3, pp. 383-400.
- [4] Eurostat (2018). [Online]. Available: <https://ec.europa.eu/eurostat/data/database>
- [5] European Commission (2017). [Online]. Available: https://ec.europa.eu/commission/sites/beta-political/files/reflection-paper-globalisation_sk.pdf
- [6] European Commission (2006). [Online]. Available: http://ec.europa.eu/economy_finance/publications/pages/publication_summary678_en.htm
- [7] Gurgul, H., and Lach, L. (2014). Globalization and economic growth: Evidence from two decades of transition in CEE. *Economic Modelling*, vol. 36, pp. 99-107.
- [8] Chang, C. P. and Lee, C. C. (2011). The effect of globalization and political party on economic growth: Panel data analysis of former communist countries and European OECD members. *Eastern European Economics*, vol. 49, no. 6, pp. 5-26.
- [9] Kramarova, K., and Valaskova, K. (2015). Globalization and transfer pricing: Brief analysis of the legislation in the Slovak republic. *Proceedings of the 15th International Scientific Conference on Globalization and its Socio-Economic Consequences*, Rajcke Teplice, Slovakia, pp. 353-361.
- [10] Mastalerz-Kodzis, A. and Pospiech, E. (2016). Socio-economic consequences of globalization – spatial analysis of economic characteristics in European Union countries. *16th International Scientific Conference on Globalization and its Socio-Economic Consequences*, Rajcke Teplice, Slovak Republic, pp. 1313-1321.
- [11] Mohaghegh, A. (2016). Move Toward Economic Globalization with a Scientist. *Procedia Economics and Finance*, vol. 36, pp. 467-479.
- [12] Suntsova, O. (2012). Macroeconomic stability diagnostics for national economy as the factor of crisis signs prevention. *Actual problems of economics*, no. 127, pp. 44-57.
- [13] Rao, B. B. and Vadlamannati, K. C. (2011). Globalization and growth in the low income African countries with the extreme bounds analysis. *Economic Modelling*, vol. 28, no. 3, pp. 795-805.
- [14] Surugiu, M.R. and Surugiu, C. (2015). International trade, globalization and economic interdependence between European countries: Implications for businesses and marketing framework. *Procedia Economics and Finance*, vol. 32 pp. 131 – 138.
- [15] Thomassen, Ø., Smith, H., Seiler, S. and Schiraldi, P. (2017). Multi-category competition and market power: A model of supermarket pricing. *American Economic Review*, vol. 107, pp. 2308-2351.

INTERNATIONAL PERCEPTION OF THE COSTS OF EQUITY ESTIMATION

Katarina Valaskova^{1,a,*}, Vladimir Bakes^{2,b}

^{1,2}University of Zilina, Faculty of Operation and Economics of Transport and Communications,
Univerzina 1, 010 26 Zilina, Slovakia

^akatarina.valaskova@fpedas.uniza.sk, ^bbakes@kpas.sk

*Corresponding author

Abstract. Costs of capital are an important business and financial instrument. They represent the expected rate of return required by the market to obtain required funds for an investment. The most complicated component of calculating the costs of capital is the equity component. We recognize three basic groups of approaches assessing the cost of equity, based on dividends, free cash flows and revenues. In practice, however, we mostly evaluate costs of equity for a limited time horizon, which brings a number of problems. The purpose of the contribution is to determine the valuation method of the costs of equity in a transnational environment, which may be characterized as pro forma accounting methods with different rules for the identification of revenues; their essential features are given within a particular structure. In an economic practice, there are several models and method used to quantify the costs of equity. Thus, the main aim of the paper is to depict the most appropriate evaluation method as a result of the comparative analysis of the methods of the costs of equity estimation (using present and past market information), considering specific business environment in the context of its international perception.

Keywords: cost of capital, cost of equity, cost of equity calculation

JEL Classification: G17, G32, F60

1. Introduction

The overall perception of the structure of capital resources and thus of the way of financing is an important aspect of the financial management. Especially, debt ratios determine not only the capital structure of the company and its indebtedness, but also the ability to repay the debt. The use of debt is necessary because it increases the return on equity, which is more expensive than debt (tax shield), but the use of debt in the long-term horizon poses a risk of disproportionate indebtedness and inability to repay obligations to creditors, which threatens the financial stability of the company. Costs of capital are an important commercial and financial instrument (Mokhova et al., 2018). They represent the expected rate of return required by the market to obtain funds for an investment (Pratt, 2002). Considering economic conditions, the cost of capital represents an opportunity cost - the cost we forfeit with the next best alternative investment. In this sense, it recalls the economic principle of substitution, and therefore, an investor does not invest in the asset if there is a more attractive substitute. The market requires a certain set of investors, the responsible adepts to realize an investment.

In the literature, there are many definitions of the cost of capital. Jindrichovska & Blaha (2001, p. 284) argue that the cost of capital is the cost of the corporate financing. They create

an imaginary boundary that determines the smallest permissible yield of each investment. They are determined by the composition of the corporate financial resources and their desired earnings for investors. The financial structure of the enterprise depends on the composition of financial sources. It determines the financial flexibility and investment opportunities of new projects. Fernandez (2002, p. 472) states that the cost of capital is the cost to be paid by an enterprise for the acquisition of the various forms of capital needed to finance the investment. We can also define them as the required rate of return that investors anticipate when they invest money into the enterprise. Costs of capital are then determined by the capital market and are closely related to the degree of risk the investor bears by investing (Larocque, et al., 2018). Damodaran (2009) indicates that costs of capital represent combined financing costs, reflecting the costs of debt and equity and their relative weights in the financial structure. Costs of capital relate to equity and debt investment sources. According to Damodaran (2000, p. 182), the cost of equity represents the rate of return that an investor expects when investing into an enterprise. Copeland et al. (2000, p. 201) argue that both creditors and shareholders expect some compensation for the opportunity costs of investing their funds in a corporate investment instead of investing in another investment with the same risk level. Most of the information needed to estimate the cost of capital of an enterprise, a security or an investment project comes from investment markets. Cost of capital always represent an expected return (Kaufman, 1999, p. 3). According to Ibbotson Associates (2013), the opportunity cost of capital equals the return we would get by an alternative investment accepting a specific level of risk. In other words, we can say that this is the competitive return of a comparable investment available on the market, where risk is the most important comparative attribute.

2. Methodology

The basic scientific methods of analysis, synthesis, induction, deduction and abstraction were used to fulfil the main aim of the paper- to depict the most appropriate evaluation method as a result of the comparative analysis of the methods of the costs of equity estimation. The most complicated component of the weighted average cost of capital calculation is just the equity component. We recognize three basic groups of approaches to evaluate the cost of equity; approach based on dividends, revenues and on free cash flows. All of these approaches are equivalent when considering revenue flowing to infinity. In practice, however, we mostly evaluate costs in a limited time horizon, which brings several problems. Valuation method can also be characterized as pro forma accounting methods with different rules to identify revenues (rewards, benefits) and their essential features are given within a particular structure behaving as a general accounting model (Penman & Sougiannis, 1996). In Anglo-Saxon countries, a concept based on capital market theory has been used to identify the cost of equity. In our conditions, the most commonly used model is the Capital Asset Pricing Model (CAPM). However, there are several methods used to estimate the cost of equity. Primarily there are two methods using market data (Arnold, 2008): i) single-factor or multi-factor approaches (build-up model, CAPM model); ii) discounted cash flow (single or multi stage discount models). Other commonly used models of the cost of equity quantification include the model of discounted dividends, risk analysis or an expert model of the cost of equity determination (Bartosova, 2005).

3. Results and discussion

The Capital Asset Pricing Model (CAPM) is the most used method of the cost of equity estimation, especially in Anglo-Saxon countries. According to the CAPM model, the expected turnover of an asset equals to the sum of the risk-free rate and the risk premium, with the risk premium being equal to the product of the expected systematic risk of a given asset related to the market portfolio and the expected risk premium of the market portfolio (Bartholdy & Peare, 2005, p. 411). The CAPM model is a part of the economic theory known as the capital market theory. The basic assumption of the CAPM model is that the portion of the risk premium of the expected return of the security is a function of the systemic risk of that security (Fama & French, 2004). The reason is that capital market theory assumes that the investor holds securities in a diversified portfolio and does not require compensation for a non-systematic risk, as they can easily diversify it. Thus, the only risk associated with the theory of asset pricing is a systematic risk (Brealey & Myers, 1992). Pratt (2002) states that financial analysts for more than 30 years preferred the CAPM model to estimate the cost of equity. Despite the criticism of the model, especially the necessary assumptions of the CAPM model, it remains the most widely used model to estimate the cost of equity. Therefore, to use the CAPM model, we need to know the expected risk-free interest rate, the expected capital market risk premium and the expected value of beta coefficient (Marik & Marikova, 2005).

To calculate the cost of equity using the CAPM model, we use the formula

$$C_E = R_f + \beta(R_M - R_f) \quad (1)$$

Even though not all assumptions can be met in real terms, the CAPM model allows a rational estimate of the cost of capital.

The fundamental principle of the *build-up model* is that a risk premium is added the risk-free interest rate. The risk premium is formed either as a whole depending on the corporate characteristics or as a sum of the sub-items. Premiums are based on the market risk assessment, industry risks, production risks, degree of diversification, degree of cost flexibility, financial risks, management risks, organizational structure, and others. A typical build-up model for the cost of equity estimation consists of risk-free interest rate and risk premium including several subcomponents – a market risk premium, a size risk premium (risk and the associated capital cost increase with the size of the enterprise, a company-specific risk premium. In international investing, there may also be a country-specific risk premium, reflecting uncertainties owing to economic and political instability in the particular country. With regard to the use of the weighted average cost of capital in other countries, the risk-free interest rate and the risk premium of the specific country should be considered. It is probably a mistake to use the risk-free interest rate of one country to calculate the cost of capital of another country, however, the risk premium of small countries can only be identified with difficulties (Lambert et al., 2012).

To calculate the cost of capital by the build-up model, the following equation is used:

$$E(R_i) = R_f + RP_M + RP_s + RP_u (\pm RP) \quad (2)$$

²¹ Note: C_E cost of equity, R_f risk-free interest rate, β beta coefficient, R_M capital market rate of return, $R_M - R_f$ risk premium of the capital market

The *dividend model* is one of the other ways of determining the calculated interest rate. It is used for stock valuation. The main idea of this model is that the corporate value is estimated by discounting the expected future flow of dividend payments from equity (Ogier, 2004). Earning of the share is given by the expected dividends in each year and the selling price of the share. The present value of the earnings per share is then :

$$PV = \sum_{t=1}^n \frac{D_t}{(1+i)^t} + \frac{P_n}{(1+i)^n} \quad (3)$$

If the shares are hold for too long, the sale price moves beyond the considered time horizon and its present value is minimal. In addition, each sale price is again determined primarily by the flow of expected future dividends. The theoretical infinite holding of a share is then given only by the present value of the expected dividends. If we assume that the next year we will have a dividend value D_1 , and in the following years, it will grow at a rate g , we may change the equation to calculate the value of share:

$$SH = \frac{D_1}{1+i} + \frac{D_1(1+g)}{(1+i)^2} + \dots + \frac{D_1(1+g)^{n-1}}{(1+i)^n} \quad (4)$$

If we can estimate the dividend per share for the next year, the market demanded return on shares and the growth rate of dividends in subsequent years, then we can calculate the value of a share. Similarly, we can estimate the equity of an enterprise.

Both the build-up model and the CAPM model use risk-free interest rates in the calculations and one or more other factors taking into account the investment risk. The *discounted cash flow (DCF) method*, however, is completely different and far simpler. An important assumption of the DCF method is that the current price of securities of publicly traded enterprise represents market expectations of return on investment (Pratt, 2002, p. 110). In other words, the present price of securities is the sum of the present values of expected future earnings of an investor. It means that the current price of a security equals to the expected future returns discounted to the present value at the discount rate, which is the cost of equity of an enterprise. The DCF method used to estimate the cost of equity is based on the general relationship for the calculation of the DCF:

$$PV = \frac{NCF(1+g)}{k-g} \quad (5)$$

However, the variable present value is known and we calculate the value of the cost of equity (k). The relation between the DCF business valuation method and the DCF method to estimate cost of capital is given by what is considered to be known, i.e. unknown variable. If this method is used for enterprise, division or project evaluation, the cost of capital is estimated and the equation has only one unknown variable, which is the present value. If we use the method to estimate the cost of capital, the present value is known and used in the

²² Note: $E(R_i)$ expected rate of return on security i ; R_f rate of return on a risk-free security; RP_M market risk premium; RP_S size risk premium; RP_u risk premium of the specific country; RP risk premium of industry (used in modified alternative of the build-up model)

²³ Note: PV present value; i required earning per share; D_t dividend in each year; P_n expected selling price; n number of years

²⁴ Note: PV present value; NCF net cash flow; k discount rate (cost of capital); g expected long-term growth rate

equation to compute the discount rate (cost of capital). When applying the DCF methods to estimate the cost of capital, two types of models are used to estimate the expected rate of return; single-stage and multistage models. All methods of the cost of capital estimation consider all or part of the expected interest rate from current capital market data. Accepting possible adjustments for private businesses, the DCF method deducts all expected returns from current market data combined with the growth expectations.

The concept of arbitrage pricing theory (APT model) was introduced by Ross in 1976. Compared to the CAPM model, it is a multi-variable model, as it distinguishes several risk factors, not just one - systematic - as is the case of the CAPM model. Young and Saadi (2011) claim that the CAPM model and the APT model are mutually compatible, it can even be argued that the beta coefficient of the CAPM model implicitly reflects the information included in each factor of the APT model. Despite the fact that the use of the APT model is rather limited, many prefer it as it is rich in information and has a relatively high explanatory and predictive power. The essence of the APT model is a multiple regression (the CAPM model uses simple regression). In this model, the cost of capital of the investment varies depending on the sensitivity of the various risk factors. The model does not precisely specify the risk factors; it only considers macroeconomic risk factors that can affect the corporate profitability. The econometric estimation of the APT model with multiple risk factors yields this formula:

$$E(R_i) = R_f + (B_{i1}K_1) + (B_{i2}K_2) + \dots + (B_{in}K_n) \quad (6)$$

Practical research has shown that the cost of equity estimated by the APT model tend to be higher for some industries (e.g. oil) than capital costs estimated by the CAPM model. The multivariate APT model explains the expected rate of return better than the univariate CAPM model (Copeland et al., 2000, p. 217). However, the CAPM model is used much more frequently in practice, because of the poor specification of variables in the ATP model and the difficulty of determining the correct statistical relation between individual corporate revenues and macroeconomic factors.

In practice, there are many other models and methods to quantify the cost of equity, considering the international background of the issue (see Sharma, 2018; Aggarwal et al. 2018 and Larson & Resutek, 2017).

Authors of *the Copeland model* (Copeland et al., 2000) have some doubts whether the country risk premium, as a margin to the premium in the US, is necessary in emerging countries. However, if we want to use it, they recommend the following procedure (Marik, Marikova, 2005): (1) The use of a ten-year bond of the country denominated in dollars and with yield determination; (2) Estimation of the difference between the rate of return of a state bond and the rate of return of the US bond; (3) Authors of this model think that cost of equity should not involve the credit risk, as the investor always bears the risk. Therefore, the total premium should be excluded from the rate of return difference Δ . The problem, however, is how to exclude only the credit risk from the total premium. Its size can be estimated according to the rating of the country, comparing the rate of return of the US corporate bonds with the rating of the country A and the rate of return of the US state bonds with the same maturity.

²⁵ Note: $E(R_i)$ expected rate of return of a security; R_f rate of return on a risk-free security; $K_1 \dots K_n$ risk premium associated with factor K for the average asset in the market; $B_{i1} \dots B_{in}$ sensitivity of security i to each risk factor relative to the market average sensitivity to that factor

The detected difference is denoted Δ_u . Subtracting the impact of the credit risk Δ_u on the difference in rate of returns Δ , we obtain a net premium to the US equity premium. We then have to adjust the premium of the difference between the expected inflation in the US and in the country A:

$$RP_A = RP_{USA} + \Delta - \Delta_u + (\text{inflation country A} - \text{inflation US}) \quad (7)$$

Model of Damodaran (2006) is considered the simplest model of setting a risk premium for national markets. It is calculated from American data, adjusted by the risk range of the country. First of all, it is necessary to know the rating of the target country (Moody's or Standard & Poor's) and project it into a risk premium - the risk of a country failure. The risk of the country failure is, according to some authors, only a statement of the subjective view of the creditor, different from that of the shareholder (owner), which should be decisive for our needs when estimating the country risk premium (Rahman & Rajib, 2018). Marik and Marikova (2005, p. 75) propose an adjustment of the country default risk using the ratio of two variables - volatility of the stock market and volatility of the government bond of the country. In conditions of the central European countries, it is challenging to obtain the current volatility of security market and bond market volatility, the denominator in the formula is replaced by a coefficient of 1.5 (Damodaran, 2009). We then calculate the cost of equity using the equation

$$c_E = R_{f(USA)} + \beta \cdot RPM_{(USA)} + RPC^{26} \quad (8)$$

This equation may be supplemented with additional premiums, e.g. size premium, premium for enterprises with unhealthy future characterized by a high market share and book value of equity, or premium for lower tradability of valued equity.

Authors Fama and French (2004, p. 25-46) modified the original single-factor CAPM model by two other factors. Thus, except the covariance with the market, the model uses two other factors: (1) business size factor - small enterprises on the capital market show higher average rate of return of securities than large corporations. The reason is higher risk of small enterprises, which is not reflected in the size of the beta factor adequately, and that this trading is associated with higher costs, which is reflected in larger bid-ask spreads; (2) financial risk factor, distinguishing accounting and market values. The authors found that the trend to higher rate of return also indicates higher ratio of accounting and market value. They explain that investing in businesses with a less favourable ratio of accounting and market value is associated with higher risk, as the growth of this ratio may signal worse financial management.

Another possibility to calculate the cost of equity is based on the assumption that the rate of return on equity in the long-time horizon approximates to the rate of return on equity expected by investors (shareholders). Then we can use an average return on equity (ROE) to quantify the cost of equity. However, this possibility of calculation is very limited in Slovak conditions, because Slovak enterprises achieve a low level of return on equity, which lags behind the rate of return expected by investors.

²⁶ Note: C_E cost of equity; R_f rate of return of risk-free assets (state bonds in the US); β sectoral beta coefficient of developed countries; RPM risk premium of the US capital market; RPC country risk premium

4. Conclusion

The cost of equity is a parameter with a significant impact on the overall corporate value. In valuation practice of the central European countries, there is some consensus in using the CAPM model to determine the cost of equity. In the case of small and medium-sized enterprises, the owners do not have any possibility to diversify their investments; if there is any possibility it is very limited due to the formation and preconditions of the model. One of the basic preconditions is the dependence of the asset return on the size of the risk; taking only the systemic risk into account, it is possible to commit errors with a significant impact on the final value of these enterprises. The aim of the paper was to approach the possibilities of estimating the cost of equity using the methods of valuation of small and medium-sized enterprises in the international context. The prospective possibility of deducting cost of equity is the use of the CML capital market model. This approach can also be a guideline to incorporate or evaluate possible alternative financial plans, i.e. flexibility of an enterprise, which is a positive value-factor. Nowadays, modern financial economists have to state (based on empirical studies and theoretical doubts) that there is no universally valid theory of the corporate capital structure. The validity of any existing theory is conditional on the fulfilment of conditions. For this reason, an enterprise cannot accept a decision on the capital structure based on a single criterion, but an optimal amount of debt must be decided on the analysis of all the key factors affecting the enterprise and its capital structure.

Acknowledgment

The contribution is an output of the scientific project VEGA 1/0428/17 Creation of new paradigms of financial management at the threshold of the 21st century in the conditions of the Slovak Republic.

References

- [1] Aggarwal, R., Mishra, D. and Wilson, C. (2018). Analyst recommendations and the implied cost of equity. *Review of quantitative Finance and Accounting*, vol. 50, no. 3, pp. 717-743.
- [2] Arnold, G. (2008). *Corporate financial management*. Harlow: Prentice Hall, 2008.
- [3] Bartholdy, J. and Peare, P. (2005). Estimation of Expected return: CAPM vs. Fama and French. *International Review of Financial Analysis*, vol. 14, no. 4, pp. 407-427.
- [4] Bartosova, V. (2005). *Optimalizácia finančnej štruktúry podniku*. Žilina : EDIS.
- [5] Brealey, R. A. and Myers, S. C. (1992). *Teorie a praxe firemních financí*. Praha: Victoria Publishing.
- [6] Copeland, T., Koller, T. and Murrin, J. (2000). *Valuation: Measuring and Managing the Values of Companies*. New York: John Wiley & Sons, Inc.
- [7] Damodaran, A. (2006). *Damodaran on Valuation: Security analysis for investment and corporate finance*. New York: John Wiley & Sons, Inc.
- [8] Damodaran, A. (2000). *Investment Valuation: Tools and Techniques for determining the value of any asset*. New York: John Wiley & Sons, Inc.

- [9] Damodaran, A. (2009). *The Dark Side of Valuation: Valuing Young, Distressed, and Complex Businesses*. New York: FT Press.
- [10] Fama, E.F. and French, K.R. (2004). The capital asset pricing model: theory and evidence. *Journal of Economic Perspectives*, vol. 18, no. 3, pp. 25–46.
- [11] Fernandez, P. (2002). *Valuation Methods and Shareholder Value Creation*. London: Academic Press.
- [12] Ibbotson Associates (2013). *Risk Premia over time report. Estimates for 1926-2012*. Chicago: Morningstar.
- [13] Jindrichovska, I. and Blaha, S. (2001). *Podnikové financie*. Praha: Management Press.
- [14] Kaufman, M. (1999). *Profitability and the cost of Capital*. New York: John Wiley & Sons.
- [15] Lambert, R.A, Leuz, C. and Verrecchia, R.E. (2012). Information asymmetry, information precision, and the cost of capital. *European Financial Review*, vol. 16, no. 1, pp. 1–29.
- [16] Larocque, S., Lawrence, A. and Veenstra, K. (2018). Managers' cost of equity capital estimates: Empirical evidence. *Journal of Accounting, Auditing and Finance*, vol. 33, no. 3, pp. 381-401.
- [17] Larson, C.R. and Resutek, R.J. (2017). Types of investor uncertainty and the cost of equity capital. *Journal of Business Finance & Accounting*, vol. 44, no. 9-10, pp. 1169-1193.
- [18] Marik, M. and Marikova P. (2005). *Moderní metody hodnocení výkonnosti a oceňování podniku*. Praha: Ekopress.
- [19] Mokhova, N., Zinecker, M. and Meluzin, T. (2018). Internal factors influencing the cost of equity capital. *Entrepreneurship and Sustainability Issues*, vol. 5, no. 4, pp. 827-845.
- [20] Ogier, T., Rugman, J. and Spicer, L. (2004). *The Real Cost of Capital*. Harlow: Pearson Education Limited.
- [21] Penman, S. H. and Sougiannis, T. (1996). *A Comparison of Dividend, Cash Flow, and Earnings Approaches to Equity Valuation*. [online]. Available: <http://online.library.wiley.com/doi/10.1111/j.1911-3846.1998.tb00564.x/abstract>.
- [22] Pratt, S. P. (2002). *Cost of Capital: Estimation and Applications*. New Jersey: John Wiley & Sons, Inc.
- [23] Rahman, A. and Rajib, P. (2018). Index revisions, stock liquidity and the cost of equity capital. *Global Business Review*, vol. 19, no. 4, pp. 1072-1089.
- [24] Ross, S.A. (1976). The arbitrage theory of capital asset pricing. *Journal of Economic Theory*, vol. 13, no. 3, pp. 341–360.
- [25] Sharma, M. (2018). New method of determining cost of equity in private equity investments. *Journal of Private Equity*, vol. 2, no. 3, pp. 23-25.
- [26] Young, S.D. and Saadi, S. (2011). Using the capital asset pricing model and arbitrage pricing theory in capital budgeting. *Baker HK*, English P (eds) Capital budgeting valuation.

KEY ASPECTS OF PRICING AND SELECTION OF PRICING STRATEGY IN GLOBAL ENVIRONMENT

Viera Valjaskova^{1,a,*}

¹ University of Zilina, Faculty of Operation and Economics of Transport and Communications,
Department of Economics, Univerzitna 1, 010 26 Zilina, Slovak Republic

^aviera.valjaskova@fpedas.uniza.sk

*Corresponding author

Abstract. As a result of globalization, there are many issues that companies need to address if they want to adapt to the international market environment. One of these is the issue of optimal pricing for products sold abroad. There are many of the same factors, which influence the process of pricing in the domestic and international conditions. However, companies often overlook the factors that need to be considered when creating and selecting a suitable global pricing strategy. Pricing is complicated not only in the domestic but also in foreign countries. Many times, companies are standardizing their global pricing strategies, and the extent of their standardization depends on several factors, such as the level of similarity between domestic and foreign countries, the economic and business environment, cultural differences and so on. The aim of the contribution is therefore to explain the key aspects of pricing and selection of the pricing strategy in the global environment in sense of highlighting the importance of adapting pricing strategies to the conditions of the global environment. In the first part, we are focusing on explaining the nature of pricing and possible pricing strategies in case that the business is only active in one country. Subsequently, the main factors influencing the pricing process under international conditions, international pricing strategies and factors influencing the choice of the strategy, are explained.

Keywords: price, pricing, pricing strategy, globalization

JEL Classification: L11, F60, F69

1. Introduction

Globalization has become an essential factor in the development of international business. Although the global market represents a universal economic space, it does not mean that it is uniform. That is why companies, that are doing business or want to operate internationally or globally, need sophisticated international marketing (Majerova & Klietnik, 2015).

In the current competitive market environment, where there are still less barriers to free trade, companies need to focus not only on domestic but also on foreign markets. Without expansion into international environment would not be possible growth in the future (Yao et al., 2017). However, internationalization is a complex process in which the company should not omit any move.

The first step is the decision on the internationalization of the company. whatever the reason for such a decision, the company must realize that this path will be demanding for both

financial and human resources. Despite these factors, we are in the last decade witnessed great expansion of globalization and international business (Kral & Bartosova, 2016).

Entry to the international market brings many pitfalls, but if the company can put a stop to it, its efforts will yield good results. This effort involves defining the international marketing environment, analysing the various factors on the foreign market, deciding on the form of entry to the foreign market and, of course, creating a marketing mix in an environment that is largely very different from the domestic one.

One of the most important parts of the marketing mix is price, not only for domestic but also for international businesses. The price is a part of the marketing mix that creates revenue for the company, while the other parts of the marketing mix contribute more to the company's costs. The pricing process can either support or break a company's expansive efforts. Companies must cooperate with other financial institutions to integrate accounting, production, financial, legal and tax components into the chosen pricing strategy. One of the biggest challenges for international companies is how to set a price on the same products sold in different countries.

There are a number of publications dealing with pricing and pricing strategies. Gittelsohn et al. (2017) published a systematic review of studies on the effects of interventions on food retailing and on the purchase and consumption of healthy foods by consumers and beverages. Rokhlin & Mironenko (2016) researched the optimal price and product strategy in the dynamic model of a monopolistic enterprise. Wang & Wang (2017) focused on studying optimal pricing strategies for modern technology products in various market structures and supply policies and found out that it was always better to set a higher price in the first period than in the next period. Wang et al. (2016) examined the pricing strategies of a seller with the budget constraints facing two types of strategic consumers with different search costs and proposed three pricing strategies that motivate all consumers to visit its company.

Because pricing decisions have a direct effect on revenue, they have always occupied a crucial place in strategic planning. Regardless of product or industry, a well-established price enables the company to best capture the value embodied in a product and thereby establish a competitively advantageous position in the market. Pricing decisions, however, can be difficult, and often speculative, due to the uncertainties associated with today's dynamic environments (Forman & Hunt, 2005).

The companies must rely on a systematic procedure for their pricing decisions, pricing policies and objectives, both explicit and implicit, are very much a part of the operation of these companies (Myers, 2004).

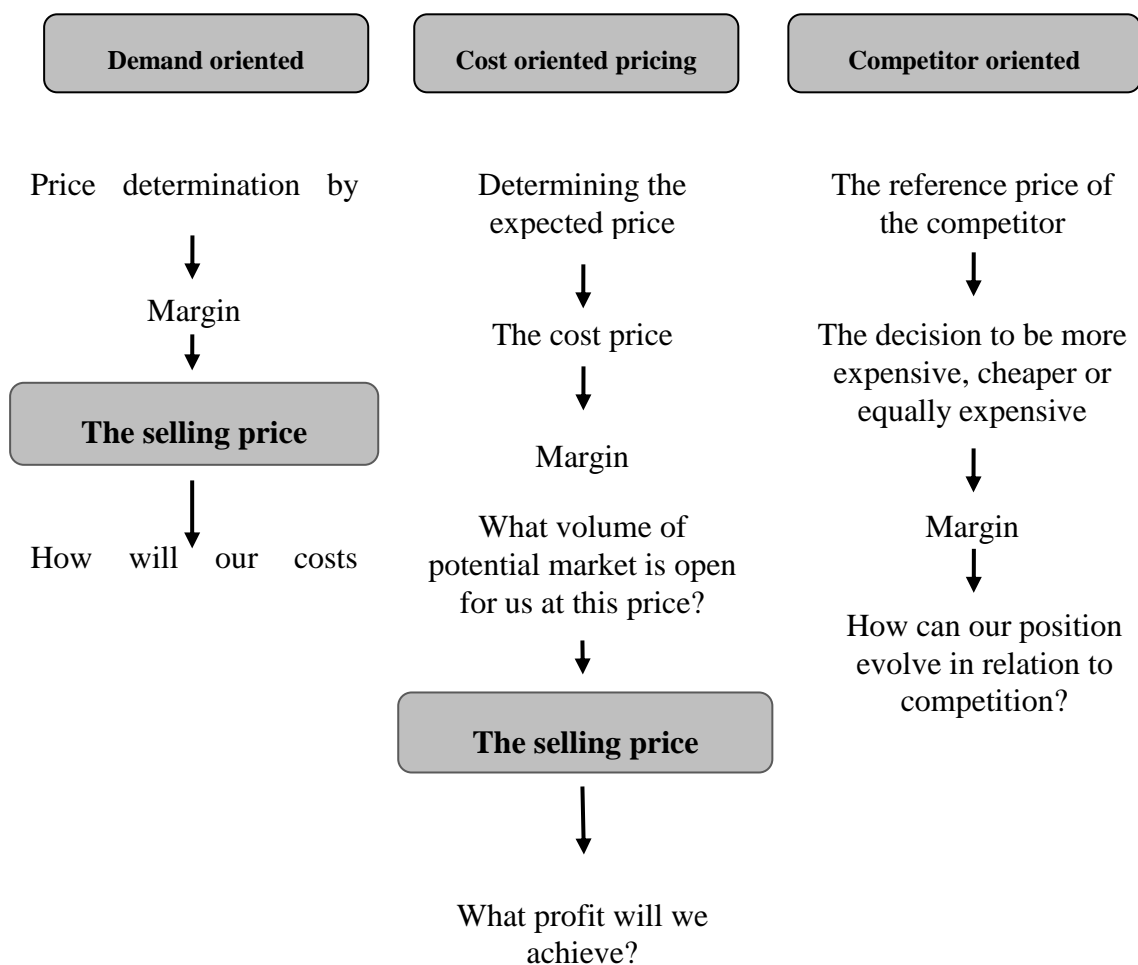
In order to survive and prosper, companies have to constantly think over their local markets, in other words, businesses have to think globally and act locally. International marketing management has the same role on domestic as well as foreign markets. Because in every market, customers are the driving force for marketing, and companies have to produce efficiently, it is necessary for products to be distributed in the most appropriate ways and valued on the basis of the conditions of the relevant market environment. Just in assessing products, companies have to take into account the fact that local market conditions may vary and need to be adapted to the needs of local customers (Musonera & Ndagijimana, 2008). It is also necessary to take into account the fact that customers are creating associations related to the quality of specific products through the price (Zhao, 2000).

Setting the right price policy if the company operates on the international market is a particularly challenging task. Ensuring coordination of prices in competitive environment is especially hard. The main roles in global pricing are therefore to manage price differences between countries and keep them at certain tolerable price limit. Because the factors affecting price levels in the international environment are constantly changing, global price setting is an endless process in which every day brings new challenges that need to be addressed.

2. Price setting and pricing strategies

The price is the basic mechanism that represents the sum of money that makes up the value of the product. For the manufacturer and the seller, the price is an important decision because it affects the next activity of the company and generates its income. When the companies pricing their products, they have a choice of several options. There are three options to set the price of products, namely demand oriented pricing, cost oriented pricing and competitor oriented pricing. The way the price is determined based on these three options and what issues companies have to consider can be seen in Figure 1.

Figure 1: Pricing methods



Source: own processing

Another, no less important, decision of company is the choice of pricing strategy. Pricing strategies are procedures or activities that can be used to achieve the price targets. When the companies create a pricing strategy, it is necessary to focus on supply, demand, costs, competition and business conditions.

Through a good pricing strategy, companies can determine the price point in which they can maximize their profits from selling their products. Companies need to realize that customers will not buy products whose price is too high and that the company will not be very successful when price covers only a cost of the company. Price, with other marketing mix tools, can influence the success of the company.

If a company follows any pricing strategy, it always has a direct impact on the conception of other elements of the marketing mix. The pricing strategy must be determined in dependence on the other parts of the marketing mix, but also on the goals the company wants to achieve. There are several basic pricing strategies, we will explain the following:

Pricing at a Premium

At a premium price, companies set higher costs than competitors. In the beginning, businesses will set a high price, trying to get as much money as possible from customers, then gradually lowering prices. This strategy should be used when the product is not easily replaceable, the demand is inelastic or if the purchasing power of the population is strong. Also, the choice of this strategy is most effective in the first days of the product's life cycle.

Pricing for Market Penetration

A strategy that consists of selling low-priced products to penetrate the market and attract customers. This strategy is appropriate if there is a high price elasticity, a sufficiently large market, there is no cheaper product and the low price does not cause the negative image of the product. However, companies sell their products at a low price until they sufficiently penetrate the market, then the product prices will increase.

According to the research of Ngendakuriyo & Taboubi (2017) the optimal pricing strategy was price penetration, while the latter found that the dynamic price was lower than the static one. They proved that the use of a skimming or a penetration strategy depends on the effect of past sales on future sales (i.e. saturation effects) and the level of the word-of-mouth effect.

3. Price setting and pricing strategies in global context

A number of economic frameworks may be used to investigate the international pricing strategies of foreign manufacturers in export markets, and the role of goodwill and bargaining power. One of these frameworks was concerned with the rental of goodwill in international marketing channels. A game theoretic model is developed to investigate the optimal pricing strategies of foreign manufacturers under conditions of asymmetric information (Farrell & Fearon, 2005).

In the international context, price is further complicated by the fact that it must be managed with costs and revenues accruing in different fluctuating currencies. While the accelerating globalization of markets increasingly pressures firms to consolidate operations and to standardize marketing activities, price remains a point of international differentiation for most

products, because firms choose to price discriminate in order to capitalize on cross-border differences in taste, price sensitivity, and supply. (Clark et al., 1999).

Many factors affect price strategies. Zhao & Zheng (2000) and Elmaghraby & Keskinocak (2003) showed that prices should rise if there is an increase in perceived product value. Moreover, cost, demand, competition and customer preference play a vital role in price setting (Chen et al., 2018). The factors influencing the selection of the global pricing strategy can be divided into three groups, factors related to company and product specifics, market factors and environmental factors. Specific factors from individual groups are shown in Table 1.

Table 1: The factors influencing the selection of the global pricing strategy

Company and product specific factors	Environmental factors	Market factors
Company and product positioning	Tax and tariffs	Market growth
Company and marketing objectives	Government influences and constraints	Demand elasticities
Marketing development	Currency fluctuation	Market structure, distribution channel, discounting pressures
Available resources	Business cycle stage	Need for product and promotional adaptation
Shipping cost	Level of inflation	Consumer perceptions, expectations and ability to pay
Inventory	Use of non-money payment and leasing	Competition objectives, strategies and strength
Degree of international standardisation or adaptation		Need for credit
Cost structures, experience		
Product range, life cycle, substitutes, product differentiation and unique selling position		

Source: own processing according to Doole, I. and Lowe, R (2008)

In the context of general price setting, companies have a choice of several options that vary according to the level of adaptation to local conditions.

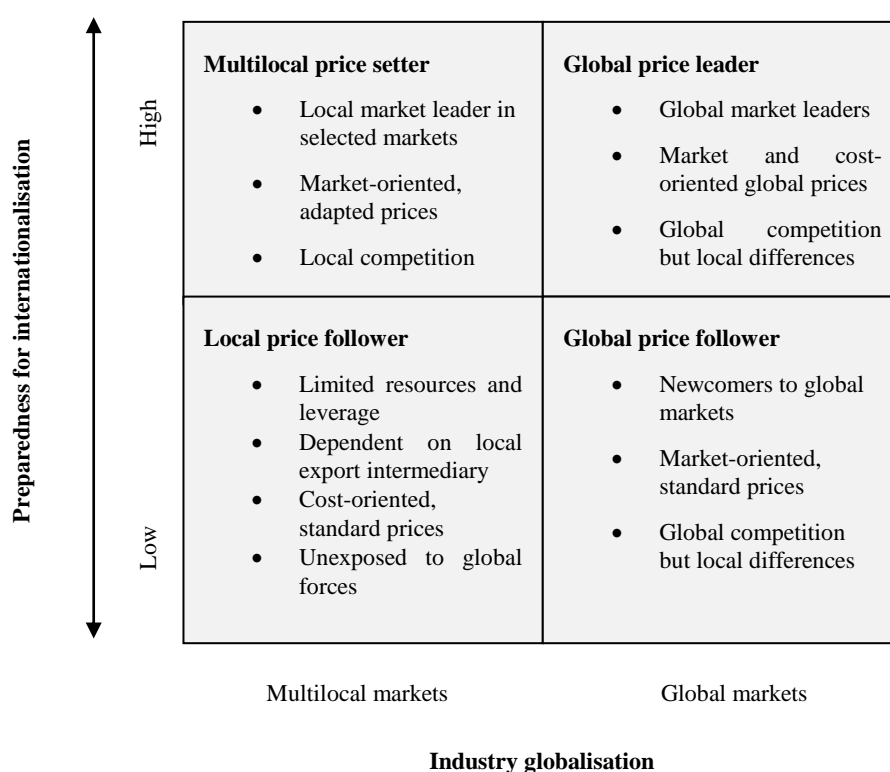
The first international pricing strategy is a standard pricing strategy whose level of adaptation to local conditions is very low. Products are sold at the same price regardless of the particular country in which they are sold. The advantage of this strategy is its simplicity as well as the guarantee of solid returns (Doole & Lowe 2008). In a standard pricing strategy, companies use the same pricing formula for products in all countries where products are sold. There are different ways to create a formula. The most useful way is to create a differential formula. This formula includes all costs arising from an external company opportunity and these costs are then added to the company's production costs. Another way is full-cost pricing, in which the costs of international transport, taxes, etc. are added to the costs of the domestic market. A direct cost plus contribution margin formula includes the basic production costs plus the required profit margin (Solberg et al., 2006).

The above-mentioned strategies underline the elements of international standardization in pricing. However, in adaptation strategies, prices are determined in a decentralized manner, that is mean, they are determined by a local partner or a local subsidiary. Ability to set a price according to local conditions can provide a clear advantage, but it can also cause problems in creating a global strategic position. It is necessary to coordinate prices in different countries in order to avoid problems such as grey market situations, parallel markets, etc. Therefore, when

the price is adapting to the local conditions, the company must consider the interconnection between international markets. To prevent these situations, geocentric pricing approaches that do not have a uniform fixed price and local subsidiaries do not have complete freedom in pricing. In order to prevent such situations, geocentric pricing approaches can be chosen, that do not have a uniform fixed price and local subsidiaries do not have complete freedom in pricing. In these cases, prices are determined, for example, in relation to competitors' prices, etc. (Mühlbacher et al., 2006).

An important factor influencing international pricing is the level of globalisation and also the ability of companies to adapt to different international conditions. This dependence can be seen in Figure 2.

Figure 2: International pricing strategies based on the degree of globalisation



Source: own processing according to Doole, I. and Lowe, R (2008)

4. Conclusion

The aim of the article was to explain the key aspects of pricing and pricing strategy in the global environment with the aim of confirming the importance of adapting the pricing strategy to international conditions. We explained the nature and types of pricing strategies in local conditions, and then, for the sake of comparison, we dealt with explaining pricing strategies and pricing in an international environment. A substantial part of the article was factors influencing the choice of the global pricing strategy in the global environment.

Acknowledgment

This contribution is an output of scientific project VEGA no. 1/0718/18: The impact of psychographic aspects of pricing on the marketing strategy of companies across products and markets.

References

- [1] Clark, T. et al. (1999). Exchange rate pass-through and international pricing strategy: a conceptual framework and research propositions. *Journal of International Business Studies*, vol. 30, pp. 249-268.
- [2] Doole, I. and Lowe, R., (2008). *International Marketing Strategy*, 5th ed. Thomson Learning, U.K.
- [3] Elmaghraby, W. and Keskinocak, P. (2003). Dynamic pricing in the presence of inventory considerations: Research overview, current practices, and future directions. *Management Science*, vol. 49, pp. 1287–1309.
- [4] Farrell, C. and Fearon, G. (2005). Renting goodwill in international marketing channels: an analysis of pricing strategies and bargaining power. *Atlantic Economic Journal*, vol. 33, pp. 285–296.
- [5] Forman, H. and Hunt, J. M. (2005). Managing the influence of internal and external determinants on international industrial pricing strategies. *Industrial Marketing Management*, vol. 34, pp. 133– 146.
- [6] Gittelsohn, J. et al. (2017). Pricing strategies to encourage availability, purchase, and consumption of healthy foods and beverages: a systematic review. *Preventing chronic disease public health research, practice and policy*, vol. 14, pp. 1-24.
- [7] Chen, W. et al. (2018). Dynamic pricing strategies for perishable product in a competitive multi-agent retailers market. *Journal of Artificial Societies and Social Simulation*, vol. 21, pp. 212-229.
- [8] Kral, P. and Bartosova, V. (2016). Importance of company early warning system in globalizing market environment. *Proceedings of the 16th international scientific conference Globalization and its socio-economic consequences*. Slovak republic, Rajecke Teplice, pp. 1054-1060.
- [9] Majerova, J. and Kliestik, T. (2015). Brand valuation as an immanent component of brand value building and managing. *Procedia Economics and Finance*, vol. 26, pp. 546 – 552.
- [10] Musonera, E. and Ndagijimana, U. (2008). An examination of factors that affect pricing decisions for export markets. *The Journal of Global Business Management*, vol. 4, pp. 189-198.
- [11] Mühlbacher, H. et al. (2006). *International Marketing: A Global Perspective*, Cengage Learning EMEA, U.K.
- [12] Myers, M. B. (2004). Implications of pricing strategy–venture strategy congruence: an application using optimal models in an international context. *Journal of Business Research*, vol. 57, pp. 591– 600.

- [13] Ngendakuriyo, F. and Taboubi, S. (2017). Pricing strategies of complementary products in distribution channels: a dynamic approach. *Dynamic Games and Applications*, vol. 7, pp. 48–66.
- [14] Rokhlin, B. D. and Mironenko, G. (2016). Optimal production and pricing strategies in a dynamic model of monopolistic firm. *Japan Journal of Industrial and Applied Mathematics*, vol. 33, pp. 557–582.
- [15] Solber, C. A. et al. (2006). A taxonomy of the pricing practices of exporting firms: evidence from Austria, Norway, and the United States. *Journal of International Marketing*, vol. 14, pp. 23-48.
- [16] Wang, M. et al. (2016). A capacitated firm's pricing strategies for strategic consumers with different search costs. *Annals of Operations Research*, vol. 240, pp. 731-760.
- [17] Yao, Y. et al. (2018). Positioning–pricing problem of heterogeneous duopoly with uncertain consumer preferences. *Soft Computing - A Fusion of Foundations, Methodologies and Applications*, vol. 22, pp. 5775-5782.
- [18] Wang, T. and Wang, X. (2017). Intertemporal pricing strategies for fashion tech products with consumption externalities. *Frontiers of Business Research in China*, vol. 11, pp. 484-501.
- [19] Zhao, H. B. (2000). Raising Awareness and Signaling Quality to Uniformed Consumers: A Price-Advertising Model. *Marketing Science*, vol. 19, pp. 390Y6.
- [20] Zhao, W. and Zheng, Y. S. (2000). Optimal dynamic pricing for perishable assets with nonhomogeneous demand. *Management Science*, vol. 46, pp. 375–388.

TRANSFER PRICING OF TRANSACTIONS BETWEEN RELATED PARTIES AS A RESULT OF GLOBALIZATION

Ivana Váryová^{1,a,*}, Iveta Košovská^{2,b}

¹Slovak University of Agriculture in Nitra, Faculty of Economics and Management, Department
of Accountancy, Trieda A. Hlinku 2, 949 76 Nitra, Slovak Republic

²Slovak University of Agriculture in Nitra, Faculty of Economics and Management, Department
of Accountancy, Trieda A. Hlinku 2, 949 76 Nitra, Slovak Republic

^aivana.varyova@uniag.sk, ^biveta.kosovska@uniag.sk

*Corresponding author

Abstract. The economic globalization has brought not only benefits, but some negative side effects as well. Globalization has led to the concentration of economic activity within a small number of multinational corporations. These corporations can shift profits among their entities across borders to low-tax countries and tax havens to reduce their pre-tax profits. In order to avoid the tax evasions the rules of transfer pricing are applied. Transfer pricing is a system that tries to protect the domestic tax authority and to prevent international tax evasion. The transfer pricing relates to the transactions realized between related parties which may be influenced by mutual relations of these parties. If the prices applied in the transactions of related parties are not comparable with the prices which shall be used by unrelated parties in comparable transactions, the tax evasions can occur. The transfer pricing is still more discussed issue in the world, as well as in the Slovak Republic, where every year the number of tax controls is growing due to this area. The aim of the paper is to assess the issue of transfer pricing in the conditions of the Slovak Republic. The theoretical research was applied for reaching the aim of the paper. Basic input materials are legal norms except for professional literature, especially OECD Transfer Pricing Guidelines for Multinational Enterprises and Tax Administrations and Act No. 595/2003 Coll. on Income Tax with the latest amendments.

Keywords: arm's length principle, documentation, related parties, transfer pricing

JEL Classification: Q14, M21, M40, M41

1. Introduction

Globalization is a characteristic feature of the modern world economy development and a significant element in the development of international economic relations (Lysenko et al., 2017; Kusá et al., 2017). Globalization is a process characterized by economic and political interconnections of current economies (Hrašková & Štofková, 2017). Many authors understand globalization as not only a global process of economic and political integration but also as a complex process that has more dimensions (e. g. Botlík & Botlíková, 2017; Juriš, 2017; Soroková & Petříková, 2017). We agree with statement of Lesáková (2017) that globalization is a complex phenomenon that affects many aspects of our life. It is a diverse process including economic, political and cultural change, which is deepening the integration

of the world economy, strengthening political interdependence between countries and causing values to coverage across countries.

By the entrance of Slovakia into the European Union (EU) the Slovak market became the part of the unified market of the EU member states. The protection in the form of customs and administrative restrictions was abolished and the market became global and integrated (Tóth et al., 2016). Ongoing internationalization and permanently growing world globalization processes shape the market and influence business activities, demands and needs of enterprises (Országhová et al., 2016; Babčanová et al., 2012). The development of the regulatory framework of markets, technical and organizational innovations, and new societal and consumer perceptions in integrated Europe, have changed the business context and the determinants of corporate success (Pakšiová, 2016).

Since the beginning of 80s, the impact of globalization was due to the fast growth of the economy and world trade mainly positive (Borowiec, 2017). Globalization has brought many opportunities and benefits as open access to new technologies, cheaper goods and services, high mobility of the capital and labour, expansion of the commodity markets, etc. (Korostyshevskaya & Urazgaliev, 2016; Pongracz, 2017). Most authors agree that there are also negative consequences of the globalization (e. g. Butek & Spuchľáková, 2017; Hadaš-Dyduch, 2017). Globalization is a persistent problem, which on the one hand, is very positive and, on the other hand, brings many complicated problems. (Domonkos & Osrihoň, 2015; Thomassen et al., 2017).

One of negative effects of globalization is an excessive profit shifting from countries of origin to tax havens. Transfer pricing appear to be an appropriate solution to this global economic problem (Rajnoha et al., 2014). The issue of transfer pricing is an important factor affecting tax incomes of individual countries (Brabec & Hasprová, 2016). Transfer pricing is the phenomenon by which related parties in different jurisdictions determine the price at which a transfer of goods or services between those two entities should be deemed to have occurred. This phenomenon is an inherent and endemic part of the international trading system (Bastin, 2014). Transfer prices play an important and strategic role on income shifting by multinational companies (Wang et al., 2016). Transfer price taxation is a system that tries to protect the domestic tax authority and to prevent international tax evasion (Cho & Park, 2015). The issue of transfer pricing presents the crucial area of legal arrangements of income tax and is the subject of dynamic development in the global but as well as in the national scale. Recently the transfer pricing has become the central theme for both tax administrators and taxpayers in the Slovak Republic (Váryová & Košovská, 2016). The Slovak legislation corresponds to the legislation at the transnational level – to the OECD transfer pricing guidelines for multinational enterprises and tax administrations and to the Code of conduct on transfer pricing documentation for associated enterprises in the European union. Given legislation has also confirmed that the arm's length principle represents an essential condition for stability of business environment in Slovakia (Kramárová & Valášková, 2015).

2. Methods

The paper's aim is to assess the issue of transfer pricing as a result of globalization in the conditions of the Slovak Republic. The theoretical research has been applied for reaching the paper's aim.

Basic input materials are following legal norms except for professional literature:

- OECD Transfer Pricing Guidelines for Multinational Enterprises and Tax Administrations,
- Act No. 595/2003 Coll. on Income Tax with the latest amendments (hereinafter referred to as “Income Tax Act”),
- Regulation of the Ministry of Finance of the Slovak Republic No. MF/014283/2016-724 on determination of documentation content pursuant to the Article 18 par. 1 of the Income Tax Act,
- Methodical instruction of Financial Directorate of the Slovak Republic to the application of transfer pricing methods.

Generally accepted basic research methods have been applied in the paper's processing which lead to the achievement of scientific knowledge in relation to the before mentioned issue.

3. Results and Discussion

The essential feature of globalization is the increase in multinational corporations which have a great economic power. The task of each entrepreneur is to achieve the maximum profit which is the subject of tax. The effort of multinational corporations is to tax the profit in a state with the lowest tax burden and therefore to achieve the tax savings. The tax savings can be achieved by the transfer of profit between individual members forming the group of related parties as the individual members can be seated in diverse tax jurisdictions with various income tax rates. The minimization of tax liability can be obtained as well as by the profit transfer between group members seated in one state, by the profit transfer to a company disclosing a tax loss. The profit transfer is performed by means of purposive measurement of mutual transactions between individual members forming the group of related parties.

Such an act of related parties has a negative effect on state budget of individual countries as tax incomes present the crucial part of state budget income. Therefore the effort of each state is to restrain such an act while it results in the minimizing of tax liability deriving from the purposive measurement of mutual business and financial transactions of related parties. The interest of each state is to tax the profit in the country where it has been generated. So called principles of transfer pricing are applied in several countries with the aim to restrain the purposive profit transfer. The transfer pricing is highly current theme of international taxation and the Slovak Republic also belongs to countries where these principles of transfer pricing are applied.

From the international point of view the transfer pricing presents the determination of prices for goods, services and intangible assets in mutual transactions between individual group members of multinational corporations. The member countries of OECD have adopted the principle that each country within the group of multinational corporations is considered to be a separate entity from the tax point of view. The member countries of OECD have decided to apply such an approach of separate entities as the most appropriate means in order to achieve the equitable results and the risk minimization of double taxation. Thus each group member is the subject of income tax in a concerned country, on the base of residence or source. The arm's length principle is the accepted and recommended principle of measurement of goods, services and intangible assets transfer realized within related parties. The arm's

length principle has become an internationally recognized standard for the measurement of mutual transactions between related parties.

The beginnings of legislation amendments of transfer pricing in the Slovak Republic reach the period of the Slovak Republic establishment. The Act No. 286/1992 Coll. on Income Tax contained the provisions pursuant to which an income tax base of related parties was adjusted by differences to which prices between related parties differentiated from prices used between unrelated parties. The range of legal arrangements of related parties has gradually extended what was disclosed in the new Act No. 366/1999 Coll. on Income Tax. The national legal arrangements of transfer pricing in the Slovak Republic has always been influenced by the international legal arrangements, namely the OECD Guideline on Transfer Pricing for Multinational Enterprises and Tax Administrations and documents adopted at the level of the European Union. The influence of international legal arrangements was fully displayed by the adoption of actual valid Act No. 595/2003 Coll. on Income Tax with the latest amendments. This Act presents the essential legal norm adjusting the transfer pricing in the Slovak Republic.

The arm's length principle presents the base of transfer pricing. It is defined in the Article 18 par. 1 of the Income Tax Act. It is based on the comparison of conditions set in business or financial relationships between related parties with the conditions which would be agreed between unrelated parties in comparable business or financial relationships under comparable circumstances. The arm's length principle allows tax administrator to adjust the tax base of related party to a difference which occurs when the prices in transactions differentiate from the prices in comparable transactions between unrelated parties under comparable circumstances.

Related party is defined quite extensively by the Income Tax Act. In the Slovak Republic the obligation to evaluate transaction on the arm's length principle referred only to foreign related parties till the end of 2014. Effective since 1 January 2015 the rules of transfer pricing has been spread also to domestic related parties. Since 1 January 2018 a new definition of related parties for the purpose of transfer pricing has come into force. Re-definition of related parties has increased the number of relationships based on which the persons or subjects are considered to be related parties for the purpose of transfer pricing. Since 2018 the related party means:

- close persons,
- persons or subjects with economic, personal or other ties,
- persons or subjects that are member of the consolidated group.

The term "subject" was newly introduced and is considered to be the legal structure of assets or legal structure of persons, which does not have a legal personality or any other legal structure, which owns assets or performs asset management. No amendments have been made in the definition of close persons in the year 2018. In the determination of close persons the Act on Income Taxes further refers to the Act No. 40/1964 Coll. Civil Code with the latest amendments. The biggest changes in the definition of related parties relate to economic and personal ties, the other ties remain unchanged. By economic or personal tie should be understood:

- the person's or subject's interest in the property, control or management of other person or subject, or

- the mutual relation between persons or subjects who are under control or management of the same person, his/her close person or subject, or
- where such person, his/her close person or subject has direct or indirect ownership interest

The participation in property or control is considered to be a direct share, indirect share or indirectly derived share in the amount at least 25 % in share capital or voting rights or share in profit in the amount at least 25 %.

A new part of related parties definition concerns persons and subjects included in a consolidation group. In connection with this the Act on Income Taxes refers to the Act No. 431/2002 Coll. on Accounting with the latest amendments. Pursuant to the Act on Accounting the consolidation group is the group of accounting entities consisting of a parent company and all its subsidiaries. The subject of transfer pricing are transactions of related parties, marked as controlled transactions. The price is the subject of a controlled transaction, is marked as a transfer price. Transactions realized between unrelated/independent parties present unrelated transactions. Controlled transactions are compared with uncontrolled transactions while only those transactions might be compared which have all economically crucial comparable features.

Methods of transfer pricing present the manner how to calculate a difference to which prices differentiate in the mutual business relationships between related parties from prices used between unrelated parties in comparable business relationships. The Slovak Republic has adopted the methods of transfer pricing pursuant to the Directive on transfer pricing which are based on the comparison of price (traditional transaction methods) and the comparison of profit (transactional profit methods). The Income Tax Act allows the mutual combination of before mentioned methods, respectively allows the selection of another method which is not defined in the Income Tax Act and the Directive on transfer pricing. The condition is to use another method which shall be in conformity with the arm's length principle.

In case of controlled transactions each related party is obliged to keep the documentation on used method of transfer pricing. The documentation presents the file of information, data and facts presenting and explaining the procedure of price creation in controlled transactions. The minimal range of documentation is limited by the Measure of the Ministry of Finance of the Slovak Republic No. MF/014283/2016-724 on determination of documentation content pursuant to the Article 18 par. 1 of the Income Tax Act. From the point of required data range the following types of documentation is recognized: reduced, basic and full documentation. Each of the before mentioned documentation is fully determined for a precise group of taxpayers who are obliged to keep a particular documentation. The news in the area of transfer pricing is so called the country-by-country reporting. The Slovak Republic signed a document on automatic change of information, so called the country-by-country reporting together with other thirty countries within the thirteenth measure for action plan of transfer pricing. The rules of country-by-country reporting have been implemented in the Slovak Republic with effect from March 1st, 2017. These rules relate to the large multinational groups with consolidated annual turnover exceeding 750 million Eur. The obligation of such companies is to report on an annual base the information relevant for financial administration in a given state. Individual tax offices will subsequently change these information on global allocation of income, profit, capital, employees, assets or information on paid taxes. Through the rules of country-by-country reporting it should be easier for tax offices to reveal the inaccuracies in

prices of international companies and as well as the related tax evasions. The brief summary of transfer price regulations in the Slovak republic is stated in the following table 1.

Table 1: Transfer price regulations in the Slovak republic

Arm's Length Principle	Since 1999
Legislation	Income Tax Act No. 595/2003 Coll; Double Tax Treaties.
Controlled parties	Domestic and cross-border related parties.
Related parties	25 % < direct or indirect control or common managing director or other control aimed purely on circumvention of tax
Applicable transfer pricing (TP) methods	Traditional transaction methods and transactional profit methods according to OECD TP Guidelines (the principle of the best method applies).
Documentation liability	Since 2009
Subjects obliged to keep the documentation	Taxpayers engaged in transactions with related parties.
Simplified documentation	Yes, as option for selected taxpayers e.g. individuals, small and medium entities, and if certain conditions are met.
Advance Pricing Agreement (APA)	Since 2004
Penalties	No specific TP penalties, but adjustment of tax base plus penalties. For non-compliance with the TP documentation obligations a penalty up to 3.000 Eur.
Safe harbours	Not officially published/accepted- but generally accepted. Low value added services 3 – 10 % mark-up.
Country-by-Country Reporting	Rules implemented with effect from March 1 st , 2017.
Level of attention paid by Tax Authority	9/10

Source: own processing according to Mazars CEE Tax Guide 2018 and Accace Transfer Pricing CEE Overview 2018

4. Conclusion

The transfer pricing in the actual theme of international taxation as the intensity of international business is still growing. The purpose of transfer pricing is to restrain the tax evasions which arise from the mutual transactions between related parties with a seat in various tax jurisdictions but as well as within one tax jurisdiction. The article deals with the assessment of national legal arrangement of transfer pricing in the Slovak Republic. It can be stated that the Slovak Republic respects the rules arising from the OECD Guidelines in the area of transfer pricing between related parties, while the concrete methods of application of the arm's length principle and the obligation of keeping the documentation on transfer pricing are anchored in the particular legal arrangements as regard the income tax. In conclusion it can be stated that the relevance of transfer pricing in Slovakia has increased in the last years also as regards the amendments in the Slovak legal arrangement which determines the obligation to keep the documentation on applied method of transfer pricing not only for foreign related parties but as well as for domestic related parties. The increasing interest in transfer pricing in the Slovak Republic is combined with the growing number of international corporations and the rise of foreign capital share. This is linked to a risk that companies will seek the profit transfer to countries with lower tax burden. The result of such a profit transfer is a decrease in tax incomes of state budget which is not acceptable.

Acknowledgment

This paper is an output of the science project VEGA No. 1/0935/17 with the title “Modelling and projections of the agri-food markets in Slovakia and the European Union”.

References

- [1] Babčanová, D., Prajová, V. and Marková, P. (2012). Brand management - the part of integrated marketing communication of industrial enterprises. *Proceedings of the 8th European Conference on Management Leadership and Governance*. Pafos, Cyprus, pp. 15-21.
- [2] Bastin, L. (2014). Transfer pricing and the WTO. *Journal of world trade*, vol. 48, no. 1, pp. 59-80.
- [3] Borowiec, A. (2017). The impact of public procurement system on the development of competition in the economy in the light of empirical research. *Oeconomia Copernicana*, vol. 8, pp. 37-50.
- [4] Botlík, J. and Botlíková, M. (2017). The sixth wave of globalization as a factor of supporting the financing the extremism. *17th International Scientific Conference Globalization and its Socio-Economic Consequences*. Žilina, Slovak Republic, pp. 194-201.
- [5] Brabec, Z. and Hasprová, O. (2016). The use of transfer pricing by associated enterprise in a Controlled transaction on the example of manufacturer. *3rd International Interdisciplinary Scientific Conference on Social Sciences and Arts*. Albena, Bulgaria, pp. 665-662.
- [6] Butek, M. and Spuchľáková, E. (2017). The role of nation state in globalized economy. *17th International Scientific Conference Globalization and its Socio-Economic Consequences*. Žilina, Slovak Republic, pp. 234-239.
- [7] Domonkos, T. and Ostrihoň, F. (2015). Inclusive growth in selected central European countries. *Ekonomický časopis*, vol. 63, no. 9, pp. 881-905.
- [8] Hadaš-Dyduch, M. (2017). Analysis of globalization by wavelets through the prism of the selected euro area countries. *17th International Scientific Conference Globalization and its Socio-Economic Consequences*, Žilina, Slovak Republic, pp. 605-612.
- [9] Hrašková, D. and Štofková, Z. (2017). Financing of social employment projects in global context. *17th International Scientific Conference Globalization and its Socio-Economic Consequences*, Žilina, Slovak Republic, pp. 717-724.
- [10] Cho, W. G. and Park, Ch.-Y. (2015). Transfer pricing practice of Korean enterprises. *Journal of International Trade & Commerce*, vol. 11, no. 3, pp. 77-89.
- [11] Juriš, R. (2017). The support of small and medium-sized enterprises in the research and innovation sector in the aspect of globalization. *17th International Scientific Conference Globalization and its Socio-Economic Consequences*, Žilina, Slovak Republic, pp. 820-827.
- [12] Korostyshevskaya, E. and Urazgaliev, V. (2016). Russia in European innovation space in the context of globalization. *16th International Scientific Conference Globalization and its Socio-Economic Consequences*, Žilina, Slovak Republic, pp. 970-979.

- [13] Kramárová, K. and Valášková, K. (2015). Globalization and Transfer Pricing: Brief Analysis of the Legislation in the Slovak Republic. *15th International Scientific Conference Globalization and its Socio-Economic Consequences*, Žilina, Slovak Republic, pp. 353-361.
- [14] Kusá, L., Fabuš, J. and Gajdoš, M. (2017). Analysis of the competitive environment in the insurance market in a global aspect. *17th International Scientific Conference Globalization and its Socio-Economic Consequences*, Žilina, Slovak Republic, pp. 1251-1258.
- [15] Lesáková, Ľ. (2017). The role of communication in managing the change in small and medium enterprises in the world of globalization. *17th International Scientific Conference Globalization and its Socio-Economic Consequences*, Žilina, Slovak Republic, pp. 1299-1306.
- [16] Lysenko, E. A., Mechikova, M. N. and Grischenko, O. V. (2017). Problems of development of industry and agriculture in Russia in conditions of the globalization economy. *17th International Scientific Conference Globalization and its Socio-Economic Consequences*, Žilina, Slovak Republic, pp. 1395-1403.
- [17] Országhová, D., Kozelová, D., Hornyák Gregáňová, R., Baraníková, H. and Vollmannová, A. (2016). Mathematics study outcomes as an indicator of the quality of the university education. *The Agri-Food Value Chain: Challenges for Natural Resources Management and Society*, Nitra, Slovak Republic, pp. 652-658.
- [18] Pakšiová, R. (2016). CSR Reporting in Slovakia. *Proceedings of the 3rd International Conference on European Integration 2016*, Ostrava, Czech Republic, pp. 697-707.
- [19] Pongracz, E. (2017). The effects of globalisation on Slovak labour market – opportunities and problems. *17th International Scientific Conference Globalization and its Socio-Economic Consequences*, Žilina, Slovak Republic, pp. 2057-2063.
- [20] Rajnoha, R., Slivková, D. and Dobrovič, J. (2014). Globalization and transfer pricing in multinational corporations in Slovakia and OECD countries – analytical study and decision making model on the choice of optimal transfer-pricing method. *Ekonomický časopis*, vol. 62, 6, pp. 609-630.
- [21] Thomassen, Ø., Smith, H., Seiler, S. and Schiraldi, P. (2017). Multi-category competition and market power: A model of supermarket pricing. *American economic review*, vol. 107, no. 8, pp. 2308-2351.
- [22] Tóth, M., Lančarič, D. and Savov, R. (2016). Changes in Performance of Slovak Agriculture Driven by Integration and Globalization. *16th International Scientific Conference Globalization and its Socio-Economic Consequences*, Žilina, Slovak Republic, pp. 2220-2227.
- [23] Váryová, I. and Košovská, I. (2016). Transfer pricing of transactions between related parties in the Slovak republic. *The Agri-Food Value Chain: Challenges for Natural Resources Management and Society*, Nitra, Slovak Republic, pp. 429-437.
- [24] Wang, Z., Gao, W. and Mukhopadhyay, S. K. (2016). Impact of Taxation on International Transfer Pricing and Offshoring Decisions. *Annals of Operation Research*, vol. 240, no. 2, pp. 683-707.

GLOBAL CONDITIONS OF THE BEHAVIORAL ASPECT OF TAX EVASION

Katarína Vavrová^{1,a,*}, Miloš Bikár^{2,b}

¹University of Economics in Bratislava, Faculty of Business Management, Dolnozemska cesta 1,
852 35, Bratislava, Slovak Republic

²University of Economics in Bratislava, Faculty of Business Management, Dolnozemska cesta 1,
852 35, Bratislava, Slovak Republic

^akatarina.vavrov10@gmail.com, ^bmilos.bikar@gmail.com

*Corresponding author

Abstract. Taxes belong to the most important instruments of fiscal policy of the government and are the main source of revenues of the state budget. Tax-policy of the state takes into account state and self-government requirements, it should support economic development and motivate the business community. The main objective of the paper is to define the behavioral factors of the tax behavior of taxpayers in the Slovak Republic within the framework of the global approach in the European Union. The first part of paper is devoted to the analysis of the theoretical background. It defines basic terminology in tax compliance and tax evasion. It describes the behavioral factors of tax behavior in the global environment. The following part is devoted to the description of the tax system of the Slovak Republic, emphasizes the existence of tax evasion in the country as a contemporary issue, and summarize the determinants that affect taxpayers' attitude towards tax. The second part of the paper deals with the research of taxpayers' attitudes towards the payment of taxes and the influence of trust in the legal system on tax behavior; describes other aspects of the behavior of taxpayers' willingness to pay taxes. The result of the contribution and its significance is the determination of taxpayers' attitude towards payment or non-payment of taxes, and points out that a higher level of tax liability exists if there is a fair legal system in the country and citizens have high-quality public services.

Keywords: behavioural factors, tax evasion, income tax

JEL Classification: H24, H26

1. Introduction

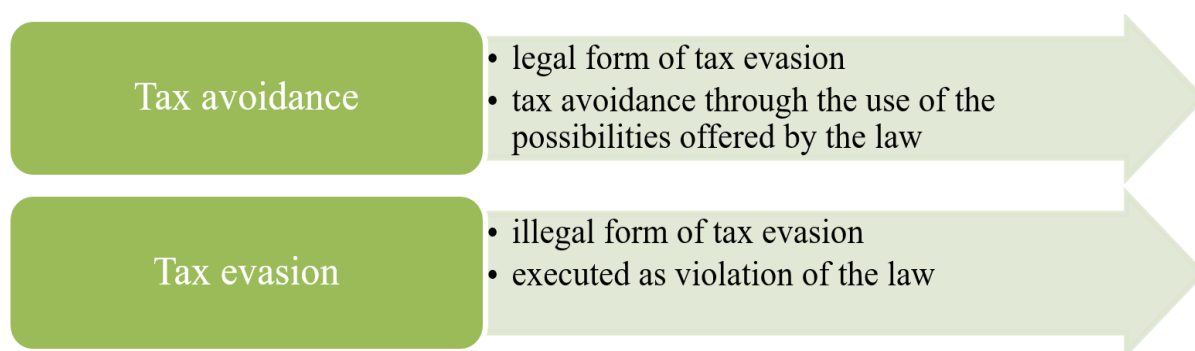
The main reason of the topic selection is the importance of taxes in the present days. The tax system is an indispensable part of every economy and forms a large part of the country's income. It is a dynamic system that is constantly changing and evolving and the negative impact of tax evasion needs to be addressed to eliminate negative effects on the society. What causes the tax evasion? Why do taxpayers commit tax frauds? Why pay taxes in offshore? Is there a negative attitude of tax payers towards paying taxes? The newer line of research tries to address these issues from the behavioural point of view. The advent of experimental economics defines the psychological aspects of taxpayer's behaviour and these results are afterwards being implied to the government's policies.

2. Tax Evasion and Behavioural Aspects

2.1 Tax evasion

Tax evasion is regarded as a result of subject's behaviour tending to reduce their tax liability towards state. Gravelle (2009) points out that one must distinguish between two various types of tax evasion as presented in Figure 1. Tax evasion represents a deliberate, elaborated, targeted and most risky form of avoiding tax obligations.

Figure 1: Tax avoidance and tax evasion



Source: Gravelle (2009)

According to Simser (2008) it is never clear to differ between these two, but Slemrod and Yitzhaki (2002) simply conclude that the main distinctive characteristic is the illegality of evasion. Tax evasion is regarded as a result of subject's behaviour tending to reduce their tax liability towards state. Gravelle (2009) points out that one must distinguish between two various types of tax evasion as presented in Figure 1. Yet, the law is sometimes vague, when it is clear it may be unknown by taxpayers, or the tax administrators effectively ignore certain transactions or activities. It is suggested two different definitions for each of these concepts. According to him, evasion appears as a result of concealing and misrepresenting the transactions, however avoidance when transactions are admitted but arranged in way that tax liability varies from that proposed by the relevant legislation. (Orviska & Hudson, 2002) define the tax evasion as the loss of potential government's income, what may result in a lack of funds in public sector and unfair burdening of taxpayers. Tax evasion is more present in transforming poor economies. The issue of tax evasion in general is closely related to the so-called shadow economy, which is also referred to as informal, black or hidden. It is called hidden, because there is no possibility to accurately quantify the loss arising from it. Shadow economy consists of set of activities concealed from the government regulatory institutions that create tax evasion. There are both positive and negative effects of hidden economy, however the most study considers the positive impacts only short term and over-weighted by long term burden of its existence. (Mohamed, 2012) listed these negative effects: inefficient markets of goods and labour, inaccurate statistics and diverted finances due to evasion of taxes. These might result in policy crisis. (Giles, 1998) connected the existence of the hidden economy or "hidden income" with the tax gap.

The existence of tax gap is caused mainly by activities, referred to as tax evasion. Authors refer to tax gap as the difference when the actual revenue of tax collected is lower than the theoretical tax liability based on the tax legislation.

2.2 Behavioural Aspect of Tax Evasion

Behavioural research provides quantifiable as well as qualitative basis for approach of behavioural economics that observes and explains the behaviour of economic subjects in real life. Behavioural economists afterwards attempt to apply the acquired knowledge to predict the actions of individuals. This gives a new dimension to use the psychological determinants in the area of tax compliance and evasion. On the basis of behavioural research OECD (2010) in the document Understanding and Influencing Taxpayers' Compliance Behaviour authors summarized the factors influencing taxpayers' attitude towards tax obligations. The determinants are listed in the Table below.

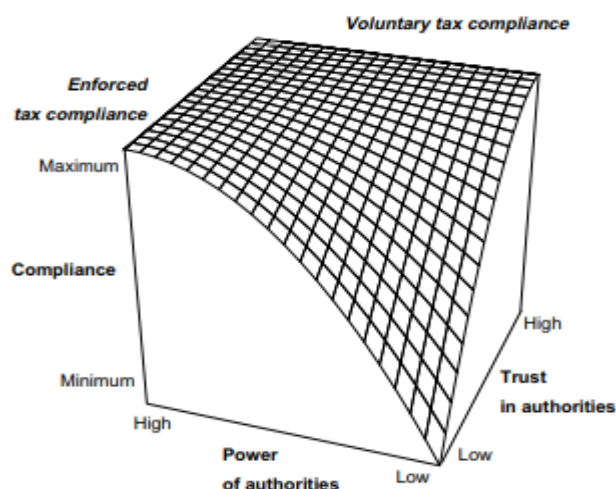
Table 1: OECD Determinants of tax behaviour

Deterrence	<ul style="list-style-type: none"> • risk detection • severity of punishment
Norms	<ul style="list-style-type: none"> • personal norms • social norms
Opportunities	<ul style="list-style-type: none"> • opportunities for evasion • compliance costs • complexity of regulation and system
Fairness	<ul style="list-style-type: none"> • tax system • tax administration
Economic factors	<ul style="list-style-type: none"> • administration costs • tax rates • business success
Interactions	<ul style="list-style-type: none"> • government policy

Source: OECD (2010)

Braithwaite (2009) considers deterrence tax politik to be device, since it may incite taxpayer aversion to oppression. Social norms are presented as patterns of behaviour that represent certain behaviour of members of the same social group and these are reflected in tax laws and tax morale (Frey & Torgler, 2007). Many studies show that high social norms have stronger effect on tax compliance than deference strategies (Braithwaite, 2009); (Hofmann, et.al, 2008). In countries like Estonia, Switzerland or Poland the electronic platform has been created to administrated tax return more efficiently (OECD, 2010). Braithwaite (2009) points out the importance of mutual trust and cooperation between taxpayers and tax authorities. Theory based on interactions between tax administrators and taxpayers that determines the trust of taxpayers towards tax regulations is model created by Kirchler, Hoelzl and Wahl (2008), known as the slippery slope. They pointed out the dependence between the degree of trust in the authority, the power of authority and forced or voluntary compliance towards tax regulations through the graphical three-dimensional model (see Figure 1). Their framework points out the close connections between these dimensions. The slippery slope model declares assumption that voluntary compliance with tax rules depends on trust in authority, in what case taxpayers are willing to pay taxes honestly and spontaneously. On the other hand, where there is a low level of trust in the authority, it is necessary to enforce tax compliance through the power of authorities. The good example of trust in authorities and consequent compliance to contribute their share is present in Switzerland (Feld & Frey, 2005).

Figure1: The slippery slope model



Source: Kirchler, Hoelzl and Wahl (2008)

3. Data and Methodology

The empirical part of the paper is devoted to research of tax compliance behaviour among citizens of Slovak Republic, defining the objectives by methods of research, the description of conducted survey and subsequent evaluations based on the theory of taxpayer's compliance behaviour, the dependence between the degree of trust in tax authority and the attitudes of taxpayers to the paying taxes, the determination of selected factors influencing compliance behaviour and overall description of taxpayers attitudes towards tax compliance and tax evasion.

Table 2: Descriptive statistics of participants

	Number	Percentage
Age		
20 – 29	51	41,5%
30 – 39	29	23,6%
40 – 60	34	27,6%
60+	9	7,3%
Gender		
Man	46	37,4%
Woman	77	62,6%
Social status		
Student	26	21,1%
Full-time employed	62	50,4%
Part-time employed	3	2,4%
Self-employed	21	17,1%
Retired	4	3,3%
Other (maternity leave...)	7	5,7%
Education		
Secondary education	35	28,5%
Bachelor degree or equivalent	26	21,1%
Master degree or equivalent	55	44,7%
Higher level of education	7	5,7%

Source: Dissertation Tomečková,D. (2018)

The Table 2 provides an overview of age, gender, social status and level of education together with percentage portion of the total amount of all participants. In the survey the answers of 123 respondents were collected. The Table 2 provides an overview of age, gender, social status and level of education together with percentage portion of the total amount of all participants.

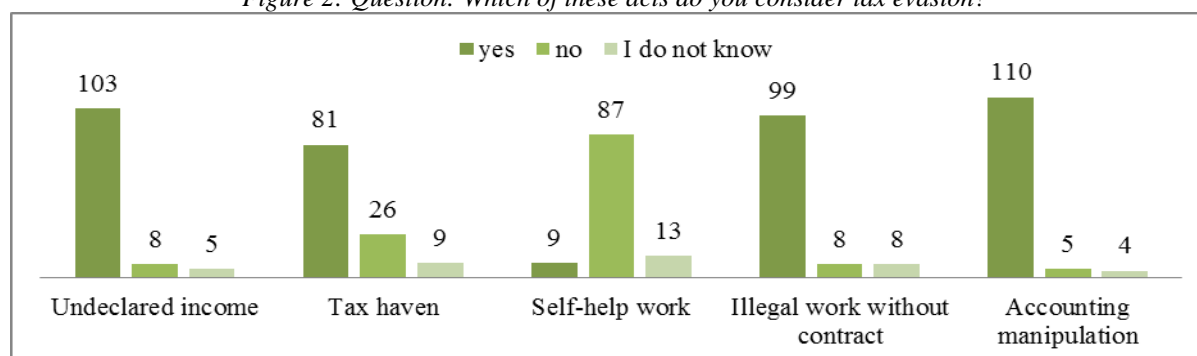
The data from questionnaire was processed using mathematical and statistical methods. For better clarity, the results are expressed using tables and figures. For research purposes, there are several research methods. The questionnaire method was considered as the most favourable alternative. The advantage of using this method is the anonymity of the respondents since the sensitivity of the questions in the questionnaire.

4. Results and Discussion

Within fields as diverse as psychology, economics, sociology, and law, tax researchers have become increasingly interested in how societal norms influence individuals to comply (or not) with tax laws. However, it is not always apparent how these insights may contribute to tax administration and tax policy. This paper will present an overview of current research on social norms and tax compliance, bringing together results from a variety of research traditions (Bobek et al., 2007). *The main aim of the conducted research of the paper is to identify respondents' attitudes towards tax compliance to define determinants of tax compliance behaviour.* As a part of this section the research questions have been set together with expected hypotheses. Question 1: What is the attitude of citizens of Slovak republic towards tax evasion and tax avoidance? Question 2: What factors affect mostly the tax compliance of taxpayers in Slovak Republic? Question 3: Is there a connection between the tax compliance and trust towards the government? On individual issues:

Question 1: In order to define the attitude towards the tax avoidance and evasion it is necessary to know what actions are considered as tax evasion among respondents to better understand their attitudes to evading taxes. All of these acts are considered as tax evasion, in either legal or illegal form. Respondents were clear about unreported income, illegal work without contract, tax havens and manipulations in accounting and considered these as serious tax evasion behaviour as can be seen in the Figure 2. On the other hand self-help work was not found as harmful among more than 70% of all participants.

Figure 2: Question: Which of these acts do you consider tax evasion?



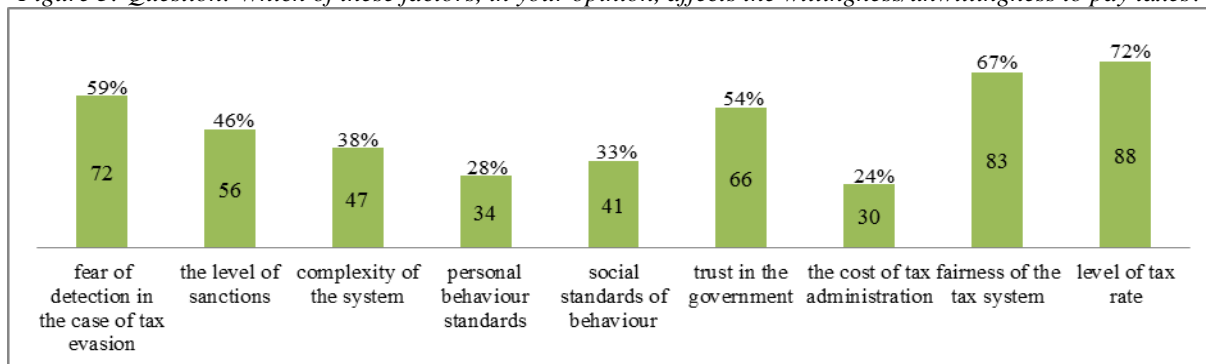
Source: own processing

Similar studies which confirmed that analysis matters for asset pricing too (Sedliačiková et al., 2015).

Question 2: *Factors of tax compliance behaviours.*

The last questions were devoted to other factors that affect tax compliance behaviour. The results are expressed in the Figure 2. Most of the respondents found level of tax rates, fairness of the tax system and fear of detection as the most influencing.

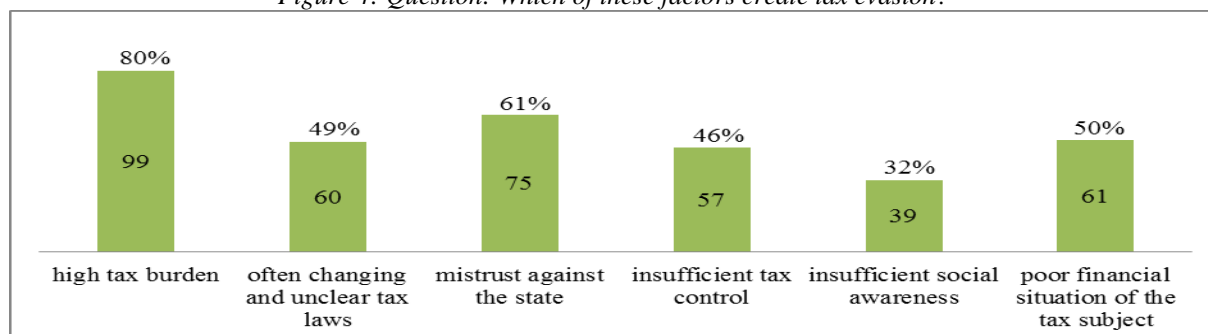
Figure 3: *Question: Which of these factors, in your opinion, affects the willingness/unwillingness to pay taxes?*



Source: own processing

Question 3: As can be seen in the Figure 4, respondents considered high tax burden together with mistrust against state, represented by politicians the factors that mostly support the creation on tax evasion. These results are also supported by the study conducted by Slovak Business Agency (2017) oriented on entrepreneurs in Slovak Republic. According to this study the problems are caused by high burden of taxes and statutory deductions among financial burden. Based on this study, the model company in Slovak republic pays 51,6% of its business profit on taxes and other statutory deductions, what is significantly higher than the average of the EU 42,9% and slightly above average of V4 (Czech Republic, Slovak Republic, Hungary and Poland) reaching the level 47,1%. Higher labour costs of the model company operating in the countries of the EU are only in France (53,5%), Belgium (48,8%) and Italy (43,4%). Slovak Republic (39,7%) is therefore well above the EU average (28,3%) and also above the V4 average (34,3%). In Slovak Republic, there is a negative development, especially in the volume of the social contributions and other statutory deductions and therefore cost of labour. While in the EU, a model enterprise has to spend only 28,3% of its net profit to cover the deductions, in Slovak Republic, this share reaches up to 39,7%. In this qualitative survey on the sample of 14 enterprises, the most significant financial burden was experienced by respondents in the following areas: social contributions and statutory deductions burden that increases cost of labour, tax burden, and number of fees, registration and administrative obligations and the costs of monitoring changes in legislation. Respondents considered high tax burden together that mostly support the creation on tax evasion. According to this study the problems are caused by high burden of taxes and statutory deductions among financial burden. Based on study Slovak Business Agency, the model company in Slovak republic pays 51,6% of its business profit on taxes and other statutory deductions, what is significantly higher than the average of the EU 42,9%

Figure 4: Question: Which of these factors create tax evasion?



Source: own processing

5. Conclusion

On basis of the determined scientific objective, we decided to use quantitative methods in the empirical part of the research (Minárová et al., 2015). The hypotheses based on the set of research questions were formed in line with the findings and are stated below:

H1: Tax avoidance or tax evasion cannot be justifiable.

H2: Tax compliance is affected by the levels of tax rate and the fairness of the tax system.

H3: The tax compliance would increase with lower level of tax rates.

Tax evasion is an economic phenomenon that is old, as old taxes are. They represent a very complicated economic phenomenon that is part of national economies not only of developing countries but also of the most advanced economies of the world. This is also supported by the finding of the European Commission, which loses more than three trillion € every year on tax evasion, and currently it cannot be completely eliminated by any of the countries in the world. There is still a great uncertainty and ambiguity about tax evasion. Based on the answers, it can be concluded that taxpayers' attitude towards paying taxes is not negative however they would be willing to pay taxes under certain circumstances. These circumstances include, for example, a higher level of public services, a fair tax system, or the higher level of trust to the political system. On the other hand, there are factors that cause tax evasion. The most important reason is the high level of the tax burden and other statutory deductions, what, according to the respondents, is disproportionately high, as is confirmed by the study conducted by Slovak Business Agency (2017). Development of world management is influenced by globalisation, which currently stresses importance of intellectual assets in a company as a tool to increase competitive advantage of the company on a market. In order to achieve business success it is not sufficient enough have properties, land and machines, that means tangible assets. With an over going globalisation, there are needed new technologies, know-how, ideas, unusual solutions carried by human capital. Creative human element, visionaries, problem solvers provide creative development potential (Gubová & Richnák, 2016).

Acknowledgment

The presented working paper is the output of the scientific grants VEGA n. 1/0184/16 Elimination of international double taxation of business entities and its impact on the development of business and investment in the Slovak Republic.

References

- [1] Alm, J., McClelland, G. H. and Schulze, W. D. (1992). Why do people pay taxes? *Journal of Public Economics*, 48, no. 1, pp. 21-38.
- [2] Bobek D.D., Roberts R.W. and Sweeney J.T. (2007). The Social Norms of Tax Compliance: Evidence from Australia, Singapore, and the United States. *Journal of Business Ethics*, 74, no. 1, pp. 49-64.
- [3] Braithwaite, V. (2009). *Defiance in Taxation and Governance: Resisting and Dismissing Authority in a Democracy*. Cheltenham: Edward Elgar Publishing Limited, pp. 384.
- [4] Frey, B. S. and Torgler, B. (2007). Tax morale and conditional cooperation. *Journal of Comparative Economics*, pp. 139-159.
- [5] Giles D. E. A. (1998). Measuring the hidden economy: implications for econometric modelling. *The Economic Journal*, pp. 370–380.
- [6] Gravelle, J. G. (2009) Tax Havens: International Tax Avoidance and Evasion. *National Tax Journal*, 62, no. 4, pp. 727-753.
- [7] Gubová, K. and Richnák, P. (2016). Development and use of intangible in the conditions of globalization. *Globalization And Its Socio-Economic Consequences, Proceedings of the 16Th International Scientific Conference*, Rajecké Teplice, Slovak Republic, pp. 572-579.
- [8] Hofmann, E., Hoelzl, E. and Kirchler, E. (2008). Preconditions of Voluntary Tax Compliance: Knowledge and Evaluation of Taxation, Norms, Fairness, and Motivation to Cooperate. *Zeitschrift fur Psychologie*, vol. 216, no. 4, pp. 209–217.
- [9] Kirchler, E., Hoelzl, E. and Wahl, I. (2008). Enforced versus voluntary tax compliance: The "slippery slope" framework. *Journal of Economic Psychology*, vol. 29, 2, pp. 210–225.
- [10] Lang, O., Nöhrbaß, K. H., and Stahl, K. (1997). On income tax avoidance: the case of German. *Journal of Public Economics*, vol. 66, 2, pp. 327-347.
- [11] Minárová, M., Malá, D. and Sedliačiková, M. (2015). Emotional intelligence of managers, *Procedia - economics and finance. Proceedings from the 4th World conference on business, economics and management, WCBEM*, vol. 26, pp. 1119-1123.
- [12] Mohamed, M. (2012). Estimating the Underground Economy from the Tax Gap: The Case of Malaysia. *Malaysian Journal of Economic Studies*, vol. 49, no. 2, pp. 91–109.
- [13] Orviska, M. and Hudson, J. (2002). Tax Evasion, Civic Duty and the Law Abiding Citizen. *European Journal of Political Economy*, pp. 83-102.
- [14] Sedliačiková, M., Vacek, V. and Sopková, E. (2015). How Slovak small and medium enterprises perceive financial controlling. *Procedia - economics and finance. 4th World conference on business, economics and management, WCBEM*, vol. 26, p. 82-85.
- [15] Simser, J. (2008). Tax evasion and avoidance typologies. *Journal of Money Laundering Control*, vol. 11, no. 2, pp. 123-134.
- [16] Yitzhaki, S. (1974). A note on income tax evasion: a theoretical analysis. *Journal of Public Economics*, vol. 3, no. 2, pp. 201-202.

IDEAL EQUITY CURVE AS A TOOL OF PORTFOLIO RISK MANAGEMENT IN THE TIME OF FINANCIAL GLOBALIZATION

Tomáš Virdzek^{1,a}, Peter Kubaška^{2,b,*} and Vladimír Úradníček^{3,c}

¹Matej Bel University in Banská Bystrica, Faculty of Economics, Research and Innovation Centre,
Tajovského 10, 975 90 Banská Bystrica, Slovakia

^{2,3}Matej Bel University in Banská Bystrica, Faculty of Economics, Department of Quantitative
Methods and Information Systems, Tajovského 10, 975 90 Banská Bystrica, Slovakia

^atomas.virdzek@umb.sk, ^bpeter.kubaska@umb.sk, ^cvladimir.uradnicek@umb.sk

*Corresponding author

Abstract. On the one hand, globalization of capital markets brings availability of financial products and the potential for return even to the smallest investors. On the other hand, globalization also showed itself in several financial crises, which had a significant risk effect for the investor. One possible tool to protect investor's capital against bad results is diversification where an investor spreads their capital among more investments. However, the problem of diversification occurs if the investor selects to his portfolio only loss ones. In this situation, the only result is loss. In our research, we solved this theoretical and practical issue by the Ideal Equity Curve (IEC). The IEC is only a hypothetical benchmark. By the IEC we compare the minimum needed level of the future portfolio performance with the performance of each investment. In simple terms, the IEC decision-making algorithm allows those instruments to the final portfolio that outperform the IEC in time. By this "active diversification", the investor assigns higher weights to the instruments that outperform the IEC and excludes those that underperform the IEC. In this paper, we represent the concept of the IEC and the way it is used in the portfolio construction. The aim of the paper is to evaluate the performance of several portfolios constructed by the concept of the IEC versus naive diversification, in terms of highly correlated markets and to demonstrate that the IEC can bring investors not only an appropriate form of capital protection but also the potential to maximize their profits.

Keywords: financial globalization, portfolio weights, naive diversification, active diversification, ideal equity curve

JEL Classification: G11, G17, G32

1. Introduction

The term of globalization is linked to a numerous definition, but in general globalization is perceived as a complex process. For example, globalization is understood as a process characterized by the building of strong regional communities, the emergence of a virtual and global economy and the creation of a global market with a high level of completeness. (Majtan & Nemecková, 2013) Globalization is therefore a complicated process that has persisted in society for a long time and it is reflected in everyday aspects of life. The notion of

globalization in the economic sense includes flows of goods and services across borders, international capital flows, tariff and trade barriers, immigration, and the spread of technology and knowledge across borders. (Jenatabadi & Samini, 2004)

Globalization is associated with positive and negative effects. The main positive effects include the opportunity for poor countries to develop in extremely fast conditions (Marosevic & Bosnjak, 2018. According to Burlacu et al. (2018) positive effects can be seen in:

- reducing the isolation of poor countries,
- expanding the information society and improving access to information,
- increasing the speed of business, financial and technological operations.

Other benefit of globalization includes the fact that it integrates people into the global community and increases the efficiency of all economic activity on a planetary level.

The greatest risk of globalization is that the world becomes increasingly dependent on the prosperity of the US economy. Slowing development of one economy in environment of globalized economy can cause a recession to a transnational level. (Jenicek, 2012) An example of this fact can be seen in economic crisis (2007). Local problem of one country grew to the level of the global economic crisis. Negatives of globalization therefore Burlacu et al. (2018) sees in the following points:

- security deficit, poverty, personal insecurity and migration are becoming a global threat,
- there are no national solutions to transnational issues,
- demographic deficit: export of human resources and intellectual potential,
- ecological problem: ecology is deteriorating with the growth of the global economy,
- reducing the number of jobs (replacing the human labor force with technologies).

1.1. Globalization on the capital market

Globalization also appears itself strongly in the capital markets environment. Its consequences can be observed especially in turbulent times when stock indexes slump and they are synchronized across multiple local capital markets. The table below presents the relationship between the monthly returns of the seven "Modern index strategy" stock indices from MSCI Inc. in two periods.

Table 1: Correlation matrix of two periods under the review

Financial crisis (Q2 2008 - Q4 2009) ²⁷							
	<i>retChina</i>	<i>retACWI</i>	<i>retUSA</i>	<i>retWorld</i>	<i>retEAFE</i>	<i>retEM</i>	<i>retEurope</i>
<i>retChina</i>	1,00						
<i>retACWI</i>	0,84	1,00					
<i>retUSA</i>	0,76	0,98	1,00				
<i>retWorld</i>	0,83	1,00	0,98	1,00			
<i>retEAFE</i>	0,86	0,99	0,94	0,99	1,00		
<i>retEM</i>	0,91	0,96	0,90	0,95	0,95	1,00	
<i>retEurope</i>	0,84	0,99	0,95	0,99	1,00	0,95	1,00

²⁷ To define the start and end of the economic crisis we used GDP-Based Recession Indicator Index (Available online at the Federal Reserve Bank website in St. Louis <https://fred.stlouisfed.org/series/JHGDPRINDX>).

From financial crisis – Present (Q2 2008 - Q2 2018)							
	<i>retChina</i>	<i>retACWI</i>	<i>retUSA</i>	<i>retWorld</i>	<i>retEAFE</i>	<i>retEM</i>	<i>retEurope</i>
<i>retChina</i>	1,00						
<i>retACWI</i>	0,77	1,00					
<i>retUSA</i>	0,67	0,96	1,00				
<i>retWorld</i>	0,73	1,00	0,97	1,00			
<i>retEAFE</i>	0,75	0,97	0,89	0,97	1,00		
<i>retEM</i>	0,88	0,91	0,81	0,88	0,88	1,00	
<i>retEurope</i>	0,72	0,96	0,88	0,96	0,99	0,86	1,00

Source: Authors

Pearson correlation coefficients show a relatively strong positive linear relationship in both matrices. This fact points to the mutual global interconnection of stock markets. Correlation matrices also point at fact, that during the financial crisis there are higher correlation coefficients between all analyzed index returns. High volatility of capital markets is therefore closely linked to their correlation. (Sandoval & Franca, 2011) Increased correlation at the time of the financial crisis was also investigated by Moldavan (2011). By the regression analyzes, he follows two time periods: the pre-crisis 2003-2006 and the crisis period 2007-2010. His results point to the fact that in the time of financial crisis there is a higher degree of interconnection of the capital markets. Thus, synchronized stock market meltdowns can be problems also for diversified portfolios.

1.2. Naive diversification versus active diversification

The principle of diversification consists in redistributing the investor's capital into the various instruments. The basic capital distribution approach is naive diversification. The principle of this kind of diversification means, that the investor evenly distributes his capital into the financial instruments. This approach is also understood as passive, because naive diversification concept does not require a deeper analysis of assets included in the portfolio. Conversely, the concept of active diversification requires a deeper analysis of assets and selects only potentially better assets into the portfolio. The goal of an active approach is to overcome the passive approach. The main question is whether these active approaches are capable to overcome the passive diversification of capital.

DeMiguel et al. (2009) compared 14 different diversification models with 1 / N approach. All these models were constructed with regular portfolio rebalancing. Author's results point to the fact that none of 14 diversification models was consistently better than naive diversification in terms of Sharpe ratio. This fact was due to author's opinion caused by estimation error in parameters. Their results are confirmed by Allena et al. (2016). By analyzing portfolios created from European indices, these authors did not confirm the higher performance of actively diversified portfolios over the naive diversification performance. Authors Hwang et al. (2013) also tested the performance of naive diversification compared to the optimal portfolio. Like DeMiguel et al. (2009), they demonstrated that the naive diversification overcame by its performance the optimal portfolio. They argue that the portfolio created on the base of naive diversification is characterized by increased exposure in the left tail. It means that such a portfolio tends to have not only a negative coefficient of skewness, but also an increased positive coefficient of kurtosis compared to normal distribution. Statistical data has rather concaved properties, which again confirms the fact, that naive diversification tends to overcome the optimal portfolio. The last factor that results in an

increase in performance is associated with the number of assets held in the portfolio. A higher number of assets in the portfolio results in an increase the characteristics in the naive diversification. According to Tu & Zhou (2011) Markowitz's modern theory of portfolio and all its extensions lag behind the principle, what is in line with the results of previous authors. The authors understood the concept of total portfolio diversification as a combination of principle with four other models. Ultimately, the authors achieved better results of the risk-yield profile compared to the principle.

While previous authors deny the ability of active diversification to overcome the passive performance, Kritzman & Turkington (2010) points to the opposite. Using estimates of expected returns, volatility, and correlations in various applications, they pointed out that optimized portfolios achieve higher Sharpe ratios than naive diversification. In their opinion, higher naive diversification performance results from incorrect assumptions (short time sample, performance estimates). Performance estimates can be calculated for example by stochastic calculus. According to Klietk et al. (2014) stochastic calculus is an essential part of description of relations and changes in the present world of finance and it is mostly used to simulate different scenarios of development of prices and yields of financial assets.

2. Data and methodology

The aim of the paper is to evaluate the performance of several portfolios constructed by the concept of the ideal equity curve (explained below) versus naive diversification in terms of highly correlated markets and to demonstrate that the ideal equity curve can bring to investors not only an appropriate form of capital protection but also the potential to maximize their profits.

We chose 7 different stock indices from MSCI Inc. as a representative of stock investments in portfolios (MSCI China, MSCI ACWI, MSCI USA, MSCI World, MSCI EAFE, MSCI EM and MSCI Europe). As a representative of the bonds, we use the ETF SHY (iShares 1-3 Year Treasury Bond ETF) in the portfolios. We work with their monthly closing prices (in USD) from 12/31/1992 to 8/31/2018. Monthly closing prices for SHY are only available from its launch (2002), so we have been simulating data from the previous period²⁸.

Portfolios constructed by the ideal equity curve are evaluated against naive diversification. This benchmark is also a portfolio that consists of 50% stock investment (7 stock indices) and 50% bond investment (SHY). We evaluate performance through three parameters: final return (FR), maximum drawdown²⁹ (MaxDD), and recovery factor³⁰ (RF).

The 1992-2002 time period is divided into 3 scenarios. In the first scenario, we are looking at a hypothetical investor who invests from July 31, 2000 (the peak of stock indices before the .COM bubble crash) to August 31, 2018. The second scenario represents a hypothetical investor who has been investing from November 30, 2007 (the peak in the stock

²⁸ For the years 1992-2002, we simulated bond curve via the Fabozzi and Modigliani (2002) indexing formula. Data of bond yields are available on the Federal Reserve Bank of St. Louis website.

²⁹ Drawdown – is the largest % difference between the local maximum and minimum over the observed period. It expresses the largest percentage decline in the value of a fund or financial instrument over time.

³⁰ Recovery Factor – is calculated as the ratio of the final return (%) and the absolute value of the maximum drawdown over observed time (%). This indicator shows how many return units the investor earned for 1 unit of maximum risk in form of the largest % loss he had to “survive” as an investor in the past.

market before the financial crisis) to August 31, 2018. Both hypothetical investors invested in the absolute peaks of stock markets, but they diversified their portfolios at least between the two classes of assets and in stock part they used also regional diversification. The third scenario represents the investment period from 12/31/1992 to 8/31/2018 (the whole dataset).

We used the Microsoft Excel 2016 program in our research. The methods used in the paper are mostly back testing and historical simulation.

The ideal equity curve (IEC) is our own idea. It is a curve that represents the condition of a hypothetical and ideal asset over time. A hypothetical asset may be that which only grows at the same rate and without any volatility (exponential curve), or that which never grows or falls and has no volatility (straight line). Investor does not gain any returns, but he also never gains negative returns. From this point of view, IEC is therefore "ideal" and only theoretical, so investor cannot invest in it. However, the IEC concept may be helpful in asset selecting process in portfolio. The investor will never know the future performance of portfolio assets, but he can have minimum performance requirements on these assets. If assets do not comply with requirements, they are sold from the final portfolio. The additional capital can be invested in those assets which comply with requirements. According to our findings, IEC can be used differently for active diversification, but in this paper, we use IEC as a tool which sets requirements on assets. We only require that assets cannot have negative final returns ($<0\%$) at the fixed period. We set this period on the level of 1 year, but this parameter can be set differently e.g. also for the whole investment period.

The creation of stock indices portfolio using IEC is realized as follows. Each of the seven selected indices closes each year (December 31) at a certain value. These values serve them as their main comparator level for the next 12 months. If in January one of the indices closes above its comparator level for that year, the index is included to the final portfolio in February. Consequently, if the close price of the index does not fall below comparator level for 11 months, it remains in the portfolio until the end of December when it is sold out from the portfolio. The testing process is then repeated every year in January for each index and new comparator level. If the index is added to the portfolio in February and, for example, in July close price of the index fall below its comparator level, the index is excluded from the portfolio next month. And vice versa, if the index outperforms its comparator level over a year, the index is included into the portfolio next month. The IEC concept in active diversification approach causes that in one year there may be all seven indices in the portfolio but another year there can be only 2 indices in the portfolio. But in this case, there is a question how to deal with that situation.

We decided to test two different approaches. Firstly, we assume that the ratio between bond and index component is fixed and unchanged. This means that if only two indices are included to the index part of portfolio, the investment will be exactly 25% to each of 2 indices (i.e. $2 * 25\% = 50\%$). In terms of active diversification, only the weights of stock indices listed in the portfolio are changed. In the second approach, we set fixed 50% as a minimum level of the bond component exposure. In the case of only 2 indices (out of 7), the aggregate exposures of the portfolio to the indices would be only $50\% / 7 * 2 = 14.29\%$. The remaining difference would be invested in bonds (85.71% together).

Table 2: Analyzed strategies

Code of strategy	Description of strategy
D/IEC	Fixed investment ratio between bond and stocks index components = 50%
Min D/IEC	Minimum exposure in bond component = 50%
Stock or Bonds	Bond component forms an addition to the current percentage of stock indexes
Naive 100%	Naive (passive) diversification (100% stock indices)
Naive 50%	Naive (passive) diversification (50% stock indices and 50% bonds)

Source: Authors

3. Results and discussion

We processed the most important results of our research into a simple summary table below (Table 3). In the first and third scenario, the best portfolio is Min D/IEC in term of all performance parameters. In the second scenario, the winner is D/IEC portfolio. However, it is important that both portfolios that are using the IEC concept are much better than naive (passive) diversification, in all 3 scenarios.

The presented results also show that the IEC concept can bring to investors not only an appropriate form of capital protection but also the potential to maximize their profits even in the environment of highly correlated markets. By using the IEC concept the hypothetical investor who invested 2 times “unlucky” at the peak of the stock markets, was able to gain not only more profits, but even a lower (more acceptable) maximum drawdown over time. It is interesting that in the longest testing period (3rd scenario) the Min D/IEC strategy outperformed (in term of final profit) the naive diversification which is the portfolio without any representation of the bond component, so it is 100% equity (Naive 100% portfolio).

Table 3: Performance parameters of constructed portfolios in 3 scenarios

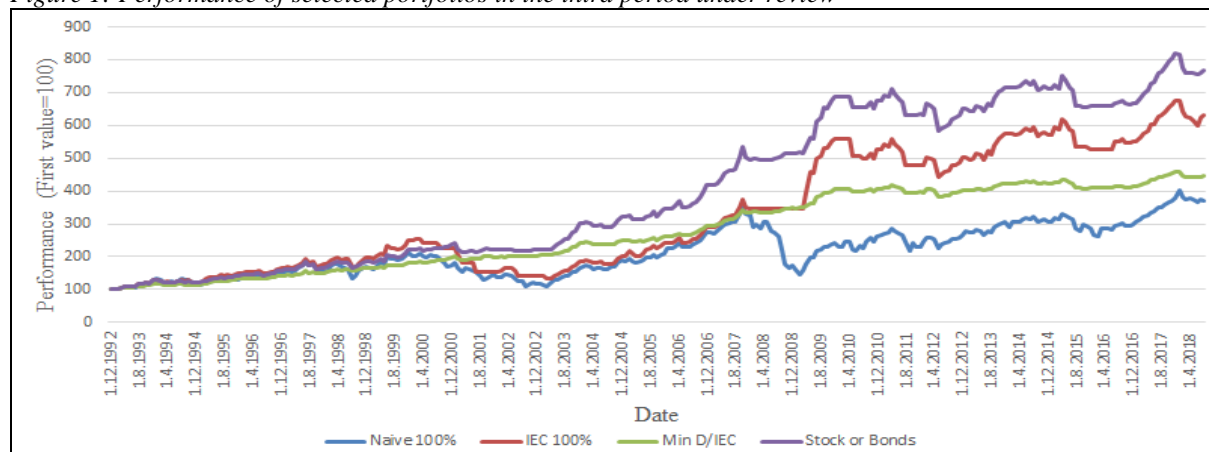
	1st scenario 7/31/2000 – 8/31/2018			2nd scenario 11/30/2007 – 8/31/2018			3rd scenario 12/31/1992 – 8/31/2018		
	MaxDD	FR	RF	MaxDD	FR	RF	MaxDD	FR	RF
D/IEC	-17,50%	114,13%	6,52	-10,32%	42,49%	4,12	-17,95%	315,76%	17,59
Min D/IEC	-8,89%	139,89%	15,74	-8,89%	30,31%	3,41	-8,89%	346,53%	38,99
Naive 50%	-32,01%	82,51%	2,58	-32,01%	15,67%	0,49	-32,01%	230,56%	7,2
Naive 100%	-58,45%	78,48%	1,34	-58,45%	5,17%	0,09	-58,45%	269,18%	4,61
IEC100%	-43,84%	162,68%	3,71	-21,09%	68,99%	3,27	-46,91%	531,28%	11,32
Stocks or Bonds	-18,00%	242,81%	13,49	-18,00%	43,67%	2,42	-18,00%	666,55%	37,04

Source: Authors

Our results lead us to the question if the IEC concept can show similar results in different approaches than 50% bond combination. Thus, if we do not add any bond ETFs to the portfolio, so only stock indices (IEC 100%) could be included in the portfolio, or if the portfolio could contain maximum of 100% of the bond or 100% of the stock indices (Stocks or Bonds). The results of these strategies are also in Table 3. Results points that in the two longest periods under review (Scenario 1 and 3), the winner is Stocks or Bonds strategy (in term of final return). This strategy also uses the IEC concept and can hold index exposure of 100%. If any indices (or all indices) are sold out from the portfolio, then the cash part of portfolio is replaced by bond investment. The results are logical. On the one hand the D/IEC

and the Min D/IEC portfolios are more conservative strategies because of their required exposure to bonds, on the other side the riskier profile of the IEC100% and Stocks or Bonds strategies brought a higher final return. But there is a higher volatility in the equity curve of IEC100% and Stock or Bonds strategies (Figure 1) and a deterioration of 2 other performance parameters (Table 3).

Figure 1: Performance of selected portfolios in the third period under review



Source: Authors

4. Conclusion

Pearson correlation coefficients demonstrate the mutual global relationship of stock markets. In time of financial crisis these correlation coefficients tend to be stronger. Thus, synchronized fall in stock indices point to a potential problem for diversified portfolios or for naive diversification.

In this paper we deal with active diversification approach and with the ideal equity curve concept. We explore how implementation of the ideal equity curve reacts to the performance of constructed portfolios. We used IEC concept as a tool of a portfolio and risk management in times of globalized financial markets in 3 different periods under review. First two periods represent a hypothetical investor who invested at the peaks of stock market just before the burst of the .COM bubble and before the latest financial and economic crisis. The third period tests the IEC concept from 12/31/1992 to 8/31/2018. In the simulation tests, we used one-year time reset of IEC and created two basic strategies. We calculate with a require bond exposure in these strategies. Our portfolios were evaluated in term of three performance parameters - final return, maximum drawdown and recovery factor. All these parameters were compared with the benchmark, which was a naive (passive) diversification.

Our results show that both portfolios constructed by IEC achieved better performance parameters than the naive diversification in all 3 scenarios. We conclude that the appropriate use of IEC can bring to investors not only an appropriate form of capital protection but also the potential to maximize their profits, even in the context of highly correlated markets.

We add that in our calculations we worked with a hypothetical investment in stock indices, which is of course not possible in the reality. Today, it can be done through the ETFs, which copy the performance of selected indices, but these ETF do not have data history that was required to our portfolio testing. We also did not consider the existence of transaction costs

that would in practice be associated with buys and sales assets in portfolios. These transaction cost would reduce the final returns of strategies.

References

- [1] Allen, D. E., McAller, M., Powell, R. E. and Singh, A.K. (2016). Down-Side Risk Metrics as Portfolio Diversification Strategies across the Global Financial Crisis. *Journal of Risk and Financial Management*, vol. 9, pp. 1-18.
- [2] Burlacu, S., Gutu, C. and Matei, F. O. (2018). Globalisation – Pros and Cons. *Quality-Access to Success*, vol. 19, pp. 122-125.
- [3] DeMiguel, V., Garlappi, L. and Uppal, R. (2009). Optimal Versus Naive Diversification: How Inefficient is the 1/N Portfolio Strategy? *Review of Financial Studies*, vol. 22, pp. 1915-1953.
- [4] Fabozzi, F. J. and Modigliani, F. (2002). *Capital Markets: Institutions and Instruments*, 2nd ed. New Jersey, U.S.: Prentice Hall.
- [5] GDP-Based Recession Indicator Index. (2018). Federal Reserve Bank. [Online]. Available: <https://fred.stlouisfed.org/series/JHGDPRINDX>
- [6] Hwang, I., Xu, S. and In, F. (2018). Naive versus optimal diversification: Tail risk and performance. *European Journal of Operational Research*, vol. 265, pp. 372-388.
- [7] Jenatabadi, H. S. and Samimi, P. (2014). Globalization and Economic Growth: Empirical Evidence on the Role of Complementarities. *Plos One*, vol. 9, e8782.
- [8] Jenicek, V. (2012). Globalisation - challenges, rewards, question. *Agricultural Economics-Zemedska Ekonomika*, vol. 58, pp. 275-284.
- [9] Klietnik, T., Lyakin, A. and Valaskova, K. (2014). Stochastic Calculus and Modelling in Economics and Finance. *Proceedings of 2nd International Conference on Economics and Social Science*, Shenzhen. China, pp. 161-167.
- [10] Kritzman, M., Page, S. and Turkington, D. (2010). In Defense of Optimization: The Fallacy of 1/N. *Financial Analysts Journal*, vol. 66, pp. 31-39.
- [11] Majtan, S. and Nemeckova, S. (2013). Globalisation – The Expectations and Reality. *Proceedings of Conference on Current Problems of the Corporate Sector*, Bratislava, Slovakia, pp. 355-360.
- [12] Marosevic, K. and Bosnjak, D. (2018). Regional Development and Glocalisation: Theoretical Framework. *Ekonomski Vjesnik*, vol. 31, pp. 201-213.
- [13] Modern Index Strategy. (2018). [Online]. Available: <https://www.msci.com/indexes>
- [14] Moldovan, I. (2011). Stock Markets Correlation: before and during the Crisis Analysis. *Theoretical and Applied Economics*, vol. 18, pp. 111-122.
- [15] Sandoval, L. and Franca, P. I. (2011). Correlation of financial markets in times of crisis. *Physica A: Statistical Mechanics and its Applications*, vol. 391, pp. 187-208.
- [16] Tu, J. and Zhou, G. (2011). Markowitz meets Talmud: A combination of sophisticated and naive diversification strategies. *Journal of Financial Economics*, vol. 99, pp. 204-215.

ANALYSIS OF ENTERPRISES IN THE MANUFACTURING INDUSTRY USING ARTIFICIAL NEURAL STRUCTURES – KOHONEN NETWORKS

Marek Vochozka^{1,a,*}, Tomáš Krulický^{2,b}

^{1,2} Institute of Technology and Business in České Budějovice, Okružní 517/10, 370 01 České
Budějovice, Czech Republic

^avochozkam@email.cz, ^bkrulicky@mail.cstecb.cz,

*Corresponding author

Abstract. The manufacturing industry plays a very important role in the global economy. It builds on the primary sector and is also a prerequisite for the tertiary sector. In the emerging economies, most workers are concentrated in the tertiary sector. This is due to the fact, that automation is strongly promoted in the primary and secondary sectors. This reduces the need for workforce. The output of the manufacturing industry is growing year on year. As a result, the pressure on production efficiency, resource utilization is steadily increasing. The margins of companies are decreasing. Companies that do not accept this trend and will not react to it in time will not survive for a long time. The aim of the paper is to analyze enterprises in the manufacturing industry. The analysis was performed using artificial neural networks without a teacher, Kohonen Networks. This was a cluster analysis. The topology of the Kohonen maps was set at 10 x 10. Individual clusters of enterprises in the manufacturing industry were identified. Subsequently, these clusters were compared with each other. It was investigated which clusters are crucial to this industry, which annual outputs they perform and their proportion to the performance of the entire industry. The structure of the enterprises was examined in terms of the size of the individual enterprises, not the number of employees, but in terms of the realized performances. Analysis can help the state target its support to specific business segments, given their importance to the national economy.

Keywords: manufacturing industry, artificial neural networks, Kohonen networks, clusters

JEL Classification: C45, L60, M21

1. Introduction

According to Antosz and Merchan (2016), enterprise analysis is used to identify and articulate the need for changes in the functioning of organizations and facilitating this change. By making effective use of enterprise analyses, it can be ensured that the company will improve its business methods (Andekina & Rakhmetova, 2013).

Enterprise analysis can be measured in different ways. The Kohonen Networks (or Kohonen Maps) are considered to be a very attractive model. Kohonen networks are types of neural networks that can be used to group sets of data into different groups (Rowland & Vrbka, 2017). The data is grouped so that the records within the group tend to be the same and the records in the different groups are different. Many experimental results show that

Kohonen networks are very effective for assessing companies (Han & Wang, 2008). The Kohonen network consists of an input layer that is completely interconnected with the output layer and learns by self-organization, without a teacher. This network has a very wide range of uses, as it is an alternative network that is applicable to most neural network calculations. It is used mainly for audio editing, speech processing, photos, videos, security applications, and allows for the projection of high dimensional data into lower dimension data (Konečný & Trenz, 2010).

Many experts even claim that Kohonen maps are a highly universal tool. Thus, if one does not know what method to use, they can use the Kohonen network with a quiet conscience. There is no need for the author to know about the information that is being processed, and he will categorize it himself and take over (Vochozka et al., 2016).

This article deals with the analysis of enterprises in the manufacturing industry through the Kohonen Networks. Singla et al. (2018) note that the manufacturing industry is concerned with the industries involved in the production and processing of goods and accompanies either the creation of new commodities or the addition of value. A significant share of industry in developed countries is therefore the manufacturing industry. Finished products can either serve as ready-made goods for sale to customers or as intermediates used in the production process (Chryssolouris et al., 2013). The manufacturing industry uses different technologies and methods and is the main wealth-producing sector. The manufacturing industry is therefore closely related to the construction, engineering, electronics, energy, chemical, textile, food and beverage industries, etc. (Ćorić et al., 2017; Avittathur & Swamidass, 2007). The manufacturing industry has seen a number of challenges over the last four decades, including drastic changes in innovation capabilities, company strategies, transformation capabilities, etc. These challenges have prompted manufacturing organizations to adopt an innovative methodology for developing new products and to make effective use of sustainable production resources and techniques. Production plays a decisive role in the business of globally industrialized countries, but its environmental impact has become a matter of concern, requiring industry to adopt sustainable production. In other words, it's a question of how to do more with less (Bogue, 2014).

Differences between manufacturing enterprises and others are sometimes very significant, for example when it comes to differences in production and services (Piroozfar, 2013). The key difference between service companies and manufacturers is the tangibility of their output (Olibe, 2010). According to Kuruezuem (2010), the difference between businesses is that service providers create a service if the customer requires it. Processing enterprises, however, produce goods in stock with a stock level. A another difference is that the provision of services is labor-intensive and can not be easily automated. Manufacturing companies can automate many of their production processes to reduce workloads. Lee et al. (2016) note that service providers and manufacturing multinationals have different responses to location-specific characteristics when conducting foreign direct investments. Many other companies use IT to increase the value of products and services to a greater extent than manufacturers. IT departments in the service sector have a direct role to play in strategic development than in manufacturing enterprises (Klieštík et al., 2015).

The aim of the paper is to analyze the manufacturing industry in the Czech Republic through the use of Kohonen Networks. The industry leaders will be identified within the analysis.

2. Data and methods

The text follows onward from the article "Analysis of Companies operating in the manufacturing industry in the Czech Republic using Kohonen networks" (Vochozka, 2017). This paper works with the same set of data. An extension of this text is then the identification of the leaders of the manufacturing industry in the Czech Republic. The paper therefore follows a deeper analysis of previously obtained results.

The results, ie the division of individual companies into clusters of 100, will be imported into an Excel spreadsheet. Subsequently, the individual clusters will be subjected to an analysis of the absolute indicators. At this point, it is necessary to answer the question of how we should understand the term industry leader. You can select a variety of variables. Within these variables we include: 1. volume of assets, 2. volume of fixed assets, 3. amount of operating profit or loss, 4. amount of operating profit before tax.

Then we have to determine whether we are going to look for clusters that show significantly high absolute values of selected variables or, on the contrary, we will look for clusters that have the highest values on average.

In the framework of the analysis we will examine both the average values of the individual clusters and the absolute quantities. This will determine:

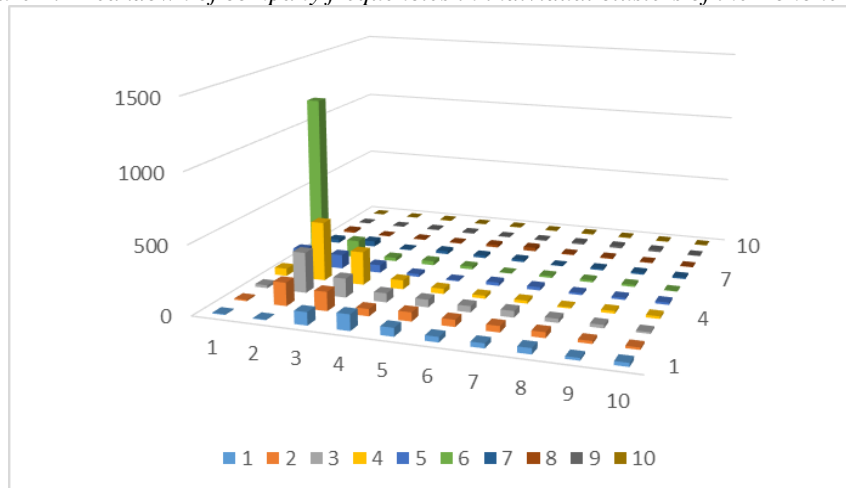
1. The most successful clusters of companies in the manufacturing industry,
2. The most successful companies in the manufacturing industry.

In the case of the analysis of absolute indicators, we will also include an evaluation of the return on assets and return on equity. Return on assets expresses an appreciation of the funds invested into companies or clusters of companies. Return on equity, among other things, demonstrates a certain attraction of individual clusters of companies for potential investors.

3. Results

Based on the applied methodology, clusters were created. The breakdown of company frequencies in each cluster of the Kohonen map is shown in Figure 1.

Figure 1: Breakdown of company frequencies in individual clusters of the Kohonen map



Source: Authors.

Figure 1 provides a three-dimensional view of the acquired Kohonen map and the frequency of companies represented in each cluster. The figure shows that the largest number of companies is in the cluster number (6, 1). Cluster (4, 2) follows. In the imaginary third place there is cluster (3, 2). In addition, a slightly higher representation of companies can be observed in clusters (4, 3), (2, 2), (3, 3), (2, 3), (1, 4), (5, 1) and (5, 2). In other clusters, the representation of companies is significantly lower. At the same time, it is worth noting that none of the clusters of the Kohonen map are vacant.

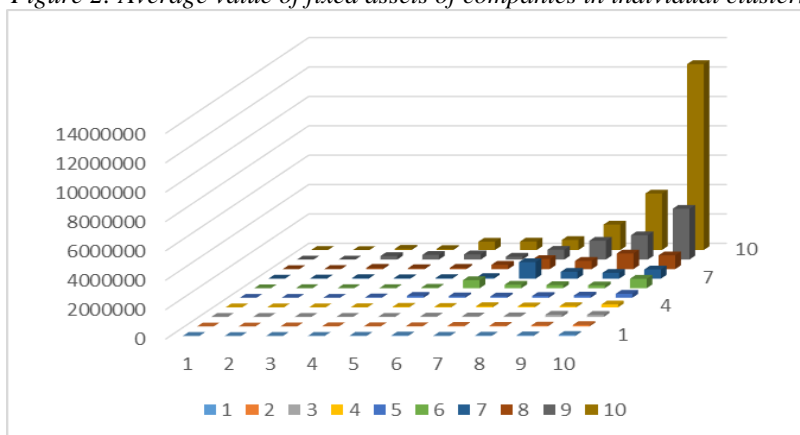
Another analysis of the companies operating in the manufacturing industry, or the analysis of the manufacturing industry itself, can be taken from two perspectives:

1. By taking the average values of the companies represented in individual clusters: this determines how the clusters are characterized and to what extent they are on average successful in their activities.
2. By looking at absolute values for individual clusters: this will give us information on how clusters affect the future development and success of the manufacturing industry in the Czech Republic.

3.1. Analysis of average values

The first characteristic we have used is the average value of the assets of companies in the same cluster (Figure 2).

Figure 2: Average value of fixed assets of companies in individual clusters



Source: Authors.

In practice, there is a marginal rate of substitution of capital for work, ie fixed assets for workers. We can say that companies with a large volume of fixed assets realize a large volume of orders with a lower number of employees. To some extent, the volume of fixed assets can predict the volume of realized revenue from its business activities. We assume, however, that it is operationally necessary asset property. In the case of manufacturing companies, we identify a cluster with an extreme average asset value. This is cluster (10, 10). There are two clusters that reach lower, yet very above average values, clusters (10, 9) and (9, 10). Even as very above average, we can include clusters (10, 8), (9, 9), (9, 8), (7, 7) and (8, 9), from the point of view of owned assets³¹.

³¹ All financial data stated in this paper is in thousands of CZK.

The other variables were drawn out similarly. An interesting indicator besides the fixed assets are also the total assets of the average company in individual clusters, the operating profit or loss in individual clusters and the profit before tax of the individual clusters.

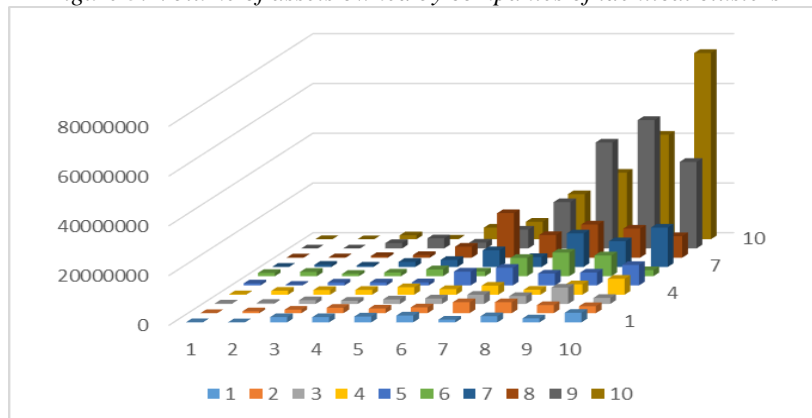
To summarize, the most successful companies of the manufacturing industry are part of clusters (9, 10), (10, 10), (8, 10) and (10, 9). Clusters which also show interesting potential are (9, 9), (9, 8), (10, 7), (8, 9), (9, 7), (8, 8), (7, 7), (7, 10), (8, 7) and (7, 8).

3.2. Analysis of absolute indicators

As stated above, the analysis of absolute indicators reveals to what extent are individual clusters of companies important for the entire manufacturing industry in the Czech Republic. We analyzed the same variables as in the case of average values.

Figure 3 provides the absolute amount of fixed assets owned by companies belonging to the same cluster.

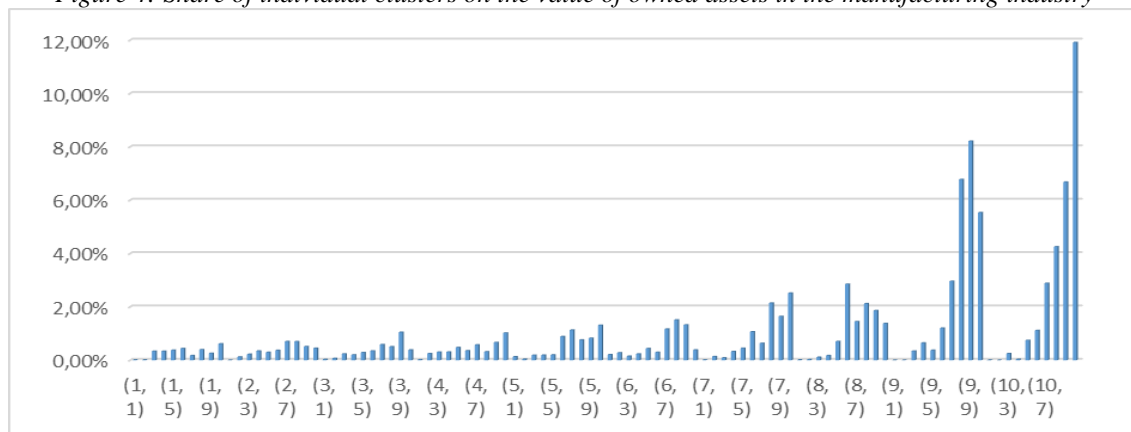
Figure 3: Volume of assets owned by companies of identical clusters



Source: Authors.

The chart shows that the largest volume of assets is owned by clusters (10, 10). Following behind are clusters (9, 9), (9, 8), (10, 9), (9, 10), (10, 8), (9, 7), (10, 7), (8, 6), (7, 10), (7, 8), (8, 8), (8, 9) and (7, 9). It is interesting to add information about the share of individual clusters on the volume of owned property (Figure 4).

Figure 4: Share of individual clusters on the value of owned assets in the manufacturing industry



Source: Authors.

The graph shows that companies of cluster (10, 10) own almost 12% of the assets in the manufacturing industry. The companies of cluster (9, 9) own more than 8% of the manufacturing industry's assets. Finally, we will also list companies of cluster (9, 8), which own more than 6.5% of all assets of the manufacturing industry in the Czech Republic as well as companies of the cluster (10, 9). We would expect very large clusters to occur in absolute quantities. But that did not happen. The cluster (6, 1) representing 1201 companies, therefore almost 24.2% of the surveyed companies, accounts for only 0.21% of the assets owned.

Similarly, other variables were examined – fixed assets, the volume of the realized profit before tax and the volume of the realized operating profit or loss.

ROE and ROA comparisons of individual clusters also appeared interesting.

4. Discussion of the results

Our analyzes clearly indicate that for the manufacturing industry are very important clusters (10, 10) and (9, 10). The cluster (10, 10) consists of only four companies. Nevertheless, it has the highest volume of assets and fixed assets. The cluster (9, 10) is made up of five companies and generates the highest volume of operating profit and profit before tax. Considering that there are only 9 companies in total, they show absolutely excellent average and absolute values. Thus, we can summarize - the most successful manufacturing companies belong to the clusters (10, 10) and (9, 10) and these clusters are the most significant clusters of the entire manufacturing industry in the Czech Republic.

Let's recall that in the manufacturing industry, a total of 5,000 companies were operating in 2015. If we take into account all the analyzes carried out, we can say that the industry leaders are representatives of the clusters (10, 10), (9, 9), (9, 8), (10, 9), (9, 10), (7, 10), (8, 8) and (7, 9). Table 1 contains a summary of the most successful clusters.

Table 1: Leaders of the Czech Manufacturing Industry in 2015

Row labels	Number of companies in cluster	Fixed assets	Assets total	Operating profit/loss	Operating profit before tax
(10, 10)	4	50609316	74829363	5260567	3880294
(9, 9)	15	24830227	51608363	5291878	5256986
(9, 8)	16	20450188	42569986	2798313	3108721
(10, 9)	6	23072046	41977742	3884495	4555909
(9, 10)	5	17288358	34771766	12110508	13317193
(7, 10)	12	7523625	15816717	2925159	2928203
(8, 8)	10	5620992	13343889	1180172	1231977
(7, 9)	13	5129684	10324883	2470980	2410826
Total	81	154524436	285242709	35922072	36690109
% of total	1,63%	50,41%	45,39%	63,82%	67,09%

Source: Authors.

The identified leader group of manufacturing industry consists of 81 companies out of a total of 4970 (who were supposed to participate in the evaluation). This represents 1.63% of all companies operating in the industry during the period under review. These 81 companies own 50.41% of all fixed assets allocated to the manufacturing industry. At the same time, they own 45.39% of all assets that are concentrated in the sector. 81 companies generate a total of

63.82% of the operating result of the entire industry, which represents 67.09% of the profit before taxes of the whole manufacturing industry in the Czech Republic.

5. Conclusion

The aim of the paper was to analyze the manufacturing industry in the Czech Republic using the Kohonen networks. In the analysis, the field leaders should have been identified.

The aim of the paper was fulfilled. The cluster analysis was performed using Kohonen networks. 4970 companies operating in the manufacturing industry in 2015 were included in 100 clusters (Kohonen's map was predefined by a topology grid of 10 x 10). All clusters were analyzed. The most crowded cluster was (6, 1). However, this cluster can not be considered as essential for the development of the manufacturing industry in the Czech Republic. On the contrary, the manufacturing industry is very much affected by companies in clusters (10, 10) and (9, 10). There are only 9 companies in these clusters. Nevertheless, their average values significantly outstrip all other companies operating in the sector. Also, the absolute figures exceed all other clusters. Still, there are other clusters that have a considerable impact on the development of the manufacturing industry in the Czech Republic. These are clusters (9, 9), (9, 8), (10, 9), (7, 10), (8, 8) and (7, 9). Overall, 81 companies can be identified as leaders in the manufacturing industry.

We can say that a relatively small group of companies has a very high impact on the development of the manufacturing industry. If we consider further, we can say that this group has a major impact on the development of the entire national economy. This is due to the nature of the manufacturing industry. Based on the result, we can deduce that the future development of the manufacturing industry can be predicted based on the results of 81 companies. Other companies, due to their number and due to their partial minor influence on the development of the sector, create some underlying influence, which will not change much in aggregate form. As a prediction tool, the analysis of 81 companies seems very positive. What is negative, however, is that the fluctuations in outputs (be it caused by any causes) may result in a fluctuation in the entire sector of the national economy.

Therefore, further research should be directed in several ways:

1. We should verify whether the representation of companies in individual clusters will change over time, especially in the clusters of the leaders of the manufacturing industry (both in numbers and in the form of specific companies – especially in the case of clusters (10, 10) and (9, 10)).
2. We should verify the ability to predict the development of the manufacturing industry based on an analysis of the leaders of the manufacturing industry.
3. We should verify how the potential fluctuations in leaders' results influenced the development of the manufacturing industry (especially with emphasis on clusters (10, 10) and (9, 10)).

References

- [1] Andekina, R. and Rakhmetova, R. (2013). Financial Analysis and Diagnostics of the Company. *Procedia Economics and Finance*, vol. 5, pp. 50-57.

- [2] Antosz, M., S. and Merchán, N. H. M. (2016). Análisis de las estrategias empresariales y de las TIC. *3C Empresa Investigación y pensamiento crítico*, vol. 5, no. 1, pp. 29-46.
- [3] Avittathur, B. and Swamidass, P. (2007). Matching plant flexibility and supplier flexibility: Lessons from small suppliers of U.S. manufacturing plants in India. *Journal of Operations Management.*, vol. 25, no. 3, pp. 717-735.
- [4] Boque, R. (2014). Sustainable manufacturing: a critical discipline for the twenty-first century. *Assembly Automation*, vol. 34, no. 2, pp. 117-122.
- [5] Ćorić, D. S., Anić, I.-D., Rajh, S. P., Rajh, E. and Kurnoga, N. (2017). Organizational buying decision approaches in manufacturing industry: developing measures and typology. *Journal of Business & Industrial Marketing*, vol. 32, no. 2, pp. 227-237.
- [6] Chryssolouris, G., Mavrikios, D. and Mourtzis, D. (2013). Manufacturing Systems. *Procedia CIRP*, vol. 7, pp. 17-24.
- [7] Han, X. and Wang, L. (2008). Stock Company Comprehensive Assessment Model Based on Kohonen Network. *Second International Conference on Genetic and Evolutionary Computing*. Hubei, China, pp. 185-188.
- [8] Klieštík, T., Majerová, J. and Lyakin, A. N. (2015). Metamorphoses and Semantics of Corporate Failures as a Basal Assumption of a Well-founded Prediction of a Corporate Financial Health. *Advances in Education Research*, vol. 86, pp. 150-154.
- [9] Konečný, V. and Trenz, O. (2010). Classification of companies with the assistance of self-learning neural networks. *Agricultural Economics*, vol. 56, no. 2, pp. 51-58.
- [10] Kuruezuem, A., Irmak, S. and Cetin, E. I. (2010). Job Involvement and Affecting Factors: A Comparative Analysis of Manufacturing and Service Industries. *Bilig*, vol. 53, pp. 183-198.
- [11] Lee, I. H., Hong, E. and Makino, S. (2016). Location decisions of inward FDI in sub-national regions of a host country: Service versus manufacturing industries. *Asia Pacific Journal of Management*, vol. 33, no. 2, pp. 343-370.
- [12] Olibe, K. (2010). The effect of R: An examination of US manufacturing and service industries. *International Journal of Production Economics*, vol. 128, no. 1, pp. 127-135.
- [13] Piroozfar, P. (2013). Advancements of mass customisation in service and manufacturing industries: lessons for the built environment: lessons for the built environment. *Mass Customisation and Personalisation in Architecture and Construction*, pp. 31-41.
- [14] Rowland, Z. and Vrbka, J. (2017). Stock price development forecasting using neural networks. *Innovative Economic Symposium 2017*. České Budějovice, Czech Republic, 8 p.
- [15] Singla, A., Ahuja, I. S. and Sethi, A. P. S. (2018). Technology push and demand pull practices for achieving sustainable development in manufacturing industries. *Journal of Manufacturing Technology Management*, vol. 29, no. 2, pp. 240-272.
- [16] Vochozka, M. (2017). Analysis of Companies operating in manufacturing industry in the Czech Republic using Kohonen networks. *Proceedings of the 17th International Scientific Conference Globalization and Its Socio-Economic Consequences*, Rajecské Teplice, Slovakia, pp. 1880-1887.
- [17] Vochozka, M., Rowland, Z., Stehel, V., Šuleř, P. and Vrbka, J. (2016). *Modelování nákladů podniku pomocí neuronových sítí*, České Budějovice.

DEVELOPMENT OF THE PRICE OF GOVERNMENT BONDS DEPENDING ON BASIC MACROECONOMIC INDICATORS

Jaromír Vrbka^{1,a}, Marek Vochozka^{2,b,*}

^{1,2} Institute of Technology and Business in České Budějovice, Okružní 517/10, 370 01 České
Budějovice, Czech Republic

^avrbka@mail.vstecb.cz, ^bvochozkam@email.cz

*Corresponding author

Abstract. Ten-year government bonds are considered a very sound investment. The return or the profit from them is entirely consistent with the aforementioned evaluation. In short – it is low. Nevertheless, not only in stable countries such as the Czech Republic and the Slovak Republic, but in every globalized world today, it is very desirable, not for the profit from the investment but for the low investment risk. In a number of models (e.g., CAPM), even the ten-year government bond interest rate is considered a risk-free constant of these models. Of course, even with these bonds the investment risk is associated, albeit minimal. The price of these bonds depends mainly on the supply (i.e. the need of the state to cover the general government deficit) and demand for bonds. Bonds are in demand by both households and businesses. However, it is questionable whether the price offered by the state is really determined by its need, or whether the relationship between the interest rate of ten-year government bonds and selected macroeconomic indicators (indicating a higher or lower external financing requirement) can be observed. The aim of the paper is to examine the relationship between interest rates of ten-year government bonds and selected macroeconomic indicators. In order to meet the objective of this contribution, the following will be used: gross domestic product, inflation and unemployment. Regression using artificial neural networks was used as the basic method. Two types of networks were used – multilayer perceptron and radial basic function using fuzzy logic.

Keywords: prediction, bonds, macroeconomic indicators, artificial neural networks

JEL Classification: C45, E27, G12

1. Introduction

A government bond is a debt security issued by the government to support government spending. Before investing in government bonds, investors have to assess several risks such as country risk, inflation risk, political risk and interest rate risk, although the government usually has a very low credit risk (Málek et al., 2007). According to Křepelová and Jablonský (2013), government bonds are securities that give the owner the right to require from the issuer payment of the outstanding amount in nominal value and regular payment of the proceeds of the bonds at a certain date. Bond issuers are individual states that need to finance state debt (Brown, 2017).

Hvozdenká (2016) notes that interest income is usually paid once a year at predetermined dates. The price at which bonds are purchased is also important for a true investment return. At a time when current bond yields are lower than bond interest yields, bonds are sold at a higher price than their face value, and vice versa. Bonds can be purchased at a price based on the current exchange rate. Akram and Das (2017), based on the findings of their research, support Keynes's view that short-term interest rates and other monetary policies have a decisive influence on long-term government bond interest rates. The fee for buying or selling a single bond is CZK 100 in the Czech Republic regardless of the number of bonds purchased or sold. Minimum investments are usually 3 bonds, i.e. CZK 30,000 (Česká spořitelna, August 2018).

As a basic method to achieve the aim of this paper, regression was utilized through Artificial Neural Networks (ANNs). Currently, artificial neural networks are widely used to address potential future problems, especially for predicting values (Pao, 2008). According to Sánchez and Melina (2015), artificial neural networks have a wide range of applications, they can be used in many areas, and because of the increasing volume of collected data they are becoming more popular. Artificial neural networks are highly suited to use for demanding operations that can not be identified analytically (Šuleř, 2017). For this reason, they are mainly used to model very difficult strategic decisions (Guresen and Kayakutlu, 2011). Neural networks can be used for regression, classification, etc. Their advantage lies in the ability to work with big data, accuracy of results, or simply use the acquired neural networks (Rowland and Vrbka, 2016). The main disadvantage of neural networks is the complexity of how to create individual models of artificial neural networks (Šuleř, 2016).

The paper also deals with basic macroeconomic indicators, mainly gross domestic product, unemployment and inflation. These indicators are used to detect and compare performance of national economies. Their development is determined by other macroeconomic indicators and they are significantly interlinked (Zotova et al., 2016). Unlike gross domestic product, unemployment or inflation represent a social phenomenon which, in addition to many negative social consequences, causes economically quantifiable losses (Vavrek et al., 2016). According to Mügge (2016), macroeconomic indicators (especially inflation, GDP growth and unemployment) are central to economic governance. Policy makers use them to assess the health of their economies. Citizens evaluate politicians' performance using these tools as benchmarks. However, these indicators define a simple definition and their formulas vary from country to country and over time.

The aim of the paper is to examine the relationship between interest rates on ten-year government bonds and selected macroeconomic indicators. In order to meet the goal of this contribution, the following will be used: Gross domestic product, inflation and unemployment. For the purpose of the contribution, we will set a hypothesis: Between ten-year government bonds and individual macroeconomic indicators, the correlation rate will be higher than 0.7.

2. Data and Methods

As noted above, gross domestic product, inflation and unemployment will be used for the analysis.

Data was taken from the Czech Statistical Office. It defines individual items as follows³²:

- "Gross Domestic Product (GDP) is a monetary expression of the total value of goods and services newly created in a given period in a given territory; is used to determine the performance of the economy." The article takes into account the GDP calculated by the production method: "The production method is calculated as the sum of the gross value added of individual institutional sectors or branches and net taxes on products (not allocated to sectors and branches). It is also a balancing item for the production account for the overall national economy, where the production side is captured on the resources side and the intermediate consumption is on the usage side. Gross value added is the difference between production and intermediate consumption. Given that production is valued at basic prices and use at market prices, the resource side for the national economy is complemented by taxes subtracted by subsidies on products." (CSO, August 2018a).
- "The inflation rate, expressed as the increase of the average annual consumer price index, represents the percentage change in the average price level for the last 12 months compared to the average of the previous 12 months." For the purpose of this contribution, it is the inflation rate, expressed always on the last day of the respective quarter." (CSO, August 2018b).
- Unemployment is expressed by the number of people without work. The figure is determined by the Czech Statistical Office through the so-called Labor Force Survey.

The ten-year government bond interest rate data was obtained from the Czech National Bank database available on its website (CNB, August 2018). Gross domestic product is reported in billions of CZK, inflation in percentage, unemployment in non-working individuals, and ten-year government bonds in percentage. All variables are available for individual quarters in the period from 1st quarter of 2000 to 1st quarter of 2018. For all calculations, we will use DELL's Statistica software in version 12.0. We will perform an analysis using two methods. In the first case, we create a correlation matrix. We will examine the interdependence of all the variables used. We will also use artificial neural networks, which will also examine the dependency of bond interest rates on selected macroeconomic variables. At the same time, however, we will align the time series with multilayer perceptron networks, or eventually neural networks of basic radial functions. Then we will analyze the residuals of the predictions and the actual development of the ten-year government bond interest rate. The tool by which we examine the relationship will be neural networks. Specifically, they will be Multilayer Perceptron Networks (MLP) and Neural Networks of Basic Radial Functions (RBFs). The data will be input from the above sources – i.e. from the databases of the Czech Statistical Office and the Czech National Bank. The data mining tool – the neural network – will be used in the Statistica software. In particular, we will need the part called Regression. First we select the data. The independent variables will be macroeconomic indicators (GDP, inflation and unemployment). As an independent variable, we will choose the interest rate of ten-year government bonds. Subsequently, we divide the data into three sets: training, testing and validation. The ratio will be 70:15:15. On the training set we will look for suitable neural networks that describe the relationship between a set of independent variables and a dependent variable. On the other two datasets, we then verify that the neural

³² Methodologies for determining the values of individual indicators are specifically mentioned on the website of the Czech Statistical Office (www.czso.cz).

structures found are adequate and faithfully describe the situation. We will generate 10,000 neural structures, of which we will keep the 5 best in terms of performance and error. For MLP we use a minimum of 2 and a maximum of 20 neurons in the hidden layer. We use the following functions to activate the inner neuron layer as well as to activate the outer layer of neurons: Identity, Logistic function, Hyperbolic tan function, Exponential function, Sinus function. In the case of RBF, at least 11, and up to 30 neurons will be hidden in the hidden layer. In order to confirm or refute a given hypothesis, the correlation coefficient between ten-year government bonds and individual macroeconomic indicators must always be higher than 0.7.

3. Results

In the first step, a correlation matrix was constructed. The results are presented in table 1.

Table 6: Correlation matrices

Variable	Correlation Marked correlations are significant at the level $p < ,05000$ N=9 (All cases omitted at ChD)					
	Averages	Stand. Deviation	Gov. Bonds	GDP	Inflation	Unemployment
Government bonds	39	85	1	0,959259	0,985861	0,958955
GDP	7761	21199	0,959259	1	0,898409	0,999993
Inflation	28	55	0,985861	0,898409	1	0,897919
Unemployment	4109089	11252693	0,958955	0,999993	0,897919	1

Source: Authors.

It can be seen from the table that the degree of dependence between variables is high. The correlation matrix does not only examine the relation between the independent variables and the dependent variable, but the relationship between all the variables that enter the calculation. The table shows that the dependence between individual macroeconomic indicators and ten-year government bonds is at least 0.958955 with unemployment and at most 0.985861 with inflation. Overall, the lowest correlation rate was certainly between inflation and unemployment, namely 0.897919. On the contrary, the highest correlation rate was found between GDP and unemployment at 0.999993. We are already on the edge of the absolute dependence of both variables.

Already thanks to the correlation matrix we can state that the established hypothesis has been confirmed. Now, however, we will continue to analyze using the second tool - Artificial Neural Networks. Basic statistics of data files divided into a set of training, test and validation were calculated. Ideally, we could expect the statistics of the individual data files of each variable to be as least different as possible. In this case, however, the total file contains data for 73 quarters. Therefore, it can be expected that the random selection performed will not provide for approximately the same data in the sub-sets. However, this does not necessarily imply erroneous or inaccurate results.

Using a training set of data, 10,000 neural structures were generated. Based on the highest performance and the smallest error, five Artificial Neural Networks were preserved for further processing. Specific data is given in Table 2.

Network name	Training perf.	Testing perf.	Validation perf.	Training error	Testing error	Validation error	Training algorithm	Error function	Activ. of hidden layer	Output activ. funct.
MLP 3-12-1	0.984794	0.989461	0.963037	0.045125	0.05313	0.096425	BFGS (Quasi-Newton) 96	Sum of sq.	Tanh	Exponential
MLP 3-11-1	0.982998	0.993316	0.959455	0.050285	0.038846	0.094774	BFGS (Quasi-Newton) 103	Sum of sq.	Logistic	Logistic
MLP 3-8-1	0.96549	0.964397	0.958702	0.102687	0.169414	0.131317	BFGS (Quasi-Newton) 55	Sum of sq.	Logistic	Logistic
RBF 3-15-1	0.893873	0.976657	0.973238	0.307528	0.149623	0.108682	RBFT	Sum of sq.	Gauss	Identity
RBF 3-14-1	0.896968	0.982071	0.969987	0.298314	0.113489	0.075081	RBFT	Sum of sq.	Gauss	Identity

From the preserved neural networks there are three networks of multilayer perceptrons and two neural networks of basic radial functions. For all networks, we use the sum of smallest squares as the error function. Multilayer Perceptron Networks were created based on the Quasi-Newton algorithm (always in a different variant). RBF neural networks were created using the RBFT algorithm. MLPs use hyperbolic tangent and logistic functions to activate neurons in the hidden layer. To activate the output layer neurons, they use exponential and logistic functions. RBF networks use the Gaussian curve to activate the neurons in the hidden layer, then the identity function for the neurons in the output layer. Network performance in all subsets of data is determined by correlation coefficients. This is the training, testing and validation performance of the networks listed in Table 2. The best result is given by the highest value of the correlation coefficient. At the same time, the correlation coefficient must be approximately the same for all three subsets of data - training, testing and validation. Such characteristics are best met by the first preserved neural network, i.e. MLP 3-12-1. However, to determine the most reliable neural network, we need to carry out further analyzes, ideally we need to analyze residues. That's why prediction statistics were listed. It is clear from the values that they differ only at a minimum in the absolute values of the variables between the networks. Taking into account, for example, the minimum residue of the training data set, the difference between the highest and the lowest value is less than 0.29. In the case of maximum residues of the same data sets, the difference is less than 1.7. Minimal differences are also evident in other statistics. We will be better able to evaluate the situation using the graph in Figure 1.

The graph displays the performance of five models over 18 quarters. The Y-axis represents a performance metric from 0 to 8. The X-axis shows quarters from 1Q00 to 1Q18. The models are: Output (Target) in blue, 1. MLP 3-12-1 in orange, 2. MLP 3-11-1 in grey, 3. MLP 3-8-1 in yellow, 4. RBF 3-15-1 in dark blue, and 5. RBF 3-14-1 in green. The graph shows significant fluctuations, with a general downward trend after 2008.

1939

The actual development of the interest rate is shown by a light blue curve. Other curves represent prediction. From the first assessment we can say that the 4th and 5th neural networks show larger deviations than the MLP networks. Therefore, in further identifying the most suitable neural structure, we should focus only on MLP networks. The sums of the residuals of the individual predictions were also calculated.

Due to the analysis process and the gradual elimination of less suitable neural structures, we get to the result. In describing the relationship between GDP, unemployment and inflation on the one hand, and the ten-year government bond interest rates, on the other hand, neural network number 1, i.e. MLP 3-12-1 is the most suitable one. This artificial neural network offers performance (correlation coefficient of independent variables and dependent variables) in the training set of data at the level of almost 0.985, in the testing data set of almost 0.99 and in the validation set 0.963. In all cases, this is a very high value confirming the assumed hypothesis, i.e. that between ten-year government bonds and individual macroeconomic indicators, the correlation rate will be higher than 0.7. MLP uses 12 neurons in the hidden layer. It was created using the Quasi-Newton 96 algorithm. To activate neurons in the hidden layer, it uses the hyperbolic tangent to exponential function to activate the neuron in the output layer.

In the case of such a clear result, we can say that there is a high degree of dependence between variables. However, careful consideration must be given to the economic interpretation of the variables used. We maximize GDP as an economic variable. On the contrary, in the case of unemployment and inflation, we generally talk about trying to minimize these variables. Thus, overall, we would expect that in the case of inflation and unemployment, the value of the correlation coefficient will be negative, ideally close to -1. If so, we would interpret this value as follows:

1. The lower the inflation, the higher the ten-year government bond rate.
2. The lower the employment rate, the higher the ten-year government bond rate.

However, in this case the values of the correlation coefficients are positive (even according to the first method used - the correlation matrix). Interpretation of results is as follows:

1. The higher the inflation, the higher the ten-year government bond rate.
2. The higher the unemployment rate, the higher the ten-year government bond rate.
3. The higher the GDP, the higher the ten-year government bond rate.

What is the correct relationship between macroeconomic variables and the interest rate of ten-year government bonds? Such a relationship is logically dependent on the purpose of the issuing of bonds. We can summarize the primary two goals for which the Czech National Bank and the state issue bonds. It is an instrument by which the state:

1. Covers the needs of its budget.
2. Regulates the volume of funds in the economy.

We will now focus on the interpretation of individual independent variables and their relation to the interest rate of ten-year government bonds. If the state wants to cover its budget needs, it reduces the interest rate on bonds and tries to convince potential buyers to buy. This means that the state sucks funds out of the economy. If it uses them in the form of government spending, it does not seem to have any impact on the development of the economy as a whole.

If the state uses funds to repay the sovereign debt abroad, there should be an overall reduction in the available funds from the economy. This would result in a potential fall in the price level on the one hand and the increase in unemployment on the other. In that case, GDP itself or GDP growth are likely to fall.

If bonds are issued in order for the state to regulate the volume of funds in the economy, it will use both the increase and the decrease of interest. The interpretation, however, depends on what the purpose of the Czech National Bank changes its interest rates and what the purpose of the intervention is. It can be summarized that the result – i.e. the high correlation between GDP, unemployment and inflation on the one hand and the interest rate on 10-year government bonds on the other hand – makes sense not only from a mathematical point of view, but also from a factual point of view.

4. Conclusion

The aim of the paper was to examine the relationship between interest rates on ten-year government bonds and selected macroeconomic indicators. The hypothesis was set to support the goal. Economic theory does not offer a clear relationship between selected macroeconomic indicators and the interest rate of ten-year government bonds. On the contrary, it looks very complex on the whole issue and offers a variety of scenarios as to how the target variable can behave in the case of a particular development of the economy.

This contribution, however, when analyzing quarterly data between 2000 and 2018, comes to a clear result – that there is a very high correlation between the selected macroeconomic indicators and the interest rate of ten-year government bonds. What does it mean? In essence, we can state a double benefit of such a relationship:

1. According to the development of macroeconomic indicators, it will be possible to predict the development of the ten-year government bond interest rate (and possibly to identify an interesting investment opportunity).
2. It will be possible to set a firm methodology for determining the interest rate of ten-year government bonds. The primary variables will be GDP, inflation and Unemployment.

References

- [1] Akram, T. and Das, A. (2017). The dynamics of government bond yields in the Eurozone. *Annals of Financial Economics*, vol. 12, no. 3, pp. 1-27.
- [2] Brown, C. O. (2017). The politics of government financial management: Evidence from state bonds. *Journal of Monetary Economics*, vol. 90, pp. 158-175.
- [3] CNB (August 2018). *Long-term interest rates for convergence purposes* [online]. Available: https://www.cnb.cz/cnb/STAT.ARADY_PKG.VYSTUP?p_period=1&p_sort=2&p_des=50&p_sestuid=375&p_uka=1&p_strid=AEBA&p_od=200004&p_do=201807&p_lang=CS&p_format=0&p_decsep=%2C
- [4] CSO (August 2018a). *Gross Domestic Product (GDP) – Methodology* [online]. Available at: https://www.czso.cz/csu/czso/hruby_domaci_produkci_hdp-

- [5] CSO (August 2018b). *Inflation, consumer prices* .[online]. Available at: https://www.czso.cz/csu/czso/inflace_spotrebitelske_ceny
- [6] Guresen, E. and Kayakutlu, G. (2011). Definition of artificial neural networks with comparison to other networks. *Procedia Computer Science*, vol. 3, pp. 426-433.
- [7] Hvozdenká, J. (2016). Which Government Bond Spread Predicts the Future Economic Growth the Best? *Proceedings of the 3rd International Conference on European Integration 2016*, pp. 376-382.
- [8] Křepelová, M. and Jablonský, J. (2013). Analysis of Government Bonds as an Indicators for Stock Market. *Politická Ekonomie*, vol. 61, no. 5, pp. 605-622.
- [9] Málek, J., Radová, J. and Štěrba, F. (2007). Konstrukce výnosové křivky pomocí vládních dluhopisů v České republice. *Politická ekonomie*, vol. 55, no. 6, pp. 792-808.
- [10] Mügge, D. (2016). Studying macroeconomic indicators as powerful ideas. *Journal of European Public Policy*, vol. 23, no. 3, pp. 410-427.
- [11] Pao, H. (2008). A comparison of neural network and multiple regression analysis in modeling capital structure. *Expert Systems with Applications*, vol. 35, no. 3, pp. 720-727.
- [12] Rowland, Z. and Vrbka, J. (2016). Using artificial neural networks for prediction of key indicators of a company in global world. *Proceedings of the 16th International Scientific Conference Globalization and its Socio-Economic Consequences*, Rajecké Teplice, Slovakia, pp. 1896-1903.
- [13] Sánchez, D. and Melin, P. (2015). Modular Neural Networks for Time Series Prediction Using Type-1 Fuzzy Logic Integration. *Design of Intelligent Systems based on Fuzzy Logic, Neural Networks and Nature-Inspired Optimization*, Book Series: *Studies in Computational Intelligence*, vol. 601, pp. 141-145.
- [14] Šuleř, P. (2017). Using Kohonen's neural networks to identify the bankruptcy of enterprises: Case study based on construction companies in South Bohemian region. *Proceedings of the 5th International Conference Innovation Management, Entrepreneurship and Sustainability*, Prague, Czech Republic, pp. 985-995.
- [15] Šuleř, P. (2016). Optimizing the capital structure of the company to maximize its profits by using neural networks on the example of building companies. *Mathematical Modelling in Economics*, vol. 7, no. 3-4, pp. 57-63.
- [16] Česká spořitelna (August 2018). *Tutorial: Czech Government Bonds* [online]. Available at: https://cz.products.erstegroup.com/Retail/en/KnowHow/Product_Tutorials/Czech_Government_Bonds/index.phtml
- [17] Vavrek, R., Jusková, M. and Bednářová, L. (2016). Correlations Between Selected Macroeconomic Indicators: Case Study of Slovak Republic and Czech Republic. *Political Sciences, Law, Finance, Economics and Tourism Conference Proceedings*. Albena, Bulgaria, pp. 793-798.
- [18] Zotova, A. S., Mantulenko, V. V., Kraskova, N. I., Kislov, A. G. and Rowland, Z. (2016). New values as the basis for innovation. *International Journal of Economic Perspectives*, vol. 10, no. 3, pp. 94-100.

DETERMINANTS OF M&A PREMIUM IN THE GLOBAL MARKET

Dmitiy Yurkov^{1,a}, Julia Kolesnikova^{2,b}, Ruslan Fakhрутdinov^{3,c,*} and Venera
Zagidullin^{4,d}

^{1,2,4}Russia, Kazan (Volga region) Federal University, 420008, Kazan, Kremlevskaya street, 18

³Russia, St. Petersburg, St. Petersburg State University of Economics, 191023, St. Petersburg,
Sadovaya street, 21

^bHulia_K@mail.ru, ^dvenera408@yandex.ru

*Corresponding author

Abstract. The research goal of the paper is to determine the relationship between the premium paid and characteristics of acquirer, target and deal. In order to achieve the defined research goal, we briefly investigated theoretical concepts of M&A process in the global market, analyzed theoretical approaches to premium payments and reviewed contemporary research on motivation for paying high premiums. There are numerous potential motivations for mergers and acquisitions; however, the recent growth in M&A is mainly fostered by the need of consolidation of core business, growing competition and persistence of lower than historically average of oil prices. Other currently crucial motivations for M&As, especially in technology and pharmaceutical sectors, are converging technologies and expiration of patents (Fama, n.d.). The findings of the econometric analysis confirmed the positive relationship between the sizes of the premium paid and present value of forecasted synergies. Moreover, we determined the positive relationship between the premium and operating performance of the acquirer; leverage of the target. Size of the acquirer and target, debt load level of the acquirer, relative importance of the deal for acquirer were found to be negatively correlated to the size of the premium. Regarding the probability of overpayment, the findings of regression analysis suggest the existence of negative relationship between the share of stock and options in the total CEO consideration of the acquirer and probability of overpayment; negative relationship between the size of the target and probability of overpayment; positive correlation of probability of overpayment to the operating performance of the acquirer.

Keywords: intangible M&A, M&A deal, premium, present value of forecasted synergies, overpayment, underpayment

JEL Classification: P43, F60, F69

1. Introduction

In the recent years M&A activity became the main driving force of the economic growth worldwide. The year 2015 was the biggest ever for mergers and acquisitions with the global deal value of 4,78 trln. US \$, breaking the previous record of 4,33 trln. US \$ achieved in 2007. The yearly growth of M&A activity accounted for almost 45%, growing from 3,3 trln. US \$ in 2014 to 4,78 trln. US \$ in 2015. Moreover, the forecast, made by KPMG, suggests that M&A activity will further continue its growth in 2016, reaching the threshold of 5 trln. US \$.

There are numerous potential motivations for mergers and acquisitions, however the recent growth in M&A is mainly fostered by the need of consolidation of core business, growing competition and persistence of lower than historically average oil prices. Other currently crucial motivations for M&As, especially in technology and pharmaceutical sectors, are converging technologies and expiration of patents (Webb, 2015) (KPMG report on M&A activity). Thus, the purpose of this paper is to explore factors that determine the size of the premium and probability of overpayment.

1.1 Key components of the price in M&A deals

Price is probably the most important component in an M&A deal as the amount paid actually determines whether an acquirer will benefit from the deal or not. So if the acquirer overpays for the target and price paid is bigger than the value of the acquired company and resulting from the merger synergies, then this is a value destroying deal for the shareholders of the bidder. Thus managers of the acquirer should be extremely cautious with the price paid in an acquisition. Of course, the price paid in an M&A deal is always a two-sided game: high price paid, on the one hand, benefits the target's shareholders and, on the other hands, harms the acquirer's shareholders. Thereby, price is always the main stumbling block during the negotiations in M&A deals. According to the neoclassical theory, price in an M&A theory should be based on the following formula (Davidson, 1985): $\text{Price} = \text{Value (target)} + \text{PV (Synergies)}$. However, in practice it is quite complicated to estimate each of the two components of the presented formula. There are three most common methods used to estimate the true value of the target: i) Discounted Cash Flow method; ii) Method of Multiples; iii) Asset Valuation method (Damodaran, 2005). Each of the listed above methods has its strengths and weaknesses: none of them is perfect. The positive aspect of the Discounted Cash Flow method is that it is firm specific in the sense that it allows to take into account various firm specific characteristics, such as cost of capital, tax rate and etc., when performing a valuation (Dutordoir et al., 2010). However, need for many assumptions questions the objectivity of DCF method. So in order to conduct a DCF valuation you have to assume the company's cash flows for the next five or ten years and predict the future growth rate of cash flows. Even a slight change in the expected growth rate of cash flows will significantly impact the size of the terminal value of the company and its total value and the expected growth rate of CFs is based on the subjective opinions of industry experts (Copeland, 1991). Method of Multiples is probably the simplest way to estimate the company's value. It is based on the assumption that similar assets should be traded at similar price. So, when valuing a company, analysts estimate the ratio of market value of its peers to their main operational figures, such as EBIT, EBITDA and NI, and find the industry average. Further, the resulting ratios are multiplied by the corresponding operational figures of the assessed company. Thus method of multiples generally reflects the market perception of the similar companies. Its main drawback is that it doesn't take the firm specific characteristics and the potential growth rate of the company into account. Moreover, industry multiples are cyclical and depend a lot on general economic conditions (Arzac, 2005). The assessment of possible synergies or present value of synergies to be more precise is even a harder mission. Synergies resulting from an M&A deal depend on many exogenous and endogenous factors and on their combination: the market's response to the merger, the ability of managers to integrate two companies, the general condition of the economy, the complementarity of two businesses and etc. Thus, it is

extremely complicated to estimate the expected synergies and all the valuations of the synergy in the end are subjective and might differ from analyst to analyst.

1.2 Analysis of motivation of premium payments

A merger premium exists when the common shareholders of a target company receive cash and/or securities of a greater value than the premerger value of their stake in the acquired company (Ismail, 2011). The potential synergy gains and incremental cash flows resulting from the merger are the main widely accepted motives for M&A deals in general and premium payments in particular (Hayward & Hambrick, 1997). As mentioned in the first paragraph, strategic acquisitions are in fact designed to achieve synergy effects – an added value that appears only as a consequence of merging two enterprises (Reed et al., 2007):

$$\text{Value (A+B)} = \text{Value A} + \text{Value B} + \text{Synergies.} \quad (1)$$

Thus, primary motives for the prosecution of the deal and premium payments for strategic buyers are efficiency-synergies (economies of scale and scope), market position (market power – higher prices; diversification – new products and markets; strategic refocus – new capabilities) and hidden opportunities (target undervalued). Main sources of synergy can be split into two groups (Slusky & Caves, 1991): operational synergy; financial synergy. Further we will analyze the main types of each synergy in detail and define their influence on the choice of the target company. We can identify eight main sources of operational synergy:

1. Economy of scale

Economies of scale imply a reduction in average production costs due to increased production volumes. Thus, the merged company is becoming more cost-effective. According to the scientific research expected economies of scale remain the most popular motive for M&A deals. Campa and Kedia, studying diversification as a motive for M&A, came to conclusion that the market perceives mergers of companies from related industries most positively, as related mergers allow to obtain operational synergies (Campa & Kedia, 2001).

2. Market power

Horizontal acquisitions are also conducted in order to reduce competition and increase market share. This effect can be easily achieved in markets with relatively small amount of players. The conducted M&A deal in such a market can result in development of oligopoly with an ability to control prices to a certain extent, which in turn will give the merged company an opportunity to increase operating profits and margins.

3. Reduction of capital expenditures and sale of assets

Apart from decreasing operational costs through the economies of scale, companies can also achieve a reduction of capital costs through mergers and acquisitions (Jensen & Meckling, 1998).

4. Combination of core competences of companies

The core motive of the deal can be an acquisition of the company, which possesses a vast experience in any particular course of business or has a unique knowledge in the form of patents or R&D projects. This type of M&A motivation is quite popular among pharmaceutical companies. Often large pharmaceutical companies acquire startups to obtain their R&D investigations.

5. Entry to new markets

As a part of the strategy of geographic expansion for fast and efficient entry to new markets companies sometimes pursue a number of major acquisitions of local players with already

well established business processes, brand recognition and high customer loyalty. These are usually cross-border acquisitions (Rhodes-Kropf et al., 2004).

6. Marketing benefits

In the scientific literature, obtaining marketing benefits from an M&A deal is highlighted as one of the ways to achieve synergy.

7. Economies of scope

Reducing operating costs can be also achieved by vertical acquisitions. These acquisitions might allow acquirers to increase company's competitiveness by reducing production costs, improving quality control and protection of proprietary technologies.

8. Risk diversification

The other potential motivation for M&A deals is risk diversification through working in several businesses. Risk diversification was the main motive for M&A deals in 1960s and 1970s, in time of heyday of conglomerates. Achievement of financial synergies allows to increase cash flows and to reduce the cost of capital. Here are the main ways of benefiting from the deal through financial synergies:

1. Increase of an investment potential

If one company has a large surplus of cash and a limited number of projects and the other company possesses an untapped lucrative investment potential in the absence of necessary funds, it is reasonable to merge these companies. An increase of value of the acquirer in this way is often observed when large companies absorb small enterprises or public organizations merge with private companies.

2. Increase in the limit of debt burden

The maximum debt burden for the merged organization might increase due to the increase in cash flows, their stability and predictability. This in turn will allow companies to borrow more funds than they could have functioning separately. The shift of the capital structure towards debt allows the merged company to decrease the weighted average cost of capital and to benefit from the increased tax shield.

3. Reduction of the tax burden

The company, carrying out the acquisition can reduce its tax burden by pursuing so called tax inversion deal, when the acquirer moves its headquarters to the jurisdiction of preferential taxation. Moreover, in cases when one of the merging companies suffers losses, synergies can be achieved through the compensation of high income of the other company with the operating losses of the first company, thus decreasing the total amount of tax payments (Campa & Kedia, 2001).

4. Better credit ratings

The increase of the cash flows of the merged companies, their stability and predictability might also result in better credit ratings, which in turn will decrease the cost of debt and improve financial position of the merged company.

Summarizing all the above, we can conclude that the main purpose of M&A deals is to increase the value of the company. Primarily, this purpose is based on the interests of the company's shareholders.

2. Empirical research of determinants of the premium in M&A deals

As we have discussed in the methodology part, we start with the statistical analysis. We split the sample of 100 deals for which the synergies were forecasted into two subsamples

based upon whether the present value of the forecasted synergies is greater than the premium (Underpayment sample) or smaller than the premium (Overpayment sample). Results of statistical analysis are presented in the Table 1 underneath.

Table 1: Statistical analysis: Overpayment and Underpayment.

	Premium<Synergy (Underpayment) 61 observation	Premium>Synergy (Overpayment) 39 observation
	Mean	Mean
<i>prm</i>	0,171**	2,23**
<i>relsize</i>	1,055	0,798
<i>reldealsize</i>	0,892**	1,42**
<i>length</i>	198,459	172,7
<i>sic</i>	0,803	0,871
<i>att</i>	0,983	1
<i>comp</i>	0,065	0,025
<i>shares</i>	0,377	0,359
<i>cash</i>	0,098	0,128
<i>mbac</i>	10,516	6,53
<i>lnassmvac</i>	10,32***	9,71***
<i>debtassmvac</i>	0,033	0,382
<i>ocfassmvac</i>	0,066	0,081
<i>mbt</i>	7,704	4,443
<i>lnassmvt</i>	9,555***	9,042***
<i>debtassmvt</i>	0,2782***	0,46***
<i>ocfassmvt</i>	0,044	0,045
<i>ceoac</i>	0,0015	0,0017
<i>stockoptceoac</i>	0,563*	0,534*
<i>ceot</i>	0,0018**	0,0015**
<i>stockoptceot</i>	0,47	0,516
<i>pvsynmveqt</i>	0,636	0,739

Source: Compiled by the author on the basis of data from the Federal statistics service using the Stata8 software package.

We can infer from the table that the difference in means is significant for the size of the premium paid scaled by the market value of equity of the target 1 month prior to the deal announcement (*prm*), the ratio of total consideration paid to the market capitalization of acquirer one month prior to deal announcement (*reldealsize*), natural logarithm of market value of assets of the acquirer (*lnassmvac*), natural logarithm of market value of assets of the target (*lnassmvt*), ratio of debt to market value of assets of the target (*debtassmvt*) and variables, which describe the CEO compensation of the target and acquirer (*stockoptceoac* and *ceot*). We can conclude from the table that, as expected, the average size of premium paid relative to market capitalization of the target and the mean ratio of total consideration paid and market capitalization of acquirer are significantly greater for the overpaying subsample, which is in line with the common sense: the more we pay for the target, the greater is the chance to overpay. Thus the average ratio of premium paid relative to market capitalization of the target is only 0,171 for underpaying sample and 2,23 for overpaying sample. The mean ratio of total consideration relative to market capitalization of acquirer is 0,892 for underpaying sample and 1,42 for overpaying sample. In addition, target companies tend to have higher ratio of debt to market value of assets in overpaying sample: 0,2782 for underpaying subsample and 0,46 for overpaying subsample. The mean difference is significant at the 1% level. The logic behind might be that companies with higher leverage, ratio of debt to market value of assets is used as a proxy for leverage, have lower WACC (Weighted Average Capital Cost) and acquirers are ready overpay for targets with low WACC as all the future Cash Flows will be discounted at a lower cost of capital and their present value will be higher. This might give an acquirer a certain ability to overpay without incurring losses. We can infer from the table that the average share of stocks and options in the total CEO consideration of the acquirer is greater for the underpaying subsample: 0,563 vs 0,534. The mean difference is significant at 10%

level. Thus we can conclude, that when CEO of the acquirer is personally interested in the future of the company, the decision whether to overpay for the target or not is made carefully. CEO of the company is the always main decision maker and the decision on whether to overpay or not is not an exception. As for the results of multivariate analysis we will start with the obtained results for the 1st regression: determinants of M&A premium.

Table 2: Determinants of M&A premium.

	I	II	III	IV	V
<i>reldealsize</i>	-0,234			0,264	-0,549*
<i>length</i>	-0,002			-0,001	-0,001
<i>sic</i>	0,2794			0,285	0,695
<i>att</i>	0,289			-0,959	6,101
<i>shares</i>				-0,558	0,087
<i>cash</i>	-0,774				
<i>forecast</i>		0,415		0,806*	
<i>mbac</i>		-0,004			
<i>lnassmvac</i>		-0,282		0,151	-0,589*
<i>debtassmvac</i>				-2,788**	-3,877***
<i>ocfassmvac</i>		-2,288		-2,557	14,627**
<i>ceoac</i>		-0,431		3,602	
<i>stockoptceoac</i>		-0,521		0,144	0,256
<i>mbt</i>			0,019	0,014	0,004
<i>lnassmvt</i>			-0,863***	-1,008***	0,533
<i>debtassmvt</i>			6,065***	7,585***	3,251**
<i>ocfmvasst</i>			-0,199	0,249	-3,507
<i>ceot</i>			4,934	4,905	
<i>stockoptceot</i>			1,141	1,245	-0,901
<i>pvsynmveqt</i>					3,165***
cons	0,931	3,341	5,871***	6,524**	-6,45
Observations	210	210	210	210	94
Adj. R ²	-0,005	-0,007	0,155	0,155	0,796
Prob > F	0,576	0,603	0,000	0,000	0,000

Note: the symbols *, ** and *** sign the variables significant at the 10%, 5% and 1% levels respectively.

Source: Compiled by the author on the basis of data from the Federal statistics service using the Stata8 software package.

The first essential thing to mention is that three out of five models are significant. The first and the second regressions have Prob > F of 0,576 and 0,603 respectively and, hence, are insignificant. Thus we can conclude that when taken separately characteristics of the deal; and acquirer do not determine the size of the premium. On the contrary, the significance of the third model implies that target's characteristics are still important for the size of the premium, even if taken separately. The logic behind is quite simple. It is obvious that when deciding how much to pay the characteristics of the object you acquire are the most important decisive factors. We find negative relationship between the deal value scaled by the market capitalization of the acquirer and premium paid. Hence, the findings suggest that the more important is the deal for the acquirer, assuming that the deal value in relation to the size of the acquirer can be used as a proxy for the strategic importance of the deal, the more careful is the acquirer regarding the estimation of the fair price of the target. We believe that the deal size in relation to the market capitalization of the acquirer is a reasonable proxy for the strategic importance of the deal for the acquirer as it is obvious that larger deals will have a greater impact on the future performance and effectiveness of the company. In the next regression the dependent variable is a binominal variable, which takes the value of 1 if difference between the present value of synergies and premium is a negative number (Overpayment) and otherwise 0 (Negative). In this regression the dependent variable is a binominal variable,

which takes the value of 1 if difference between the present value of synergies and premium is a negative number (Overpayment) and otherwise 0 (Negative).

Table 3: Determinants of overpayment and underpayment in M&A deals.

	Probit regression
<i>reldealsize</i>	0,191
<i>length</i>	-0,002
<i>sic</i>	0,212
<i>cash</i>	-0,208
<i>lnassmvac</i>	-0,047
<i>debtassmvac</i>	-1,236
<i>ocfassmvac</i>	5,706**
<i>stockoptceoac</i>	-0,991*
<i>mbt</i>	0,002
<i>lnassmvt</i>	-0,596**
<i>debtassmvt</i>	3,528***
<i>ocfmvasst</i>	-1,827
<i>stockoptceot</i>	0,751
cons	4,519**
Observations	94
Pseudo R ²	0,31
Prob > chi	0,000

Note: the symbols *, ** and *** sign the variables significant at the 10%, 5% and 1% levels respectively.

Source: Compiled by the author on the basis of the calculations that were performed using Stata8 software package.

The first thing we can conclude is that regression is valid: Prob > F is equal to 0,000. The following variables are significant at 1,5 and 10% levels: *ocfassmvac*, *stockoptceoac*, *lnassmvt* and *debtassmvt*. In order to directly interpret the obtained results, we need to calculate the marginal effects of independent variables on the dependent variable. Marginal effects are presented in the Table 13 underneath.

Table 4: Marginal effects for probit regression

	dy/dx
<i>reldealsize</i>	0,068
<i>length</i>	-0,0005
<i>sic</i>	0,073
<i>cash</i>	-0,072
<i>lnassmvac</i>	0,016
<i>debtassmvac</i>	-0,444
<i>ocfassmvac</i>	2,051**
<i>stockoptceoac</i>	-0,356*
<i>mbt</i>	0,0007
<i>lnassmvt</i>	-0,214**
<i>debtassmvt</i>	1,268***
<i>ocfmvasst</i>	-0,657
<i>stockoptceot</i>	0,269

Note: the symbols *, ** and *** sign the variables significant at the 10%, 5% and 1% levels respectively.

Source: Compiled by the author on the basis of the calculations that were performed using Stata8 software package.

The findings of probit regression model support the results of statistical analysis that there is a negative correlation between the size of the target and probability of overpayment.

3. Conclusion

With the help of econometric analysis we have identified factors that determine the size of the premium in M&A deals. Moreover, we have recognized characteristics of the deal, target and acquirer that impact the management's decision to overpay for the target. Overpayment was defined as the positive difference between the premium paid and present value of forecasted synergies. We have empirically confirmed the existence of robust positive relationship between the size of the premium paid and present value of forecasted synergies

and, hence affirmed the postulates of neoclassical theory. Apart from strong impact of present value of forecasted synergies on the premium paid we have determined the positive relationship between the premium and operating performance of the acquirer; and leverage of the target. Size of the acquirer and target, debt load level of the acquirer, relative importance of the deal for acquirer were found to have negative correlation with the size of the premium paid. As for the probability of overpayment, we have identified the empirical evidence of robust negative relationship between the share of stock and options in the total CEO consideration of the acquirer and probability of overpayment. This finding allowed us to conclude that, as predicted by agency theory, personal interests of acquirer's CEO do have an impact on the decision whether to overpay for the target or not. Furthermore, we have determined the negative correlation between the size of the target and probability of overpayment; positive relationship between the operating performance of the acquirer and probability of overpayment.

References

- [1] Arzac, E. (2005). *Valuation for mergers, buyouts and restructuring*. New York: John Wiley & Sons.
- [2] Campa, J. M. and Kedia, S. (2001). Explaining the Diversification Discount. *SSRN Electronic Journal, Journal of Finance*, vol. 57, no. 4, pp. 1731-1762.
- [3] Copeland, T., Koller, T. and Murrin, J. (1991). *Valuation*. New York: John Wiley & Sons.
- [4] Damodoran A. (2005). *The Value of Synergy*. Stern School of Business.
- [5] Davidson, I. (1985). Takeovers: Partitioning Of Gains And Pareto Improvement In A Rational Market With Asymmetric Information. *Journal of Business Finance & Accounting*, vol. 12, no. 3, pp. 373-385.
- [6] Dutordoir, M., Roosenboom, P., and Vasconcelos, M. 2010. Synergies Disclosure in Mergers and Acquisitions / Dutordoir, M., P. Roosenboom, and M. Vasconcelos. Erasmus University Working Paper, Erasmus University.
- [7] Fama, E. (n.d.). Agency problems and the theory of the firm. *The Economic Nature of the Firm*, pp. 270-282.
- [7] Hayward, M. L. and Hambrick, D. C. (1997). Explaining the Premiums Paid for Large Acquisitions: Evidence of CEO Hubris. *Administrative Science Quarterly*, vol. 42, no. 1, p. 103.
- [8] Ismail, A. (2011). Does the Managements Forecast of Merger Synergies Explain the Premium Paid, the Method of Payment, and Merger Motives? *Financial Management*, vol. 40, no. 4, pp. 879-910.
- [9] Jensen, M. C. and Meckling, W. H. (1998). Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure. *SSRN Electronic Journal*.
- [10] Reed, S.F., Lajoux, A. and Nesvold, H.P. (2007). *The Art of M&A: A Merger Acquisition Buyout Guide*. 4th ed. McGraw-Hill.
- [11] Rhodes-Kropf, M., Robinson, D. T. and Viswanathan, S. (2004). Valuation Waves and Merger Activity: The Empirical Evidence. *SSRN Electronic Journal*, vol. 77, no. 3, pp. 561-603
- [12] Slusky, A. R. and Caves, R. E. (1991). Synergy, Agency, and the Determinants of Premia Paid in Mergers. *The Journal of Industrial Economics*, vol. 39, no. 3, p. 277.
- [13] Webb, R. (2015). How Much is my Company Worth? Agency, pp. 275-279.

PROSPECTS FOR THE BANKING SECTOR DEVELOPMENT WITHIN THE CONDITIONS OF INTERNATIONAL FINANCIAL GLOBALIZATION IN THE RUSSIAN FEDERATION

Zinovyeva Ekaterina Georgievna^{1,a,*}, Koptyakova Svetlana Vladimirovna^{2,b,*}

^{1,2}Nosov Magnitogorsk State Technical University, Magnitogorsk city

^aekaterina_7707@mail.ru, ^bsvetlana.cop@yandex.ru

*Corresponding author

Abstract. The process of globalization is the main characteristic of modern world social and economic development. World financial globalization is necessary to be investigated as a condition and development factor of the banking system. The purpose of the article is to develop scenarios for the functioning of the banking sector in the Russian Federation in the context of international financial globalization. The fundamental scientific works of Russian and foreign scientists in the field of international banking, state regulation of the activity of credit organizations served as a methodological and theoretical basis for the study. Dialectical and systemic approaches made it possible to reveal the features of international financial globalization in modern conditions, to identify trends in the development of the banking sector and the institutions for their regulation in post-crisis conditions. The information base of the research was national and international regulatory legal documents in the field of banking sector and financial markets regulation, publications in Russian and in international economic literature on banking regulation, the strategy of the banking system development in the Russian Federation, increasing its sustainability and competitiveness. Information sources included the materials of the Federal State Statistics Service, analytical materials of the World Bank and the Bank of Russia, analytical conclusions and reviews prepared by the Institute for the Economy in Transition. The novelty of the study is to determine the ways for the effective development of the national banking system in the context of international financial globalization.

Keywords: Russian banking sector, international financial globalization, the national economy, the financial crisis.

JEL Classification: G210, G280, G010, E580

1. Introduction

In modern conditions, the importance of the banking sector in the country's economy significantly increases, which has substantial investment resources and thus has a direct impact on economic growth, the welfare of market economy subjects and macroeconomic processes in general.

Increasing the competitiveness of the banking sector is always an urgent task of its strategic development. International cooperation, in which our country takes an active part, requires the

application of certain efforts to uphold national interests in all sectors of the economy, and especially in the banking segment. The nature of the banking sector influences its structure and determines the properties of its elements, just as the essence of the banking system components affects the system as a whole. The state of the banking sector of the state always reflects the state of the country's economy as a whole. To date, it is not sustainable and is characterized by volatility in performance indicators. The system can be called effective only when it is competitive due to its market capabilities, and not due to legislative ways of protection against foreign competitors. The conditions for the development of banking business in Russia cannot be called favourable: insufficient profitability of the banking sector, high risks and a small investment attractiveness of the banking sector, serious limitations and unreasonable requirements for banks clearly underline all that. Thus, the main problems of the Russian banking sector today are the low capitalization of the banking system due to the abundant outflow of capital abroad, the scarcity of resources for lending due to the lack of operating refinancing mechanisms, and the developing business infrastructure. An important aspect of solving these problems is the interest in increasing the capitalization of the sector not only of the banking community, but of the state as a whole.

For the research the works of such Russian scientists and practitioners as Ageeva & Mishura (2017), Vernikov (2012, 2015, 2017), Kirdin (2013), Mamonov (2017), Jagitian (2016) et al. are of great interest. Among foreign scholars who study the problems of banking regulation, the works of such authors as Fries (2002), Anzoátegui (2010), Affinito (2009), Beck (2006), Berger (2004), Gros (2013), Hakenes (2010, 2015), Rajan (2003), Sucháček (2007), Bruno (August 2014) are most significant. Despite the abundance of works in the field of banking regulation, there are no comprehensive studies in domestic and foreign economic literature devoted to the regulation of the national banking sector in an open economy operating under conditions of financial globalization. To date, sufficient international experience has been accumulated to modernize banking sector regulation institutions, which requires generalization and analysis for its applicability in Russian practice.

1.1 Financial globalization and its impact on the national economy

A distinctive feature of the modern economy is the accelerated and contradictory process of aggravating the interdependence and interconnectedness of all spheres of the world community. It is no more than a manifestation of globalization, within which:

- the phases of economic cycles are synchronized on a global scale;
- the impact of the global conjuncture on the formation of the national economic space, the structure of economic sectors and the map of the location of production capacities has become almost total;
- the economic, social and geographical areas have drastically narrowed, which has led to the serious confrontations both within countries and in transboundary territories.

There are two key points that are common to most studies of the globalization process. First, these are the directions of economic globalization, among which financial globalization stands out; the formation of global TNCs; regionalization of the economy; intensification of world trade; the trend towards the convergence of economic systems. Secondly, these are objective and subjective aspects of the globalization process, which is due to the fact that the very process of economic convergence is an objective process, but people are managing this process. In the conditions of globalization, qualitative changes occur in the interaction of national economies with the world economic space. As a result, globalization is viewed as the

process of gradual formation of systemic interdependence, interconnectedness and interdependence, the process of formation of global planetary integrity, the global subjects of which consciously interact in order to survive and develop the human community, to search for answers to the challenges and threats of modern world civilization.

The process of globalization has advanced most quantitatively and qualitatively in the financial sphere. The carriers of globalization are financial markets, international movements of capital, loans, currencies, which are determined by the following reasons:

- 1) new information technologies have ensured the establishment of a system of financial centres, which has led to a reduction not only in transaction costs for the implementation of financial transactions, but also in the time required for their execution;
- 2) there was a formation of a new instrument of the financial market - hedging and risk management mechanisms, which is especially significant in conditions of high uncertainty in the financial market; increased risk led to the introduction of new instruments - derivative securities - derivatives;
- 3) financial institutions were given the opportunity to expand their activities due to the worldwide deregulation of banking activities and the emergence of financial holdings offering the client a full range of financial intermediation services.

According to the researcher, financial globalization is "the development of global financial markets, the growth of cross-border capital flows and the intensification of the activity of international financial organizations" (Koptyakova, 2011). At the same time, speaking of financial globalization, we mean the free movement of capital between countries" (Smyslov, 2006). The dominant role of the process of financial globalization is confirmed by outstripping growth rates of foreign direct investment in comparison with the growth rates of cross-border capital flows (Table 1).

Table 1: Predictable dynamics of the globalization process

Indices	1980	1990	2000	2007	2008	2020
Cross-border capital flows / World GDP at current prices, %	4,7	5,2	15,3	20,7	3,1	23-28
Accumulated foreign direct investment (total-world) / World GDP at current prices. %	6	8,5	18	28,3	24,5	42-47

Source: Mirkin, 2011

Financial globalization creates a whole range of problems. First, financial globalization increases the polarization of world development. Secondly, the states belonging to the category of "peripheral capitalism" become on the global level dependent on the activities and finances of transnational companies, and politically - subordinate countries of "centralized capitalism". Thirdly, all financial markets act as global ones, which radically affects international economic stability. In modern conditions, there is an inevitable "trade-off" conflict - between the opening of the financial sphere, on the one hand, and the need to protect against financial volatility that is taking place from the outside, on the other. Namely, the contradiction between the international character of financial capital and the continuing form of the national-state organization of monetary systems, which does not allow to control these flows to the full, is aggravated. In the context of financial globalization, the banking sector is not independent. It is more and more exposed to the impact of the world capital market and those deformations, the asymmetry that arises on it. Global destructives of the global financial crisis 2007-2009 convincingly demonstrated it.

1.2 The banking sector of the Russian Federation in the context of financial globalization

The collapse of the financial market during the financial crisis of 2007-2009 led to a crisis in the liquidity of the banking sector and, then, the curtailment of credit led to a reduction in production in the real sector of the economy. The crisis exacerbated the problem of concentration in the banking sector of Russia. As of 01.01.2018, 561 credit institutions operating in Russia have the right to engage in banking activities. Since 2008 the number of banks has decreased by 575 banks (1 136 - 561) that is 50.6% (2018). In 2014 48.2% of the market share of the top five banks in our country was reached. A similar figure in Europe on average is about 60% (from 22% in Germany to 96% in Estonia) (Vedev, et al. 2012). The Bank of Russia, after the financial crisis, increased the requirements for banks' own capital and encourages further consolidation in the banking sector (Table 2). Thus, Federal Law No. 391-FZ of 03.12.2011 "On Amendments to the Federal Law" On Banks and Banking Activities "raised the minimum amount of own funds (capital) for the bank from 180 to 300 million roubles.

Table 2: Concentration indices in the banking sector

Indices	1.01.2008	1.01.2009	1.01.2010	1.01.2011	1.01.2012	1.01.2013	1.01.2014
IHH on deposits, %	0,270	0,274	0,251	0,236	0,225	0,216	0,227
The OJSC share of Sberbank of Russia in total deposits, %	51,6	51,9	49,4	47,9	46,6	45,7	46,7
The share of the 5 banks that have the largest volume of deposits in the total volume of deposits, %	60,9	63,1	61,3	60,0	59,4	58,3	60,5

Source: according to <http://www.cbr.ru>

Administrative efforts to raise the minimum capital for banks facilitate the withdrawal from the market of a significant number of players in the lower segment, where bank competition in Russia is the benchmark. Therefore, the largest Russian banks, when analysing the marketing and product offerings of competitors, are guided by the proposals of credit institutions that occupy a position after the 300th in terms of assets, not of their own kind. Small banks, being in extremely cramped conditions in terms of opportunities for price competition, find the most original solutions for attracting customers. There is a point of view that the optimal number of banks in Russia should be 220-280. Expert calculations are supported by the facts: the first 200 banks account for about 94% of the total assets of the sector. However, it should not be forgotten that the activities of small and medium-sized banks play an important role in the economy development of the Federation subjects, as these organizations reliably conduct business in their region and often they finance clients who are not attractive to federal banking groups. Therefore, in order to stimulate medium and small banks, the main criterion for their activities should be quality. This will save them from bankruptcy or merger with large banks, and then there can be as many as they want. In the assets of the Russian banking sector, a high proportion is held by banks with state participation, which receive substantial support. This problem is linked to the problem of large banks. In the last decade there has been a trend towards an increase in the share of state-owned banks in the banking sector's assets. By the end of 2011, the total weight of the seven

financial institutions, with the dominance of the state in the capital of any state-owned companies amounted to 27.7% of banking sector assets and, together with Sberbank of Russia - 54.6%. Banks with state participation have preferences of the federal government, which creates a negative effect, as this leads to distortion of the mechanism of competition. According to experts, the difference in the cost of funding for public and private banks can reach 4%. Hence the impossibility of fair competition, an artificially high level of profitability due to the availability of rental income in the public sector, the use of profits is often not for business development, but for non-core foreign acquisitions. Russian banks also lack sources of long-term funding, which serve as a source of long-term lending to the real sector. The modern model of banking business in Russia is characterized by the following parameters: the concentration of resources in several large banks (with the participation of the state); structural weakness of the inter-bank lending market, which creates high risks of new liquidity crises in the banking sector; high level of "bad credits" in bank balances (2011).

1.3 Medium-term prospects for the development of the banking sector of the Russian Federation in the context of financial globalization

A stable banking system is extremely important for the safe functioning of the state, its successful development is necessary for the economy, as it provides credit and financial services for the entire economic turnover of the country. In order to build the most accurate forecast for the development of any sphere, including the banking sector, it is necessary to take into account not only the indirect development of the industry, but also all its interrelations with other sectors of the economy. Thus, according to forecasts for the medium term, it is expected that almost all macroeconomic indicators of the Russian economy will decline, with their restoration in the future, i.e. There is another cycle with a possible financial crisis. At the same time, it can be noted that cyclicity does not allow setting tendencies (trends). The banking system of the country is an important component of the national economic system and at the same time is a participant in the global financial market. And as A.L. Vedev and Yu.A. Danilov mark, "the specifics of the financial market presuppose the highest level of globalization of the financial sector in comparison with all other sectors of the economy, causing a high level of dependence of national financial markets on the development of the global financial market" (Vedev and Danilov, 2012). Therefore, the forecasts of the development of the national banking system should take into account the plans for the development of the global financial market. In the process of globalization, the borders between countries are blurred, resulting in lower transaction costs and capital flow, the growth of the financial market is faster than the growth of the commodity market, and new banking products appear that increase leverage. And all these combined factors provoke the growth of demand for financial instruments. According to some analysts (Vedev and Danilov, 2012), the volume of available resources for investing in financial instruments in the current decade will be quite stable - at the level of 33-34% of GDP. This volume will be formed from a somewhat shrinking volume of domestic savings and offset by increased resource mobilization from the outside world (Table 3).

Table 3: Estimation of the available volume of resources of the national economy for investing in financial instruments

Indices	2011	2012	2013	2014	2015	2020
RUB bn						
GDP	53 808	59 238	66 016	73 207	80 477	131 018
Balance of investment income	-1329	-1349	-1454	-1511	-1665	-2939

Balance of remuneration and current transfers	-418	-458	-507	-562	-621	-1027
Gross disposable income	52 061	57 431	64 055	71 134	78 192	127 053
Consumptive use	C	40 186	44 947	50 102	55 518	92 237
Gross savings	16 127	17 244	19 108	21 031	22 674	34 816
Attraction from the outside world	2235	3181	3265	3819	4351	8701
Total resources	18 361	20 426	22 372	2850	27 024	43 517
% to GDP						
Gross savings	30,0	29,1	28,9	28,7	28,2	26,6
Attraction from the outside world	4,2	5,4	4,9	5,2	5,4	6,6
Total resources	34,1	34,5	33,9	33,9	33,6	33,2

Source: VedeV and Danilov, 2012.

The distribution of the available amount of savings between the domestic and foreign markets will largely depend on the state of the business climate in the country and on the current economic policy. Formally available resources at the level of 33-35% of GDP are a good indicator, allowing to maintain a steadily positive growth rate during the decade. However, as in previous years, there is a danger of a significant reduction, primarily because of capital outflows, and also because of the low efficiency of their use. At the same time, it should be noted that the balanced scenario provides for the absence of "overheating" of the markets, which implies a gradual increase in the volume of financial instruments (VedeV and Danilov, 2012). The increase in GDP in 2017 was 1.5%. The main reason that has affected the decline in economic growth is the worsening of the current situation in international markets and a drop in demand from foreign consumers. The improvement and development of the Russian banking sector is necessary not only for internal modernization of the state economy, but also in the context of globalization, from the position of growing competition in this segment of business. One of the programs of social and economic development of Russia is the Concept of long-term social and economic development of the Russian Federation for the period until 2020, or, as it is also called, "Strategy 2020: A New Model of Growth - a New Social Policy". Increasing the efficiency and sustainability of the functioning of financial markets in this document is referred to as a "special problem", because "in modern conditions, the financial system plays a key role in ensuring the balance and innovative development of the economy." The calculations presented in its framework suggest two scenarios for the further operation of the Russian banking sector: accelerated growth and balanced development. The first option involves the use of a bank loan to increase the rate of economic growth, which will undoubtedly reduce the stability of the banking system, the second is the introduction of a macro-regulation by the Bank of Russia and the elimination of imbalances in the structure of the banking sector, which, on the contrary, should increase stability in the industry. In accordance with the Strategy 2020, the banking system and banking supervision will develop in such areas as increasing the transparency of the activities of credit institutions, improving the procedures for their reorganization, and expanding the networks of customer banking for credit institutions. The credit organizations are most likely to continue to be enlarged with a reduction in their number (including at the initiative of the CBR, due to a decrease in financial stability and a fall in the profitability of banking operations due to increased competitiveness in the industry). It is important that this trend is common for almost all the Group of Twenty countries. "Strategy 2020" provides for raising the level of bank lending to the economy to 80-85% of GDP in 2020.

2. Conclusions

Globalization is the main characteristic of modern world social and economic development. It covers almost all countries of the world, including Russia, which actively integrates into the global market. In order to move to an intensive development model, the Russian banking system should strive to achieve a high level of competition in the banking market, to implement diverse and relevant banking services, to increase capitalization, increase efficiency, invest in advanced technologies and products, to develop a risk management system, high degree of business transparency, compliance with market discipline. However, the importance of not only quantitative indicators, but also the level of qualitative development of the sector should be taken into account. Banking regulation should be aimed at mitigating systemic risks, protecting consumers and ultimately the whole sector from unscrupulous behaviour (for example, unfair pricing) and achieving certain goals, in particular the stability of the industry. Ambiguity in the development of the world economy in the medium term significantly influences the trends of the Russian economy and thus provokes additional risks of reducing the rates of economic growth in the country. But these risks can also be connected with the dynamics of internal factors of the development of the Russian economy. To reduce the possible risks of banking activities, it is necessary to continue work on the further development of regulatory and legal regulation of the banking sector. The results of the scientific research are applicable in the theory and practice of the banking system of Russia and have prospects in developing strategies for the banking sector of the Russian Federation until 2020.

References

- [1] Affinito, M. and Piazza, M. (2009). What are borders made of an analysis of barriers to European banking integration. *The changing geography of banking and finance*, pp. 185-214.
- [2] Ageeva, S.D. and Mishura, A.V. (2017). Regional Banking System in Russia: Trends and Factors of Spatial Distribution. *Issues of Economics*, no. 1, pp. 123 - 141.
- [3] Ageeva, S.D. and Mishura, A.V. (2017). Geography and structure of the banking sector: trends in the world and in Russia. *Issues of Economics*, no. 9, pp. 83 - 97.
- [4] Anzoátegui, D., Martínez Pería, M.S. and Melecky, M. (2010). Banking sector competition in Russia. World Bank Policy Research Working Paper.
- [5] Beck, T., Demirgüç-Kunt, A. and Peria, M. (2006). Reaching out: Access to and use of banking services across countries. *Journal of Financial Economics*, vol. 85, no.1, pp. 234-266.
- [6] Berger, A.N., Hasan, I. and Klapper, L.F. (2004). Further evidence on the link between finance and growth: An international analysis of community banking and economic performance. *Journal of Financial Services Research*, vol. 25, no. 2-3, pp. 169-202.
- [7] Bruno, V. and Song Shin, H. (2014). Cross-Border Banking and Global Liquidity. *Bank for International Settlements*. [Online]. Available: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2495003
- [8] Fries, S. and Taci, A. (2002). Banking reform and development in transition economy. *EBRD Working Paper*, Slovenia, Portoroz, 71.

- [9] Gros, D. (2013). Banking union with a sovereign virus: The self-serving treatment of sovereign debt. *Intereconomics*, vol. 48, no. 2, pp. 93-97.
- [10] Hakenes, H. and Schnabel, I. (2010). The threat of capital drain: A rationale for regional banks? *Journal of Institutional and Theoretical Economics*, vol. 166, no. 4, pp. 662-689.
- [11] Hakenes, H., Hasan, I., Molyneux, P. and Xie, R. (2015). Small banks and local economic development. *Review of Finance*, vol. 19, no. 2, pp. 653-683.
- [12] Jagitani, E.P. (2016). Basel III: in Search of Criteria and Scenarios for Success of Banking Regulation Reform. *Issues of Economics*, no. 2, pp. 77 - 93.
- [13] Kirdina, S. and Vernikov, A. (2013). Evolution of the banking system in the Russian context: an institutional view. *Journal of Economic Issues*, vol. 47, no. 2, pp. 475-484.
- [14] Koptyakova, S.V. (2011). Financial globalization as a condition and the development factor of the banking system. *Proceedings of the Orenburg State Agrarian University*, vol. 3, no. 31-1, pp. 223-225.
- [15] Mamonov, M. and Vernikov, A. (2017). Bank ownership and cost efficiency: new empirical evidence from Russia. *Economic Systems*, vol. 41, no. 2, pp. 305-319.
- [16] Mirkin, Ya. (2011). MFC in Russia: The Boundaries of the Possible, *Direct Investments*, vol. 2, no. 108, pp. 23.
- [17] Number of banks in Russia. (2018). [Online]. Available: <https://bankirsha.com/kolichestvo-bankov-v-rossii-na-konec-goda-finansovyi-krizis-ustavnoi-kapital-i-chislennost-bankov.html>
- [18] Rajan, R. and Zingales L. (2003). The great reversals: The politics of financial development in the 20th century. *Journal of Financial Economics*, vol. 69, no. 1, pp. 5-50.
- [19] Smyslov, D.V. (2006). *The World Financial Market and the Interests of Russia*, Institute of World Economy and International Relations, Moscow: Nauka.
- [20] Strategy for the development of the banking sector of the Russian Federation for the period until 2015 (2011). *Herald of the Bank of Russia*, no. 21 (1264), pp. 12-13.
- [21] Sucháček, J. (2007). Spatial organization of banking system in the Czech Republic: Towards absolute concentration. *Paper presented on 47th Congress of the European Regional Science Association*, Paris, France.
- [22] Vedev, A.L. and Danilov, Yu.L. (2012). *Forecast of the development of financial markets in Russia until 2020*, M. Izd-vo Institute of Gaidar, Russia.
- [23] Vernikov, A. (2012). The impact of state-controlled banks on the Russian banking sector. *Eurasian Geography and Economics*, vol. 53, no. 2, pp. 250-266.
- [24] Vernikov, A. (2015). Comparing the banking models in China and Russia: Revisited. *Studies on Russian Economic Development*, vol. 26, no. 2, pp. 178-187.
- [25] Vernikov, A. (2017). Measuring institutional change: the case of the Russian banking industry. *Journal of Institutional Studies*, vol. 9, no. 2, pp. 119-136.