



Munich Personal RePEc Archive

Estimating a fiscal reaction function for the South East European countries

Tashevska, Biljana and Trpkova-Nestorovska, Marija and
Trenovski, Borce

Ss. Cyril and Methodius University in Skopje, Faculty of Economics
– Skopje, Ss. Cyril and Methodius University in Skopje, Faculty of
Economics – Skopje, Ss. Cyril and Methodius University in Skopje,
Faculty of Economics – Skopje

2017

Online at <https://mpra.ub.uni-muenchen.de/91298/>

MPRA Paper No. 91298, posted 08 Feb 2019 10:35 UTC



Munich Personal RePEc Archive

Estimating a fiscal reaction function for the South East European countries

Biljana Tashevska and Marija Trpkova-Nestorovska and
Borce Trenovski

Ss. Cyril and Methodius University in Skopje, Faculty of Economics
– Skopje, Ss. Cyril and Methodius University in Skopje, Faculty of
Economics – Skopje, Ss. Cyril and Methodius University in Skopje,
Faculty of Economics – Skopje

2017

Online at <https://mpra.ub.uni-muenchen.de/91298/>
MPRA Paper No. 91298, posted UNSPECIFIED

Proceedings

of the ISCCRO -
International Statistical Conference in Croatia

ISCCRO'18

The 2nd International Statistical Conference in Croatia, 10-11 May 2018,
Opatija, Croatia

Conference topic:

“New Advances in Statistical Methods Applications for a Better World”

Vol. 2, No. 1

Editors-in-Chief:

Ksenija Dumičić, Nataša Erjavec, Mirjana Pejić Bach, Berislav Žmuk

Electronic ISSN: 1849-9872

Zagreb, 2018

Impressum

Proceedings of the ISCCRO – International Statistical Conference in Croatia

-

**ISCCRO'18: The 2nd International Statistical Conference in Croatia, Opatija, Croatia,
10-11 May 2018**

Conference topic: “New Advances in Statistical Methods Applications for a Better World“

EDITORS-IN-CHIEF

Ksenija Dumičić, Nataša Erjavec, Mirjana Pejić Bach, Berislav Žmuk

PUBLISHER

Croatian Statistical Association (CSA) / Hrvatsko statističko društvo (HSD)

Ilica 3, HR-10000 Zagreb, Croatia

www.hsd-stat.hr

PUBLISHING EDITOR: Berislav Žmuk

LOGO DESIGNER: Žarko Dumičić

PRINT: Recom d.o.o., Kamenarka 31, HR-10010 Zagreb

ORGANIZER OF THE ISCCRO'18 CONFERENCE

The International Statistical Conference in Croatia (**The 2nd ISCCRO'18**) has been organised by ***Croatian Statistical Association***

The ISCCRO'18 General Chair: Marko Krištof, Vice-President, Croatian Statistical Association & Director General, Croatian Bureau of Statistics, Zagreb, Croatia

The ISCCRO'18 Conference Program Chair: Ksenija Dumičić, President, Croatian Statistical Association & Univ. of Zagreb, Faculty of Economics and Business, Dept. of Statistics, Zagreb, Croatia

PATRONAGE OF THE ISCCRO'18

The **ISCCRO'18** Conference has been organised under the **patronage** of the ***Ministry of Science and Education of the Republic of Croatia.***

Supporters: ***Croatian Bureau of Statistics (CBS); Croatian Biometric Society (HBMD)***

Sponsors: ***University of Zagreb Faculty of Economics and Business; Ipsos d.o.o, Zagreb***

ISCCRO'18 Conference Web Site: http://www.hsd-stat.hr/en/isccro_en/

Abbreviation: Proc. ISCCRO - Int. Stat. Conf. Croat

Note: The papers are anonymously double-blind peer reviewed by the two independent reviewers.

Electronic ISSN 1849-9872

Focus and Scope of the ISCCRO Conference

The 2nd International Statistical Conference in Croatia - ISCCRO'18, with the topic: “**New Advances in Statistical Methods Applications for a Better World**”, was held from the 10th to the 11th May 2018 in Opatija, Croatia. The conference, covering statistical and related cross and multi-disciplinary fields, topics and areas, provides a platform for international networking and exchange of ideas on various aspects of theory and applications of statistics and related professional and scientific areas.

At the ISCCRO'18 in Opatija 188 authors, coming from 19 countries and Croatia, gave 100 submissions for presentation, half of them as Abstract Only and half of them as Full Papers, split in a variety of sessions in two parallel lines during two conference days of presentations, plus four of them being Invited Lectures. *Croatian Statistical Association* co-organized five Special Sessions, as follows: *Spreading out Official Statistics in the Digital World*, organized by Maja Pekeč from Croatian Bureau of Statistics; *Econometric Modelling for Fiscal Policy Making in European Union Countries*, chaired by Assistant Professor Irena Palić, PhD, University of Zagreb, Faculty of Economics and Business, Zagreb, Croatia; *Economic and Social Effects of Demographic Trends*, chaired by Professor Ana Štambuk, PhD, University of Rijeka, Faculty of Economics, Rijeka, Croatia; *Recent Advances in Robust Statistics for High-dimensional Settings and Techniques for Handling Large Spatial Data*, organized by Professor Taps Maiti, PhD, Michigan State University, East Lansing, Michigan, USA & Asuman S. Turkmen, Ohio State University, Newark, USA; and *Quantitative Analysis for Faster Development of the South East European Countries*, organized by Assoc. Professor Blagica Novkowska, PhD, from University of Tourism and Management in Skopje, Republic of Macedonia. Croatian Statistical Association organized the Special Session *Young Statisticians in Action*, chaired by Professor Anamarija Jazbec, University of Zagreb, Faculty of Forestry and Professor Mirta Benšić, coming from J. J. Strossmayer University of Osijek, Department of Mathematics, too.

The conference hosted the authors from Austria, Belgium, Bosnia and Herzegovina, Croatia, France, Germany, Hungary, Italy, Luxembourg, Netherlands, Republic of Macedonia, Russian Federation, Poland, Serbia, Slovakia, Slovenia, South Africa, Sweden, Ukraine, United Kingdom and USA.

The **Proceedings of the ISCCRO - International Statistical Conference in Croatia**, published after *The 2nd ISCCRO'18, held in Opatija, Croatia, 10-11 May 2018*, Volume 2, No. 1, 2018 (Electronic ISSN: 1849-9872; CD), includes 24 selected full conference papers written by the international authors with the share larger than 50%. It is followed by the **Book of Abstracts of the ISCCRO – International Statistical Conference in Croatia** (Online ISSN 2584-3850; Print ISSN 1849-9864), which contains four Plenary Speech abstracts and 96 contributed abstracts of the talks presented at the ISCCRO'18 Conference.

The International Scientific Program Committee, which is the Editorial Board of the ISCCRO'18 includes 118 scientists and professionals, from all over the World, 60% of them being from outside of Croatia. The ISCCRO'18 International Organizing Committee is comprised of the statisticians from four countries: Croatia, Serbia, Republic of Macedonia and Slovenia, which is the proof of the international importance of the ISCCRO conference.

The anonymous double-blind peer review by the two independent reviewers is applied to the all the papers.

International Scientific Program Committee and Editorial Board Members:

Mirta Benšić, J. J. Strossmayer Univ. of Osijek, Dept. of Mathematics, Unit for Probability and Mathematical Statistics, Osijek, Croatia – **Chair**
Maja Biljan August, Univ. of Rijeka, Faculty of Economics, Dept. of Statistics, Rijeka, Croatia – **Chair**
Lea Bregar, Univ. of Ljubljana, Faculty of Economics, Ljubljana, Slovenia – **Chair**
Ksenija Dumičić, Univ. of Zagreb, Faculty of Economics and Business, Dept. of Statistics, Zagreb, Croatia – **Chair**
Nataša Erjavec, Univ. of Zagreb, Faculty of Economics and Business, Dept. of Statistics, Zagreb, Croatia – **Chair**
Anamarija Jazbec, Univ. of Zagreb, Faculty of Forestry, Dept. for Forest Inventory and Management, Zagreb, Croatia – **Chair**
Zagorka Lozanov-Crvenković, Univ. of Novi Sad, Faculty of Science, Dept. of Mathematics and Informatics, Novi Sad, Serbia – **Chair**
Blagica Novkowska, Univ. of Tourism and Management in Skopje, Faculty of Economics, Skopje, R. of Macedonia – **Chair**
Snježana Pivac, Univ. of Split, Faculty of Economics, Dept. for Quantitative Methods, Split, Croatia – **Chair**
Josip Amerić, Univ. of Zagreb, Faculty of Economics and Business, Dept. of Statistics, Zagreb, Croatia
Petar Atanasov, Ss. Cyril and Methodius Univ., Faculty of Sociology, Skopje, R. of Macedonia
Dragan Bačić, Univ. of Zagreb, Faculty of Humanities and Social Sciences, Dept. of Sociology, Zagreb, Croatia
Vlasta Bahovec, Univ. of Zagreb, Faculty of Economics and Business, Dept. of Statistics, Zagreb, Croatia
Tea Baldigara, Univ. of Rijeka, Faculty of Tourism and Hospitality Management, Dept. of Quantitative Economics, Opatija, Croatia
Bojan Basrak, Univ. of Zagreb, Faculty of Science, Dept. of Mathematics, Zagreb, Croatia
Mojca Bavdaž, Univ. of Ljubljana, Faculty of Economics, Academic Unit for Mathematics, Statistics and Operations Research, Ljubljana, Slovenia
Emira Bečić, Croatian Bureau of Statistics, Zagreb, Croatia

Predrag Bejaković, Institute of Public Finance, Zagreb, Croatia
 Lynne Billard, Univ. of Georgia, Dept. of Statistics, Athens, Georgia, USA
 Penelope Bidgood, Fac. of Science, Engineering and Computing, Kingston Univ. London, London, UK
 Andrej Blejec, Univ. of Ljubljana, Biotechnical Faculty & National Institute of Biology, Ljubljana, Slovenia
 Srđan Bogosavljević, Univ. of Belgrade, Faculty of Economics, Belgrade, Serbia
 Vesna Bucevska, Ss. Cyril and Methodius Univ. Faculty of Economics, Dept. of Mathematics and Statistics, Skopje, R. of Macedonia
 Jozef Bushati, Luigj Gurakuqi Univ. of Shkodra, Dept. of Mathematics, Statistics and Applied Informatics, Shkodra, Albania
 Vesna Buško, Univ. of Zagreb, Faculty of Humanities and Social Sciences, Dept. of Psychology, Zagreb, Croatia
 James J. Cochran, Univ. of Alabama, Dept. of Information Systems, Statistics, and Management Science, Tuscaloosa, Alabama, USA
 Vesna Čančer, Univ. of Maribor, Faculty for Economics and Business, Maribor, Slovenia
 Anita Čeh Časni, Univ. of Zagreb, Faculty of Economics and Business, Dept. of Statistics, Zagreb, Croatia
 Draženka Čizmić, Univ. of Zagreb, Faculty of Economics and Business, Dept. of Statistics, Zagreb, Croatia
 Mirjana Čižmešija, Univ. of Zagreb, Faculty of Economics and Business, Dept. of Statistics, Zagreb, Croatia
 Marc-Arthur Diaye, Univ. of Evry Île de France, Dept. of Economics, Evry Île de France, France
 Somnath Datta, Dept. of Biostatistics Univ. of Florida, Gainesville, Florida, USA
 Susmita Datta, Dept. of Biostatistics Univ. of Florida, Gainesville, Florida, USA
 Luca Di Gennaro Splendore, Statistical Consultant of European Union, European Union Election Observation Missions (EUEOM)
 Adela Delalić, Univ. of Sarajevo, School of Economics and Business, Dept. of Quantitative Methods, Sarajevo, Bosnia and Herzegovina
 Jasminka Dobša, Univ. of Zagreb, Faculty of Organisation and Informatics, Varaždin, Croatia
 Samo Drobne, Univ. of Ljubljana, Faculty of Civil and Geodetic Engineering, Ljubljana, Slovenia
 Fatih Destović, Univ. of Sarajevo, Faculty of Pedagogy Sarajevo, Bosnia and Herzegovina
 Rajeev Dwivedi, Institute of Management Technology, Ghaziabad, India
 Senad Fazlović, Univ. of Tuzla, Faculty of Economics, Bosnia and Herzegovina
 Anuška Ferligoj, Univ. of Ljubljana, Faculty of Social Sciences, Ljubljana, Slovenia
 Florin Fesnic, Univ. Babeş-Bolyai Cluj & Univ. of Illinois at Urbana-Champaign, Cluj County, Romania
 Nancy Flournoy, Univ. of Missouri-Columbia, Dept. of Statistics, Columbia, Missouri, USA
 Herwig Friedl, Graz Univ. of Technology, Graz, Austria
 Davor Galinec, Croatian National Bank, Zagreb, Croatia
 Jakov Gelo, Prof. Emeritus, Univ. of Zagreb, Faculty of Economics and Business, Dept. of Demographics, Zagreb, Croatia
 Tom Gillpatrick, Portland State Univ. School of Business Administration, Portland, Oregon, USA
 Amanda L. Golbeck, Univ. of Arkansas for Medical Sciences, Fay W. Boozman College of Public Health, Little Rock, Arkansas, USA
 Sabina Hodžić, Univ. of Rijeka, Faculty of Tourism and Hospitality Management, Dept. of Public Finance, Opatija, Croatia
 Jasna Horvat, J. J. Strossmayer Univ. of Osijek, Faculty of Economics, Dept. of Quantitative Methods and Informatics, Osijek, Croatia
 Chen Hua, Shanghai Univ. of International Business and Economics, Dept. of International Economics, Shanghai, China
 Miljenko Huzak, Univ. of Zagreb, Faculty of Science, Dept. of Mathematics, Zagreb, Croatia
 Saša Jakšić, Univ. of Zagreb, Faculty of Economics and Business, Dept. of Statistics, Zagreb, Croatia
 Hrvoje Jošić, Univ. of Zagreb, Faculty of Economics and Business, Dept. of Economic Theory, Zagreb, Croatia
 Dubravka Jurlina Alibegović, The Inst. of Economics, Zagreb, Croatia
 Djordje M. Kadijevich, Institute for Educational Research, Belgrade, Serbia
 Gindra Kasnauskienė, Vilnius Univ., Faculty of Economics, Dept. of Quantitative Methods and Modeling, Vilnius, Lithuania
 Sasho Kjosev, Univ. "Ss. Cyril and Methodius", Skopje, R. of Macedonia & President and Chairman of the Board of Directors, Association for Regional Development Balkan Economic Forum
 Milorad S. Kovacevic, Chief Statistician, United Nations Development Programme, New York City, New York, USA
 Péter Kovács, Univ. of Szeged, Faculty of Economics and Business Administration, Dept. of Statistics and Demography, Szeged, Hungary
 Miladin G. Kovačević, Director General of the Republican Bureau of Statistics of Serbia, and Faculty of Economics, Belgrade, Serbia
 Maria Králová, Masaryk Univ., Faculty of Economics and Administration, Dept. of Applied Mathematics and Computer Science, Brno, Czech Republic
 Marko Krištof, Croatian Bureau of Statistics, Zagreb, Croatia
 Mirjana Kujundžić Tiljak, Univ. of Zagreb, School of Medicine, Andrija Stampar School of Public Health, Zagreb, Croatia
 Nataša Kumoga, Univ. of Zagreb, Faculty of Economics and Business, Dept. of Statistics, Zagreb, Croatia
 Éva Laczka, Hungarian Central Statistical Office (President of the Hungarian Statistical Association), Budapest, Hungary
 Peter Laimer, Statistics Austria, Directorate Spatial Statistics – Tourism, Motor Vehicles, Road Safety, Vienna, Austria
 Anita Lee-Post, Univ. of Kentucky, School of Management, Decision Science and Information Systems Area, Lexington, Kentucky, USA
 Goran Lešaja, Georgia Southern Univ. College of Science and Mathematics, Dept. of Mathematical Science, Georgia, USA
 Michael Loupis, Univ. of Applied Sciences of Central Greece, Lamia, Greece
 Justyna Majewska, Univ. of Economics in Katowice, Dept. of Demography and Economic Statistics, Katowice, Poland
 Aleksandra Marcikić, Univ. of Novi Sad, Faculty of Economics Subotica, Dept. of Business Informatics and Quantitative Methods, Novi Sad, Serbia
 Suzana Marković, Univ. of Rijeka, Faculty of Tourism and Hospitality Management, Dept. of Quantitative Economics, Opatija, Croatia
 Maja Meško, Univ. of Primorska, Faculty for Management, Koper, Slovenia
 Josipa Mijoč, J. J. Strossmayer Univ. of Osijek, Faculty of Economics, Dept. of Quantitative Methods and Informatics, Osijek, Croatia
 Andrija Mihoci, Brandenburg Univ. of Technology Cottbus-Senftenberg Humboldt-Univ. of Berlin, Berlin Area, Germany

Craig A. Molgaard, Univ. of Arkansas for Medical Sciences, Fay W. Boozman College of Public Health, Little Rock, Arkansas, USA
 Srđan Mrkić, United Nations Statistics Division (UNSD), New York City, New York, USA
 Danijel Nestić, The Inst. of Economics, Zagreb, Croatia
 Emilija Nikolić Đorić, Univ. of Novi Sad, Faculty of Agriculture, Novi Sad, Serbia
 Irena Ograjenšek, Univ. of Ljubljana, Faculty of Economics, Academic Unit for Mathematics, Statistics and Operations Research, Ljubljana, Slovenia
 Irena Palić, Univ. of Zagreb, Faculty of Economics and Business, Dept. of Statistics, Zagreb, Croatia
 Mirjana Pejić Bach, Univ. of Zagreb, Faculty of Economics and Business, Dept. of Informatics, Zagreb, Croatia
 Sanja Peković, Univ. of Montenegro, Podgorica, Montenegro
 Tunjo Perić, Univ. of Zagreb, Faculty of Economics and Business, Dept. of Mathematics, Zagreb, Croatia
 Lei Ping, Shanghai Univ. of International Business and Economics, Dept. of International Business, School of Business, Shanghai, China
 Judit Poór, Univ. of Pannonia, Georgikon Faculty, Dept. of Economic Methodology, Keszthely, Hungary
 Lovrenc Pfařfar, Univ. of Ljubljana, Faculty of Economics, Ljubljana, Slovenia
 Bořidar V. Popović, Univ. of Montenegro, Faculty of Science and Mathematics, Podgorica, Montenegro
 Yichen Qin, Univ. of Cincinnati, Carl H. Lindner College of Business, Dept. of Operations, Business, Analytics, and Information Systems, Ohio, USA
 Źeljko Račić, Univ. of Banja Luka, Faculty of Economics, R. of Srpska, Bosnia and Herzegovina
 Gábor Rappai, Univ. of Pécs, Institute of Business Methodologies, Pécs, Hungary
 Emina Resić, Univ. of Sarajevo, School of Economics and Business, Dept. for Quantitative Economics, Sarajevo, Bosnia and Herzegovina
 Sead Rešić, Univ. of Tuzla, Faculty of Science and Mathematics, Bosnia and Herzegovina
 Jože Rován, Univ. of Ljubljana, Faculty of Economics, Ljubljana, Slovenia
 Ante Rozga, Univ. of Split, Faculty of Economics, Dept. for Quantitative Methods, Split, Croatia
 Tamás Rudas, Center for Social Sciences, Hungarian Academy of Sciences and Eötvös Loránd Univ., Budapest, Hungary
 Jasmina Selimović, Univ. of Sarajevo, School of Economics and Business, Dept. for Quantitative Economics, & Dept. of Finance, Sarajevo, Bosnia and Herzegovina
 Rabija Somun-Kapatanović, Univ. of Sarajevo, School of Economics and Business, Dept. for Quantitative Economics, Sarajevo, Bosnia and Herzegovina
 Zdenko Sonicki, Univ. of Zagreb, School of Medicine, Andrija Stampar School of Public Health, Zagreb, Croatia & President of Croatian Biometric Society, Croatia
 Petar Sorić, Univ. of Zagreb, Faculty of Economics and Business, Dept. of Statistics, Zagreb, Croatia
 Janez Stare, Univ. of Ljubljana, Faculty of Medicine, Dept. of Biomedical Informatics, Ljubljana, Slovenia & Institute of Biomedical Informatics, Ljubljana, Slovenia
 Stevan R. Stević, Univ. of East Sarajevo, Faculty of Economics Brcko, Bosnia and Herzegovina
 Źeljko Šain, Univ. of Sarajevo, School of Economics and Business, Dept. for Quantitative Economics & Dept. of Finance, Sarajevo, Bosnia and Herzegovina
 Ensar Šehić, Univ. of Sarajevo, School of Economics and Business, Dept. for Quantitative Economics, Sarajevo, Bosnia and Herzegovina
 Ana Štambuk, Univ. of Rijeka, Faculty of Economics, Dept. for Statistics, Rijeka, Croatia
 Nenad Šuvak, J. J. Strossmayer Univ. of Osijek, Dept. of Mathematics, Unit for Probability and Mathematical Statistics, Osijek, Croatia
 Josip Tica, Univ. of Zagreb, Faculty of Economics and Business, Dept. of Macroeconomics and Economic Development, Zagreb, Croatia
 Orsolya Tóth, Research Institute of Agricultural Economics, Rural Development Policy Dept., Budapest, Hungary
 Grażyna Trzpiot, Univ. of Economics in Katowice, Dept. of Demography and Economic Statistics, Katowice, Poland
 João Varajá, Univ. of Trás-os-Montes and Alto Douro, Trás-os-Montes and Alto Douro, Portugal
 Emir Veledar, Florida International Univ. Robert Stempel College of Public Health and Social Work, Dept. of Biostatistics, Miami, Florida, USA
 Maruška Vizek, The Inst. of Economics, Zagreb, Croatia
 Lidija Zadnik-Štim, Univ. of Ljubljana, Biotechnical Faculty, Ljubljana, Slovenia
 Sejfudin Zahirović, Univ. of Tuzla, Faculty of Economics, Tuzla, Bosnia and Herzegovina
 Davor Zorić, Univ. of Zagreb, Faculty of Economics and Business, Dept. of Managerial Economics, Zagreb, Croatia
 Janez Źerovnik, Univ. of Ljubljana, Institute of Mathematics, Physics and Mechanics & Faculty for Mechanical Engineering, Ljubljana, Slovenia
 Saša Źiković, Univ. of Rijeka, Faculty of Economics, Dept. for Finance and Banking, Rijeka, Croatia
 Berislav Źmuk, Univ. of Zagreb, Faculty of Economics and Business, Dept. of Statistics, Zagreb, Croatia

International Organizing Committee Members:

Organizing Committee Chairs:

Davor Galinec, Croatian National Bank, Croatia – **Chair**
 Sabina Hodžić, Univ. of Rijeka, Croatia – **Chair**
 Tea Baldigara, Univ. of Rijeka, Croatia – **Chair**
 Ana Štambuk, Univ. of Rijeka, Croatia – **Chair**
 Anamarija Jazbec, Univ. of Zagreb, Croatia – **Chair**
 Ksenija Dumičić, Univ. of Zagreb, Croatia – **Chair**

Lea Bregar, Univ. of Ljubljana, Slovenia – **Chair**
Zagorka Lozanov-Crvenković, Univ. of Novi Sad, Serbia – **Chair**
Blagica Novkovska, Univ. of Tourism and Management in Skopje, R. of Macedonia – **Chair**

Dubravka Rogić-Hadžalić, Croatian Bureau of Statistics, Croatia
Jasna Pugar, Croatian Bureau of Statistics, Croatia
Mario Gavrić, Croatian Bureau of Statistics, Croatia
Nino Mrša, Croatian Bureau of Statistics, Croatia
Maja Pekeč, Croatian Bureau of Statistics, Croatia
Nataša Kumoga, Univ. of Zagreb, Croatia
Nenad Šuvak, J. J. Strossmayer Univ. of Osijek, Croatia
Anita Čeh Časni, Univ. of Zagreb, Croatia
Saša Jakšić, Univ. of Zagreb, Croatia
Hrvoje Jošić, Univ. of Zagreb, Croatia
Irena Palić, Univ. of Zagreb, Croatia
Petar Sorić, Univ. of Zagreb, Croatia
Davor Zoričić, Univ. of Zagreb, Croatia
Berislav Žmuk, Univ. of Zagreb, Croatia
Tea Poklepović, Univ. of Split, Croatia
Danijel Grahovac, J.J. Strossmayer Univ. of Osijek, Croatia
Ema Kelin, Univ. of Rijeka, Croatia
Ivana Lolić, Univ. of Zagreb, Croatia
Zrinka Lovretin Golubić, Univ. of Zagreb, Croatia
Maja Mamula, Univ. of Rijeka, Croatia
Ana Pavković, Univ. of Zagreb, Croatia
Ivan Papić, J.J. Strossmayer Univ. of Osijek, Croatia
Jasmina Pivar, Univ. of Zagreb, Croatia
Matea Bogdanić, Univ. of Zagreb, Graduate Student, Croatia
Marta Cota, Univ. of Zagreb, Graduate Student, Croatia
Matea Pavić, Univ. of Zagreb, Graduate Student, Croatia
Ante Šterc, Univ. of Zagreb, Graduate Student, Croatia

Contents

| | Page |
|--|------|
| <i>Almira Arnaut-Berilo, Tea Baldigara</i> Applying linear programming in optimizing food consumption: a comparative analysis of Bosnia & Herzegovina and Croatia | 1 |
| <i>Ana Pavković, Nikolina Pejović, Petra Palić</i> A revisit to the determinants of immigration in the European Union: evidence from count panel data models | 8 |
| <i>Andrea Andrejević Panić, Zagorka Lozanov-Crvenković</i> Analysis of interrelation between financial and performance indicators in higher education in Central East Europe | 16 |
| <i>Anita Čeh Časni</i> The housing wealth effect before and after the 2008 financial crisis: panel vector autoregression approach | 23 |
| <i>Berislav Žmuk</i> Impact of the number of shown questions on response rates in business web surveys | 28 |
| <i>Biljana Tashevska, Marija Trpkova-Nestorovska, Borce Trenovski</i> Estimating a fiscal reaction function for the South East European countries | 36 |
| <i>Craig A. Molgaard</i> Factors in the diffusion of Islamic mathematics in the Mediterranean | 43 |
| <i>Damir Plesac, Lidija Gligorova, Dubravka Rogić-Hadžalić</i> Census quality control: performance, lessons learned and directions for the next Post Enumeration Survey in Croatia | 49 |
| <i>Davor Galinec, Jadranka Vuglar, Dario Cvrtila</i> Residential property price index in Croatia: from experimental to official statistics | 57 |
| <i>Denis Dolinar, Ena Pecina, Saša Jakšić</i> Applied panel data analysis in the field of corporate finance – analysis of stock returns and capital structure of Croatian companies | 65 |
| <i>Doris Schadler, Ernst Stadlober</i> Model based methods for fault diagnostics at engine test beds | 72 |

| | |
|--|-----|
| <i>Ivana Vidaković Peruško, Katarina Kovač, Miroslav Jošić</i> Integration in global value chains: case of Croatia | 80 |
| <i>Maja Mamula, Kristina Duvnjak</i> Artificial neural networks implementation potentials – a literature review | 86 |
| <i>Maja Rožman, Sonja Treven, Vesna Čančer</i> The impact of stress of older employees on their work engagement | 94 |
| <i>Marija Gojević</i> Importance of the non-financial sector accounts in the macroeconomic statistics | 101 |
| <i>Marko Senekovič, Jani Beko, Alenka Kavkler</i> Determinants of the size of fiscal multipliers: new empirical evidence for European Union countries | 109 |
| <i>Martina Pezer</i> Maternity support policies: a cluster analysis of 22 European Union countries | 117 |
| <i>Melinda Tokai</i> Sampling frames construction using the Hidiroglou algorithm | 125 |
| <i>Renata Benda-Prokeinova, Martina Hanova, Johana Paluchova</i> Application of the discrete choice experiment by using the questionnaire | 131 |
| <i>Sasho Kjosev, Blagica Novkovska</i> Developing Social Accounting Matrix methodology for regional analysis of the SEE countries | 139 |
| <i>Tihana Škrinjarić, Boško Šego</i> Exploring herding investment behaviour on Zagreb Stock Exchange | 146 |
| <i>Zagorka Lozanov-Crvenković, Emilija Nikolić-Đorić</i> Measures of complexity of stock returns | 154 |
| <i>Zagorka Lozanov-Crvenković, Gabrijela Grujić, Ivana Štajner-Papuga</i> A note on some statistical notions with fuzzy integration | 162 |
| <i>Želimir Kurtanjek</i> Big data analytics and variance based global synergism | 169 |

Estimating a fiscal reaction function for the South East European countries

Biljana Tashevsk

Ss. Cyril and Methodius University in Skopje, Faculty of Economics – Skopje, Blvd. Goce Delcev 9V,
Skopje, Republic of Macedonia
biljana@eccf.ukim.edu.mk

Marija Trpkova-Nestorovska

Ss. Cyril and Methodius University in Skopje, Faculty of Economics – Skopje, Blvd. Goce Delcev 9V,
Skopje, Republic of Macedonia
marijat@eccf.ukim.edu.mk

Borce Trenovski

Ss. Cyril and Methodius University in Skopje, Faculty of Economics – Skopje, Blvd. Goce Delcev 9V,
Skopje, Republic of Macedonia
borcet@eccf.ukim.edu.mk; borcetrenovski@gmail.com

Abstract:

The global economic crisis caused a deterioration in the public finances of the South East European countries. Hence, the fiscal sustainability issue became important not only for developed EU countries (considering the European debt crisis), but also for the SEE region. The paper analyses how primary government balances in South East Europe adjust to increasing government debt and to the economic cycle, by estimating a panel fiscal reaction function. The main goal is to test whether fiscal policy tends to react to a sufficient extent to increasing public debt in order to ensure long-term fiscal sustainability. The empirical results imply a pro-cyclical fiscal policy in the SEE countries. The results also show an initial deterioration of the primary balance after a rise in the debt level, which is not consistent with sustainability of public finances. However, in the medium run primary balance seems to adjust to rising debt.

Keywords: fiscal reaction function, fiscal sustainability, South East European countries.

JEL code: C33, E62, H62, H63.

1. Introduction

The issue of fiscal sustainability is one of the most discussed by economic academics and policy makers in the last few years. The economic crisis and the responding fiscal stimulus proved the importance of fiscal policy during recessions. However, the deterioration of the fiscal stability in many countries (more so in advanced economies) caused great concerns over the long-term fiscal sustainability. This was especially evident in the European Union, particularly in some peripheral countries, which faced difficulties in the financial markets due to rising borrowing costs and diminished credibility. These recent events placed fiscal sustainability in the centre stage of economic discussions.

Fiscal sustainability is most often regarded as the long-term solvency of the government. A government is solvent if it meets its intertemporal budget constraint, i.e. if it is able, within an infinite horizon, to repay its debt with future primary surpluses without an explicit default (IMF, 2003; Celasun, Debrun, Ostry, 2006; Chalk, Hemming, 2000). Fiscal unsustainability implies that current fiscal policies cannot continue forever and a future adjustment will be needed to prevent debt from exploding. Some authors find a lower debt tolerance in less developed countries and show that default can occur at much lower debt levels than in developed countries (see Reinhart, Savastano, Rogoff, 2003).

A common approach for the empirical investigation of fiscal sustainability includes testing whether there exists a systematic (positive) linear relationship between primary surplus and public debt and shows that fiscal policy that contains a strong enough reaction of primary surplus to public debt growth is

sustainable even in an uncertain world (Bohn, 2005; Chalk, Hemming, 2000; Afonso, Jalles, 2011, 2016). The systematic, that is, average response of the primary balance to past debt is crucial for the fiscal sustainability. If the fiscal authorities react systematically to indebtedness by improving the primary balance in order to maintain public debt sustainable throughout time, then the transversality condition is met and the fiscal policy prevents excess debt accumulation (Bohn, 1998). Its main advantage lies in the direct testing of the link between the primary surplus and the public debt, which does not require any explicit strong assumptions about the interest rates. The public debt evolution depends on whether the concern for debt sustainability dominates the snowball effect or vice versa. This, according to Bohn (1995; 2007), is an error correction mechanism: if the public debt ratio grows, the government should respond by increasing the primary balance in order to keep or even reduce the debt ratio and it is a sufficient condition to ensure that the inter-temporal budget constraint is satisfied. Also one needs to account for the influence of other heterogeneous, often transitory influences, allowed with this approach (Mendoza, Ostry, 2007).

The aim of this paper is to analyse how primary government balances adjust to increasing government debt and to the economic cycle. The main goal is to check whether fiscal policy in SEE countries tends to react to a sufficient extent to increasing public debt in order to ensure fiscal sustainability. The paper contributes to the existing literature on fiscal sustainability in SEE by estimating a panel fiscal reaction function, following Bohn (2007) and Afonso and Jalles (2011, 2016). The issue of fiscal sustainability has become important in the countries of the region, since most of them experienced a drastic rise in public debt since 2008, after a period of positive economic performances and favourable fiscal conditions. General government debt grew from an average of 27,9% of GDP in 2007 to an average of 59,7% of GDP in 2015. An additional incentive for the countries to maintain sustainable public finance is the membership or aspirations for membership in the EU and EMU, where the countries are meant to comply with the Maastricht criteria.

The rest of the paper is structured as follows. Section 2 briefly overviews the empirical literature on fiscal reaction functions as means for testing fiscal sustainability. Section 3 explains the used methodology and data, Section 4 reveals and explains the empirical analysis and results and Section 5 contains the concluding remarks.

2. Overview of the empirical literature

The interest in using fiscal reaction functions for testing the response of primary balance to debt has grown recently, especially since the crisis. Most studies focus on developed countries (Bohn, 1998; 2005; 2007; de Mello, 2008; Afonso, Jalles, 2011, 2016; Fincke, Greiner, 2012). Some studies include both developed and developing or transition economies (IMF, 2003; Mendoza, Ostry, 2007; Baldi, Staehr, 2013; Shijaku, 2017) while there is a growing body of literature focusing on CEE and SEE countries or other developing countries (Burger et al., 2011; Tanner, Ramos, 2002; Eller, Urvova, 2012; Zdravkovic, Zubovic, Bradic-Martinovic, 2013; Llorca, Redzepagic, 2008; Zoli, 2005; Trenovski, Tashevskaja, 2015; Andric, Arsic, Nojkovic, 2016; Tashevskaja and Trenovski, 2017 etc.).

Most of the estimated fiscal reaction functions for the developing countries are based on panel regression models since there are no long series of data for individual countries (IMF, 2003; Mendoza, Ostry, 2007; Eller, Urvova, 2012; Llorca, Redzepagic, 2008). IMF (2003) found that the primary balance response weakens with the growth of the debt ratio and stops at a, that is beyond the 50% of GDP debt level, the fiscal policy in the emerging economies is not consistent with providing sustainability, while in the industrialized countries, there is a strong reaction at high debt levels. Baldi and Staehr (2013) found a stronger response of primary balance in Europe since the crisis, explaining it as a reflection of short-term measures to address the fiscal problems facing the countries. However, they didn't find a strong response in the CEE countries with the possible exception that fiscal policy appears to be counter-cyclical in the post-crisis sample while it was pro-cyclical or a-cyclical in the pre-crisis sample. Mendoza and Ostry (2007) analysed a larger set of emerging and industrialized countries for the period from 1990 to 2005 and confirmed that the sustainability condition was met in the countries with moderate debt levels, but not in the highly indebted countries. They warned against a smaller ability of governments to keep fiscal

solvency above a 50-60% of GDP level. Berti et al. (2016) found that the primary balance reacts positively to increasing public debt among CEECs, while Stoian and Campeanu (2010) got mixed results for the reaction of primary balance to debt for a group of CEE countries. Eller and Urvova (2012) and Zdravkovic, Zubovic and Bradic-Martinovic (2013) found a positive response of primary balance to debt shocks in the CESEE countries. Zdravkovic, Zubovic and Bradic-Martinovic (2013) also found evidence of a non-linear relationship between primary balance and lagged debt, with fiscal fatigue occurrence at 70% threshold and showed that countercyclical response of primary balance is more pronounced in economic downturn. Shijaku (2017) concluded that there was some evidence of sustainability in the candidate and potential EU candidate countries. However, he notes that the pursued fiscal policies do not avoid excessive debt accumulation.

3. Data and methodology

The analysis uses annual data for the period 2000-2016, for nine South East European countries (Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia, Montenegro, Romania, Serbia and Slovenia), with a total number of 153 observations. Three variables are used: General government gross debt (% of GDP) - *debt*, General government primary net lending/borrowing (% of GDP) – *primary balance* and Output gap – *output gap*. The data source for the first two variables, and for real GDP, is the World Economic Outlook Database 2017, from the International Monetary Fund. The output gap was calculated with the Hodrick-Prescott filter, as a percentage deviation of real GDP from its trend.

Figure 1 represents the movements of the two main fiscal variables for the period 2000-2016. The left vertical axis refers to the gross debt, while the right vertical axis refers to the primary balance.

The analysed countries from Southeast Europe are characterised with diversity regarding the level and trends of their government debts and primary balance. What is common is the falling debt level in the pre-crisis period and the rising debt since the outburst of the global economic crisis. There are economies in our sample with high government debt – above 60% of GDP (Albania, Croatia, Montenegro, Serbia, Slovenia), another group with general government debt below 50% of GDP (Bosnia and Herzegovina, Bulgaria,, Macedonia, Romania) and some were significantly affected by the global economic crisis from 2007 (Slovenia marked the largest rise in debt since 2007 – from 23% of GDP to 78% of GDP in 2016). Despite the different paths of primary balances across countries, there is an evident worsening of the balances once the crisis reached the countries.

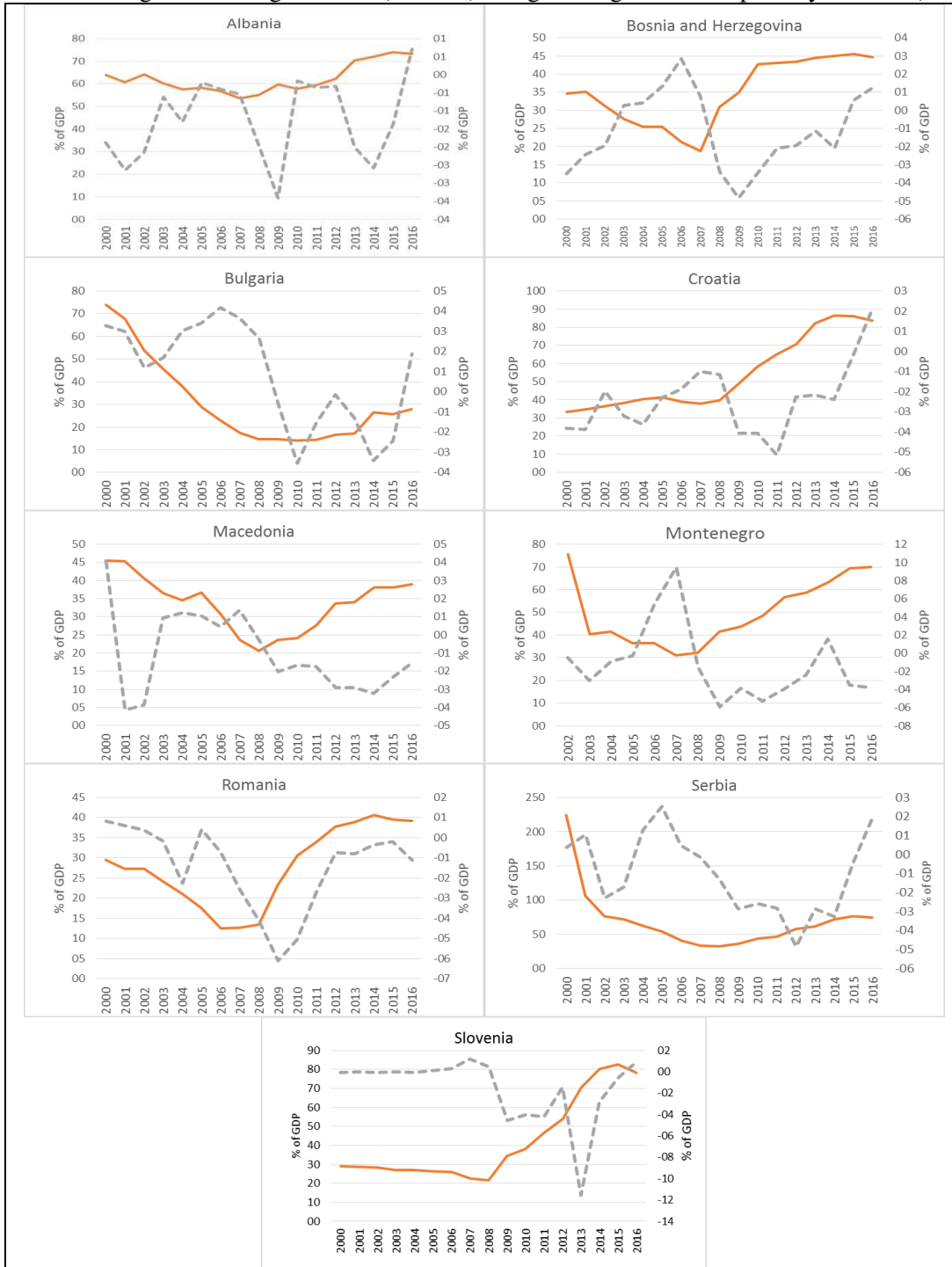
The analysis in this paper is based on a fiscal reaction function, following Bohn (1995; 2008). The use of primary balance, instead of total budget balance has an advantage because the government controls primary expenditures more easily, while the interest payments are an exogenous category and are determined by past activities of fiscal policy related to borrowing (Angelovska-Bezovska et al., 2011). As in other studies (Bohn, 2007; Ostry et al., 2010; Eller, Urvova, 2012; Afonso, Jalles, 2011; Budina, van Wijnbergen, 2007; Tashevskaja, Trenovski, 2017) we use cyclically unadjusted balance, because: this helps avoid the disadvantages of the methodology for calculating cyclically adjusted variables related to potential GDP; the cyclically adjusted primary balance can be influenced by temporary factors, not directly related to the cycle, such as onetime operations, creative accounting and classification errors. It should be taken into account that primary balance includes the response of automatic stabilisers, as well as of discretionary policy.

The usual way of assessing the fiscal reaction is by estimating a regression equation where the primary balance is the dependent variable and lagged debt is an independent variable. Sometimes the models contain the output gap as a control variable, which reflects the business cycle and shows whether the government conducts a short term aggregate demand stabilisation policy (Bohn, 1998; Burger et al., 2011; Mendoza, Ostry, 2007; Celasun, Debrun, Ostry, 2006; Afonso, Jalles, 2011; Eller, Urvova, 2012; Medeiros, 2012).

The use of VAR model that captures multiple interactions between the endogenous variables in the models gains importance (Tanner and Ramos, 2002; Afonso and Jalles, 2011; Burger et al., 2011; Shijaku, 2017). When assessing regression equations with the OLS method, the variables need to be stationary and if the model contains non-stationary series, it could provide spurious results. Hence, following Burger et

al. (2011) and Afonso and Jalles (2011), we employ a VAR framework. We give preference to the vector model also due to the fact that the OLS method omits the feedback effect of primary balance on debt. Namely, this framework does not distinguish between ex-post primary balance adjustments to government obligations (public debt) and ex-ante adjustments of government obligations (public debt) to primary balance (Tanner, Ramos, 2002).

Figure 1 General government gross debt (% GDP) and general government primary balance (% GDP)



Note: — General government gross debt; General government primary balance.

As in other studies focused on developing countries, we use a panel model since there are no long series of data for individual countries (Mendoza, Ostry, 2007; Eller, Urvova, 2012; Llorca, Redzepagic, 2008). The designated method for analysis is panel VAR. Panel VARs have the same structure as VAR models, in the sense that all variables are assumed to be endogenous and interdependent, but a cross sectional dimension is added. So, the Y_t is a stacked version of y_{it} , the vector of G variables for each unit $i = 1, \dots, N$, i.e., $Y_t = [y'_{1t}, y'_{2t}, \dots, y'_{Nt}]'$. The index i is generic and in our analysis indicates countries. The panel VAR is

$$y_{it} = A_{0i}(t) + A_i(l)Y_{1t-1} + u_{1t} \quad i = 1, \dots, N \quad t = 1, \dots, T$$

Where u_{1t} is a $G \times 1$ vector of random disturbances and, $A_{0i}(t)$ and A_i may depend on the unit (Canova, Ciccarelli, 2013).

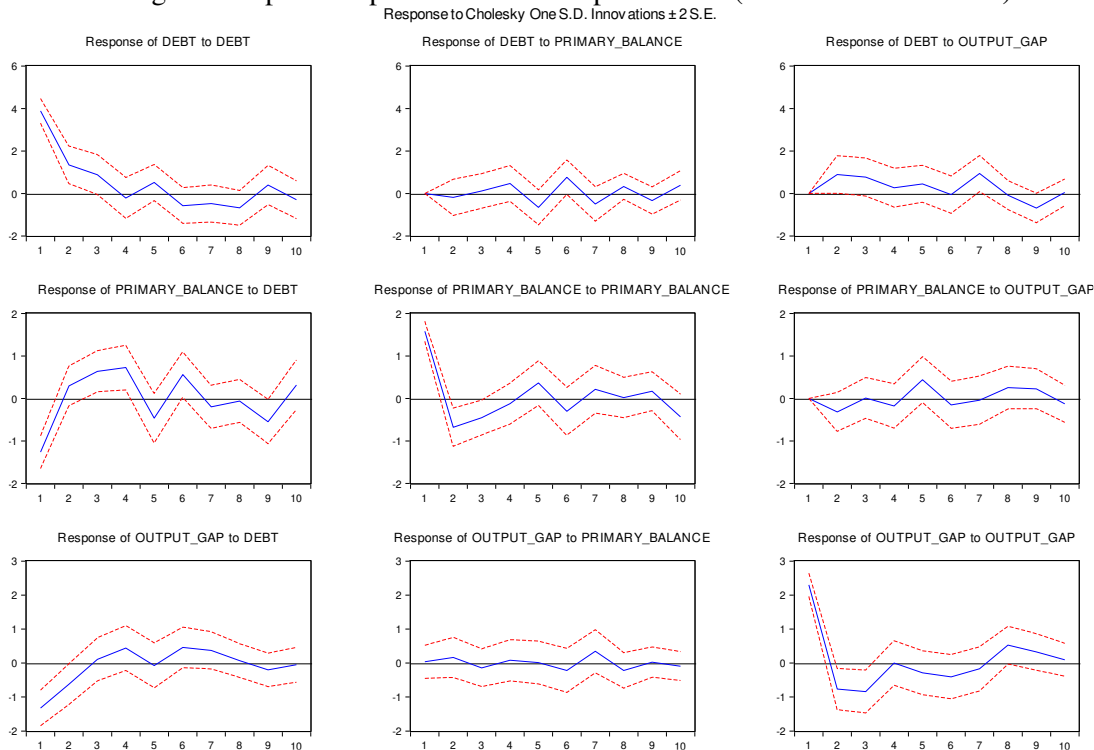
4. Empirical analysis

Initially, panel unit root tests are applied to the data. The results are presented in table 1.

Table 1 Panel unit root tests (Authors' calculations)

| | p-values (level) | | | p-values (first differences) | | |
|----------------------------------|------------------|-----------------|------------|------------------------------|-----------------|------------|
| | Debt | Primary balance | Output gap | Debt | Primary balance | Output gap |
| Levin, Lin & Chu test | | | | | | |
| Individual intercept | 0.2241 | 0.0057 | 0.0746 | 0.0000 | 0.0000 | 0.0009 |
| Individual intercept and trend | 0.0600 | 0.0764 | 0.5312 | 0.0000 | 0.0000 | 0.0457 |
| None | 0.5422 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Im, Pesaran and Shin W-statistic | | | | | | |
| Individual intercept | 0.3611 | 0.0085 | 0.0248 | 0.0002 | 0.0000 | 0.0040 |
| Individual intercept and trend | 0.5013 | 0.1530 | 0.6117 | 0.0001 | 0.0050 | 0.3226 |

Figure 2 Impulse response functions of panel VAR (Authors' calculations)



Non-stationarity is present in the series. The series are stationary in first differences and the panel VAR is estimated with the first-differenced variables and with 6 time lags (lag length criteria showed that the LR statistic and Hannan-Quinn information criteria select 6 time lags, while the Final prediction Error and the Akaike information criteria select 8 time lags). The analysis was performed in both ways, and the results were very similar. The authors' decision was to continue the analysis with 6 time lags. The results from the panel VAR in form of impulse response functions are presented in figure 2.

The response of government debt to primary balance appears to be insignificant, which does not confirm that SEE countries' debt falls when the primary budget balance seems to improve. Regarding the reaction of debt to the economic cycle, the initial positive response indicates a pro-cyclical behaviour of fiscal policy in these countries in the first couple of years. This finding seems to contribute to the previous, also confirmed with the negative response of primary balance to output gap shocks. Even when the output gap is positive and the economy is improving, the initial debt increase puts additional burden on the future debt servicing. The negative implications of the public debt increase on economic activity are confirmed with the negative response of output gap to debt shocks in the first two years. The response of primary balance to debt is significant and negative in the first year, while in the second, third and fourth year the response becomes positive, and remains significant. Fiscal authorities increase the budget deficits in spite of the higher debts levels in the short run, which means that they do not take into account the level of indebtedness and this is not consistent with the fiscal sustainability. However, in the medium run, the SEE countries improve their primary balance implying that fiscal authorities seem to undertake measures to counteract the rising level of debt.

5. Conclusions

The paper analyses how the general government primary balance in the South East European countries adjusts to increasing general government debt and to the economic cycle. The results of the empirical analysis imply a pro-cyclical fiscal policy in the SEE countries in the initial period. The response of government debt to primary balance appears to be statistically insignificant, while the initial positive response of debt to the economic cycle confirms the pro-cyclical nature of fiscal policy in these countries in the short run. Even when the output gap is positive and the economy is improving, the debt continues to increase. This puts additional fiscal burden regarding the future servicing of the public debt. On the other hand the analysis implies negative implications of the public debt increase on economic activity proved by the negative response of output gap to debt shocks in the first two years.

Regarding the fiscal sustainability issue, the results show that initially, a rise in the debt level, instead of being accompanied by an improvement of the primary balance in order to ensure fiscal sustainability, is followed by a deterioration of the primary balance. Other studies found similar results for these countries. It is encouraging, however, that in the medium run, the primary balance adjusts to the rise in indebtedness in the expected manner, suggesting that the fiscal authorities do seem to take action for maintaining sustainable public finance. This indicates that these countries still partially follow the lessons and the basic recommendation that emerged from the Global economic crisis that in good times the countries should build fiscal buffers and reduce the fiscal burden of debt in order to be able to react in times of crisis.

References

- Afonso, A., Jalles, J. (2011). Appraising fiscal reaction functions. *Economics Bulletin*, AccessEcon, Vol. 31, No. 4, pp. 3320-3330.
- Afonso, A., Jalles, J. (2016). The elusive character of fiscal sustainability. *Applied Economics*, Vol. 48, No. 28, pp. 2651-2664.
- Andrić, V., Arsić, M., Nojković, A. (2016). Public debt sustainability in Serbia before and during the global financial crisis. *Economic Annals*, Vol. 61, No. 210, pp. 47-77.
- Angelovska-Bezovska, A., Bogoev, J., Mitreska, A., Kadievski Vojnovik, M. (2011). Investigating the Cyclical Behavior of Fiscal Policy in the Republic of Macedonia during the Period of Transition. *Croatian Economic Survey*. Vol. 13, No. 1, pp. 57-104.
- Baldi, G., Staehr, K. (2013). The European debt crisis and fiscal reaction functions in Europe 2000-2012. *Eesti Pank Working Paper Series*, 5/2013.

- Berti, K., Colesnic, E., Despouts, C., Pamies, S., Sail, E. (2016). *Fiscal Reaction Functions for European Union Countries*, No. 028, Directorate General Economic and Financial Affairs (DG ECFIN), European Commission.
- Bohn, H. (1995). The sustainability of budget deficits in a stochastic economy. *Journal of Money, Credit, and Banking*, Vol. 27, pp. 257-271.
- Bohn, H. (1998). The Behavior of U.S. Public Debt and Deficits. *The Quarterly Journal of Economics*. Vol. 113, No. 3, pp. 949-963.
- Bohn, H. (2005). The Sustainability of Fiscal Policy in the United States. *CESifo Working Paper Series* 1446.
- Bohn, H. (2007). Are stationarity and cointegration restrictions really necessary for the intertemporal budget constraint?. *Journal of Monetary Economics*, Vol. 54, pp. 1837-1847.
- Budina, N., van Wijnbergen, S. (2007). Quantitative Approaches to Fiscal Sustainability Analysis: A New World Bank Tool Applied to Turkey. *World Bank Policy Research Working Paper*, No. 4169.
- Burger, P., Stuart, I., Jooste, C., Cuevas, A. (2011). Fiscal sustainability and the fiscal reaction function for South Africa. *IMF Working Papers*, WP/11/69.
- Canova, F., Ciccarelli, M. (2013). *Panel vector autoregressive models: a survey*. European Central Bank, No. 1507.
- Celasun, O., Debrun, X., Ostry, J. D. (2006). Primary Surplus Behavior and Risks to Fiscal Sustainability in Emerging Market Countries: A Fan-Chart Approach. *IMF Working Paper*, WP/06/67.
- Chalk, N., Hemming, R. (2000). Assessing fiscal sustainability in theory and practice. *IMF Working Papers*, WP/00/81.
- de Mello, L. (2008). Estimating a fiscal reaction function: the case of debt sustainability in Brazil. *Applied Economics*, Vol. 40, No. 3, pp. 271-284.
- Eller, M., Urvová, J. (2012). How Sustainable are public Debt Levels in emerging Europe?. *Focus on European Economic Integration*, No. 4, pp. 48-79.
- Fincke, B., Greiner, A. (2012). How to assess debt sustainability? Some theory and empirical evidence for selected euro area countries. *Applied Economics*, Vol. 44, No. 28, pp. 3717-3724.
- IMF (2003). *Sustainability Assessments – Review of Application and Methodological Refinements*. Washington DC: International Monetary Fund.
- Llorca, M., Redzepagic, S. (2008). Debt sustainability in the EU New Member States: empirical evidence from a panel of eight Central and East European countries. *Post-Communist Economies*, Vol. 20, No. 2, pp. 159-172.
- Medeiros, J. (2012). Stochastic debt simulation using VAR models and a panel fiscal reaction function – results for a selected number of countries. *European Economy, Economic Papers*, No. 459, European Commission.
- Mendoza, E., Ostry, J. (2007). International Evidence on Fiscal Solvency: Is Fiscal Policy “Responsible”. *IMF Working Paper*, WP/07/56.
- Ostry, J.D., Ghosh, A. R., Kim, J. I., Qureshi, M. S. (2010). Fiscal space. *IMF Staff Position Note*, SP/10/11. International Monetary Fund, Research Department.
- Reinhart, C. M., Rogoff, K. S., Savastano, M. A. (2003). Debt Intolerance. *Brookings Papers on Economic Activity*, Vol. 2003, No. 1, pp. 1-62.
- Shijaku, G. (2017). Fiscal sustainability Across the EU and Other Potential Member countries. *Working Paper*. Bank of Albania.
- Stoian, A., Câmpeanu, E. (2010). Fiscal policy reaction in the short term for assessing fiscal sustainability in the long run in Central and Eastern European countries. *Finance a Uver*, Vol. 60, No. 6, pp. 501-518.
- Tanner, E., Ramos, A. (2002). Fiscal sustainability and monetary versus fiscal dominance: Evidence from Brazil, 1991–2000. *IMF Working Paper*, No. 02/5.
- Tashevska, B., Trenovski, B. (2017). “Testing Fiscal Sustainability in the Republic of Macedonia - A VAR Approach” in Potocan, V., Kalinic, P. and Vuletic, A. (eds.) *Book of Proceedings of the 26th International Scientific Conference on Economic and Social Development - "Building Resilient Society"*, Varazdin Development and Entrepreneurship Agency, Varazdin, Croatia; Faculty of Management University of Warsaw, Warsaw, Poland; University North, Koprivnica, Croatia, pp. 479-489.
- Trenovski, B., Tashevska, B. (2015). Fiscal or monetary dominance in a small, open economy with fixed exchange rate – the case of the Republic of Macedonia. *Zbornik radova Ekonomskog fakulteta u Rijeci: časopis za ekonomsku teoriju i praksu*, Vol. 33, No. 1, pp. 125-145.
- Zdravkovic, A., Zubovic, J., Bradic-Martinovic, A. (2013). Fiscal Reaction Function: Evidences from CESEE countries. *Industrija*, Vol. 41, No. 4, pp. 7-21.
- Zoli, E. (2005). How does fiscal policy affect monetary policy in emerging market countries? *Working Papers*, No. 174, Bank for International Settlements, Monetary and Economic Department.