

CHARLES UNIVERSITY IN PRAGUE

FACULTY OF SOCIAL SCIENCES

Institute of Economic Studies

Bachelor's Thesis

2012

Jan Mareš

CHARLES UNIVERSITY IN PRAGUE

FACULTY OF SOCIAL SCIENCES

Institute of Economic Studies

Jan Mareš

**CEE fiscal deficits in the course of
financial crisis**

Bachelor's Thesis

Prague 2012

Author: Jan Mareš

Supervisor: doc. MPhil. Ondřej Schneider Ph.D.

Academic year: 2011/2012

Bibliografický záznam:

Mareš, Jan. Rozpočtové deficity v zemích Střední a Východní Evropy během finanční krize, Praha, 2012. Bakalářská práce, Univerzita Karlova, Fakulta sociálních věd, Institut ekonomických studií. Vedoucí bakalářské práce: doc. MPhil. Ondřej Schneider Ph.D.

Název práce: Rozpočtové deficity v zemích Střední a Východní Evropy během finanční krize

Autor: Jan Mareš

Institut: Institut ekonomických studií

Vedoucí bakalářské práce: doc. MPhil. Ondřej Schneider Ph.D.

E-mail vedoucího bakalářské práce: schneider@fsv.cuni.cz

Abstrakt: Bakalářská práce se zabývá rozpočtovými úpravami v zemích Střední a Východní Evropy (SVE) od vypuknutí finanční krize 2008/2009. Téma je spjato s přetrvávající debatou o účinnosti opatření na straně výdajů a příjmů ve snaze stabilizovat veřejné finance a podpořit ekonomický růst. Práce shrnuje opatření přijatá vládami České republiky, Estonska, Litvy, Lotyšska, Maďarska, Polska, Slovenska a Slovinska. Dále se zabývá rozpočtovými pravidly a institucemi zemí SVE a jejich vlivem na rozpočtovou kázeň vlád. Pokračujeme přehledem literatury o vlivu vládních příjmů a výdajů na hospodářský růst a tyto vztahy poté zkoumáme v zemích SVE na datech od roku 1999. Aplikace vektorové autoregrese a následných testů Grangerovy kauzality nepotvrzuje souvislosti mezi vládními výdaji, příjmy a hospodářským růstem. Dále aplikujeme strukturální vektorovou autoregresi s postupem identifikace navrženým Blanchardem a Perottim (2002) a s pomocí impulse-response funkcí konstruuje multiplikátory vládních příjmů a výdajů. Tyto multiplikátory nabývají hodnot blízkých nule a jejich vliv nejsme schopni prokázat.

Klíčová slova: Střední a Východní Evropa, ekonomická krize, Evropská unie, rozpočtové instituce, rozpočtová politika, vektorová autoregrese.

Délka práce: 74 731 znaků

Bibliographic entry:

Mareš, Jan. CEE Fiscal deficits in the course of financial crisis, Prague, 2012. Bachelor's thesis, Charles University in Prague, Faculty of Social Sciences, Institute of Economic Studies, Supervisor: doc. MPhil. Ondřej Schneider Ph.D.

Title: CEE fiscal deficits in the course of financial crisis

Author: Jan Mareš

Department: Institute of Economic Studies

Supervisor: doc. MPhil. Ondřej Schneider Ph.D.

Supervisor's email address: schneider@fsv.cuni.cz

Abstract: The thesis covers the fiscal adjustments of countries in Central and Eastern Europe (CEE) since the financial crisis of 2008/2009. The topic revolves around ongoing debate about the right steps to stabilize government finances and encourage economic activity. It provides an overview of the measures undertaken by the governments of the Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland, Slovenia and Slovakia. The discussion of fiscal rules and institutions in CEE is also presented along with their influence on budgetary discipline. We follow with the review of literature debating government expenditures and government revenues having impact on economic growth. These relationships are then explored for countries of the CEE region based on the data from 1999 onwards. We apply Granger causality tests on reduced-form vector autoregressions and since we find no significant relationships between the government revenues, expenditures and GDP, we continue with structural vector autoregression using identification procedure developed by Blanchard and Perotti (2002). After identification, we utilize impulse response analysis to compute the multipliers of government expenditures and revenues. The multipliers generally take values close to zero and are found insignificant.

Keywords: Central and Eastern Europe, economic crisis, European Union, fiscal institutions, fiscal policy, vector autoregression.

Length of the thesis: 74 731 characters

Declaration: I hereby declare that I have elaborated the bachelor's thesis on my own and I have used only listed sources and references. Furthermore, I have written this thesis only for purpose of acquiring the bachelor's degree at IES FSV UK. I acknowledge and agree with lending and publishing of the thesis for studying and research purposes.

In Prague, 30th July, 2012

Jan Mareš

Acknowledgements

I would like to thank my supervisor doc. MPhil. Ondřej Schneider Ph.D. for his patient support, accurate recommendations and valuable comments on my thesis.

Table of contents:

Introduction	1
1 Budgets in countries of Central and Eastern Europe during financial crisis	2
1.1 Pre-crisis development of CEE economies	2
1.2 Reactions to the global downturn	3
1.2.1 The Baltics	3
1.2.2 Czech Republic, Poland and Hungary	5
1.2.3 Slovakia, Slovenia	7
1.2.4 Summary and selected macroeconomic statistics	9
1.3 Fiscal adjustments and their effect on economic growth	13
2 The trend of fiscal rules adoption throughout the crisis	15
3 Empirical analysis of fiscal adjustments	19
3.1 The data	19
3.2 Methodology	23
3.3 Identification	25
4 Outcomes of the structural model	29
4.1 Impulse response analysis	29
4.1.1 Czech Republic	29
4.1.2 Lithuania	31
4.1.3 Poland	32
4.1.4 Slovenia	33
4.1.5 Slovakia	34
4.1.6 Alternative tax elasticity regimes	35
4.2 Summary of empirical part	36
Conclusion	39
Bibliography	41
Appendix	45

List of Tables:

Table 1: The Baltics' main adjustments	5
Table 2: Main adjustments in Czech Republic, Hungary and Poland	7
Table 3: Main adjustments in Slovakia and Slovenia	9
Table 4: Fiscal rules in CEE countries	18
Table 5: Fiscal institutions in CEE countries	18
Table 6: Unit root tests	22
Table 7: Lag order selection criteria	24
Table 8: Coefficients of government revenues and expenditures (c_1, c_2)	27
Table 9: Coefficients b_2 , elasticity of spending to taxation	28
Table 10: Magnitudes of modeled shocks	37
Table 11: Summary table of the results	37

List of Figures:

Figure 1: Net current accounts	10
Figure 2: Government expenditures	10
Figure 3: Unemployment	11
Figure 4: Real effective exchange rates	11
Figure 5: Deficits	11
Figure 6: Gross debts	12
Figure 7: Primary deficits	12
Figure 8: Inflation	12
Figure 9: Fiscal rule strength index	16
Figure 10: Darvas' budgetary discipline index 2007/2008	16
Figure 11: Average share of social contributions on governments' total revenues	21
Figure 12: IRFs Czech Republic	30
Figure 13: IRFs Lithuania	32
Figure 14: IRFs Poland	33
Figure 15: IRFs Slovenia	34
Figure 16: IRFs Slovakia	35

List of Abbreviations:

ADF - Augmented Dickey-Fuller

AIC - Akaike Information Criterion

B - billion

CEE - Central and Eastern Europe

CZ - Czech Republic

ECOFIN - Economic and Financial Affairs Council

ERP - Economic Recovery Plan

EU - European Union

EC - European Commission

EIB - European Investment Bank

Eurostat - statistical office of the European Union

ERMII - Exchange Rate Mechanism II

ES - Estonia

ESA95 - European System of Accounts 1995

FCS - Fiscal Council of Slovenia

FRL - fiscal responsibility law

FDI - foreign direct investments

G-7 - France, Germany, Italy, Japan, United Kingdom, United States, Canada

GDP - gross domestic product

HQIC - Hannah and Quinn Information Criterion

HU - Hungary

IMF - International Monetary Fund

IRF - impulse response function

LA - Latvia

LI - Lithuania

M - million

MFSR - Ministerstvo financií Slovenskej republiky

MoF - Ministry of Finance

MPSV - Ministerstvo práce a sociálnych vecí

MZCR - Ministerstvo zdravotníctví České republiky

NAOE - National Audit Office of Estonia

NAOL - National Audit Office of Latvia

OECD - Organization of Economic Cooperation and Development

OLS - ordinary least squares

pc - per capita

PP - Phillips-Perron

PO - Poland

SBIC - Schwarz Bayesian Information Criterion

SK - Slovakia

SL - Slovenia

SME - small and medium enterprises

SVAR - structural vector autoregression

USA - United States of America

VAR - vector autoregression

VAT - value added tax

Introduction

In the early 2000s' the economies of Central and Eastern Europe¹ (CEE) were booming, nourishing on reformed market economies and accession to the European Union (EU). The governments were pressing the advantages even further acting as if the conditions will last forever. The 2008/2009 global financial crisis found the region unprepared and some CEE countries were severely hit by drying international financial flows. Hungary and Latvia had to acquire cash injections from the International Monetary Fund (IMF) and European Union to cover their immediate liabilities, but all the countries had to tackle the gaps occurring in their budgets and growing national indebtedness. With the world economy further slowing down and newly occurring Euro crisis, there has been a policy revision and stress on austerity to balance countries' budgets. The measures undertaken were complex, from reducing social transfers, tightening the expenditures on public services over incentives to encourage entrepreneurship and businesses to raising the levels of taxation. In this thesis, we want to capture what were the adjustments, how successful they were in getting the countries' budgets back on track and what was their impact on economic growth.

The thesis is divided into two parts. The aim of the first part is to picture the changes implemented by the governments throughout the 2008/2009 financial crisis and following economic downturn. The description of fiscal adjustments is accompanied by selected macroeconomic statistics to portray their development throughout 2000s'. They provide statistical overview of the influence the adjustments had on the economies. Moreover, we include the review of academic knowledge on the fiscal adjustments' impact on economies. We also discuss the institutional setup of budgetary processes, fiscal rules and institutions and their effect on budgetary discipline. In the second part, we explore the potential of applying structural vector autoregression (SVAR) on the data available from the countries in CEE. Finally, we hypothesize the fiscal adjustments represented by changes in government expenditures and government revenues have an effect on economic growth and utilize SVAR for the hypothesis testing.

¹ For the purpose of the thesis we use term CEE for the countries from the region of Central and Eastern Europe which joined EU in 2004 (Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland, Slovenia and Slovakia).

Chapter 1: Budgets of countries in Central and Eastern Europe during the financial crisis

1.1 Pre-crisis development of CEE economies

During the transition period in the 1990s', countries in Central and Eastern Europe made immense progress in building economies based on democracy, free markets and rule of law. The transformation procedures were certainly not uniform, as each country tackled individual issues. Hungary suffered from large accumulated debt, while the Baltic countries faced financial crisis accompanied by hyperinflation soon after becoming independent from Soviet Union. Meanwhile, Czech Republic and Slovakia, formerly Czechoslovakia, along with Poland experienced somewhat smoother but far from perfect transformation. All the countries eventually committed to quite radical structural reforms and by 1994, they were all considered full-fledged market economies (Åslund, 2012). Sequentially, with assistance from Western Europe, they made their way into the community of developed economies and became increasingly coherent with European Union. Their efforts were crowned in the year 2004, when the largest enlargement of the EU took place and the countries of CEE constituted the majority of the accessing members.

Both before and after the accession process the countries were required to carry out additional structural reforms and consequentially membership in European Union brought institutional, trade and financial integration along with the higher labor mobility. All these factors further accelerated the economic development in CEE as studies generally confirm positive impact of EU membership on economic growth. European Commission (2009) estimated the effect on growth in new member states to be 1,75% per year from 2000 to 2008. Offered explanations are the improvements in productivity, increasing amount of Foreign Direct Investments (FDI) and the transfer of technology. The figure for the 'growth dividend' has been recently reviewed to 0,15-0,4% annually by Darvas (2010b), who takes in account the data from the economic downturn after 2008.

Higher level of integration with uneven economic fundamentals among the countries gradually brought imbalances and overheating of the economies, especially in the Baltic countries. When the financial crisis struck the global markets in 2008, resulting in suddenly surging availability of credit and lower expectations of future growth, most of the overinflated bubbles had to burst. With Hungary facing debt problems and Latvia's failing financial sector,

both had to seek support from IMF and EU (€7,5B – 3% of gross domestic product (GDP) in the case of Latvia, €19B² – 20% GDP in the case of Hungary). However, disparities could have been observed within the CEE region. While Baltics were forced to make large-scale adjustments, countries in Central Europe – Czech Republic, Poland, Slovakia and Slovenia could tackle the bust with far more pliable measures. This section of our study outlines the fiscal adjustments made by these countries during the crisis. We also provide a view on efficiency of fiscal adjustments in general, which has been substantially debated in literature. Additionally, we summarize the fiscal rules adopted in CEE countries and review discussion of their influence on governments' fiscal responsibilities.

1.2 Reactions to the global downturn

1.2.1 The Baltics

The accession to the EU engaged a new phase of growth in the Baltics. The confident private sector was thriving on the lower risks provided by the prospect of Euro adoption after entering Exchange Rate Mechanism (ERMII). Bank lending increased due to high permanent income expectations and low rates of Euro denominated loans. Loans were gladly supplied by both domestic and Nordic banks operating in the region for it was perceived as an area with high growth potential and therefore attracted foreign capital (Purfield and Rosenberg, 2010). The indebtedness of private sector rose sharply and together with the loans denominated in foreign currencies made creditor banks vulnerable to depreciation of the exchange rate (Berglöf, 2010). The availability of credit also boosted domestic demand and led to inflation, which was reaching double digits. The most affected factors were wages and real estate prices, which soared, undermining the competitiveness of the economies (Åslund, 2012). Rosenberg and Sierhej (2007) note mainly non-tradable sectors of the economy boomed. These sectors include real estate as well as construction, retail and financial services. The ever increasing number of EU grants could have also played a role in promoting extensive credit seeking. While these vulnerabilities were eventually recognized and the overheated economies began to cool down, they were hit with the external financial crisis. This meant the global financial flows were drying up and non-residents' deposits were being withdrawn. Economic activity deteriorated when domestic demand shrunk and exports were hit by relative appreciation to main trading partners – Nordic countries and Russia (Purfield and Rosenberg, 2010).

² As of July 2012, Hungary is in negotiations with IMF about additional financial assistance (IMF, 2012b).

What were the measures taken to overcome the economic slowdown? Åslund (2012) stresses that none of the CEE countries with currency pegged to Euro depreciated although their current account deficits were large and their exports dwindling. Instead, the countries pursued 'internal devaluation' to regain competitiveness, balance current accounts and resolve the distortions of real exchange rates. This devaluation was primarily focused on structural fiscal adjustments, extensive cuts in public expenditures and minor tax increases. Focus was put on wage cuts and reorganization of the public sector. The long postponed reforms of public administration, healthcare and education were undertaken. The most radical adjustments were accepted in Latvia where the country was under a binding agreement with the IMF. Almost 30% of employees in public sector were laid off, the average public wage was cut by 26% and ceilings were placed on salaries of managers in state-owned companies (Åslund and Dombrovskis, 2011). Within the healthcare system, policy dictated more than half of the hospital network is to be shut down by 2013. The education system was put through a similarly radical procedure. More than 100 schools were closed and 2400 teachers were dismissed, allowing for the teacher/pupil ratio to reach average European levels. Changes were made to school funding, which is newly based on the fixed amount of finances per pupil and steps were taken to concentrate and improve quality in tertiary education (Åslund, 2012). Although pensions were cut by 10%, special care was taken to spare individuals in need from these cuts as much as possible. Middle-class social benefits were trimmed, but overall ratio of social spending to GDP increased by 1,5%, a growth attributed to the increase in minimum wage as well as social transfers (Darvas, 2010a; Purfield and Rosenberg, 2010).

Lithuania experienced less radical, but still substantial adjustments. Public wages were cut by 20% and parallel measures to that of Latvia were introduced in the schemes of higher education. The government was forced to reduce investments and cut pensions. Contributions to the private pillar of the pension system were temporarily cut from 5,5% to 2%. The spending cutbacks amounted to 7,6% GDP. The Economic Recovery Plan had been adopted with the aim of enhancing business conditions, as well as backing the acquisition of loans from European Investment Bank (EIB). Furthermore, the government began to focus on short-term rather than long-term projects, and tax incentives were offered for companies investing in technology and business modernizations (Darvas, 2010a). Lithuania has closely cooperated

with IMF and World Bank on the public reforms. There were discussions about potential aid from IMF, but the direct financial support has never been found necessary³.

Estonia had an outstandingly balanced budget before the late 2000s' downturn. However, budget consolidations were needed to achieve deficit to GDP ratios of only -2,9% and -2,0% in 2008 and 2009, respectively. These were also the only years when government expenditures exceeded revenues. The adjustments took the form of salary cuts in the public sector by 10% and reducing the scale of intended increase in pensions (from 14% to 5%). Government also suspended the contributions to mandatory pension schemes temporarily and increased levies on unemployment insurance (Åslund, 2012, Darvas 2010a, Epstein and Velculescu, 2011).

On revenue side of the budget, the Baltic countries decreased their income taxes and concentrated on optimizing property taxes and the taxation of consumption, that is, excise and Value Added Tax (VAT). The focus was also on keeping the number of taxes small and the tax system clear, thus a lot of exemptions were abandoned (Åslund, 2012; Darvas, 2010a).

Latvia
<ul style="list-style-type: none"> ▪ 30% of public employees laid off ▪ Average public wage cut by 26% ▪ Hospital network revised and narrowed ▪ 100 schools closed and 2400 teachers dismissed ▪ Pensions cut by 10% ▪ Private pension fund contributions cut from 10% to 2% temporarily
Lithuania
<ul style="list-style-type: none"> ▪ Public wages cut by 20% ▪ Investment and pension cuts of 7,6% of GDP ▪ Contributions to the private pillar of the pension system cut temporarily from 5,5% to 2% ▪ Tax incentives for research and technology investments
Estonia
<ul style="list-style-type: none"> ▪ Lower increase in pensions ▪ Public sector salaries cut by 10% ▪ Suspended contributions to private pension funds ▪ Higher levies on unemployment insurance

Table 1: The Baltics' main adjustments

Source: Compiled by author based on Åslund (2012), Darvas (2010a), Epstein and Velculescu (2011), Purfield and Rosenberg (2010)

1.2.2 Czech Republic, Poland and Hungary

The second group of countries is categorized based on their floating exchange rate regimes. The countries of Central Europe were not facing any imminent troubles caused by the freeze of financial markets. Hungary was struggling with ever growing public debt, but compared to

³ Status as of July 2012.

The Baltics, the overheating of the economies never reached such magnitude (Åslund, 2012). Nonetheless, facing the globally deteriorating conditions, they were forced to reevaluate their policies and accept new legislation to counter unfavorable development of public finances.

Czech Republic introduced a flat income tax of 15% instead of the previously progressive taxation ranging from 12% to 32%⁴. The government cut expenditures on social security by cutting unemployment benefits and adjusting schemes of social transfer programs, such as maternity benefits and sick pay. Generous and problematic housing subsidies⁵ were cut. The stimulus packages adopted included higher spending on infrastructure projects (0,4% of GDP) and tax incentives to encourage employment. Following the wage freeze in 2009, lay-offs took place in the public sector and wages of state-employees were trimmed by 10% on average, with the exception of primary wages for teachers (EC, 2012c; The European Institute, 2011). After minimum inflation-based increase of pension expenditures in 2009, the structural adjustments were made to the pension system. A voluntary option to redirect 3 percentage points of social insurance payments towards individual pension account was introduced, and the state contributions to individuals who save for pensions were made more progressive to encourage higher savings (MPSV, 2011). Moreover, there is an ongoing healthcare reform, which aims to enhance the efficiency of the system by introducing commercial elements, raising complicity of the patients and streamlining the network of hospitals. While the former two aspects were partially introduced, the curtailing of medical facilities is only under negotiations (MZCR, 2012).

Hungary's correctional fiscal steps were induced while facing conditions from the IMF and EU, thanks to the loan obtained to finance government expenditures. Flat tax rate of 16% was introduced and VAT rose to 25%. Additional levies of €735M were put on the financial sector in 2010 and 2011. Extra tax of 8% was imposed on energy companies in 2009-2010. Public wages were frozen and cut off 13th monthly salary. The retirement age was increased to 65 years with the 13th pensions limited to the pensioners older than 62 or to the people receiving disability pension. Similarly to the Czech Republic, sick payments were reduced by 10% and housing subsidies were cut completely. A decrease amounting to 15% was made in subsidies for political parties (Darvas, 2010a; The European Institute, 2011).

⁴ Although the measure had been long term plan and was introduced just before the crisis severely hit. Furthermore, comeback of progressive taxation is being considered in the parliament along with increments in VAT.

⁵ See Švejnar et al. (2010)

Poland was the only country which experienced continuous economic growth, despite the global downturn. However, the worsening conditions in Europe eventually brought the adjustments. They mostly consisted of stimuli to support the economic growth such as tax incentives to embolden investments in research and development, lower corporate taxes, and personal income tax decrease alongside with lesser progressivity of the tax system (new brackets of 18% and 32%). VAT was elevated by 1 percentage point to 23%, but the period for its refunds was shortened. Excise duties were set to raise additional income corresponding to 0,2% GDP. On the spending side, cuts of €14,4B were agreed. In the public sector, wages were frozen and 10% of jobs were cut. Further measures were comprised of pension system optimization with the cut of contributions to private pillar from 7,3% to 2,3% and reduction of military expenditures (Darvas, 2010a; Epstein and Velculescu, 2011).

Czech Republic
<ul style="list-style-type: none"> ▪ Flat income tax of 15% ▪ Housing subsidies cut by half ▪ Decrease of certain social transfers (maternity benefits, sick pay) ▪ Public sector wages cut by 10% (excluding primary wages for teachers) ▪ Introduced an option of redirecting 3% of wage to private pillar of pension system ▪ Complicity of patients in healthcare
Hungary
<ul style="list-style-type: none"> ▪ Introduced Flat tax of 16% ▪ VAT rose to 25% ▪ Taxes exclusive to financial and energy sector ▪ Public wages were frozen ▪ Housing subsidies cut completely ▪ Decreased social transfers (e.g. pensions, sick payments) ▪ Redirected all contributions to first pillar of pension system and provided incentives to switch the accumulated assets back to first pillar (resulted in the budget 'surplus' in 2011)
Poland
<ul style="list-style-type: none"> ▪ Progressivity of the tax system reduced ▪ Cut 10% of jobs in public sector and wages in public sector were frozen ▪ Contributions to private pillar of pension system reduced from 7,3% to 2,3% ▪ VAT increased by 1 percentage point to 23%

Table 2: Main adjustments in Czech Republic, Hungary and Poland

Source: Compiled by author based on Darvas (2010a), EC (2012c), Epstein and Velculescu (2011), MPSV (2011), MZCR (2012), The European Institute (2011)

1.2.3 Slovenia, Slovakia

As for members of the euro area, currency depreciation was not an option for these countries. Consequently with the Euro appreciating towards currencies of their trading partners, their economies saw higher real efficient exchange rates which undermined their competitiveness (Åslund, 2012). Since the conditions were not as pressuring, both countries presented supportive measures for their economies.

Slovakia adopted stimuli packages containing infrastructure investments, steps to improve conditions of setting up new businesses and lower taxes for low-income employees already in 2008. The government also sped up payments to businesses and offered subsidies for new car purchases. Parliamentary salaries were decreased by 10% and some ministries were merged while the budgets of the remaining were cut to provide expenditure savings counterbalancing the stimuli. Again, VAT rose from 19% to 20% and excise duty on tobacco was elevated. Furthermore, Slovakia redirected a portion of the capital transfers from second-pillar of the pension scheme to boost the budget.

Slovenia followed a similar path at the turn of 2008. Its focus was on substituting shortfalls in infrastructure projects and increasing competitiveness by lowering payroll and corporate taxes. The corporate tax was initially cut from 22% to 20% and gradually lowered to 18% in 2012. Efforts were made to boost the labor market by wage subsidies for part-time jobs and creating advantageous conditions for business start-ups and Small and Medium Enterprises (SME), the measures estimated to account for 0,9% GDP. Additionally, subsidies for research and development projects were increased. Public sector bonuses were lowered and the automatic growth of wages based on inflation was abandoned (Darvas, 2010a).

Both countries recently joined the Fiscal Compact within EU. Slovenia plans to cut spending by €818M by further reduction in bonuses of public employees, reduction of their standard wages by 15% and shortening the unemployment and healthcare benefits. With new center-left government elected in 2012, Slovakia leans towards reintroduction of progressive taxation and other revenue focused measures. Additional taxation of the financial sector includes levies on creditors' savings, reduction of seasonal jobs' tax incentives, higher taxes on gambling and dividend incomes, puzzling rise in administration fees or double taxation of properties (tax for municipalities and for the state). High contribution to the second-pillar of the pension system is being lowered from 9% to 4%. However, whether these plans are going to be fully carried out and how adoption will affect the economies of respective countries is yet to be seen (K.M., 2012; Laven and Santi, 2012; MFSK, 2012).

Slovakia
<ul style="list-style-type: none"> ▪ Infrastructure investments ▪ Improving conditions for setting up new businesses ▪ Decreased taxes for low-income employees ▪ Subsidies on new car purchases ▪ Merging ministries and reduction of parliamentary salaries by 10% ▪ VAT increased from 19% to 20% ▪ Redirecting contributions to the private-pillar of pension scheme to the state budget
Slovenia
<ul style="list-style-type: none"> ▪ Corporate taxes cut from 22% to 20% and gradually decreased to 18% ▪ Wage subsidies for part-time jobs ▪ Improving conditions for SMEs ▪ Subsidies on research and development ▪ Lower bonuses in public sector and abolishment of inflation based increases of public sector wages

Table 3: Main adjustments in Slovakia and Slovenia

Source: Compiled by author based on Åslund (2012), Darvas (2010a), Laven and Santi (2012) MFSK (2012)

1.2.4 Summary of adjustments and selected macroeconomic statistics

Above all, Baltic countries proved that radical fiscal adjustments and expenditure cuts are possible to carry out in democratic regimes and the depth of the crisis results in farther-reaching structural reforms. Åslund (2012) also stresses the fact that Baltics refused to devalue their currencies and rather preferred to regain competitiveness by what he calls ‘internal devaluation’ - reducing labor costs, optimizing public sector expenditures and improving conditions of doing business. These actions sent positive signal of will to stabilize public finances and contended markets. With all the measures undertaken, they were able to turn their large current account deficits into surpluses in a very short time (see figure 1), stabilize their financial sector, inflation and they are acknowledged to have great prospects for future growth. Besides, expenditure cuts were far more preferred to higher taxation. Increases in taxes were made such as not to discourage economic activity mainly preferring taxes on consumption. The effects of direct fiscal stimuli, in particular increasing social transfers to boost the consumption, is rather debatable. Such measures controversial because they further raise the overall debt levels and in small open economies of CEE the benefits are partially diminished by spending the extra income on imports. This was displayed by Székely et. Al (2011) who find fiscal multiplier of consumption to be 0,81 in a closed economy, compared to 0,57 in an open economy. That is if the consumption is increased by 1%, GDP grows by 0,81% in a closed economy, but only by 0,57% in an open one. Also, however acknowledged and progressive the reforms may seem the growing gross debts of the countries in CEE only slowed down the pace, yet kept rising (see figure 6). Furthermore, ongoing demographic trends make the budgets unsustainable in the long-term and will require additional structural adjustments especially in pension schemes (Grech, 2010; EC, 2012b).

The structure of the adjustments was essentially similar throughout the region, but indeed differed in extent. Non-Baltic countries from CEE were far more lenient in their reforming efforts, even though the ongoing Euro-crisis and consequently other EU member states pressure them to stabilize their budgets. Current situation is far from flourishing, even the best reformers still have to struggle with high unemployment levels, deficits hovering under the -3% of GDP and prevailing slow economic growth in Western Europe. While emphasis in Europe is still put on budget consolidation through the spending side in adopted Treaty on Stability, Coordination and Governance, Latvia and Czech Republic are currently considering reintroduction of progressive tax system and newly established government in Slovakia already expressed their will to do the same.

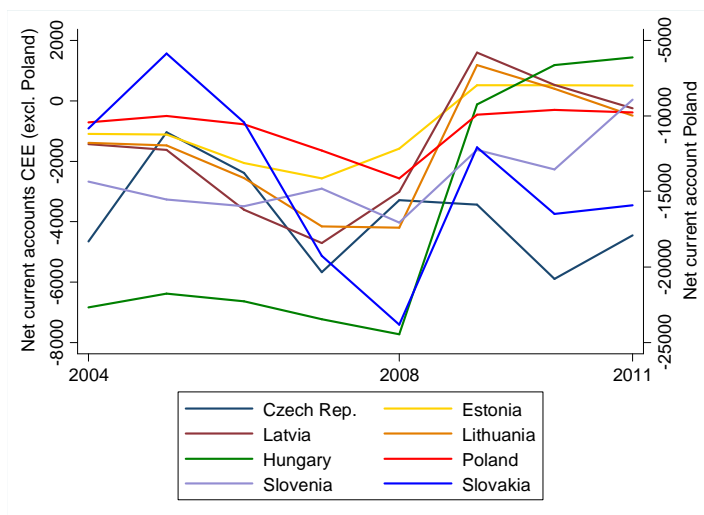


Figure 1: Net current accounts (all trading partners of the world, million EUR)
Source: Author, based on Eurostat data

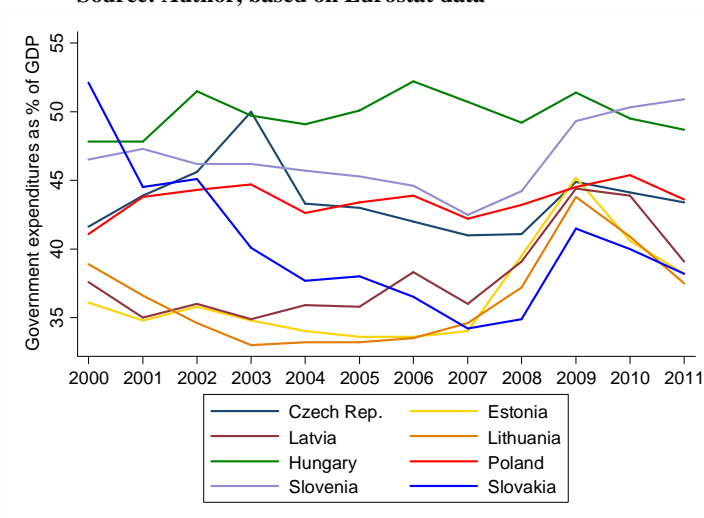


Figure 2: Government expenditures (% of GDP)
Source: Author, based on Eurostat data

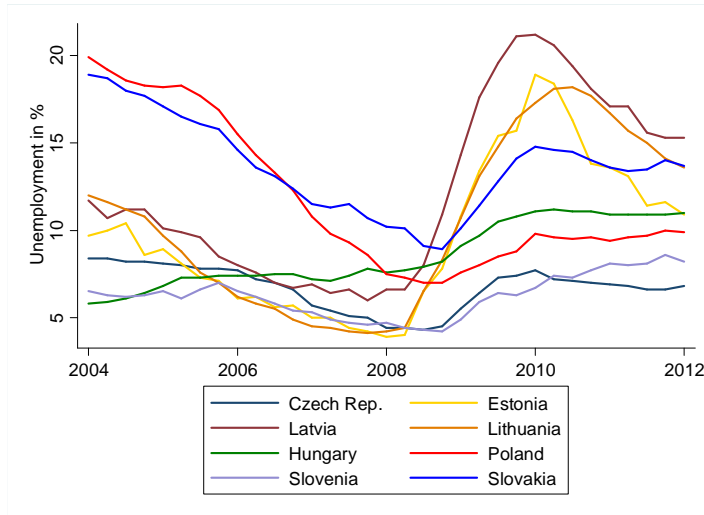


Figure 3: Unemployment (% of work force)
 Source: Author, based on Eurostat data

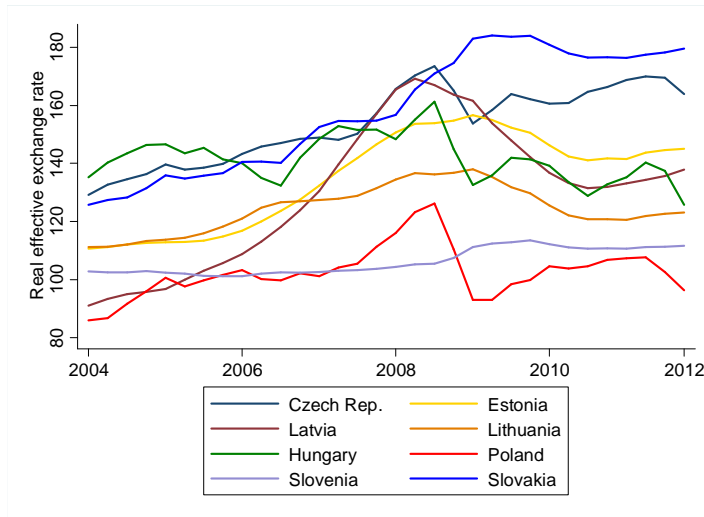


Figure 4: Real effective exchange rates (index, 100=1999)
 Source: Author, based on Eurostat data

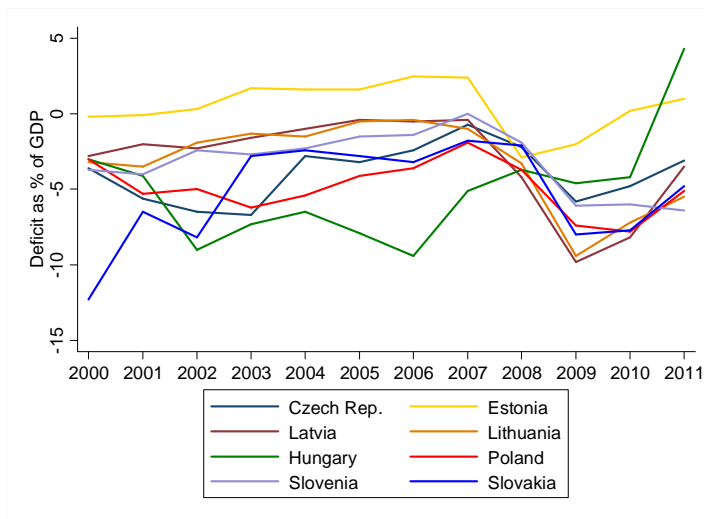


Figure 5: Deficits (% of GDP)
 Source: Author, based on Eurostat data

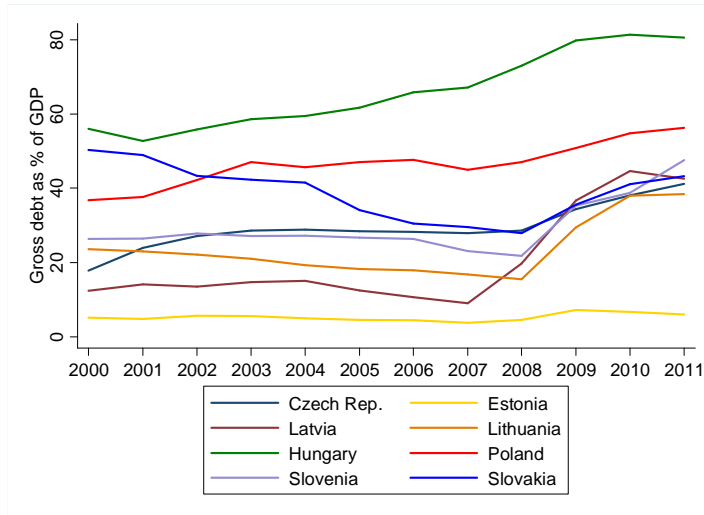


Figure 6: Gross debt (% of GDP)
 Source: Author, based on Eurostat data

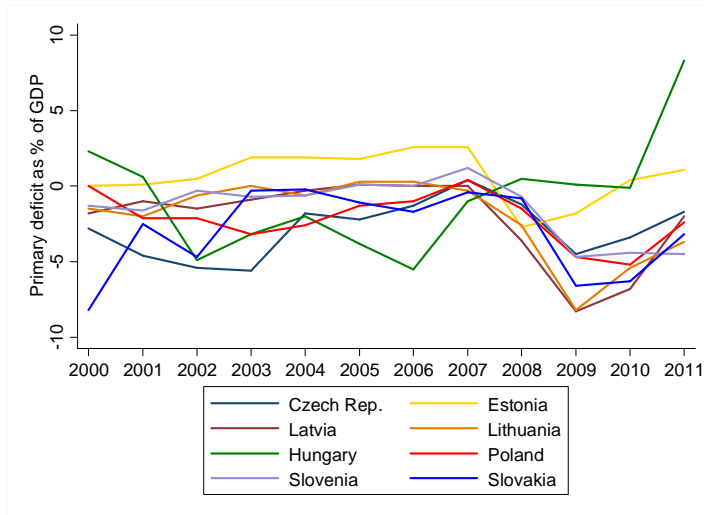


Figure 7: Primary deficits (% of GDP)
 Source: Author, based on Eurostat data

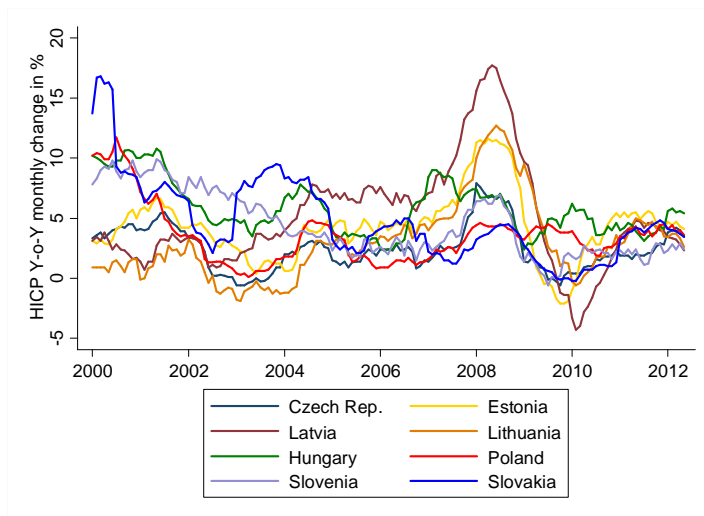


Figure 8: Inflation
 Source: Author, based on Eurostat data

1.3 Fiscal adjustments and their effect on economic activity

What are the effects of fiscal discretionary measures taken by the government? The answer to this question is by far not unique. It is dependent on individual countries, economic conditions and also very much on character of the adjustments. Alesina (2010) defends tax reductions and extensive fiscal tightening undertaken by the countries even when their economies are slowing down. The conventional view of deficit reduction policies having negative impact on economic growth and causing recessions is refuted by Alesina and Ardanga (2009). They show that large cuts in budget deficits can be followed by rapid and sustained growth even in the short run. "These are adjustments which have occurred on the spending side and have been large, credible and decisive" (Alesina 2010, p.3). Moreover, it is important that the actions of the government are regarded as permanent to eliminate uncertainty about potentially more costly countermeasures in the future. Alesina (2010) further argues if the changes are credible, the budget cuts might also influence the economy through interest rates. Apart from its effect on agents' expectations in the economy and employment implications for labor market, debt stabilization can lower the interest rate on government bonds, enhance private consumption and drive up prices of stocks and bonds to increase wealth of their holders and potentially encourage investments. The study provides evidence that spending cuts are far more effective than increasing taxation. What they define successful fiscal adjustment (primary balance improves by 1,5% of GDP) is more likely to be achieved with expenditure cuts/revenue increases ratio approximately 2 to 1. Complementing research was presented by Giavazzi, Jappelli and Pagano (2000), showing the responses are far stronger for fiscal contractions rather than for fiscal expansions.

Von Hagen et al. (2002) discuss the importance of quality of the budgetary measures in terms of their longevity and composition to find expenditure based consolidations providing superior results to tax based ones. Beetsma and Guiliodori (2009) bring the evidence of pro-cyclical reaction towards the development of economic conditions in the European countries. They claim the governments in Europe generally fail to tighten policy during good times, but adopt restrictive fiscal measures in economic downturns. However, this is only in the case of Europe, other OECD members are shown to follow counter-cyclical fiscal policies. The observation of pro-cyclical policies is supported by Kaminsky, Reinhart and Vegh (2004) in the case of emerging markets. They argue that budget policy amplifies boom and bust times of the business cycle. Moreover, if an extensive growth is induced by pro-cyclical budget

policy, it can influence agents to increase their borrowings against their higher expected income. The consequences of economic decline then become far more painful (Darvas, 2010a). Research papers by Baum and Koester (2011), Baum, Poplawski-Ribeiro and Weber (2012) as presented in IMF (2012a) or already mentioned Beetsma and Guilidori (2009) show that the effect and magnitude of fiscal adjustments also depend on the output gap. In times of negative output gaps, the fiscal multipliers are generally higher than in times with positive output gaps. Additional arguments about fiscal changes can be found in Romer and Romer (2011) or Gale and Orszag (2004), who show the inverse relation between taxation and output and none or very negative effect of higher taxes on consumption. The literature covering the influence of adjustments in 2008 and onwards in the region of Central and Eastern Europe is limited. Székely et al. (2011) model the impact of experimental fiscal stimulus of increasing the government spending by 1% of GDP and find that stimulus can soften the impact of economic downturn at least over the course of its duration. They further argue fiscal stimulus is more effective when the interest rates are near their zero-bound, thus monetary policy becomes rather inefficient. We examine the relations between government spending, government expenditures and economic growth for selected countries in chapters 3 and 4 of the study.

Chapter 2: The trend of fiscal rules adoption throughout the crisis

With poor economic conditions and pressures on the governments through market premiums, fiscal rules and institutions became center of attention in Europe as they are adopted to enforce the will of governments to stabilize public finances (EC, 2010). Describing the development after the financial crisis of 2008 in CEE, we feel obliged to provide a broad overview of the impact budgetary framework has on the fiscal performance and also present a summary of fiscal rules and institutions present in CEE countries (see tables 4 and 5).

Conventional theoretical background behind the forming of rules for fiscal policy very much resembles the one which brought the introduction of independent central banks taking care of monetary policy. Firstly, it is the short-term focus of governments which seek re-election and therefore have incentives to ‘bribe’ public through higher spending⁶ (Kopits, 2008). Secondly, there is so called problem of ‘resource pooling’ when the individual interest groups within the electorate do not fully internalize the budgetary impact of their demanded policies (Kopits, 2008; Debrun and Kumar, 2007). Thus there seems to be room for rules addressing fiscal policy to enhance its efficiency, but there are indeed pitfalls in their potential failure. The construction is usually not strict enough to bind up undisciplined governments and thus the credibility of the rules might be questionable. Also, they sometimes lack flexibility to allow for anti-cyclic measures during economic decline and may motivate ‘easy-cuts’ in investments which are seen essential for long-term growth. Lastly, introduction of rules may provide incentives for creative accounting and off-budget operations and consequently worsen the transparency of budgetary policy (IMF, 2009). The research on the topic is mostly proves the positive influence of budgetary rules on fiscal performances, though whether it is direct or indirect is unclear. To mention some of the recent studies, Caceres et al. (2010) demonstrate that fiscal responsibility laws (FRLs) do not have significant effect on primary balances and they suggest the transmission channel probably lies in higher transparency and lowering uncertainty about the fiscal policy conveyed by lower market premiums. On the contrary, budget consolidations are found more likely to have lasting character with implemented fiscal rules and better budgetary procedures (Larch and Turini, 2011). These outcomes are also supported by Guichard et al. (2007), who find expenditure targets ensuring longer lasting and

⁶ This theory is partially disproved by Brender and Drazen (2005), who show that political budget cycles only exist in not fully developed democracies, because experienced and conscious electorate punishes politicians who abuse fiscal policy.

more successful adjustments. To picture the differences among states within CEE we use the indices of budgetary discipline, computed by EC and Darvas and Kostyleva (2011) (see figures 9 and 10). While EC evaluates the fiscal rules individually and then assign weights to them regarding their scope and strength, Darvas and Kostyleva (2011) distinguish between three stages of budgetary cycle: preparation, authorization and implementation. The rules are evaluated with respect to the individual stages and then the stages are weighted to capture their importance. Budgetary discipline index also takes into account the procedural aspects of budget creation and evaluates the process in general not only the rules themselves. Figure 9 can be also used to see the ‘development’ of fiscal framework over 2000s’.

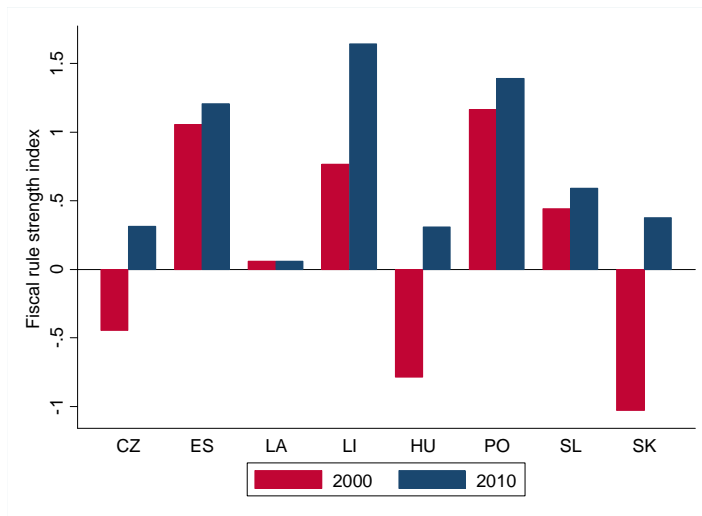


Figure 9: Fiscal rule strength index
Source: Author, based on EC database of fiscal rules

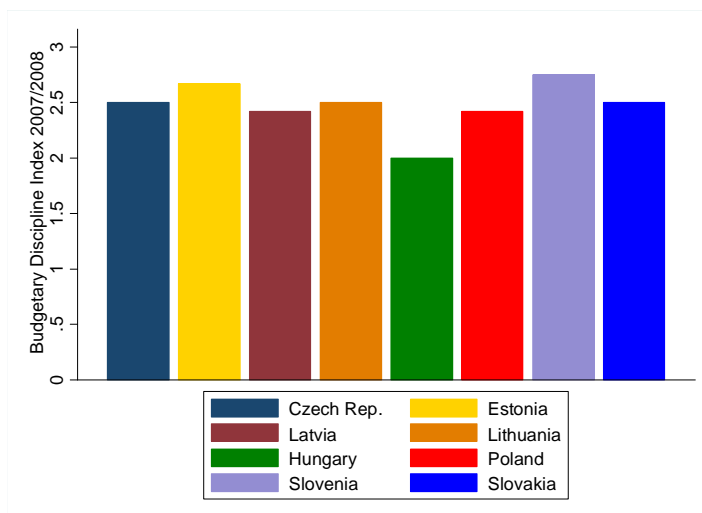


Figure 10: Darvas' budgetary discipline index 2007/2008
Source: Darvas (2011)

Czech Republic	Corrective measures in non-compliance
Nominal expenditure ceiling, (inserted in medium term expenditure framework. Expenditures are set to achieve a pre-defined deficit target (2010) Ministry of finance calculates ratios for municipalities and units funded from their budget: short-term assets/short-term liabilities, long-term liabilities/long-term assets.	None. Explanation of non-compliance is required.
Estonia	
Balanced budget rule for general government	Corrective measures are proposed, possible sanctions, MoF can limit payments from the Treasury.
Local governments are not allowed to increase their debt over 60% of their budget revenues less state budget allocations	None.
Avoid state foundations to take impayable loans or other liabilities.	None
Latvia	
Central government and social security budgets are divided into base and special budgets. Special budgets are devoted to social needs, mainly pension payments.	None.
Local governments can only increase borrowing and loan guarantees up to certain limits set by the central government.	None.
Lithuania	
Limit on borrowing of central government.	Ministry of Finance is obliged to propose corrective measures for the Parliament/respective enforcement body
If the general government showed deficit on average over the past 5 years, then the annual growth rate of the planned state budget appropriations may not exceed 0,5% of the average growth rate of the State budget revenue of those 5 years.	None.
The deficit of the approved state budget shall be reduced by excess revenue of the current year.	Possible sanctions and non-approval of the budget.
Local governments must approve balanced budgets.	Possible sanctions and claim to the Court.
Hungary	
Local governments have annual ceiling of debt-creating commitments (borrowing, bond issues, etc.) set in proportion to their repayment abilities.	None.
Budget act has to determine the primary balance target for the second year following the subject year such that the primary balance target is not a primary deficit and government debt does not increase in the year following.	Obligation to offer corrective measures.
Poland	
Public debt must not exceed 60% of GDP.	Government proposes corrective measures. If the debt is between 55% and 60% of GDP, the draft of budget for following year must not increase the ratio. If the debt exceeds 60% despite the previous rule, government borrowing is forbidden in subsequent year (public accounts in balance/surplus).
For each local government total debt at the end of fiscal year is not allowed to be higher than 60% of the revenue for given year. Checked quarterly on estimates. Also, the ratio of installments and planned revenues for a fiscal year cannot exceed 15%.	None.
Slovenia	
Local governments' total payment of principal and interest in each year must not exceed 8% of revenues of the previous year. Local governments cannot borrow abroad and their borrowing needs approval of Ministry of Finance.	None.
The establishing of legal act of rule sets nominal expenditure ceilings for year t to t+5.	None.

Slovakia	
Expenditure not considered in the state budget law can only be executed if its total amount does not exceed 1% of total expenditure approved in the budget law and the deficit is not increased. Allows increasing expenditure in good times (limit set on 15% increase)	Obligation to take effective measures.
Limits on borrowing of regional and local governments: <ul style="list-style-type: none"> ▪ Total debt cannot exceed 60% of current revenue in the previous budget year in nominal terms (capital revenues and revenues from financial transactions are excluded) ▪ Annual installments do not exceed 25% of actual current revenues of the preceding fiscal year. 	Possibility of sanctions.
Local governments' current budget has to be adopted either as balanced or in surplus. Capital budget can be in deficit, provided that this deficit is financed by unspent funds of local governments transferred from previous years, loans or by surplus of the current budget in the respective fiscal year.	None.

**Table 4: Fiscal rules in CEE countries,
Source: EC database of fiscal rules (2010), EC (2012a)**

Estonia	
National Audit Office of Estonia	Its independence secured by the constitution. The Audit Office gives recommendation to the government and has right to make proposals to government ministers and local authorities to draft legislation or amend legislation in force
Lithuania	
National Audit Office of Lithuania	Based in constitution. National Audit Office supervises the lawfulness and effectiveness of the management. It further controls use of state property and execution of state budget. Government is not obliged to consult with the National Audit Office during budget planning phase. NAOL only gives opinion on draft of state budget to the parliament.
Slovenia	
Institute of Macroeconomic Analysis and Development	Government has to consult the Institute during budgetary preparation phase. It provides analysis on fiscal policy developments without normative judgment and creates macroeconomic and budgetary forecasts. The Institute further gives recommendations on fiscal policy, analyses the budget, monitor its implementation and quantifies short/long-term effects of measures and reforms.
Fiscal Council	Established in 2009, it provides assessment of the sustainability and stability of fiscal policy in annual budget memorandum. Additionally it assesses budget's compliance with the rules of the Stability and Growth Pact. Its judgments may consider cyclical economic situation. It also evaluates the adequacy of fiscal objectives in mid-term macroeconomic framework. Annually measures the efficiency of the use of public funds and comments on transparency and quality of economic forecasts used in national budget preparation.

**Table 5 : Fiscal institutions in CEE countries
Source: EC database of fiscal institutions (2010), EC (2012a), councils' websites (NAOE, 2009; FCS, 2012)**

Chapter 3: Empirical analysis of fiscal adjustments

In the second part, we try to investigate the application of vector autoregressive (VAR) econometric methods on the data for eight countries from Central and Eastern Europe⁷. We hypothesize adjustments in government expenditures and government revenues influence economic growth of individual countries and want to examine VAR methods' ability to enlighten these relationships. The hypothesis arises from the ongoing discourses in economic theory, where some claim the government spending has an ability to boost the economy at least in the short-term, whilst others say it is an inefficient redistribution of income from private sector to the government and only has the potential to crowd out private investments. The effect of revenues is expected on the basis of economic insight that lower tax burdens provide positive incentive for economic activity and vice versa.

While studies on western countries, USA, Germany and other G-7 members are available, lack of attention has been given to the countries of our focus. Additionally, researchers admit the results of VAR models are highly dependent on the country analyzed, the structure of its economy and its fiscal policies (Baum and Koester, 2011), so we are likely to see differences across the CEE region. We expect the main obstacle of our approach to be in the data deficiency for the region.

Chapter 3 addresses the data description in section 1, tailed by methodology discussion in section 2 where we provide general background for using vector autoregressive method. Identification process and estimation compile section 3. In following chapter 4, we model impulse response functions based on the introduced structural identification framework.

3.1 The data

Based on Blanchard, Perotti (2002) and Baum, Koester (2011), we use only three variables in the regression: government revenues, government spending and GDP. The main purpose of using limited number of variables is to keep the analysis as straightforward as possible and avoid the unfavorably large ratio of explanatory variables to observations. Conversely to the studies of Baum and Koester (2011) or Baum, Poplawski-Ribeiro and Weber (2012) we do not utilize any kind of threshold analysis. This decision is based on lack of convenient threshold variables available as well as on limited length of data series for countries in focus.

⁷ Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland, Slovenia, Slovakia

Further fragmentation of the time series due to threshold is likely to weaken the merit of our results and hence is not desirable.

The data is collected from Eurostat national accounts database and the variables follow definitions in accordance with the European System of Accounts 1995 (ESA95). The dataset contains 52 observations on each of the countries, namely Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland, Slovenia and Slovakia. It is recorded quarterly and covers the period from the first quarter of 1999 to the fourth quarter of 2011. GDP series were originally seasonally adjusted, thus we only use Eurostat GDP deflators to get the real GDP values. On the contrary, the non-financial government accounts which we use to construct the variables of government spending and revenues are at disposal only in their unadjusted form. In order to keep consistency, we applied the X-12-Arima software and underlying X-12 method of seasonal adjustment⁸ on these data series. Finally, they are deflated using the GDP deflator.

There are different ways of compiling the government variables. Some of them (Perotti 2004; Heppke-Falk, 2010) follow the Blanchard and Perotti (2002) construction, which defines government expenditures as a sum of government consumption and investments, while revenues as general government revenues less social transfers. We broadly follow the procedure introduced by Baum and Koester (2011), who argues that aforementioned procedure is not convenient in cases where the social transfers account for a large proportion of government revenues, discussing Germany. They argue the social security system is often used as a mean of economic stimulation during the economic downturn, and the difference in rate of savings between net payers and net beneficiaries can then influence private consumption and subsequently affect overall growth (Baum and Koester, 2011). These measures were used as a part of fiscal consolidations in CEE countries during late 2000s' economic turmoil and the ratio of social contributions to total government revenue is significant as in the case of Germany. The individual ratios are demonstrated in figure 11 and the share across the countries averages around 32%. Therefore we decide not to subtract social contributions from government revenues. Baum and Koester (2011) further pay special treatment to unemployment spending of the government. As it is strongly influenced by the business cycle, it does not enter government expenditures, but is included in the revenues series with negative sign instead. In our data, we use *social benefits other than social benefits in kind* account to get the same arrangement. This adjustment allows us to use the model

⁸ See Ladiray and Quenneville (2001)

identification structure by Blanchard and Perotti (2002), which revolves around automatic stabilizers being present only on the revenue side of the budget. Discussions also appear about including public interest spending in the analysis. While some consider it the redistribution between private and public sector having impact on economic growth, others debate that interest payments are not part of a discretionary policy and thus should be set aside (Baum and Koester, 2011). We follow the methodology of Baum and Koester (2011) and exclude it from the series.

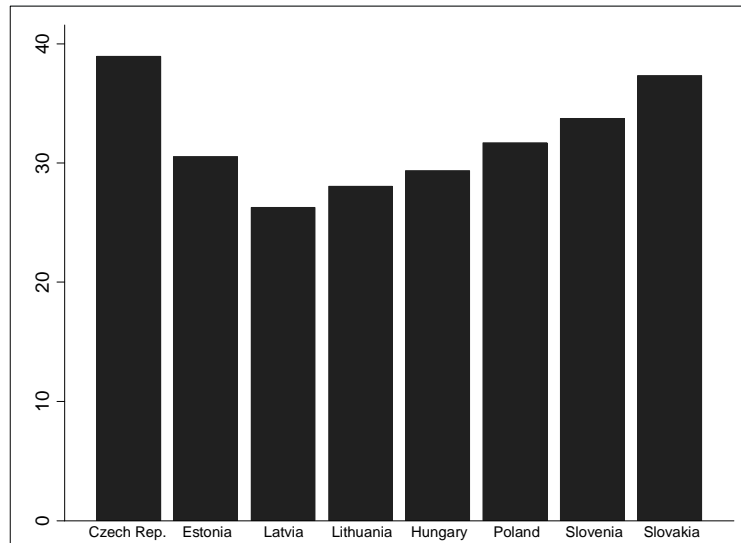


Figure 11: Average share of social contributions on governments' total revenues (in %, 1999-2011)
Source: Author's calculations based on Eurostat data

All in all, it leaves us with government spending defined as total government expenditures less social insurance spending and net interest payable. The revenues series constitutes from total government revenues also excluding net interest and diminished by social insurance spending by government. For all the series, we use the per capita value. Based on economic insight, we suspect the variables to be non-stationary, specifically to be following random walk with possible drift. We cannot reject the hypotheses in the original series, thus we apply logarithms and then first-differences to achieve stationary variables for regressions. The plots of transformed series are displayed in the Appendix and suggest the tendency of the processes to fluctuate around their means.

In order to confirm the stationary character of our series we apply the methodology to investigate the presence of unit-root processes. We rely on Augmented Dickey-Fuller (ADF) test where the optimal lag order for the tests is based on Schwarz Bayesian Information Criterion (SBIC). In cases where zero lag is suggested for the series (GDP of Poland, Slovakia, Revenues of Latvia, Lithuania, Poland, Slovenia and Expenditures of Estonia and

Poland), we utilize tests of order 1 to make just for the assumptions of the models. Furthermore, we employ Phillips-Perron (PP) test for unit-root. Surprisingly, the hypotheses of unit root are rejected in all the series using the PP tests. However, ADF test suggests unit root in the series GDP Latvia, GDP Hungary and Revenues Estonia. In these we are not able to reject null hypothesis of the unit root even on 10% level of significance. We leave the discussion about the superior reliability of these tests to the theoretical studies and choose the safe option of leaving the countries with suspect variables out of our analysis. Table 6 shows the summary of the test results.

Time series	ADF		H_0 : unit root present	Phillips-Perron t-statistic
	Lag order (SBIC)	t-statistic		
GDP Czech Republic	1	-2,985	Rejected on 5%	-3,448
GDP Estonia	1	-2,792	Rejected on 10%	-3,976
GDP Latvia	2	-2,028	Cannot reject	-4,579
GDP Lithuania	1	-4,155	Rejected on 10%	-5,868
GDP Hungary	1	-2,308	Cannot reject	-3,063
GDP Poland	1	-4,294	Rejected on 5%	-5,616
GDP Slovenia	1	-3,360	Rejected on 5%	-4,230
GDP Slovakia	1	-4,741	Rejected on 5%	-7,069
Revenues Czech Republic	2	-6,425	Rejected on 5%	-14,261
Revenues Estonia	5	-2,150	Cannot reject	-20,011
Revenues Latvia	1	-4,269	Rejected on 5%	-7,861
Revenues Lithuania	1	-5,158	Rejected on 5%	-10,087
Revenues Hungary	3	-5,394	Rejected on 5%	-15,178
Revenues Poland	1	-6,758	Rejected on 5%	-9,041
Revenues Slovenia	1	-4,769	Rejected on 5%	-5,581
Revenues Slovakia	1	-6,058	Rejected on 5%	-10,125
Expenditures Czech Republic	1	-6,308	Rejected on 5%	-23,234
Expenditures Estonia	1	-5,157	Rejected on 5%	-15,688
Expenditures Latvia	1	-6,044	Rejected on 5%	-12,970
Expenditures Lithuania	2	-5,360	Rejected on 5%	-18,797
Expenditures Hungary	2	-8,724	Rejected on 5%	-13,574
Expenditures Poland	1	-5,854	Rejected on 5%	-8,613
Expenditures Slovenia	1	-5,492	Rejected on 5%	-18,233
Expenditures Slovakia	1	-4,625	Rejected on 5%	-15,836

Table 6: Unit root tests

3.2 Methodology

Since vector autoregressions provide us with various possible ways of use, we outline the general methods and then describe the approach we apply in our work.

VAR modeling has risen in popularity since the first introduction by Sims (1980); when it was presented as an alternative to criticized complex simultaneous equation models, which struggled to capture and predict the economy of 70's. These models required imposing restrictions on endogenous variables to achieve identification which was suspected to disrupt model dynamics (Sims, 1980). The original VAR approach is constructed to hand the researchers a less demanding method that is easier to execute. VAR fits the data to the model in exchange for lower theoretical consistency (endogeneity of variables) and then uses Impulse Response Functions (IRF⁹) to explore the dynamic responses of the system to shocks. However, without any restrictions imposed on the covariance matrix of errors, multiple sets of impulse responses exist because the underlying orthogonalisation procedure (usually Cholesky decomposition) is not unique. Therefore, findings from such models have limited use in interpretation of economic relationships. Objections lead to implementing a priori restrictions to the models contradicting the original thought of unloading the identification burden. This approach has been labeled as structural vector autoregression (Garrat et al., 1998).

In this paper, we employ the structural vector autoregression identification procedure by Blanchard and Perotti (2002), formerly developed to picture the influence of government revenues and spending on the economy of the USA. We rely on underlying VAR for assumption tests and SVAR is utilized to model impulse responses.

First, we present the model in its reduced form and define it as:

$$y_t = \beta_0 + \beta_1 y_{t-1} + u_t \quad (1)$$

where $y_t = (T_t, G_t, X_t)'$ is the vector of our transformed stationary variables (T represents growth in government revenues, G growth in government expenditures and X growth in GDP per capita), β_0 is a three dimensional vector including such components as a constant, time

⁹ See e.g. Lütkepohl (2005)

trend or other exogenous variables, β_1 is the squared coefficient matrix and u_t is the serially uncorrelated series of random vectors with zero mean and covariance matrix is $Cov(u_t) = \Sigma_u$.

The selection of VAR with the lag order of one is motivated by two insights. One of the frailties of vector autoregression is the rising number of estimated coefficients with chosen lag length. These additional coefficients can not only lead to over-specification of the model, which might thereafter give unreliable results because of the undesirable effect on variances (Wooldridge, 2003), but they also reduce the number of observations for the analysis, which is not favorable with our dataset. Secondly, we base our choice of one lag VAR on statistical tests. We rely on the Schwarz's Bayesian Information Criterion in choice of the proper lag order¹⁰. Lag selection of orders of zero in cases of Lithuania, Poland and Slovakia suggests that the relationships between the variables and their lagged values are rather insignificant.

From now on we work with the estimates of VAR, therefore we only include the countries where the variables proved to be viable for the analysis. That leaves us with the time series for the Czech Republic, Lithuania, Poland, Slovenia and Slovakia.

Country	SBIC	AIC	HQIC
CZ	1	1	1
ES	3	4	4
LA	2	2	2
LI	0	4	1
HU	1	4	1
PO	0	1	1
SL	1	1	1
SK	0	0	0

Table 7: Lag order selection criteria

Continuing with the compliance of assumptions check, we examine possible serial correlation in the residuals after fitting the regressions. We use Breusch-Godfrey Lagrange multiplier test for our one lag VARs with the lag order of test set to four. On 10% level of significance the null hypothesis of no serial correlation is not rejected for Czech Republic for any of the lags. The data for Lithuania on the other hand provides strong evidence for serial correlation in the first and fourth lag. Hence, we include the lags in the regression and rerun the test on now four lag VAR. We cannot reject the hypothesis of no serial correlation and this result points

¹⁰ We also explore Akaike Information Criterion (AIC) and Hannan and Quinn Information Criterion (HQIC). Even though AIC and HQIC sometimes suggest higher lag orders, we rely on SBIC and the argument of model parsimony in order to keep the analysis as robust as possible.

towards misspecification of the former model, which lacks the lags of higher order possibly relevant to the estimation. This forced us to reconsider the model in the case of Lithuania and use VAR with four lags for later analysis (supported by AIC lag selection). Additionally, we also reject the null of no serial correlation in the second lag in the case of Slovenia. However, when the procedure parallels Lithuanian, adjustment is performed and the lag is included in the regression and the null is still rejected even on low levels of significance with p-value 0,014. As a result, we decide to keep the model as it is, but it forces us to treat the results with caution, since the presence of serial correlation can invalidate OLS test statistics (Wooldridge, 2003). The models for Poland and Slovakia show no signs of possible serial correlation. The test results are available in the Appendix.

After reviewing the assumptions of the models, we continue with Granger-causality tests to see to what extent the reduced-form VAR can serve to explain the relationships among the variables. The tests fail to reject the null of no causal links of government expenditures and revenues to GDP for all countries with exception of Slovenia, where revenues are highly significant in explaining GDP. However, with possible serial correlation in the residuals, we should not put too much stress on this result. As for the other countries there is a place for additional structural identification restrictions to look for a better model (StataCorp, 2011), the objective of next section.

3.3 Identification

As mentioned before, we utilize Blanchard and Perotti's (2002) identification process, but we also largely incorporate the descriptive approach of Baum and Koester (2011) because of their illustrative insight and clarity of their depiction of the former study. The identification itself is developed using AB-Model SVAR representation:

$$Au_t = B\varepsilon_t, \quad \varepsilon_t \sim (0, I_K) \quad (2)$$

with $u_t = (t_t, g_t, x_t)$ being the vector of underlying VAR residuals for government revenue, government spending and GDP, $\varepsilon_t = (\varepsilon_t^t, \varepsilon_t^g, \varepsilon_t^x)$ the vector of structural shocks with $Cov(\varepsilon_t) = I_3$ and $\varepsilon_t^t, \varepsilon_t^g, \varepsilon_t^x$ standing for shocks to tax, spending and GDP respectively. This framework allows us to formulate the equation system for the errors of the underlying VAR model rather than directly for the variables; subsequently we can follow with the specification of relations among innovations instead of observed variables (Lütkepohl, 2005). Using VAR

to get residuals u_t , we can determine the elements of A and B and then proceed with the impulse response analysis.

The equation system we want to identify is:

$$\begin{aligned} t_t &= a_1 \varepsilon_t^x + a_2 \varepsilon_t^g + \varepsilon_t^t \\ g_t &= b_1 \varepsilon_t^x + b_2 \varepsilon_t^t + \varepsilon_t^g \\ x_t &= c_1 \varepsilon_t^t + c_2 \varepsilon_t^g + \varepsilon_t^x \end{aligned} \quad (3)$$

and corresponds with $Au_t = B\varepsilon_t$ matrix representation¹¹ where:

$$A = \begin{pmatrix} 1 & 0 & -a_1 \\ 0 & 1 & -b_1 \\ -c_1 & -c_2 & 1 \end{pmatrix} \quad B = \begin{pmatrix} 1 & a_2 & 0 \\ b_2 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \quad (4)$$

The first equation in the system depicts that innovation in government revenues can be explained by three separate effects, the automatic response of government revenues to the real output, the discretionary response of revenues to the change in expenditures, and random structural shock in the fiscal policy that is to be identified. Similarly, the second equation shows government expenditure innovation constitutes of its automatic response to the real output, the systematic effect of discretionary shock in government revenues and lastly a random fiscal policy shock we want to capture. In the last equation, we assume the unanticipated moves in GDP are due to shocks in government revenues, government spending and the shock in GDP itself.

The coefficients in the system are identified using economic rationale and construction of the data. Both studies we rely on with the identification, that is Baum and Koester (2011) and Blanchard and Perotti (2002), apply three step procedure:

- I) The information on institutional systems of respective countries are gathered to derive coefficients a_1 and b_1 . The studies point out there are two forms of GDP shocks on fiscal variables, the automatic effects of economy's development and the effects of discretionary interventions to fiscal policy based on the unexpected changes in the economic activity within the quarter. Further, they argue the latter can be taken off consideration due to the utilization of quarterly data because the

¹¹ For detailed process, see Lütkepohl (2005), p. 364-366

lag between the realization of state of the economy and accepting adjustment measures is longer than three months due to legislative and bureaucratic settings. The shocks to fiscal variables are assumed to exclusively picture their automatic feedback to GDP. Additionally, as a result of including the social transfers, the largest component of government spending into net revenues, b_1 is considered to be zero (Baum and Koester, 2011). The identification of a_1 is trickier and uses formula to compute the elasticity of tax revenues to GDP. However, we decided not to follow preceding articles in formal computation and in the interest of simplicity rather chose to use preset rates of 0,5, 1 and 1,5 for three different model estimates. We base the value 1 on the previous reports on revenue/GDP elasticities by European Commission (2010) and OECD (Girouard and André, 2005), adding low and high variants to enhance robustness of the analysis¹². We elect to take up this approach because of ambiguity of measured elasticities in the focus countries. Moreover, the elasticity of tax revenue to GDP is indeed time-variant¹³, thus using preset instead of mean values does not fundamentally weaken our procedure.

- II) In the second step we compute the contemporaneous influence of government revenues and expenditures on GDP c_1 , c_2 . With the previous estimates of a_1 and b_1 , we can derive fiscal policy shocks as $t_t^{ins} = t_t - a_1 x_t$ and $g_t^{ins} = g_t - b_1 x_t = g_t$. These variables can be used as instruments in the third equation of the system since they are no longer correlated with ε_t^x . The coefficients in the equation can then be consistently estimated using ordinary least squares.

Country	c_1	c_2
Czech Republic	0,0065 (p=0,59)	-0,0222 (p=0,07)
Lithuania	0,0785 (p=0,26)	-0,0247 (p=0,70)
Poland	0,0043 (p=0,83)	-0,0137 (p=0,50)
Slovenia	0,1209 (p=0,06)	-0,0052 (p=0,91)
Slovakia	0,0045 (p=0,90)	-0,0158 (p=0,70)

Table 8: Coefficients of government revenues and expenditures (c_1 , c_2), p-values in parentheses

- III) Finally, there are parameters a_2, b_2 left to be estimated. Their identification revolves around choosing whether taxation follows spending or if spending is

¹² Baum and Koester (2011) choose to explore models with alternating a_1 values too, arguing with time-varying revenue/GDP elasticity

¹³ See e.g., EC (2010)

subsequent to taxation. Kollias and Paleologou (2006), Payne (2003), Anderson, Wallace and Warner (1986) provide insight into the government tax-spend relationship, which tends to be unclear. Spending adjustments preceding taxation would imply $b_2 = 0$, while spending following taxation would result in $a_2 = 0$. We follow Baum and Koester (2011) identification and assume the adjustments in taxation come first and estimate b_2 .

Country	b_2
Czech Republic	-0,2598* (p=0,07)
Lithuania	-0,0690 (p=0,63)
Poland	0,4142* (p=0,003)
Slovenia	-0,2074 (p=0,14)
Slovakia	-0,0059 (p=0,96)

Table 9: Coefficients b_2 , elasticity of spending to taxation, * marks significant coefficients, p-values in parentheses

Chapter 4: Outcomes of the structural model

4.1 Impulse response analysis

This block presents the impulse response function for five countries, whose data were valid for the analysis. We utilize the structural impulse response functions available in Stata. These IRFs picture the effect of one standard deviation shock of the impulse variable on the response variable over eight quarters following the shock. We show the responses of revenue shock on government spending, government spending on revenues, but mainly focus on the shocks of revenue and spending on GDP. For the record, we also display the self-shock responses of the variables. Additionally, we compute the fiscal multipliers of government revenues and expenditures which we define as a ratio between accumulated change in the GDP four quarters and the initial shock of the variable that is standard deviation of revenue or expenditures.

4.1.1 Czech Republic

After identification, we find no significant influence of shocks in government expenditures and revenues on growth of domestic product. With respective p-values of 0,07 and 0,59, we cannot reject the hypothesis of the variables not being able to explain the shocks in GDP and the model itself appears to provide bad fit for the data (see Table 8 for p-values of all the countries). As we proceed with computing the impulse responses, we discover negative short-run effect of government spending shock on the GDP and positive short-run effect of shock in government revenues on GDP. The contemporary effect of revenues is 1,23% and in following four quarters it slowly drops to give the cumulative effect on the GDP after four quarters is 2,57%. The influence of government expenditures is negative with immediate effect -2,23%. It stays negative for the whole observation period following the impulse and leaves us with the accumulated effect of -4,93% over four quarters. It is important to look at these influences with respect to the shock they account for. As previously mentioned, the shock in Stata is predefined as one standard deviation of the impulse variable. If we want to derive the fiscal multipliers¹⁴ we get the values 0,23 and -0,25 for revenues and expenditures respectively. That is 1% increase in revenues causes a GDP growth of 0,23% and 1% raise of

¹⁴ Defined as $g_m = \frac{\Delta X}{\Delta G}$, $f_m = \frac{\Delta X}{\Delta T}$, see e.g. Spilimbergo, Symansky, Schindler (2009)

expenditures leads to 0,25% decrease in the GDP. This would imply very small influence of any fiscal adjustments on GDP. Although the influence of fiscal variables could not be statistically verified, these results are unexpected, as expenditures are presumed to promote economic activity and higher revenues are suspected to hinder it. Similarly surprising but indistinct results are also found for remaining countries in question.

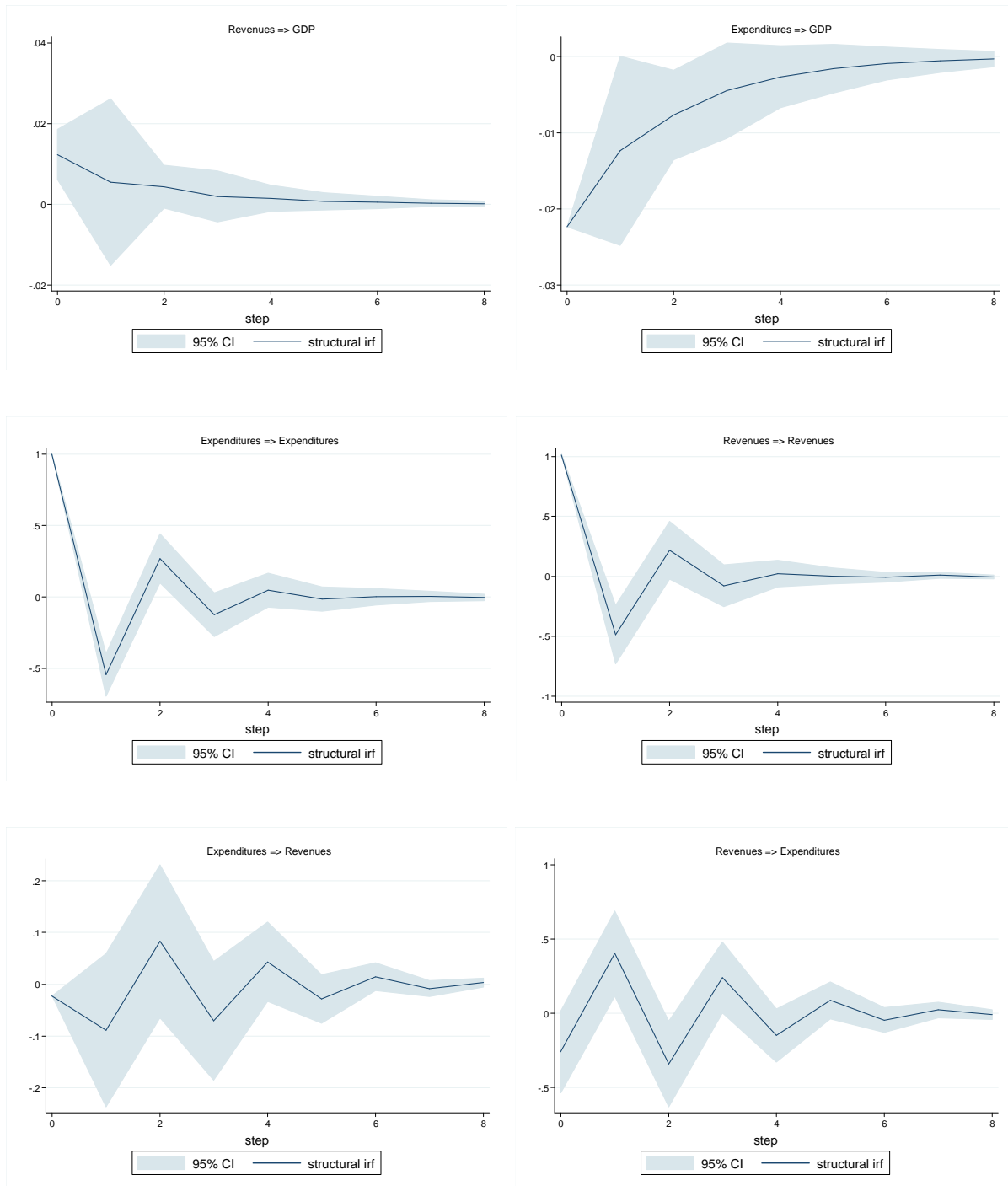
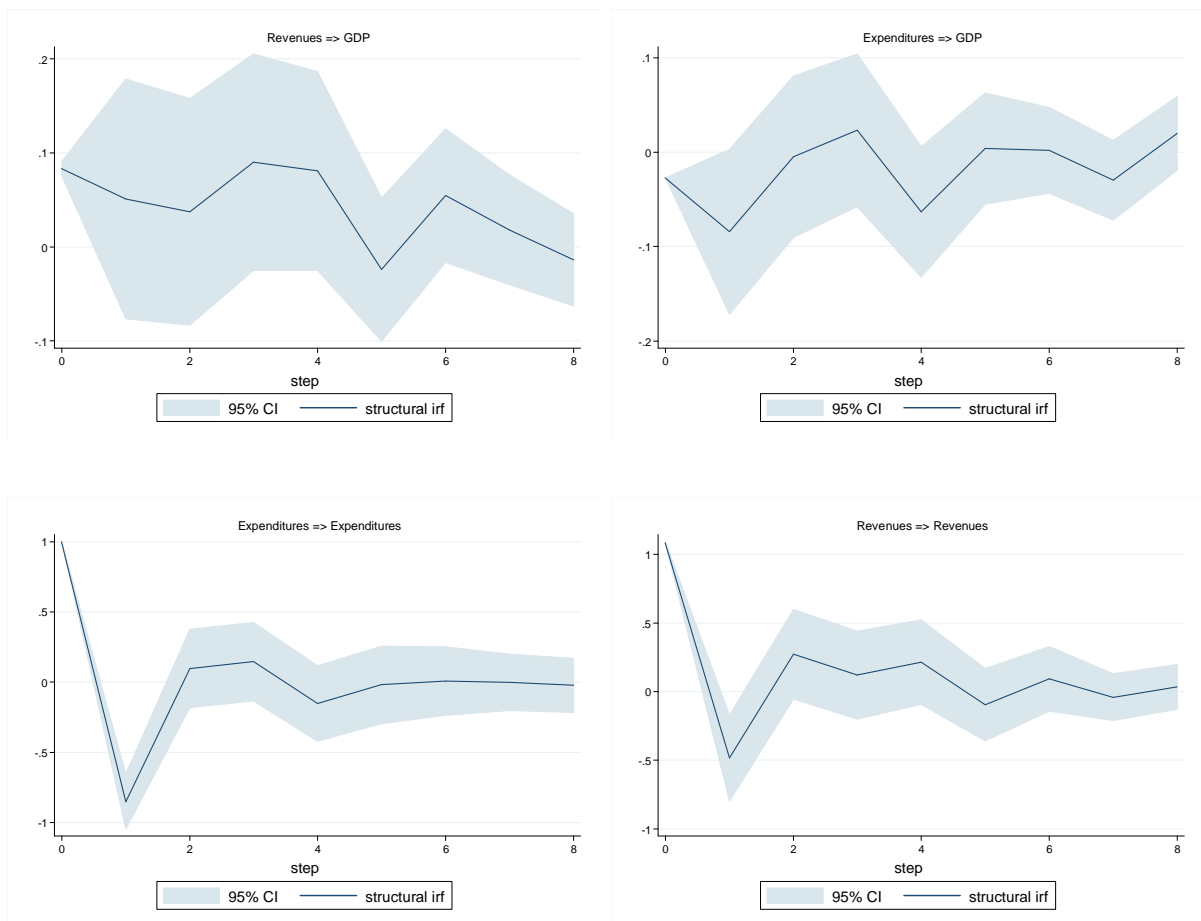


Figure 12: IRFs Czech Republic

4.1.2 Lithuania

Lithuania was the only country where we used SVAR with four lags and the effects appear to be lasting for a longer time. Neither revenue nor expenditure shocks are detected to have statistically significant impact on GDP in Lithuania. Computed IRF shows the immediate impact of expenditure shock to be -2,68%, it becomes even stronger and remains negative at -8,41% in period two and then diminishes with accrued value of -20,23% over four quarters. Revenue shock reflects in 8,33% within quarter increase of GDP and remains positive over the following four quarters, with an accumulated effect of 34%. Given these values we derive potential fiscal multipliers to be -1,57 for government expenditures and 3,53 for government revenues.



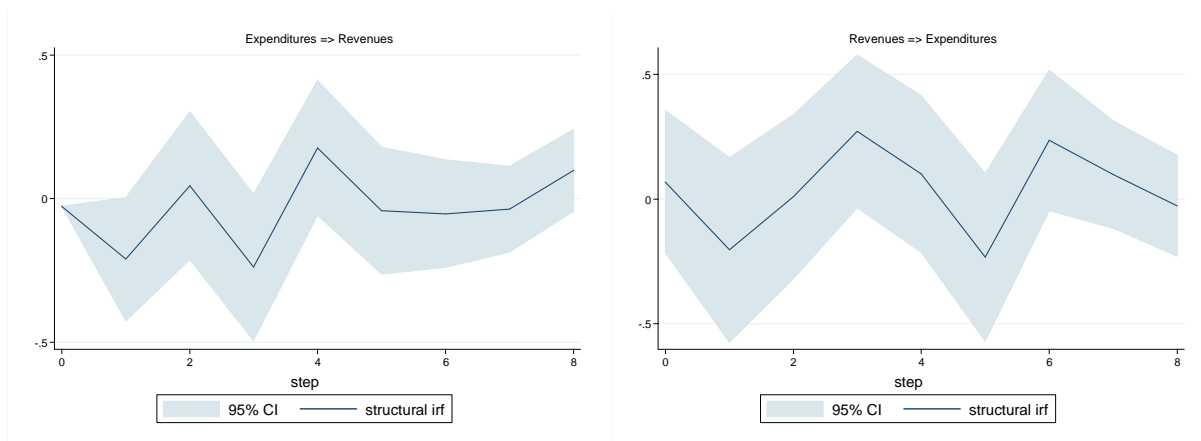
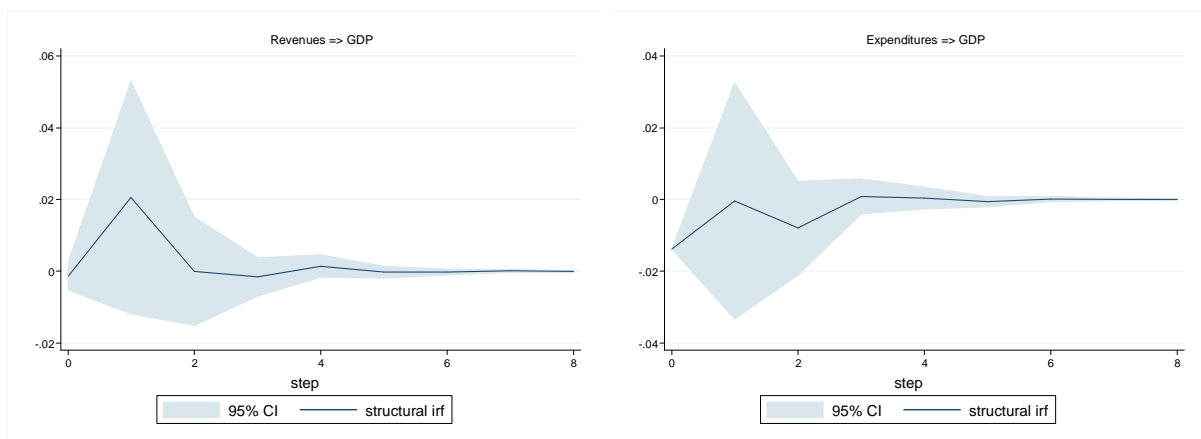


Figure 13: IRFs Lithuania

4.1.3 Poland

Spending and revenue multipliers are not significant in the case of Poland. The statistics for rejection are exceptionally weak and there is no evidence of possible relationship between fiscal variables and GDP. IRF analysis depicts the immediate effect of revenue shock as very small at -0,14%. The peak impact is present in the second period at 2,06% and then it recedes to an overall reaction of 1,91% after four quarters. Expenditures show almost exclusively negative impact and the four period effect is totaled to -2,1%. The corresponding multipliers are computed to be 0,31 in the case of government revenues and -0,33 for government expenditures.



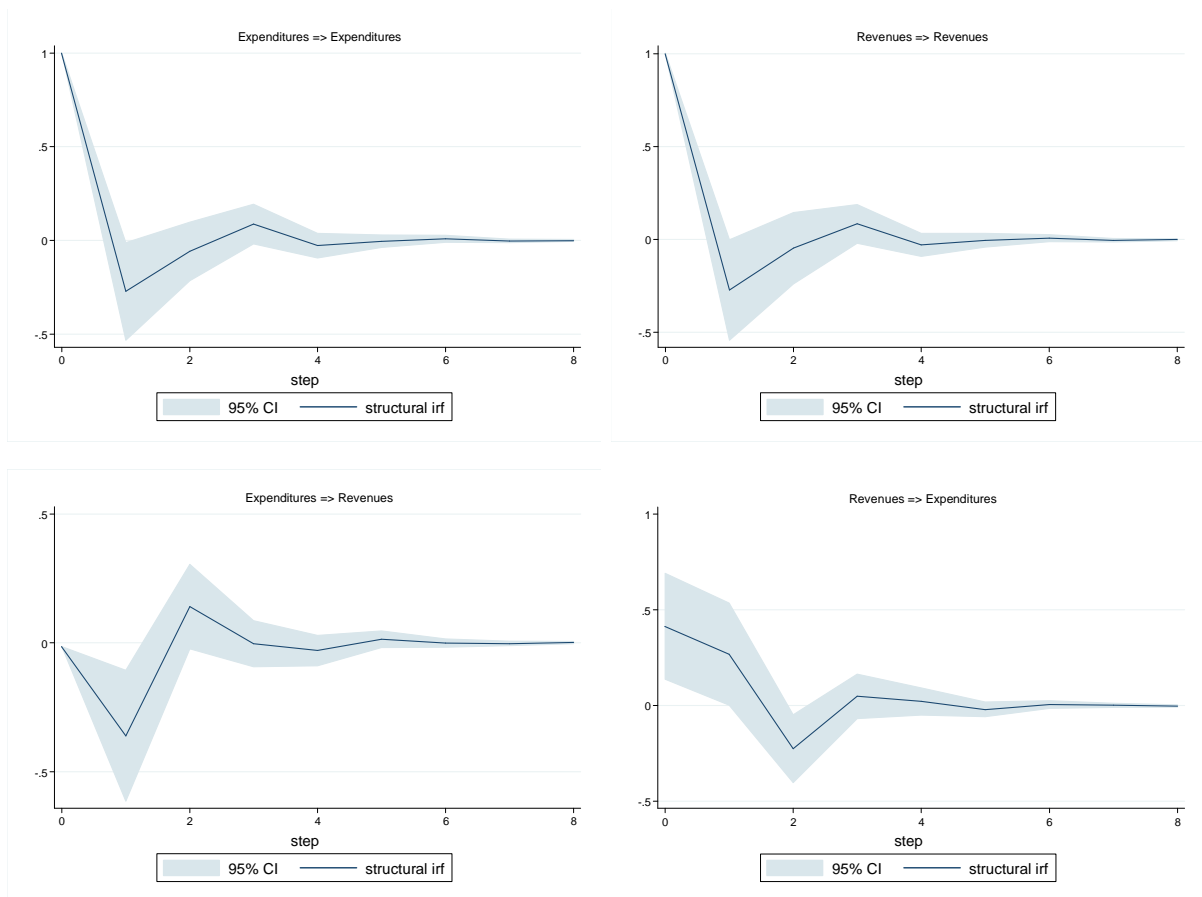


Figure 14: IRFs Poland

4.1.4 Slovenia

The results for Slovenia are exceptionally puzzling¹⁵. The effects of shocks to GDP is calculated to be as high as 13,88% within quarter and 27,96% in the second period for revenues. The effect slowly fades out, but the overall influence according to the model still adds up to almost 58%. Given the underlying shock to revenues is 3,05%, the consequent multiplier of 18,97 is highly unlikely to be true. The value of a spending multiplier of -1,45 implied by GDP shock of -7,7% given 5,28% shock to spending also sticks out from the finding or all other countries. However, as in the case of other CEE countries, the fit to the model is far from perfect and the relationships are statistically insignificant.

¹⁵ We discuss potential cause in the summary and methodology sections

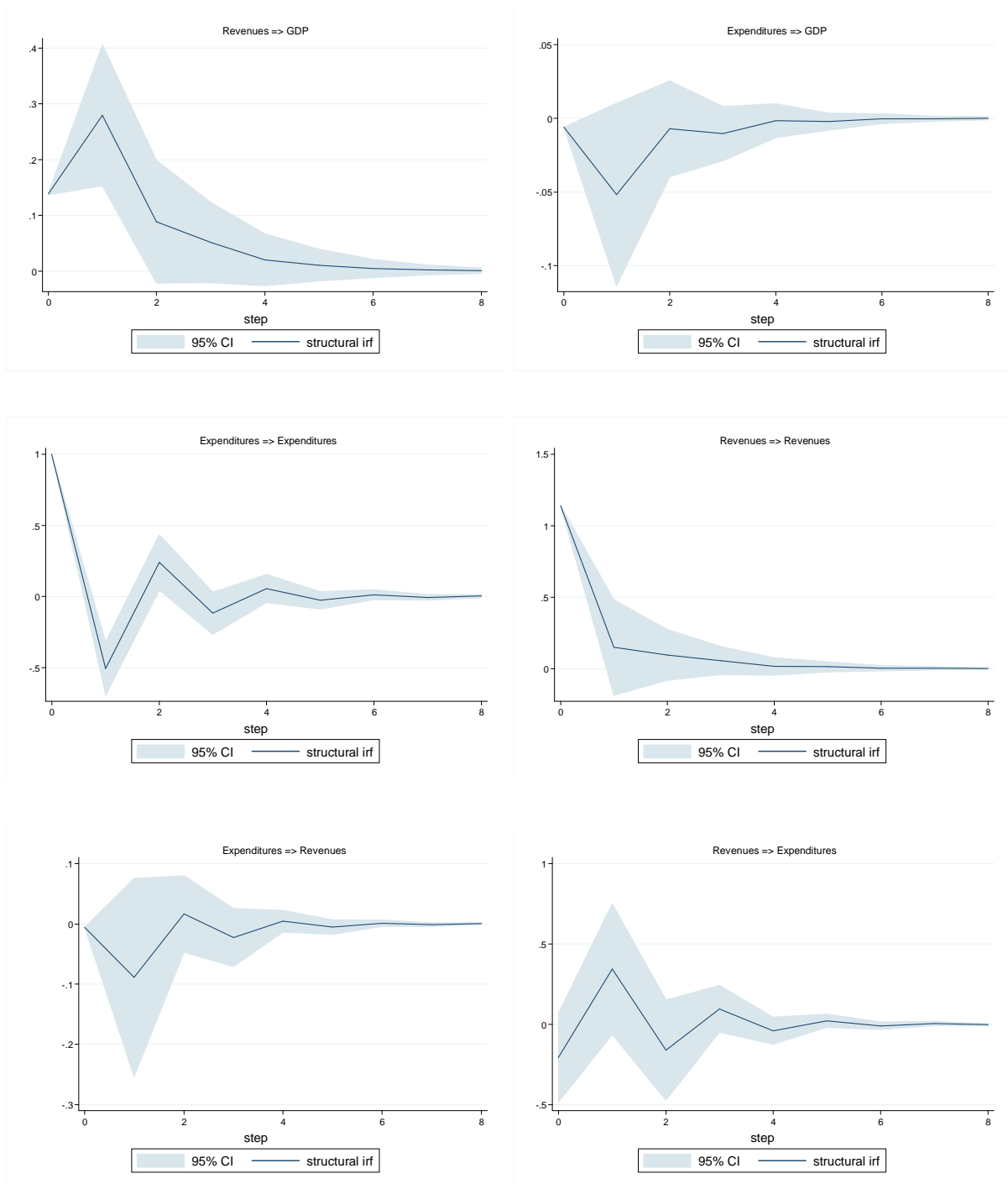


Figure 15: IRFs Slovenia

4.1.5 Slovakia

Slovakia is subject to similar weak explanatory power like that of Poland. We did not get any close to reject the null hypotheses of no relationship between government spending and revenues. The IRF gives the contemporary effect of government revenue shock on GDP of 0,46% but then it turns negative for later periods. Over four quarters, we capture the cumulative effect of 0,13%. The expenditure shock generates response of -1,59% within the

quarter and in the aggregate it accounts for -2,79% change in GDP. We use these values to arrive at the values of expenditure multiplier -0,25 and revenue multiplier 0,02.

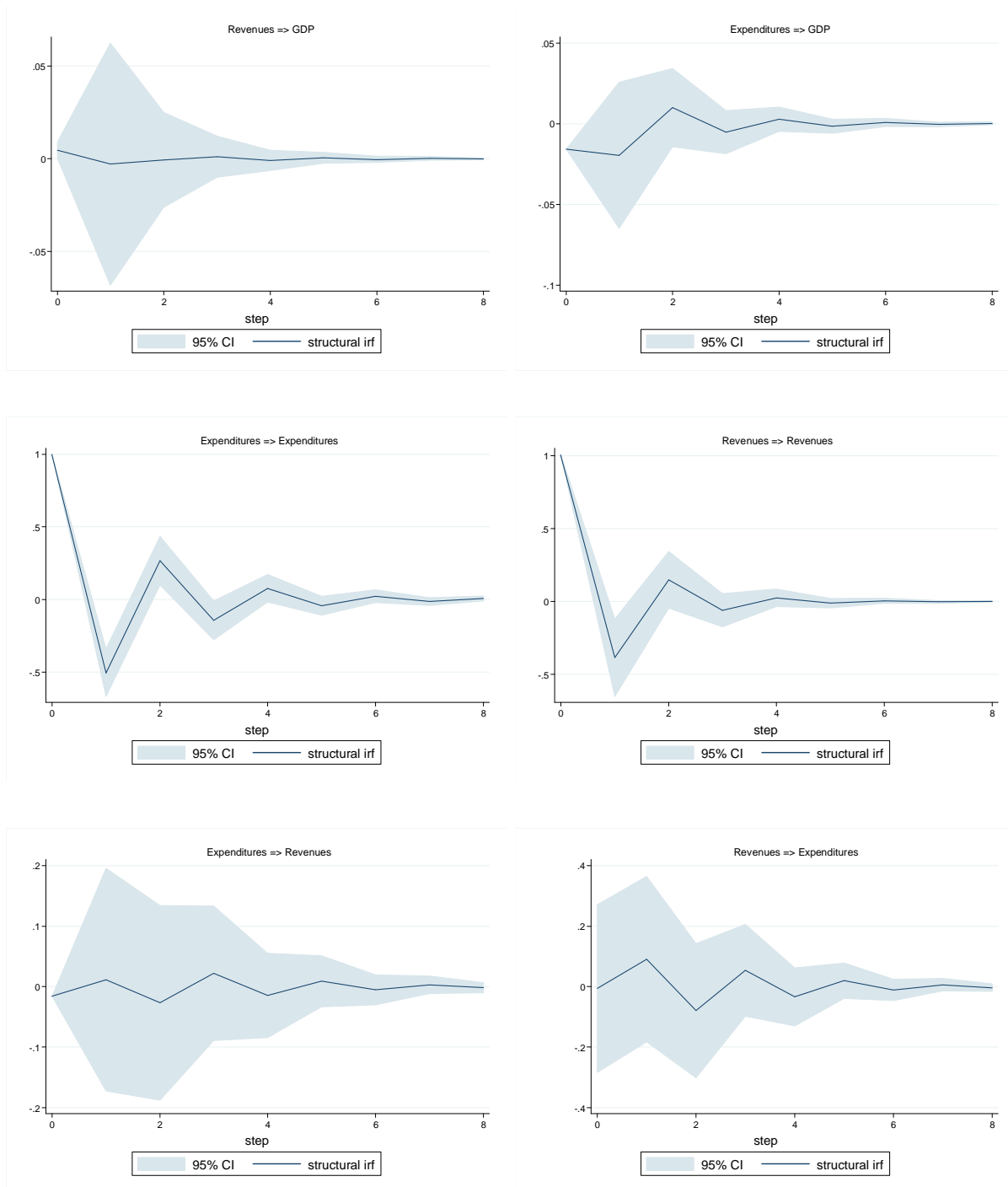


Figure 16: IRFs Slovakia

4.1.6 Alternative tax elasticity regimes

We identified the equation system (3) with alternative tax elasticities 0,5 and 1,5 re-estimating the coefficients for fiscal shocks in the third equation of the system. Under $a_1=0,5$ regime, we

observe a change of higher significance of shock revenues in Slovenia. The impact of revenue shock in Slovenia also rises in magnitude and results in revenue multiplier of 22,11. However, Slovenia is the country for which the hypothesis of serial correlation in the residuals could not be rejected, so we have to be prudent with the inference. Additionally, the coefficients for revenue shocks of Lithuania and Poland are larger. In case of Poland they are still statistically insignificant, but shock in Lithuanian revenues under this regime becomes significant and yield multiplier 1,79. Otherwise, the response coefficients we get are mildly different in size, but share the signs of the coefficients from the original regime and thus the IRFs give similar effects.

We find more diversity in the higher tax elasticity regime with $a_1=1,5$. Coefficient for revenue shock in Lithuania becomes negative, -0,030 compared to original 0,079. The aggregate four quarter impact however, remains positive as high as 14,75% and the resulting multiplier is 1,52. Another difference can be found in the revenue shock coefficient for Poland, which is -0,0057. The IRF then pictures the effect of 0,78% over four quarter period and the multiplier looks even weaker than originally at 0,13. Lastly, revenue coefficient for Slovakia is negative, -0.027, and corresponding IRF generates response of GDP to shock in revenues of -2,94% over four quarters. Resulting revenue multiplier is then -0.37. However, the individual parameters for all the countries remain insignificant on usual levels of significance.

The different identification procedures did not provide us with a better model for the data, but with the exception of Lithuania showed that our results of insignificant statistical relationships between government expenditure or revenue shocks to GDP in CEE countries are quite robust to their the particular tax yield elasticities.

4.2 Summary of empirical part

Tables 10 and 11 below summarize the outcomes of our analysis. Table 10 portrays magnitudes of the shocks to revenues and expenditures. Due to software limitations, we were not able to model the 1% shocks' impact on GDP directly, but that did not prevent us to compute the multipliers g_m , t_m of government expenditures and government revenues respectively. They are constructed show a percentage change in the GDP four quarters after the shock in impulse variables. Table 11 displays the resulting multipliers for the base identification regime with $a_1=1$. Additionally, we show coefficients for expenditures and revenues in alternative identification regimes with $a_1=0,5/a_1=1,5$ to account for potential

dependence of the statistical significance on different tax yield elasticities. The changes can be observed only in Lithuania and Slovenia. However, the series for these countries suffer from high correlations between modeled variables and we have found evidence of possible serial correlation in regression residuals, so the results are not particularly powerful. The significance is marked with asterisks for both the multipliers and coefficients.

Country	Revenue shock	Expenditure shock
CZ	11,4%	19,9%
LI	9,7%	12,9%
PO	6,1%	6,3%
SL	3,1%	5,3%
SK	8%	11,1%

Table 10: Magnitudes of modeled shocks (standard deviations of the variables)

Country	Tax elasticity regime					
	$a_1=1$		$a_1=0,5$		$a_1=1,5$	
	g_m	t_m	c_1	c_2	c_1	c_2
CZ	-0,25	0,23	0,0098	-0,0212	0,0030	-0,0231
LI	-1,57	3,52	0,0165*	-0,0268	-0,0303	-0,0196
PO	-0,33	0,31	0,0142	-0,0174	-0,0057	-0,0097
SL	18,98	-1,46	0,1903*	0,0044	0,0202	-0,0169
SK	-0,25	0,02	0,0360	-0,0153	-0,0274	-0,0157

Table 11: Summary table of the results, * marks significant coefficients/multipliers

The main result of our analysis is the insignificance of revenue and expenditure shocks on GDP in selected countries of Central and Eastern Europe. Even though we portrayed the Impulse Response Functions of fiscal shocks on GDP, they have to be regarded as illustrative, because we were not able to statistically prove the relationships between the shocks in fiscal variables and GDP. We originally started with analysis of eight countries, but the data of Estonia, Latvia and Hungary turned out not to be applicable for the study when we could not reject the presence of potential unit roots in their time series. The data of Czech Republic, Lithuania, Poland, Slovenia and Slovakia were found valid for vector autoregression. After running the test for serial correlation in the residuals, we applied Granger causality tests on reduced-form VAR. The null hypotheses of no causal relationship among the variables could not be rejected and thus we further apply structural vector autoregression with identification restrictions. The identification procedure was successfully utilized to find significant influences of fiscal shocks on GDP in USA (Blanchard and Perotti, 2002), Germany (Baum and Koester, 2011) or Japan (Baum, Poplawski-Ribeiro, Weber, 2012) arriving at fiscal multipliers ranging from 0 up to 2,1. The latter papers also utilize the threshold vector

autoregressions to find the difference between the multipliers at times with negative and positive output gaps. They provide evidence that the impact of fiscal policies is substantially higher during economic downturn.

In our study we could not prove any such relationships, not even under our restricted model. Although we found the links insignificant, we used the Impulse Response Functions to calculate the fiscal multipliers and found that in the majority of countries they are typically lower than 0,5 (see g_m and t_m in table 11). The potential influence of the shocks is ambiguous and depends from the identification of the model, but the insignificance of shocks remains present across different regimes with exception of revenues in Lithuania and Slovenia¹⁶. The reasoning behind insignificance most likely lies with the lack of the data variety, since we are restrained to work with a limited time span from the first quarter of 1999 to the fourth quarter of 2011. Not only does this time frame maximally accounts for two business cycles in the majority of the countries, but also the discretionary adjustments of revenues and expenditures are not as frequent and therefore its identification is problematic. Aforementioned studies usually work with time series three or four times longer which likely increases the explanatory scope of the data.

¹⁶ VAR model for these countries, however, may suffer from serial correlation in residuals, see methodology

Conclusion

In the first part of the thesis we described the adjustments the governments in Central and Eastern Europe adopted to tackle the financial and economic downturn from 2008 onwards.

Firstly, we discovered the magnitude of measures was quite diverse depending on the depth of problems the countries were facing. While the economies of the Baltic countries suffered from serious overheating of their economies mainly through financial sector and overly high expectations about the future development, their immediate actions and reforms were far more reaching than the ones adopted in the countries of Central Europe, Czech Republic, Poland, Slovenia and Slovakia. In case of Baltics, the expenditures on public sector were severely cut, education and healthcare policies were reviewed and restructured to improve their efficiency. Most of these measures were to some extent also adopted in other countries of the CEE region but the structural reforms proved to be much slower with less pressure on the governments. On the revenues side, the focus was on taxing the consumption through value added and excise taxes. So far, the income taxes have been kept low even though the reintroduction of progressive tax has been discussed recently. The clarity of the tax systems was emphasized.

We also provided an overview of academic research on the fiscal adjustments from which we drew two main important conclusions. The evidence shows that successful fiscal adjustments are usually achieved by stressing expenditure cuts to tax increases. Moreover, the larger the adjustments the better chances they have to bring the desired impact of stabilizing budget balance and stimulating the economy. Far-reaching changes have been found to neither lower reelection chances for the government nor were the expenditure cuts found to cause lasting recessions. Changes in the Baltics and their outcomes might serve as a backing for countries in fiscal difficulties such as Spain or Italy which fear to adopt radical adjustments. This can be further supported by the data of CEE countries in this thesis where we could not find evidence of fiscal adjustments to have impact on economic growth.

Secondly, we reviewed the fiscal rules and institutions which are utilized in CEE countries. The literature on the impact of fiscal rules and institution on budgetary discipline does not give clear-cut evidence on their influence. The effect is claimed to be higher in less mature democracies, where the electorate is not able to realize irresponsible government policy and punish it during elections.

Finally, we explored the application of SVAR method on the data of CEE countries. Time series of Estonia, Latvia and Hungary were found unsuitable for the analysis, because we could not reject the possibility of unit roots in their series. Using Granger causality test on reduced-form VAR, we could not find significant relationships between government expenditures, revenues and GDP. Thus we expanded our analysis with identification procedure developed by Blanchard and Perotti (2002) and followed with structural vector autoregressions. Using impulse response functions, we computed multipliers of government spending and government revenues. Their values were in general found to be close to zero and their effect insignificant with exception of Lithuania and Slovenia. However, their analysis and underlying regression is likely to suffer from serial correlation in residuals, so the outcomes cannot be regarded as particularly reliable.

To conclude, we were not able to provide the evidence of government expenditures and revenues having influence on economic growth. The reasoning for this outcome might be that we mainly studied smaller and opened economies, where the effects of adjustments might be 'exported' abroad. Moreover, the share of shadow economies in CEE countries can possibly cause insignificant fiscal multipliers as the citizens have alternative sources of income which is not taxed and does not enter government revenues. Last cause we propose are the remittances in economies with the high rate of labor mobility (mainly Latvia, Poland). Additional income coming from abroad might have influence on the GDP, but is not reflected in the government accounts we used for the analysis.

Another, far more technical, reason to justify our results is the limited data available for the analysis compared to the earlier studies of other countries which used much richer datasets. We suggest that additional research, perhaps utilizing different econometric methods might be desirable to enlighten the relationships better.

Bibliography

Alesina, A. (2010): *Fiscal adjustments: lessons from recent history*, Madrid, Spain 15 April 2010, ECOFIN meeting.

Alesina, A./ Ardagna, S. (2009): *Large Changes in Fiscal Policy: Taxes Versus Spending*, Working Paper 15438, National Bureau of Economic Research.

Anderson, W./ Wallace, M. S./ Warner, J. T. (1986): Government Spending and Taxation: What Causes What?, *Southern Economic Association*, 52(3), p. 630-639.

Åslund, A. (2012): *Lessons from Reforms in Central and Eastern Europe in the Wake of the Global Financial Crisis*, Working Paper Series WP12-7, Washington: Peterson Institute for International Economics.

Åslund, A./ Dombrovskis, V. (2011): *How Latvia Came Through the Financial Crisis*, Washington D.C.: Peterson Institute for International Economics.

Baum, A./ Koester, G.B (2011): *The impact of fiscal policy on economic activity over the business cycle – evidence from a threshold VAR analysis*, Deutsche Bundesbank Discussion Paper, Series 1: Economic Studies, No. 03/2011.

Baum, A./ Poplawski-Ribeiro, M./ Weber, A. (2012): Fiscal Multipliers and the State of the Economy, IMF Working Paper (forthcoming, Washington D.C.: International Monetary Fund).

Beetsma, R./ Giuliadori, M. (2009): Fiscal adjustment to cyclical developments in the OECD: an empirical analysis based on real-time data, *Oxford Economic Papers*, 62, p.419-441.

Berglöf, E./ Korniyenko, Y./ Plekhanov, A./ Zettelmeyer, J. (2010): Understanding the Crisis in Emerging Europe, *Public Policy Review*, 6(6), p. 985-1008.

Blanchard, O./ Perotti, R. (2002): An Empirical Characterization of the Dynamic Effects of Changes in Government Spending and Taxes on Output, *Quarterly Journal of Economics*, 117(4), p. 1329-1368.

Brender, A./ Drazen, A. (2005): Political Budget Cycles in New Versus Established Democracies, *Journal of Monetary Economics*, 52, p.1271-1295.

Cacares, C./ Corbacho, A./ Medina, L. (2010): *Structural Breaks in Fiscal Performance: Did Fiscal Responsibility Laws Have Anything to Do with Them?*, IMF Working Paper WP 10/248, Washington D.C.: International Monetary Fund.

Darvas, Z. (2010a): The Impact of the Crisis on Budget Policy in Central and Eastern Europe, in: *OECD Journal on Budgeting*, 10(1), p. 45-86.

Darvas, Z. (2010b): *Beyond the Crisis: Prospects for Emerging Europe*, Working Paper 2010/06, Brussels: Bruegel.

Darvas, Z. / Kostyleva, V. (2011): *The Fiscal and Monetary Institutions of CESEE Countries*, Working Paper 2011/02, Brussels: Bruegel

Debrun, X./ Kumar, M.S. (2007): *The Discipline-Enhancing Role of Fiscal Institutions: Theory and Empirical Evidence*, IMF Working Paper WP07/171, Washington D.C.: International Monetary Fund.

Epstein, N./Velculescu, D. (2011): *Republic of Poland: Selected Issues*, IMF Country Report 11/167, Washington D.C.: International Monetary Fund.

European Commission (2009): *Five years of an enlarged European Union: economic achievements and challenges*, European Commission, Brussels: Directorate General for Economic and Financial Affairs.

European Commission (2010): *Public Finances in EMU*, European Commission, Brussels: Directorate General for Economic and Financial Affairs.

European Commission (2012a): *Fiscal frameworks across Member States: Commission services country fiches from the 2011 EPC peer review*, European Commission, Brussels: Directorate General for Economic and Financial Affairs.

European Commission (2012b): *An Agenda for Adequate, Safe and Sustainable Pensions*, White Paper COM (2012) 55 final, Brussels: European Commission.

European Commission (2012c): *Národní sociální zpráva 2012 Česká Republika* [pdf], Brussels: European Commission, available at: <http://ec.europa.eu/social/BlobServlet?docId=7685&langId=cs>, [accessed:14/7/2012].

Gale, W./ Orszag, P.R. (2004): Budget Deficits, National Saving, and Interest Rates., *Brookings Papers on Economic Activity*, 2, p.101-210.

Giavazzi, F./ Jappelli, T./ Pagano, M. (2000): Searching for non-linear effects of fiscal policy: Evidence from industrial and developing countries, *European Economic Review*, 44(7), p. 1259-1289.

Girouard, N./ André, C. (2005): Measuring Cyclically-Adjusted Budget Balances for OECD Countries, *OECD Economics Department Working Paper*, No.3372.

Grech, A.G. (2010): *Assessing the Sustainability of Pension Reforms in Europe*, London: Centre for the Analysis of Social Exclusion.

Guichard, S./ Kennedy, M./ Wurzel, E./ André, C. (2007): *What Promises Fiscal Consolidation: OECD Country Experiences*, OECD Working Paper, ECO/WKP(2007)13.

Hepke-Falk, K.H./ Tenhofen, J./ Wolf, G.B. (2010): The Macroeconomic Effects of Exogenous Fiscal Policy Shocks in Germany: A Disaggregated SVAR Analysis, *Journal of Economics and Statistics*, 230(3), p. 328-355.

IMF (2009): *Fiscal Rules Anchoring Expectations for Sustainable Public Finances*, Washington D.C.

IMF (2012a): *Fiscal Monitor: Balancing Fiscal Policy Risks*, Washington D.C.

IMF (2012b): *Transcript of a Press Briefing by Gerry Rice, Director, External Relations Department* [online], available at: <http://www.imf.org/external/np/tr/2012/tr071212.htm>, accessed 14/7/2012.

Kaminsky, G.L./ Reinhart, C.M. / Végh, C.A. (2004): When It Rains, It Pours: Procyclical Capital Flows and Macroeconomic Policies, *NBER Macroeconomics Annual 2004*, 19, p.11-53.

K.M. (2012): Vague, but probably austere, *The Economist* [online], available at: <http://www.economist.com/blogs/easternapproaches/2012/05/slovakias-new-government>, accessed 14/7/2012.

Kollias, C./ Paleologou, S.-M. (2006): Fiscal policy in the European Union: Tax and spend, spend and tax, fiscal synchronization or institutional separation?, *Journal of Economics Studies*, 33(2), p.108-120.

Kopits, G. (2008): The Political Economy of Fiscal Reform in Central and Eastern Europe, *OECD Journal on Budgeting*, 3, p. 1-11.

Ladiray, D./ Quenneville, B. (2001): *Seasonal Adjustment with the X-11 Method*, New York: Springer, Lecture Notes in Statistics, 158.

Larch, M./ Turrini, A. (2011): Received Wisdom and Beyond: Lessons from Fiscal Consolidation in the EU, *National Institute Economic Review*, 217(1), p. 1-18.

Laven, Z./ Santi, F (2012): EU Austerity and Reform: A Country by Country Table [online], available at: <http://www.europeaninstitute.org/April-2012/eu-austerity-and-reform-a-country-by-country-table-updated-may-3.html>, updated 3/5/2012, accessed 14/7/2012.

Lütkepohl, H. (2005): *New Introduction to Multiple Time Series Analysis*, Springer, Berlin Heidelberg New York.

MFSR (2012): *Ozdravný balíček 2012-2013* [doc], available at: http://i.sme.sk/cdata/2/64/6424032/Ficov_balicek.doc, accessed 14/7/2012.

MPSV (2011): *Důchodová reforma - základní fakta* [online], available at: <http://duchodovareforma.mpsv.cz/72>, accessed 15/7/2012.

MZCR (2012): *Memorandum zdravotních pojišťoven o restrukturalizaci lůžkového fondu za účelem jeho optimalizace* [pdf], available at: <http://www.mzcr.cz/Soubor.ashx?souborID=15023&typ=application/pdf&nazev=Memorandum%20ZP%2020.6.2012.pdf>, accessed 15/7/2012.

National Audit Office of Estonia (2009): *What is the National Audit Office?* [online], available at: <http://www.riigikontroll.ee/Riigikontrollkuiasutus/tabid/106/language/en-US/Default.aspx>, updated 16/5/2012, accessed 18/7/2012.

Payne, J.E. (2003): A Survey of the International Empirical Evidence on the Tax-Spend Debate, *Public Finance Review*, 31(3), p. 302-324.

Perotti, R. (2004): Estimating the Effects of Fiscal Policy in OECD Countries, *CEPR Discussion Paper Series*, No. 4842.

Purfield, C./ Rosenberg, C. (2010): *Adjustment under a Currency Peg: Estonia, Latvia and Lithuania during the Global Financial Crisis 2008–09*, IMF Working Paper WP 10/213, Washington D.C.: International Monetary Fund.

Republic of Slovenia - A Fiscal Council (2012): *Fiscal Council* [online], available at: <http://www.fiskalnivet.si/fs/fs-eng.nsf>, accessed 18/7/2012.

Romer, C.D./ Romer, D.H. (2007): The Macroeconomic Effects of Tax Changes: Estimates Based on a New Measure of Fiscal Shocks, *American Economic Review*, 100(3), p. 763-801.

Rosenberg, C./ Sierhej, R. (2007): *Interpreting EU Funds Data for Macroeconomic Analysis in the New Member States*, IMF Working Paper WP/07/77, Washington D.C.: International Monetary Fund.

Sims, C.A. (1980): Macroeconomics and Reality, *Econometrica*, 48(1), p. 1-48.

Garrat, A./ Lee, K./ Pesaran, M.H./ Shin, Y. (1998): *A structural cointegrating VAR approach to macroeconomic modelling* [pdf], available at: <http://www.econ.ed.ac.uk/papers/ni98.pdf>, accessed 7/6/2012.

Spilimbergo, A./ Symansky, S./ Schindler, M. (2009): *Fiscal Multipliers*, IMF staff position note SPN/09/11, Washington D.C.: International Monetary Fund.

StataCorp (2009): *Stata: Release 11*, Statistical Software, College Station, TX: StataCorp LP.

Švejnar, J./ Dušek, L./ Semerák, V. (2010): *An Intelligent Reform of Public Finance*, Prague: Institute for Democracy and Economic Analysis.

Szekély I./ Roeger, W./ in't Veld, J. (2011): *Fiscal Policy in the EU in the crisis: a model-based approach*, CASE Network Studies & Analyses No.423.

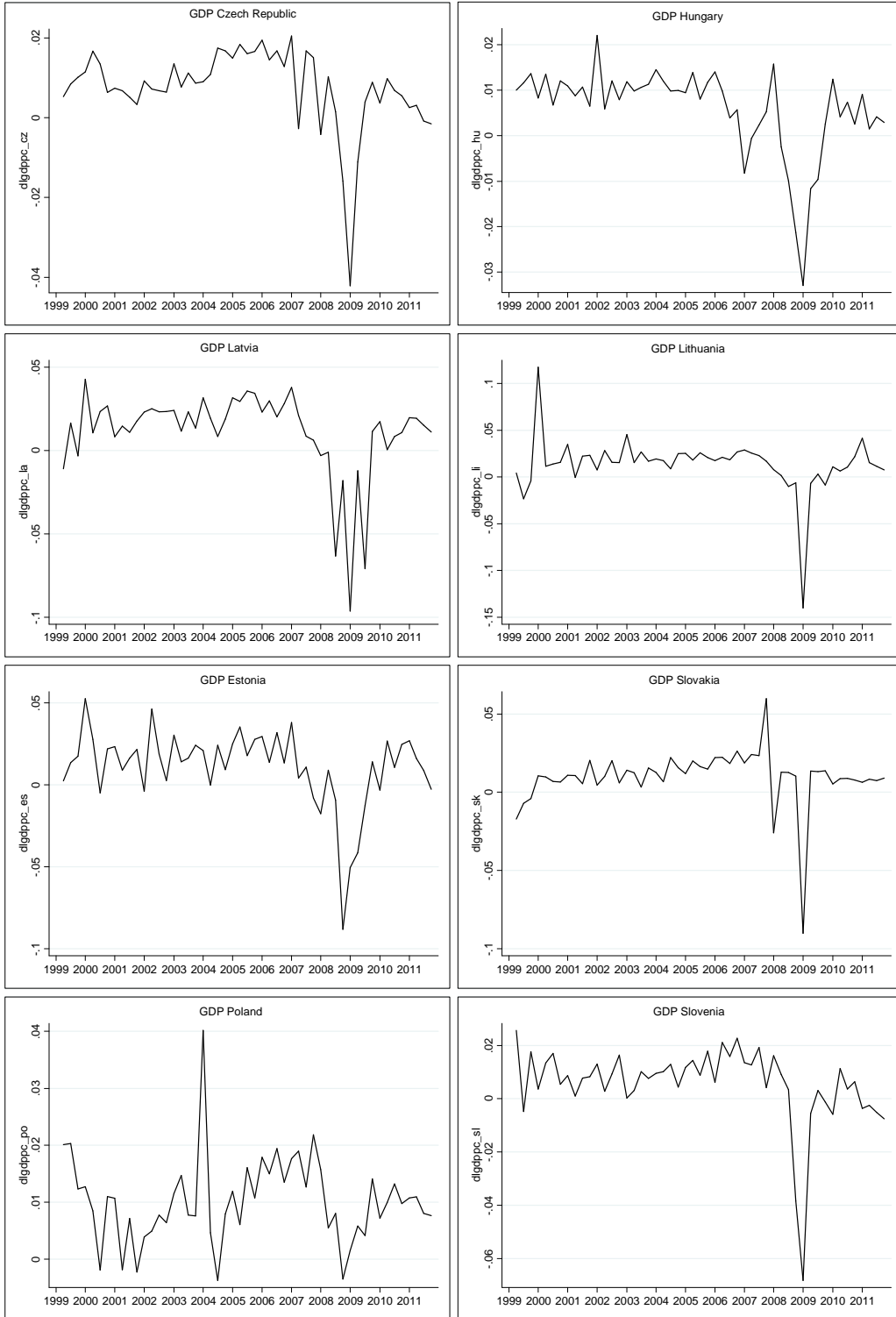
The European Institute (2011): *EU Austerity: Country-by-Country* [online], available at: <http://www.europeaninstitute.org/April-2011/eu-austerity-country-by-country-updated-421.html>, updated 26/4/2012, accessed 15/7/2012.

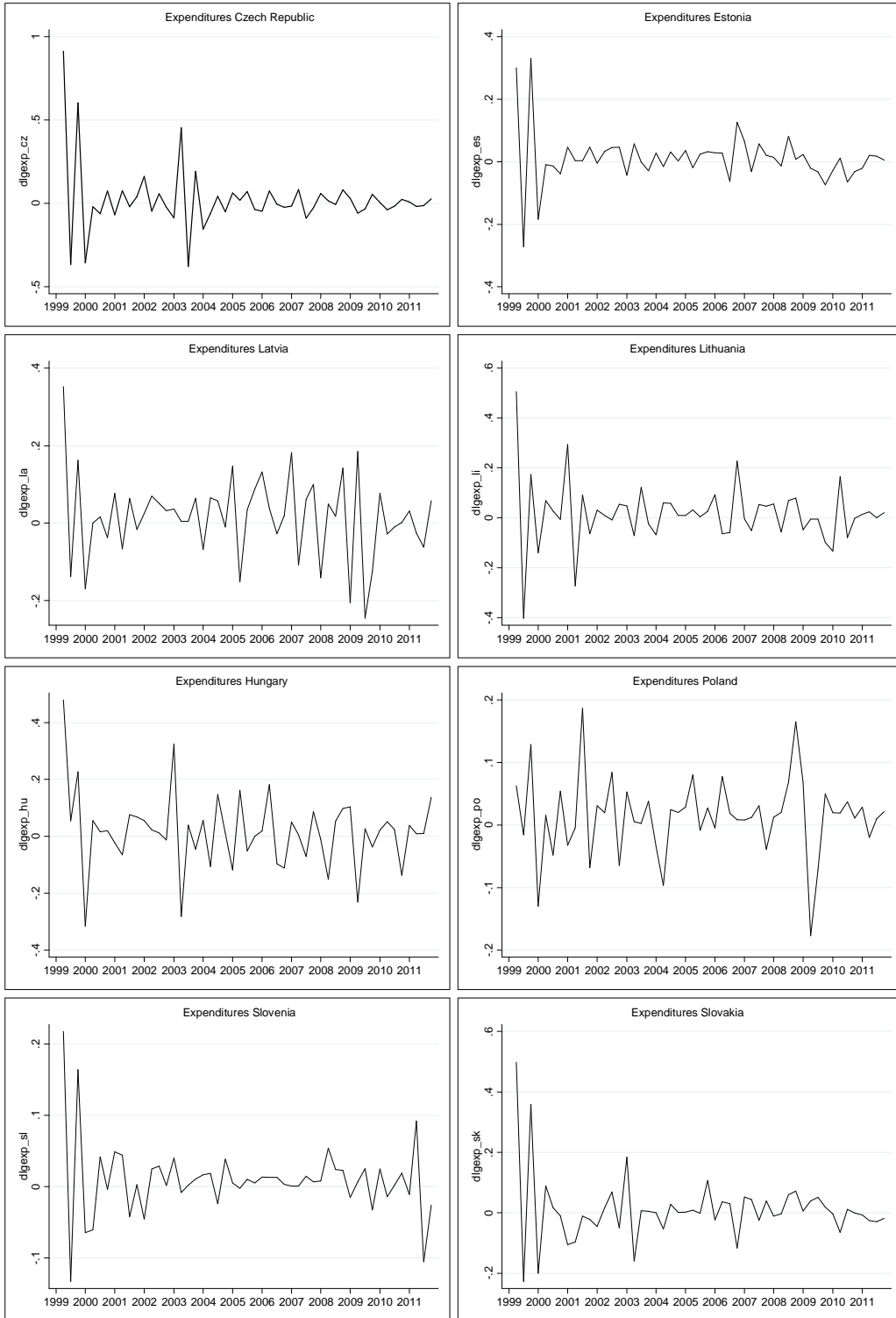
von Hagen, J./ Hallet, A.H./ Strauch, R. (2002): Budgetary Consolidation in Europe: Quality, Economic Conditions and Persistence, *Journal of the Japanese and International Economies*, 16, p.512-535.

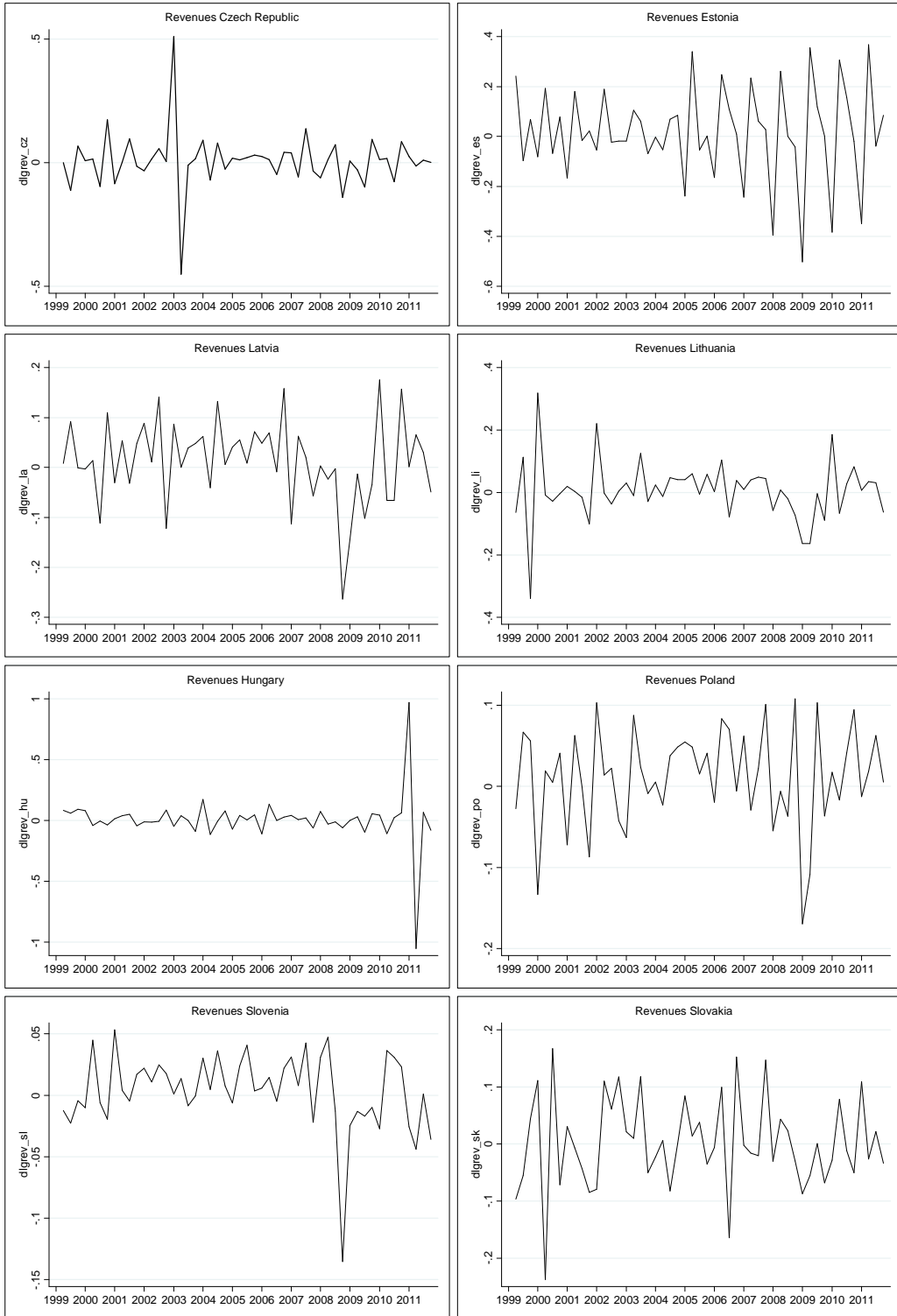
Wooldridge, J. M. (2003): *Introductory Econometrics: A Modern Approach* Vol. 2e, Mason, Ohio: South-Western College Publ.

Appendix

Time series' plots







Breush-Godfrey LM tests for serial correlation of residuals

Czech Republic

lag	chi2	df	Prob > chi2
1	6.1534	9	0.72447
2	14.2488	9	0.11375
3	2.0657	9	0.99038
4	4.8443	9	0.84767

Lithuania (1 lag VAR)

lag	chi2	df	Prob > chi2
1	25.0700	9	0.00289
2	10.1913	9	0.33522
3	8.6792	9	0.46740
4	21.1952	9	0.01181

Lithuania (4 lag VAR)

lag	chi2	df	Prob > chi2
1	10.6003	9	0.30411
2	10.1854	9	0.33568
3	3.4917	9	0.94158
4	8.1105	9	0.52305

Poland

lag	chi2	df	Prob > chi2
1	5.0692	9	0.82824
2	4.9385	9	0.83964
3	11.4134	9	0.24843
4	6.1431	9	0.72552

Slovenia

lag	chi2	df	Prob > chi2
1	6.1945	9	0.72030
2	18.9358	9	0.02574
3	4.9617	9	0.83763
4	8.1830	9	0.51581

Slovakia

lag	chi2	df	Prob > chi2
1	9.3420	9	0.40632
2	2.7521	9	0.97332
3	3.2933	9	0.95152
4	7.5396	9	0.58113

Structural impulse response tables

Czech Republic

Revenues => GDP

step	(1) sirf	(1) Lower	(1) Upper
0	.012348	.006154	.018542
1	.005498	-.015146	.026143
2	.00439	-.000891	.009671
3	.001964	-.004357	.008286
4	.001502	-.001725	.004729

Expenditures => GDP

step	(1) sirf	(1) Lower	(1) Upper
0	-.022345	-.022345	-.022345
1	-.012368	-.024794	.000057
2	-.007682	-.013565	-.001798
3	-.004461	-.010711	.00179
4	-.002646	-.006743	.001451

Lithuania

Revenues => GDP

step	(1) sirf	(1) Lower	(1) Upper
0	.083339	.075676	.091002
1	.050935	-.076643	.178513
2	.037362	-.083208	.157933
3	.090229	-.024828	.205286
4	.080914	-.024654	.186482
5	-.023996	-.100162	.05217
6	.054724	-.016353	.1258
7	.018166	-.040315	.076647
8	-.013638	-.06277	.035494

Expenditures => GDP

step	(1) sirf	(1) Lower	(1) Upper
0	-.026804	-.026804	-.026804
1	-.084143	-.171422	.003137
2	-.00496	-.09037	.080451
3	.023293	-.057524	.10411
4	-.063063	-.132256	.00613
5	.004054	-.054634	.062741
6	.002086	-.043284	.047456
7	-.029515	-.071847	.012818
8	.01985	-.018975	.058675

Poland

Revenues => GDP

step	(1) sirf	(1) Lower	(1) Upper
0	-.00138	-.005194	.002434
1	.020551	-.011832	.052934
2	-.000031	-.015147	.015085
3	-.001559	-.006914	.003796
4	.001466	-.00168	.004613

Expenditures => GDP

step	(1) sirf	(1) Lower	(1) Upper
0	-.013759	-.013759	-.013759
1	-.000381	-.033313	.032551
2	-.007963	-.021068	.005141
3	.00084	-.004027	.005707
4	.000388	-.002642	.003417

Slovenia

Revenues => GDP

step	(1) sirf	(1) Lower	(1) Upper
0	.138754	.137114	.140393
1	.2796	.153053	.406146
2	.088614	-.021416	.198645
3	.051343	-.020952	.123637
4	.020684	-.025936	.067304

Expenditures => GDP

step	(1) sirf	(1) Lower	(1) Upper
0	-.005915	-.005915	-.005915
1	-.051747	-.113656	.010162
2	-.007175	-.039802	.025452
3	-.01039	-.02868	.0079
4	-.001639	-.013196	.009918

Slovakia

Revenues => GDP

step	(1) sirf	(1) Lower	(1) Upper
0	.004615	.000215	.009014
1	-.002891	-.0682	.062419
2	-.000614	-.02615	.024923
3	.001118	-.009985	.012221
4	-.000891	-.006356	.004574

Expenditures => GDP

step	(1) sirf	(1) Lower	(1) Upper
0	-.015871	-.015871	-.015871
1	-.019486	-.064755	.025782
2	.009995	-.014269	.034259
3	-.005234	-.01853	.008061
4	.002784	-.00473	.010299

Granger causality tests

Czech Republic:

Equation	Excluded	chi2	df	Prob > chi2
d1grev_cz	d1gexp_cz	1.5522	1	0.213
d1grev_cz	d1gdppc_cz	.11087	1	0.739
d1grev_cz	ALL	1.7879	2	0.409
d1gexp_cz	d1grev_cz	4.2837	1	0.038
d1gexp_cz	d1gdppc_cz	.07413	1	0.785
d1gexp_cz	ALL	4.2847	2	0.117
d1gdppc_cz	d1grev_cz	.0245	1	0.876
d1gdppc_cz	d1gexp_cz	.01832	1	0.892
d1gdppc_cz	ALL	.03768	2	0.981

Lithuania:

Equation	Excluded	chi2	df	Prob > chi2
d1grev_li	d1gexp_li	6.2407	4	0.182
d1grev_li	d1gdppc_li	24.952	4	0.000
d1grev_li	ALL	35.382	8	0.000
d1gexp_li	d1grev_li	6.5696	4	0.160
d1gexp_li	d1gdppc_li	16.686	4	0.002
d1gexp_li	ALL	63.83	8	0.000
d1gdppc_li	d1grev_li	6.1802	4	0.186
d1gdppc_li	d1gexp_li	4.1494	4	0.386
d1gdppc_li	ALL	12.764	8	0.120

Poland:

Equation	Excluded	chi2	df	Prob > chi2
d1grev_po	d1gexp_po	7.3146	1	0.007
d1grev_po	d1gdppc_po	.50807	1	0.476
d1grev_po	ALL	8.2005	2	0.017
d1gexp_po	d1grev_po	8.0344	1	0.005
d1gexp_po	d1gdppc_po	3.4165	1	0.065
d1gexp_po	ALL	10.655	2	0.005
d1gdppc_po	d1grev_po	1.2446	1	0.265
d1gdppc_po	d1gexp_po	.03292	1	0.856
d1gdppc_po	ALL	1.5542	2	0.460

Slovenia:

Equation	Excluded	chi2	df	Prob > chi2
d1grev_sl	d1gexp_sl	1.2009	1	0.273
d1grev_sl	d1gdppc_sl	.58809	1	0.443
d1grev_sl	ALL	1.4156	2	0.493
d1gexp_sl	d1grev_sl	1.2104	1	0.271
d1gexp_sl	d1gdppc_sl	.07549	1	0.784
d1gexp_sl	ALL	1.4262	2	0.490
d1gdppc_sl	d1grev_sl	10.419	1	0.001
d1gdppc_sl	d1gexp_sl	2.7912	1	0.095
d1gdppc_sl	ALL	16.885	2	0.000

Slovakia:

Equation	Excluded	chi2	df	Prob > chi2
d1grev_sk	d1gexp_sk	.02905	1	0.865
d1grev_sk	d1gdppc_sk	1.5115	1	0.219
d1grev_sk	ALL	1.5217	2	0.467
d1gexp_sk	d1grev_sk	.55142	1	0.458
d1gexp_sk	d1gdppc_sk	.83872	1	0.360
d1gexp_sk	ALL	1.1208	2	0.571
d1gdppc_sk	d1grev_sk	.00698	1	0.933
d1gdppc_sk	d1gexp_sk	.75988	1	0.383
d1gdppc_sk	ALL	.76391	2	0.683

UNIVERSITAS CAROLINA PRAGENSIS
založena 1348

Univerzita Karlova v Praze
Fakulta sociálních věd
Institut ekonomických studií



Opletalova 26
110 00 Praha 1
TEL: 222 112 330,305
TEL/FAX: 222 112 304
E-mail: ies@mbox.fsv.cuni.cz
<http://ies.fsv.cuni.cz>

Akademický rok 2010/2011

TEZE BAKALÁŘSKÉ PRÁCE

Student:	Jan Mareš
Obor:	Ekonomie
Konzultant:	doc. MPhil. Ondřej Schneider Ph.D.

Garant studijního programu Vám dle zákona č. 111/1998 Sb. o vysokých školách a Studijního a zkušebního řádu UK v Praze určuje následující bakalářskou práci

Expected name of the bachelor's thesis:

CEE fiscal deficits in the course of financial crisis

Preliminary scope of work:

The aim of thesis is to depict the impact the budgetary adjustments the governments had to undertake, either voluntarily as precautionary measures, or unwillingly with the international institutions conditioning their financial assistance. Economic development from the beginning of the century will be covered followed by the analysis of both pre-crisis and recent data. The thesis should give an answer on whether the measures undertaken followed the similar pattern with similar influences on national budgets. I would like to discuss potential differences and causes with respect to the budgetary discipline of individual countries and the fiscal rules they have implemented.

References:

Alesina, A. (2010) "Fiscal Adjustments Lessons from Recent History", prepared for Ecofin meeting in Madrid, 2010/04.
Berglöf, E., Korniyenko, Y., Plekhanov, A., Zettelmeyer J. (2010) "Understanding the Crisis in Emerging Europe", Public Research Institute, ministry of Finance, Public Policy Review, vol.6, No.6, September 2010.
Cordero, J.A. (2009) "The IMF's Stand-by Arrangements and the Economic Downturn in Eastern Europe", Center for Economic and Policy Research", 09/2009.
Darvas, Z., Kostyleva, V. (2011) "The Fiscal and Monetary Institutions of CESEE Countries", Bruegel, Working Paper, 2011/02.
Darvas, Z. (2010), "Beyond the Crisis: Prospects for Emerging Europe", Bruegel, Working Paper 2010/06.
Di Noia, C., Misossi, S. with Carmassi, J., Pierce, F. (2009) "Keep It Simple: Policy Responses to the Financial Crisis", Centre for European Policy Studies.
Fatás, A., Mihov, I. (2006) "The Macroeconomic Effects of Fiscal Rules in the US States", Journal of Public Economics, vol. 90, p.101-117.
Lienert, I. (2010) "Should Advanced Countries Adopt a Fiscal Responsibility Law?", International monetary fund, Working Paper 10/254.
Wyplosz, Ch. (2005) "Fiscal Policy: Institutions Versus Rules", National Institute Economic Review, 191(1), p.70-84.

Date of registering:	June 2011
Date of submission	May 2012