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Working Paper

Assessment of the Impact of Fiscal Policy on the Current Account – the Twin Deficit Hypothesis in the Case of Macedonian Economy

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2016

ASSESSMENT OF THE IMPACT OF FISCAL POLICY ON THE CURRENT ACCOUNT – THE TWIN DEFICIT HYPOTHESIS IN THE CASE OF MACEDONIAN ECONOMY

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Abstract

For a small open economy with fixed exchange rate regime, the twin deficit hypothesis is always an interesting and relevant research topic. The aim of this research is to evaluate the effects of the government budget shocks on the current account movement in the case of the Macedonian economy, hoping to shed light on the influence of the fiscal policy on the external position of the economy, as well as to provide useful guidance for policy makers about the sensitivity of the current account balance to changes in the primary budget balance. By using a VAR model on quarterly data for the period from 1998 to 2013, this paper points to a positive relationship between the two balances, but the empirical results also indicate that connection is only contemporaneous, implying that fiscal policy stance does not cause long lasting changes in the balance of payments position of the Macedonian economy. However, our results do not undemand the need for fiscal cautiousness, especially in an economy with a fixed exchange rate regime.

Key Words: Government Budget Deficit, Balance of Goods and Services, Real Exchange Rate, Twin Deficit Hypothesis, VAR

JEL Classification: C32, E62, F31, F32, F41

* The opinions and views expressed in this paper are only those of the authors and do not necessarily reflect the position and views of the National Bank of the Republic of Macedonia.

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1. Introduction

With the beginning of the global economic crisis and the implementation of the economic stimulus in most of the advanced economies, a significant focus has been placed on the fiscal policy and its implications on the economy. Following the European debt crisis in 2010, the spotlight on the implementation and the effects of the fiscal position was further enhanced. Thus, it has been our primary motivation to give a deeper understanding of the potential implication of the changes in the budget balance on the external position of the Macedonian economy.

Being defined as a small opened economy with a peg against the euro, containing a sustainable position in the external sector is basically a precondition for the overall macroeconomic stability, and the current account deficit is one of the leading indicators for the external sustainability. Hence our interest is to empirically investigate the connection between the government budget balance and the balance of the current account, represented in our research by the balance of trade with goods and services, by using the standard VAR model. We ponder whether there is a positive relationship between the two variables, meaning if a budget balance contraction improves the current account balance, indicating that the fiscal policy is influencing the balance of goods and services, and accordingly the current account.

The remainder of this paper is organized as follows: Section 2 focuses on the relevant literature in this area; Section 3 gives an overview of the stylized facts about the economy, with more detailed description of the fiscal stance and the factors driving the current account movements during the period from 1998 to 2013; Section 4 describes the data used, the estimation method and elaborates the results; Section 5 explains the additional specifications of the model and some robustness tests; Section 6 gives the conclusion of this research.

2. Literature overview

The link between the government balance and the current account balance has been long debated in the economic literature. While the correlation between the two variables is widely recognized, the causal effect of the fiscal policy on the current account is still debated among economists. The literature on the topic is vast, although mainly focused on the advanced countries and the OECD countries, dedicating only modest amount of research to Central and Southeastern Europe countries.

As known by theory, the movement of the current account is related to the fiscal policy by the following identity:

$$CA \equiv (S_p - I_p) + (S_g - I_g) + rB$$

where CA represents the current account; S_p is private savings; I_p is private investment; S_g is government savings; I_g is government investment and rB is the interest payments. The S_g-I_g part of the equation equals the fiscal balance, hence representing the correlation of the two balances. On the basis of this equation, the macroeconomic theory developed the twin-deficit hypothesis, arguing that a larger fiscal deficit, through its effect on national saving-investment balance, leads to an expanded current account deficit.

According to theory-based studies, the fiscal policy can cause direct effects on the current account by affecting the aggregate demand, as well as indirectly, by impacting the relative price of the non-tradable to the tradable sectors. Hence, the twin deficit hypothesis can be theoretically explained by two main relationships between budget deficits and the current account deficits, the exchange rate approach, deriving from the basic Mundell–Fleming model (1962), and the national accounting approach, as described before. The impact strength of both mechanisms on the current account is strongly predetermined on the characteristics of the specific economy.

Detailed overview of the empirical literature on the topic is meticulously summarized in the paper by Abbas et al. (2011), offering a broad overview of the empirical methods used and the presented findings of different research. According to the empirical studies listed by Abbas et al. (2011), there is a broad consensus that fiscal expansion causes worsening of the current account, estimating a current account impact from 0.2 to 0.7 p.p of GDP due to increase in the government deficit of 1 p.p. of GDP. The research itself, focused on larger sample of advanced

and emerging economies, by using different econometric methods (panel regressions, large fiscal and external adjustments analyses and panel VAR) confirms the positive relationship between the two variables, indicating that an improvement of the fiscal balance by 1 p.p. of GDP results in current account improvement of 0.3 to 0.4 p.p. of GDP, with stronger effects in emerging and low-income countries under flexible exchange rate regime, higher trade openness, above the potential output and public debt levels above 90% of GDP.

In recent empirical literature VAR estimation techniques are widely used for testing the effects of fiscal shocks on the trade balance and the real exchange rate. Monacelli and Perrotti (2010) use Structural Vector Auto Regression methodology to analyze the effect of fiscal policy, with particular emphasis on the government spending impact on the trade balance and the real exchange rate in four OECD countries[1]. Their findings confirm the existence of the twin deficit in all the countries excluding the United States, meaning that an increase in the government spending induces trade balance deficit and REER depreciation. Corsetti and Müller (2006) also focus on these countries, and by using similar methodology, try to explain the different response of the trade balance to government budget shocks across countries with divergent level of trade openness. The obtained results are similar to Monacelli and Perrotti (2010), with additional distinction that the impact of fiscal shocks on the current account is more prominent in economies with higher level of trade openness, like Canada and the United Kingdom. Also, the impact is more significant if the fiscal shocks are persistent. By using a VAR model in the case of a small open economy like Israel, Mazar and Haran (2012) find that a positive shock of 1% of the GDP in public consumption increases the net imports by 0.6% of GDP, albeit only up to two quarters.

Empirical research has been also opposing the existence of the twin deficit phenomenon. One of the prominent articles is the one by Kim and Roubini (2007) that focuses solely on the case of the United States. Based on VAR model, it examines the effects of government budget deficit shocks on the current account and the real exchange rate, during periods of flexible exchange rate regime. Contrary to theoretical models, the results imply that expansionary fiscal policy shock improves the current account and depreciates the real exchange rate, suggesting an existence of twin divergence in the case of the United States. Kim and Roubini explain the current account improvement by the Ricardian behavior of private saving and the crowding-out effect as a result of the real interest rate increase.

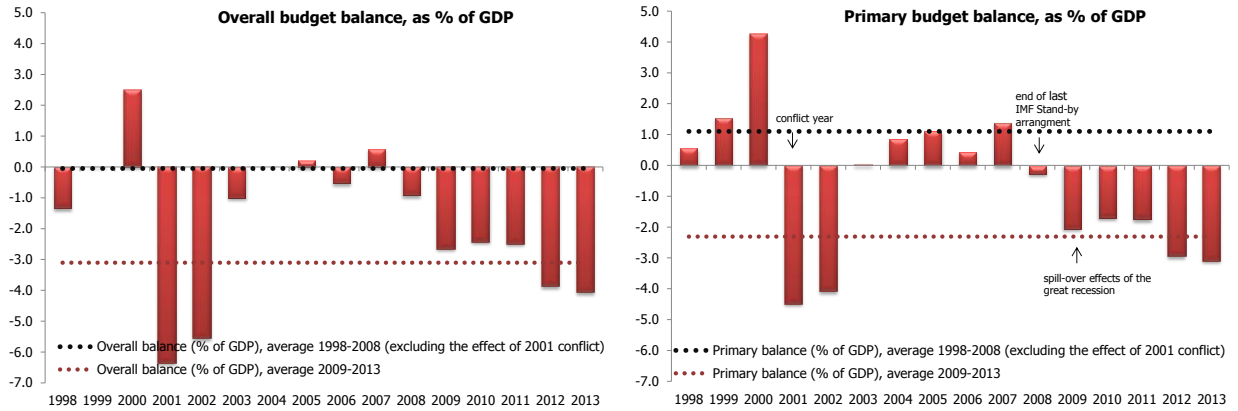
[1] The four countries are as follows: the United States, the United Kingdom, Canada and Australia.

Relevant literature focusing on the region is scarce. One recent research focusing particularly on the Macedonian economy is the paper by Kurtishi (2013). It is exploring the effects of the fiscal policy, in particular the primary expenditures and the tax revenues, on a border set of macroeconomic variables and the public debt, by using SVAR model. The results imply that a shock on the primary expenditures causes widening of the net-imports during the first year, hence causing deterioration in the external position, followed by a mild improvement during the second year. Still, it is important to mention that the presented results are not statistically significant. Another research focusing solely on the case of Macedonia is by Unevska and Jovanovic (2011), analyzing in particular the sustainability of the Macedonian current account. Using a structural model of the current account that views the current account as an outcome of variations in macroeconomic "structural" determinants that influence the saving-investment balance, the authors conclude that the budget deficit is one of the key variables that affected current account during the analyzed period.

3. Stylized facts about fiscal policy and the external position of the Macedonian economy

Describing the main features of the fiscal policy, as well the external position of the Macedonian economy is a challenging task due to the rapidly changing structure of the economy as well as the lack of quality and consistent data. Our focus on the period of sixteen years, starting from 1998 until 2013, is based on the availability of fiscal and external sector data, as well as the broad consistency of the period. Namely, during the whole period of the research, the National Bank of the Republic of Macedonia (NBRM) has implemented exchange rate targeting as a monetary policy strategy, first to the Deutsch Mark, and starting from 2002 to the Euro (the only devaluation took place in 1997).

Figure 1. Overall and primary budget balance as % of GDP



Source: MoF, SSO and authors' own calculation.

The fiscal policy in the analyzed period has been dealing with swift changes influenced by the external macroeconomic surrounding, as well as by factors of political provenance. On average, for the period 1998 until 2013, the fiscal policy, analyzed by the primary budget balance[2], was balanced, with average primary budget balance of 0.6% of GDP. Still, the averaging of the period does not reflect the recent changes in the fiscal stance. While the first ten years of the analysis are characterized by primary surpluses in the government budget, the start of the global crisis has created significant spillover effects on the Macedonian economy in general, with particular negative effects on the budget balance, indicating two different periods in the fiscal policy history. The first period from 1998-2008 can be described by relatively stable external environment and prudent fiscal policy. The average primary balance for this period, excluding the conflict year 2001 as well as the following 2002, is positive amounting to 1.1% of GDP, while fiscal policy in the second period of the analysis (2009-2013) is characterized by an average primary balance deficit of 2.3% of GDP. An important factor leading the fiscal policy during the initial period was the formal arrangements between the Republic of Macedonia and the International Monetary Fund. Fiscal discipline has been one of the major preconditions imposed by the Fund starting from the first arrangement in 1994[3], and stayed an important prerequisite in the following arrangement between the Government of Republic of Macedonia and the IMF. Fiscal prudence was one of the main pillars of the overall macro framework, aimed

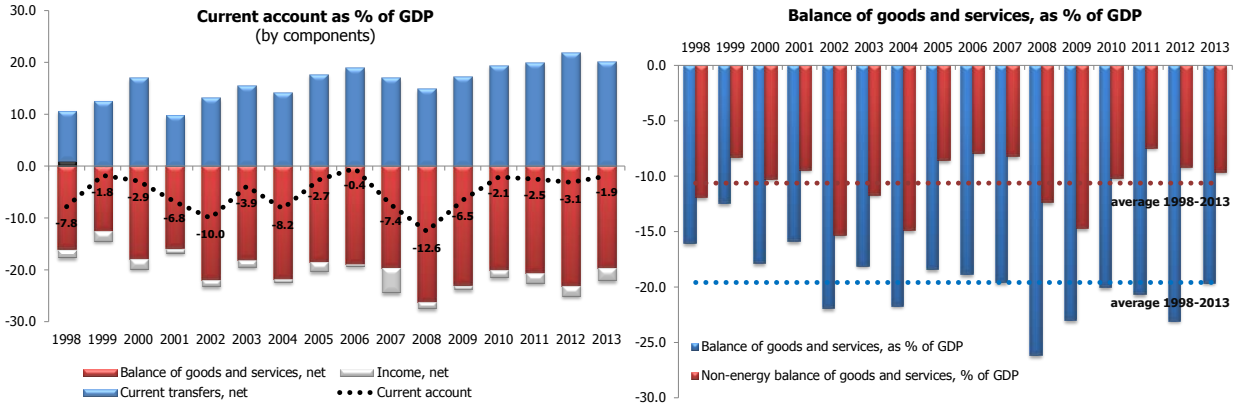
[2] The primary budget balance is defined as central government revenues minus central government expenditures excluding interest payments.

[3] In 1994, the Republic of Macedonia was approved the first IMF arrangement in the form of Systemic Transformation Facility, followed by the Stand-By arrangement in 1995. Starting from 1997, Macedonia has passed through six different IMF arrangements.

at maintaining stability of the fixed exchange rate regime by achieving sustainable external sector position.

An overview of the overall budget balance for the period offers very similar perspective of the fiscal stance. Namely, excluding 2001 and 2002, when the government deficit was driven by factors of national security provenance, the average budget balance for the period of 1998 until 2008 was neutral, followed by an average deficit of 3,1% of GDP in the following five years. The unfavorable external conditions deriving from the blooming global recession, followed by contraction of the domestic economy and the undertaken government anti-crisis measures had significant effects on the budget revenues and expenditures initially in 2009, but also in the upcoming years. Underperforming revenues and stagnating expenditures drove the significant deterioration of the primary balance in 2009. Trying to contain the spill-over effects of the Great recession on the Macedonian economy, the government undertook series of anti-crisis measures aimed at support of domestic companies[4]. The undertaken fiscal measures during the heat of the crisis supported the countercyclical position of the fiscal policy for most of the 2009-2013 period, providing significant fiscal stimulus for the overall economy, hence supporting the recovery and enlivening of the economic growth. The prudent fiscal policy during the pre-crisis years provided significant fiscal space when the spill-over effects of the global recession hit the economy, allowing countercyclical behavior without compromising the fiscal sustainability.

Figure 2. Current account by components and balance of goods and services, as % of GDP



Source: NBRM and SSO.

On the other side, the external position of the economy, viewed through the current account balance, has shown visible variation over time. While the structure through the whole period is

[4] The anti-crisis measures included introduction of profit tax incentives, reduction of customs duties and social contributions, support of the agricultural sector via reduction of taxes imposed on farmers, introduction of new infrastructure projects as well as credit support for small- and medium-size companies in the economy (and others).

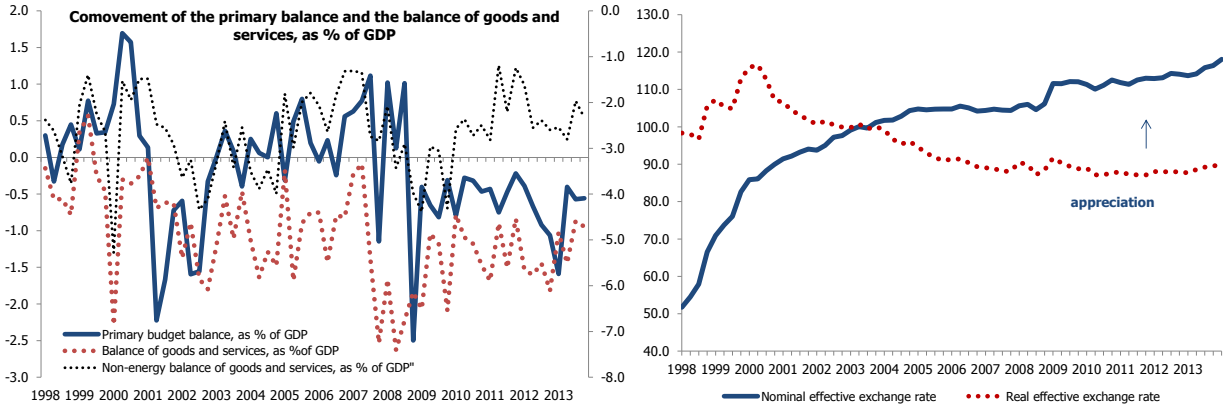
dominated by the two major components, the trade balance and the current transfers, when it comes to the deficit, it reaches from near 13% to around 2% of GDP. The average current account deficit for the period 1998-2013 was 5% of GDP, driven by the high trade deficit of 19.6% of GDP on average. On the other hand, the constantly high inflows coming from the private sector' current transfers[5] have been a major source for financing the trade deficit. With average of 16.2% of GDP, during these sixteen years, the current transfers have balanced more than 80% of the trade deficit.

Following the previous research on the topic, our paper focuses solely on the effects of the primary budget balance on the balance of goods and services. The Macedonian economy is characterized as small and highly open economy, with high import dependence on energy and commodities, while historically exporting mainly metal industry products, textile and agricultural products[6]. The structure of the both trade components emphasizes the vulnerability of the external position in times of volatile commodity and energy prices, well represented during 2008 and the first half of 2009, when high energy and food prices drove the import growth, while the effects of the global recession triggered the downturn of the export performances, resulting in historically widest deficit in the balance of goods and services. The strong impact of world energy prices on the development of the trade balance can explain the smoother co-movement of the primary budget balance with the non-energy balance of goods and services during the 2007-2009 period, compared to the synchronization between the primary balance and overall balance of goods and services. Still, the following period offers somehow different story. Driven by the positive effects of the ongoing structural reforms in the economy, the non-energy trade balance has followed a trend of gradual improvement, leading to break of the co-movement of the two balances.

[5] Private transfers are predominantly consisted of foreign cash purchased on the currency exchange market as an assessment of remittances in cash.

[6] While the historical structure of the export has been dominated by lower value added products, including iron and steel, textile, agricultural products and tobacco, the latest years have witnesses swift change in the structure towards export products with higher value added. Namely, the new foreign owned companies in the domestic economy, mainly in the automotive industry, increased the export of machinery and chemical products, resulting in predominant share of these products in the total export.

Figure 3. Co-movement of the primary balance and the balance of goods and services (as % of GDP) and movement of the real and nominal effective exchange rate (2003=100)



Source: NBRM.

The historical development of the fiscal policy and the current account of the economy follows the path that marks most of the transition economies – with fiscal restraints in the early years and more prominent fiscal presence during the heat of the crisis, gradual improvement in the current account as a result of the changing structure of the economy and positive spill-over effect of the foreign direct investments in the economy. What can be described as a peculiarity in the case of the Macedonian economy is the dynamics of the real exchange rate. While most of the transition economies have been faced with trend appreciation of the REER in the period before the global recession, the competitiveness indicator for the domestic economy has shown gradual improvement over time, driven by the positive input from the price differential between the domestic consumer prices and the consumer prices of the main trading partners[7].

4. Empirical Analysis

4.1 Data Description

In what follows, we provide a description of the variable definitions and data sources. The following endogenous variables are used in the basic model: real GDP (Y_REAL), primary budget balance (PBD), balance of goods and services (BGS) and CPI-based real effective exchange rate (REER). Primary budget balance is defined as central government revenues less central government primary expenditures (i.e. excluding interest payments), while balance of goods and services is obtained by subtracting export of goods and services from imports of

[7] More detailed analyses about the competitiveness of the Macedonian economy and the factors driving the REER movements can be found in a paper by Gutierrez E. (2006), Export Performance and External Competitiveness in Republic of Macedonia.

goods and services. We use the balance of goods and services as a preferred variable instead of the current account balance in order to avoid the distortions caused by the large amount of private transfers in the domestic economy which are not directly affected by the fiscal policy. We include real GDP to capture the general movements in the economy and to control for the cyclical behavior of the variables. The primary budget balance and the balance of goods and services are expressed as percentages of GDP, while real GDP and real effective exchange rate are log differences. Data are acquired from the Ministry of Finance, the National Bank of the Republic of Macedonia, the State Statistical Office and the IMF[8]. Data for these variables are with a quarterly frequency, for the period 1998:1-2013:4. Since we use quarterly data, we have to take into account the seasonality issue. So, we have applied the X-12-ARIMA seasonal adjustment method to remove the seasonal component of the time series. Also, we include a dummy variable as an exogenous variable in the model to control for the period in which the Macedonian Government had financial arrangements with the IMF. The reason behind this is that in the years with arrangements (up until 2008), the Government was obliged to conduct sound fiscal policy with low deficits or small surpluses in order to avoid putting pressures on the balance of payments. This is reflected in the fiscal data, which show that the government budget was balanced on average in the period 1998-2008 (excluding 2001 and 2002 which were conflict years). By contrast, in the period 2007-2013, when the Government run the IMF conditionality-free fiscal policy, the average deficit amounted to 2.2%. Precisely because of this shift in the policy conduct we argue that it is important to include a dummy variable in the model. The econometric analysis was performed using the eViews 8 econometric software.

4.2 Econometric Methodology

One of the most widely used methods for econometric analysis of the twin deficits hypothesis is the vector autoregression (VAR) model. The VAR model was developed by Sims (1980) and it was found to be reliable and consistent in data description, forecasting, structural inference and policy analysis. By using the VAR model we are able to capture the dynamic interdependence of the variables of interest within a linear model. An important advantage of the VAR model is that it accommodates well for the endogeneity problem among the variables and is easy to use and interpret. The VAR model that we use has the standard representation:

$$y_t = A_1 y_{t-1} + \cdots + A_p y_{t-p} + B x_t + u_t$$

[8] Source for oil prices.

where y_t is a vector of endogenous variables, x_t is a vector of exogenous variables, $A_1 ... A_p$ and B are coefficient matrices and u_t is a vector of white noise error terms. Once the VAR model is estimated, further analysis can follow, and we are particularly interested in the model's dynamic behavior, i.e., impulse response functions. However, before this can be performed, the econometric problems of identification should be solved. Since we use quarterly data, we follow the approach of Kim and Roubini (2007), drawing on Blanchard and Perotti (2002), according to which government deficit is contemporaneously affected by the current real GDP, but is exogenous to the changes within the quarter in other variables due to the well-known decision lags in the conduct of fiscal policy. Specifically, in Macedonia, as in other countries, the national budget is annual and it is being implemented only after a lengthy process of preparation and, consequently, approval by the Parliament. However, albeit changes in fiscal policy in relation to other current variables are likely to be discretionary and not instantaneous, it is reasonable to assume that the actual budget deficit is affected by the economic developments within a quarter, given that in Macedonia the most important revenue items (such as the VAT tax) depend on the current level of economic activity. This logic allows us to use the Cholesky decomposition in order to depict the dynamic impact of each variable in the model on the other variables. Hence, the ordering of the variables in our VAR model is [Y_REAL, PBD, BGS, REER]. This, for example, means that the balance of goods and services is simultaneously affected by the shocks in real GDP and fiscal policy, but the latter are affected by the balance of goods and services only with a lag.

Since stability is an important characteristic of the VAR process, we start our empirical analysis by applying a battery of univariate unit root tests on each real, fiscal and external variable to check for stationarity of the series.

Table 1 in the Appendix reports the Augmented Dickey-Fuller test (ADF), Dickey-Fuller Generalized Least Squares test proposed by Elliot, Rothenberg and Stock (1996) (DF-GLS), Phillips-Perron test (PP) and Kwiatkowski–Phillips–Schmidt–Shin (KPSS) tests for unit root testing. We use several tests since in practice there is no test which is consistently most powerful, and often researcher's judgment is required. We should note that when performing the tests, the number of lags was chosen according to the available information criteria, such that there is no serial correlation in the residuals. Also, as it is often the case with time series data, we perform the tests both with and without a time trend. Surprisingly, the results from the unit root tests are more or less unanimous for the variables in consideration. On the one

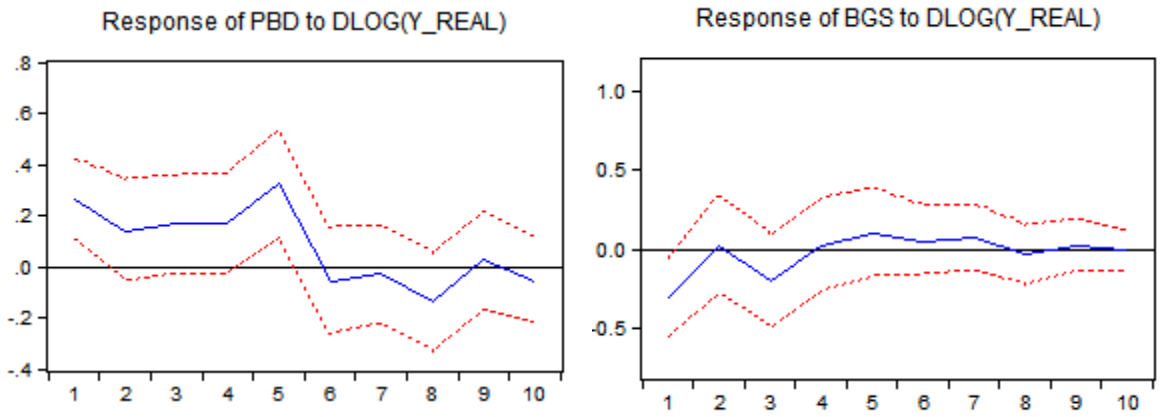
hand, they robustly suggest that we cannot reject the null of a unit root for the real GDP and the real exchange rate. On the other hand, we find the primary budget balance and the balance of goods and services to be stationary. When in addition we perform unit root tests on the first differences of the real GDP and the real exchange rate, we find them stationary, which suggests that they are integrated of order 1. Since there are I(1) variables in the model that we want to estimate, first we have to test that there are no cointegrating relationships between them. Only then the appropriate modeling technique will be to estimate a VAR in the first-differenced data. Otherwise, if we find a cointegrating vector, then an error correction model should be estimated to study the long run dynamics of the variables. Hence, we apply the Johansen test to analyze if the variables are possibly integrated of some order. As shown in Table 2 in the Appendix, the evidence is conclusive in rejecting the null of presence of a long-run cointegrating relationship between the studied variables, so it is possible to continue with estimation of the VAR model using the first differences of the series which are found non-stationary. In the selection of the lag length, we were mainly guided by the residual diagnostics tests, i.e. our main aim was to build a model that does not suffer from residual autocorrelation, since this is the most fatal problem in the estimation of VARs, making the estimation results biased. So, a lag of 4 is chosen, which is not unreasonable given the quarterly frequency of the data. Also, when we did a cross-check with the standard VAR lag order selection criteria, the majority of them were in support of our choice[9]. For convenience, all the details about the model's estimation (autocorrelation test, stability test, etc.) are presented at the end of the paper.

4.3 Main results

In this section we present the empirical findings from the estimated VAR model, with the main focus on the dynamic adjustment process, i.e. the impulse-response functions of the variables of interest. Figure 2 in the Appendix depicts the effects of one standard deviation shock to each variable over period of ten quarters. Impulse responses are within a band representing a two standard error confidence interval. Our main interest is on the reaction of the external variable to shocks to the endogenous fiscal variable. However, it is also worth first having an insight into the transmission of the shocks to the real GDP.

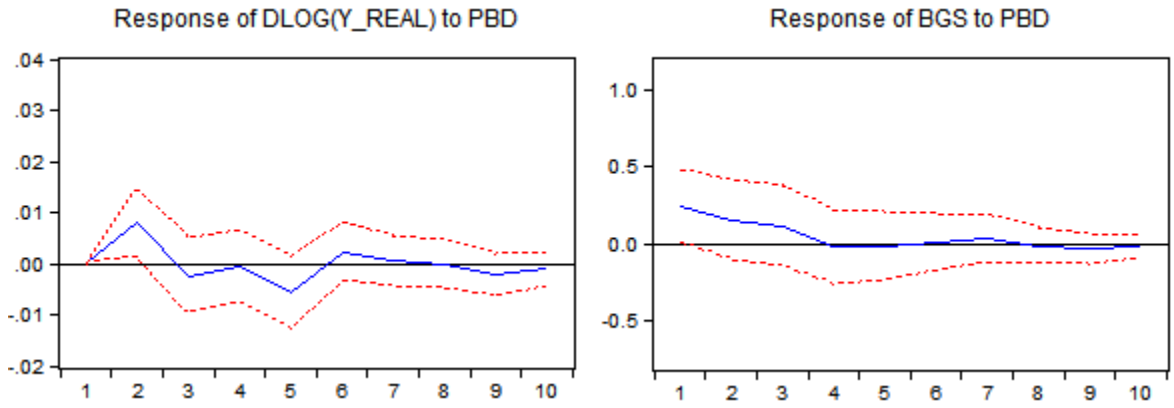
[9] The Schwartz criterion suggests 1 lag and the Hannan-Quinn criterion suggests 2 lags. However, the likelihood ratio criterion, the final prediction error criterion and the Akaike information criterion all suggest that the model with 4 lags is preferred.

a) Shock to the real GDP



We find that a positive shock to the real GDP has the same effect on the fiscal and external variable as expected ex ante. Namely, the results suggest that an increase in GDP positively affects the primary budget balance, causing the deficit to shrink, or the surplus to increase, against the backdrop of an automatic increase of tax receipts and/or a decline of government transfers. These findings are valid for up to the fifth quarter, albeit for most of the period this relationship can be considered only borderline significant. Additionally, the accumulated responses show that the positive effect of the output increase on the primary budget balance lasts in the following two years. By contrast, both the impact and cumulative impulse response indicate that the movements of real GDP and the balance of goods and services are negatively correlated, meaning that an expansion of the economic activity is accompanied with worsening of the external balance. This countercyclical behavior is in line with the standard theories of the current account and also is not surprising for Macedonia, rather it might be considered as a stylized fact. Given that the country is a very small and open economy, historical data show that the expansion of the domestic economic activity is nearly always accompanied with a rise in imports and vice versa. This increase is considered to come mainly through three channels: increase of the consumption of foreign goods, increase of investment, and/or increase of import-dependent export. However, a puzzling result is that this negative relationship is significant only in the first period. Also, it is found that the real exchange rate temporarily (i.e. after one quarter) appreciates in response to a positive output shock, which is more or less a standard result in the literature in line with the well-known Mundell-Fleming model (1962).

b) Shock to the primary fiscal balance



Turning to our main focus, which is analyzing the effects of fiscal shocks, it is found that one standard deviation contractionary primary balance shock has somewhat paradoxical positive effect on GDP, albeit only in the short run, i.e. for up to two quarters. However, the reaction is not so large, so its economic significance might be debatable. These two features suggest that if the government were to balance the budget, the impact on GDP would be trivial. Given this result, it appears that fiscal policy does not significantly affect the trade balance through changes in GDP. However, this is only a simplistic interpretation, given that here we test only for the direct effects, without taking into account the indirect effects that expansionary or contractionary fiscal policy could have on the state of the economy. Additionally, in order to draw more certain conclusions about this issue, a more specific analysis of the size of fiscal multipliers is required, and this is out of the scope of this paper. Indeed, some of the recent studies on this topic suggest presence of negative fiscal multipliers in the case of Macedonia[10]. The key finding in our research is that the balance of goods and services is seen to improve following the primary government balance contractionary shock. Thus, a positive relationship between the trade and fiscal variable is found, providing some evidence in support of the twin deficit hypothesis for Macedonia. However, the impulse response function shows that this is valid only for the period in which the shock occurs, whereas in the following quarters the effect dampens out to zero. Hence, this on impact result suggests that apart from their simultaneous effect, the actions of the government aimed at fiscal consolidation or expansion translate neither in improvement nor in worsening of the current account balance. Also, the results from the cumulative impulse response function are not very conclusive about the statistical

[10] See for example Trenovski B. (2013), Optimal macroeconomic policy in Macedonia in terms of the global economic crisis and Kurtishi N. (2013), Fiscal policy and its influence on the economy of Macedonia.

significance of the link between trade and budget balance, since for three quarters after the shock, the lower confidence band is lingering on the zero line. One can argue that partially this might be related to the finding that fiscal expansion is practically unable to generate higher real income that would cause worsening of the current account balance in an environment of a fixed exchange rate. Although, most likely, the inability to find a more persistent relationship between the budget and trade balances reflects the fact that the relevant period of IMF-free fiscal policy conduct is rather short, so it might be difficult to assess the effect of the fiscal balance on the trade balance by using the VAR method. Hence, these are only preliminary results, and further attention should be paid on this topic in the future. With regards to the reaction of the real exchange rate, we find that in response to a positive primary budget balance shock it depreciates one quarter after the shock, whereas this effect dissipates afterwards. The depreciation of the exchange rate is likely to positively contribute to the external competitiveness, which in turn leads to improvement of the current account. Thus, the fiscal policy affects the current account also through the exchange rate channel, although this again appears to be the case only on impact.

In order to gain further insights into the transmission of fiscal shocks and the channels how they might be mitigated, we re-estimated the VAR model, with two additional intermediating variables – foreign direct investments (FDI) and inflation[11]. Regardless of the ordering and the number of lags chosen, it appears that a positive government balance shock results in an increase of FDI after three quarters, which is likely to adversely affect the trade balance (mainly through import of investment goods), thus weakening the positive link between the two balances. One explanation why fiscal contraction would result in an increase in FDI might be because of the improved risk perception by foreign investors which causes a decrease of the risk premium of the country. At the same time, it was found that a positive fiscal shock results also in an increase of inflation, although this is only an on impact effect which is on the verge of the statistical significance. Again, by making the domestic goods more expensive, this might worsen the current account in the short run. This somewhat surprising result also might be related with the finding that in the case of Macedonia, fiscal contraction appears to have some positive effects on output, and consequently on inflation. However, further research is needed in order to draw stronger conclusions on this topic. Given our extended VAR model, we can

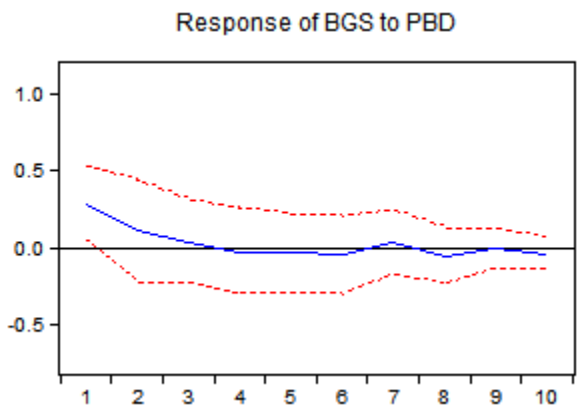
[11] It should be noted that only a limited number of variables can be included in the VAR model for a sample size such as ours.

infer that these are some of the channels through which the observed direct effects of fiscal changes might be mitigated. In the next section we further expand our analysis.

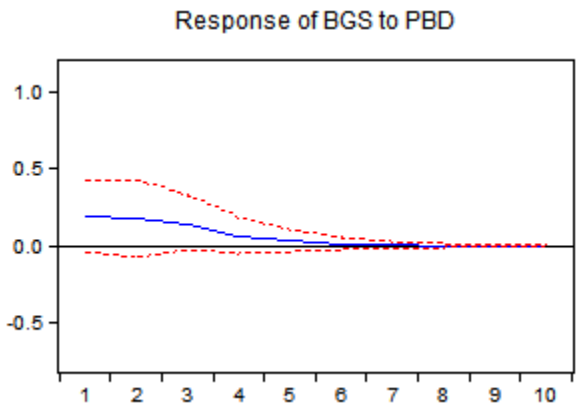
5. Additional Experiments and Robustness Tests

Additionally, we experiment by adding some new exogenous variables, changing the specification of some of the endogenous variables, as well as by changing the sample period, the order of the variables and the number of lags.

a) Oil inflation



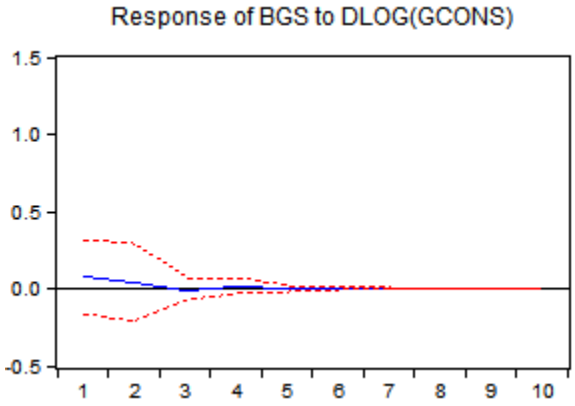
b) Foreign demand



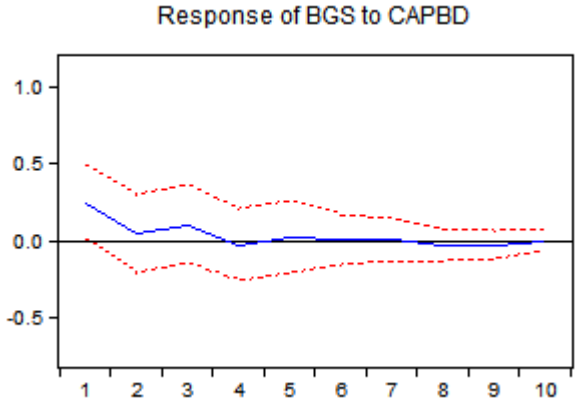
First, we start by including the world oil inflation as an additional exogenous variable, in order to control for the changes in oil prices which can significantly affect the Macedonian current account, given Macedonia's full dependence on import of oil. The results with respect to the effect on the trade balance of the fiscal shock are unchanged from the principal model, i.e. we still obtain the on impact influence of the latter on the former. If we instead use the foreign effective demand indicator[12] as a way to control for the global business cycle, the connection between the two balances is still there but, in principle, it is no longer statistically significant.

[12] This indicator is calculated as a sum of the weighted GDP indices of the most important importers of Macedonian goods. It includes the following countries: Germany, Italy, Greece, the Netherlands, Belgium, Spain, Serbia, Croatia, Bulgaria and Slovenia.

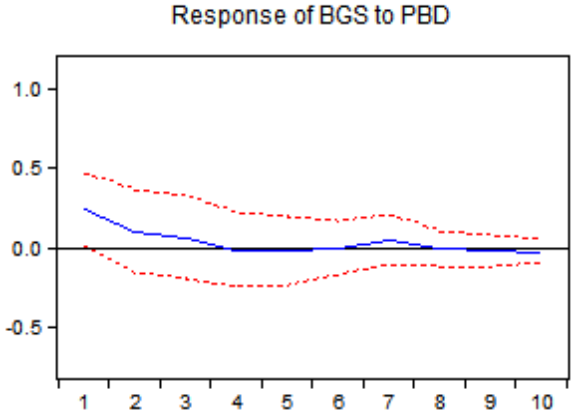
c) Government consumption



d) Cyclically-adjusted primary budget balance

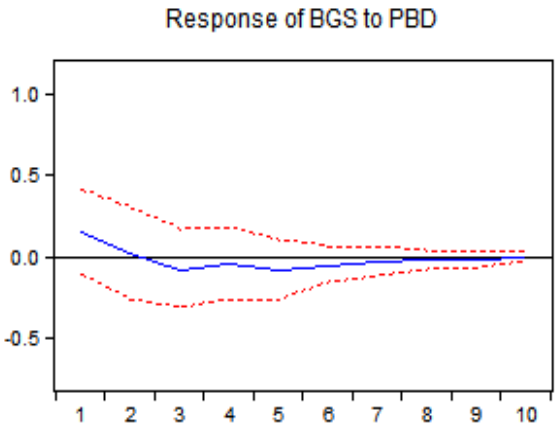


e) Dummy for 2008-2009 crisis

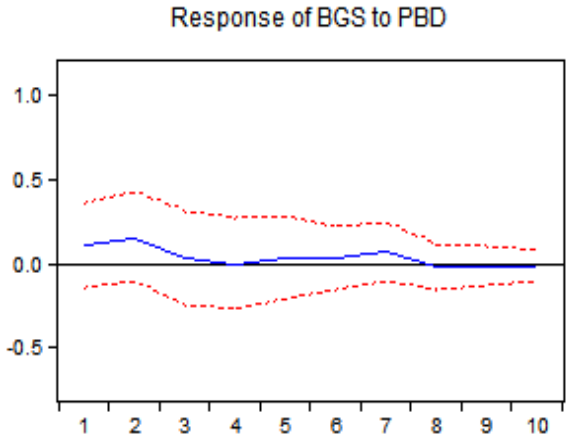


We have also tried using government consumption instead of the primary budget balance as a choice for the fiscal variable, with the main assumption being that government spending is contemporaneously exogenous to other non-government variables in the model as in Fatas and Mihov (2001) and Blanchard and Perotti (2002). In this case we find opposite results than in the basic model, i.e. we find that an increase in government consumption causes an increase (widening) in the trade balance. However, these results are found to be strongly insignificant. In another related experiment, we used the cyclically-adjusted primary budget balance as a preferred fiscal variable. In this case, we obtain similar results as in the principal model. In addition, we have also used this specification to estimate separate models for two subsamples (1998-2005 and 2006-2013), but the results in both cases, although pointing to a positive effect of the fiscal shock on the trade balance, are not statistically significant. Also, we have included an additional dummy variable to control for the periods of the global economic crisis (2008-2009), in which case the results of the principal model are confirmed.

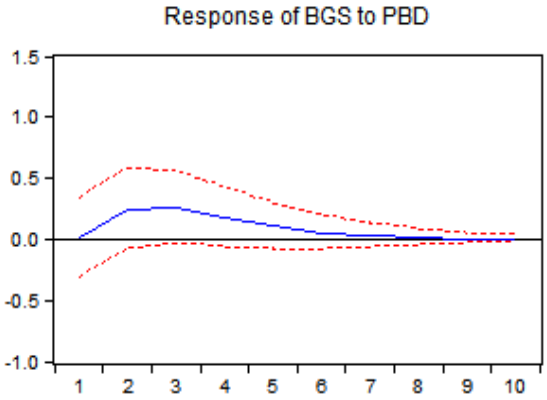
f) Sample 2003-2013

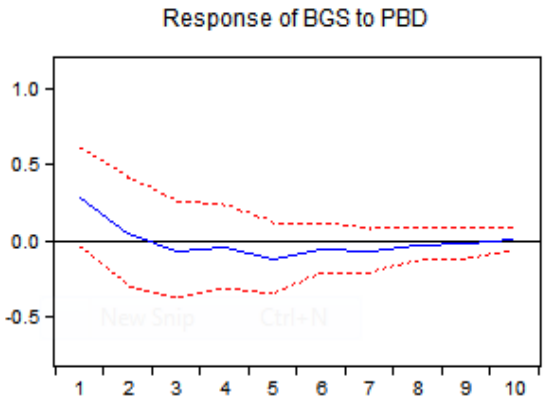


g) Order of the variables [PBD, Y_REAL, BGS, REER]

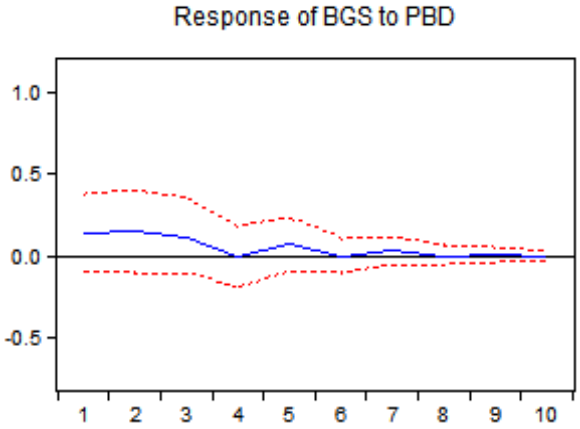


h) Two sub-samples: 1998-2005 (left) and 2006-2013 (right)





i) Smaller number of lags



Next, as a robustness check, we have reduced the sample period to include only the 2003-2013 period, which omits the years of the limited internal conflict in Macedonia and concentrates only

to the recent period for which data are more reliable[13] and which might be more relevant. Compared to our basic results, the impulse responses are similar in sign, but somewhat different in magnitude, persistence and most importantly in significance, since in this case the link between the trade and fiscal balances is found to be not statistically significant even in the very short run. In addition to this, it would be also interesting to divide the sample into two sub-samples (1998-2005 and 2006-2013), given the significant shift in the fiscal policy towards realization of deficits in the recent period. In both cases, although insignificant, the results point to a positive relationship between the trade and fiscal balances (primary budget balance), although it appears that the impulse-responses obtained for the full sample are more similar to the ones for the more recent subsample (2006-2013) than for the first subsample. However, these two experiments with the sample might only accentuate the need for using a longer time series when applying the VAR technique. Also, we experimented with changing the ordering of the fiscal and trade variables as an alternative identifying assumption (Figure 4 in the Appendix) as well as with lowering of the number of lags to equal 2 as suggested by the HQ criterion. In both cases, we found that the balance of goods and services improved after the shock, but the effects were not different from zero in both short and longer run. We argue that the basic model might be sensitive to lowering of the number of lags because of the presence of serial correlation in the residuals at each lag smaller than the chosen one, which is not the case when using larger number of lags.

6. Conclusion

The main goal of this paper was to investigate empirically whether the proposition of a positive relationship between the budget balance and the trade balance, i.e. the twin deficit hypothesis, holds in the case of the Republic of Macedonia. The analysis was performed through the standard VAR modeling setup, following the work of Kim and Roubini (2007). The main empirical results point to a positive relationship between the chosen trade and fiscal variables, providing some evidence that there is a connection between the two balances. However, this link is found to hold only on impact – in the quarter when shock appears, suggesting that the fiscal policy affects the external balance merely contemporaneously, which implies that any fiscal expansion or contraction does not necessarily translate into (un)favourable swings in the

[13] Based on fully consistent framework.

balance of payments in the longer run. Obviously, the findings from our estimation need to be taken with caution mainly because of the small size of the sample, numerous internal and external shocks in this period as well as the changing structure of the economy. Some of the VAR disadvantages, related to the limited time dimension of the data, could be overcome in future by applying more advanced Bayesian VAR or panel VAR techniques as a direction for further research on this topic.

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Appendix

Table 1. Unit Root Tests

Variable	Test	Integration	p-value	constant	trend	DW
Y_REAL	ADF	I(1)	0.8454	✓	-	2.8
	ADF	I(1)	0.1454	✓	✓	2.4
	DF-GLS	I(1)	>0.1	✓	-	2.6
	DF-GLS	I(1)	>0.05	✓	✓	2.5
	PP	I(1)	0.8996	✓	-	2.8
	PP	I(1)	0.2386	✓	✓	2.4
	KPSS	I(1)	>0.1	✓	-	0.03*
	KPSS	I(1)	>0.01	✓	✓	0.5*
PBD	ADF	I(0)	0.0001	✓	-	2.2
	ADF	I(0)	0.0002	✓	✓	2.1
	DF-GLS	I(0)	<0.01	✓	-	1.9
	DF-GLS	I(0)	<0.01	✓	✓	2.1
	PP	I(0)	0.0001	✓	-	2.2
	PP	I(0)	0.0003	✓	✓	2.1
	KPSS	I(0)	>0.1	✓	-	1.2
	KPSS	I(0)	>0.1	✓	✓	1.3
BGS	ADF	I(0)	0.0001	✓	-	2.2
	ADF	I(0)	0.0001	✓	✓	2
	DF-GLS	I(1)	>0.01	✓	-	2
	DF-GLS	I(0)	<0.01	✓	✓	2
	PP	I(0)	0.0001	✓	-	2.2
	PP	I(0)	0.0001	✓	✓	2

	KPSS	I(0)	>0.01	✓	-	1.1
	KPSS	I(0)	>0.1	✓	✓	1.4
REER	ADF	I(1)	0.7967	✓	-	1.5
	ADF	I(1)	0.1417	✓	✓	1.5
	DF-GLS	I(1)	>0.1	✓	-	1.9
	DF-GLS	I(1)	>0.1	✓	✓	1.5
	PP	I(1)	0.7386	✓	-	1.6
	PP	I(1)	0.3104	✓	✓	1.5
	KPSS	I(1)	<0.01	✓	-	0.06*
	KPSS	I(1)	<0.1	✓	✓	0.3*

Notes: The number of lags is chosen by the SIC Criterion in EViews 8.0.
* indicates possible problem of serial correlation according to DW.
Source: Authors' calculations

Table 2. Cointegration Results

Data Trend:	None	None	Linear	Linear	Quadratic
Test Type	No Intercept No Trend	Intercept No Trend	Intercept No Trend	Intercept Trend	Intercept Trend
Trace	0	0	0	0	2
Max-Eig	0	0	0	0	0

*Critical values based on MacKinnon-Haug-Michelis (1999)

Table 3. Lag Length Selection

VAR Lag Order Selection Criteria
Endogenous variables: DLOG(Y_REAL) PBD BGS DLOG(REER)
Exogenous variables: C DUM01
Date: 06/16/15 Time: 12:09
Sample: 1998Q1 2013Q4
Included observations: 58

Lag	LogL	LR	FPE	AIC	SC	HQ
0	130.7107	NA	1.71e-07	-4.231404	-3.947205*	-4.120703
1	160.8509	54.04438	1.05e-07	-4.718995	-3.866398	-4.386891*
2	179.7113	31.21731	9.64e-08	-4.817631	-3.396636	-4.264125
3	195.6802	24.22869	9.89e-08	-4.816559	-2.827166	-4.041650
4	217.1805	29.65552*	8.56e-08*	-5.006223*	-2.448432	-4.009912
5	226.7568	11.88788	1.15e-07	-4.784718	-1.658528	-3.567004

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 4. Residual Serial Correlation Test

VAR Residual Serial Correlation LM Tests
Null Hypothesis: no serial correlation at lag order h
Date: 06/16/15 Time: 12:11
Sample: 1998Q1 2013Q4
Included observations: 59

Lags	LM-Stat	Prob
1	11.62478	0.7694
2	13.51934	0.6345
3	13.86723	0.6086
4	31.18229	0.0128
5	12.60409	0.7015
6	11.96087	0.7467
7	15.77295	0.4689
8	12.00431	0.7437
9	17.06335	0.3815
10	13.02495	0.6709
11	9.087040	0.9098
12	10.53902	0.8370

Probs from chi-square with 16 df.

Table 5. Normality Test

VAR Residual Normality Tests
Orthogonalization: Cholesky (Lutkepohl)
Null Hypothesis: residuals are multivariate normal
Date: 06/16/15 Time: 12:13
Sample: 1998Q1 2013Q4
Included observations: 59

Component	Skewness	Chi-sq	df	Prob.
1	-0.136127	0.182217	1	0.6695
2	-0.428647	1.806757	1	0.1789
3	-0.213095	0.446528	1	0.5040
4	0.278498	0.762684	1	0.3825
Joint		3.198186	4	0.5252

Component	Kurtosis	Chi-sq	df	Prob.
1	3.164967	0.066902	1	0.7959
2	3.037058	0.003376	1	0.9537
3	2.385655	0.927825	1	0.3354
4	3.517502	0.658362	1	0.4171
Joint		1.656465	4	0.7986

Component	Jarque-Bera	df	Prob.
1	0.249119	2	0.8829
2	1.810133	2	0.4045
3	1.374352	2	0.5030
4	1.421046	2	0.4914
Joint	4.854650	8	0.7730

Figure 1. Stability Analysis

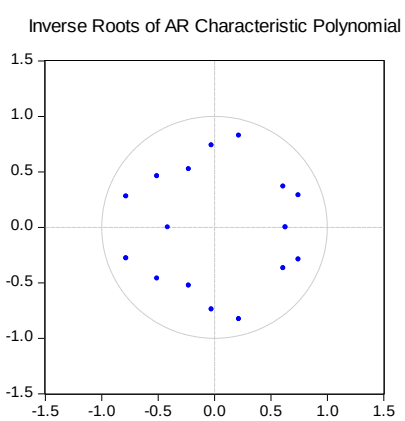

Figure 2. Basic model impulse-response functions

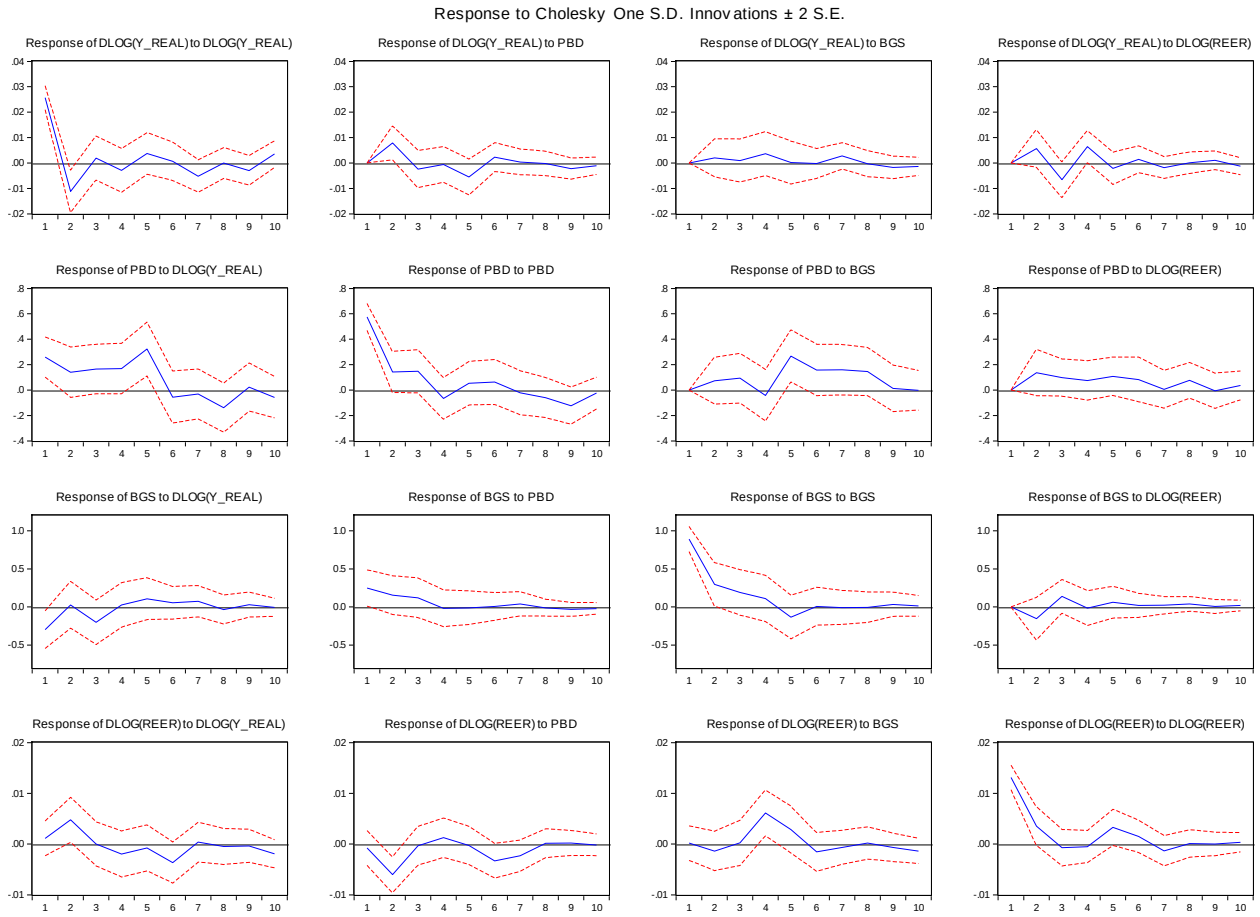

Figure 3. Accumulated impulse-response functions

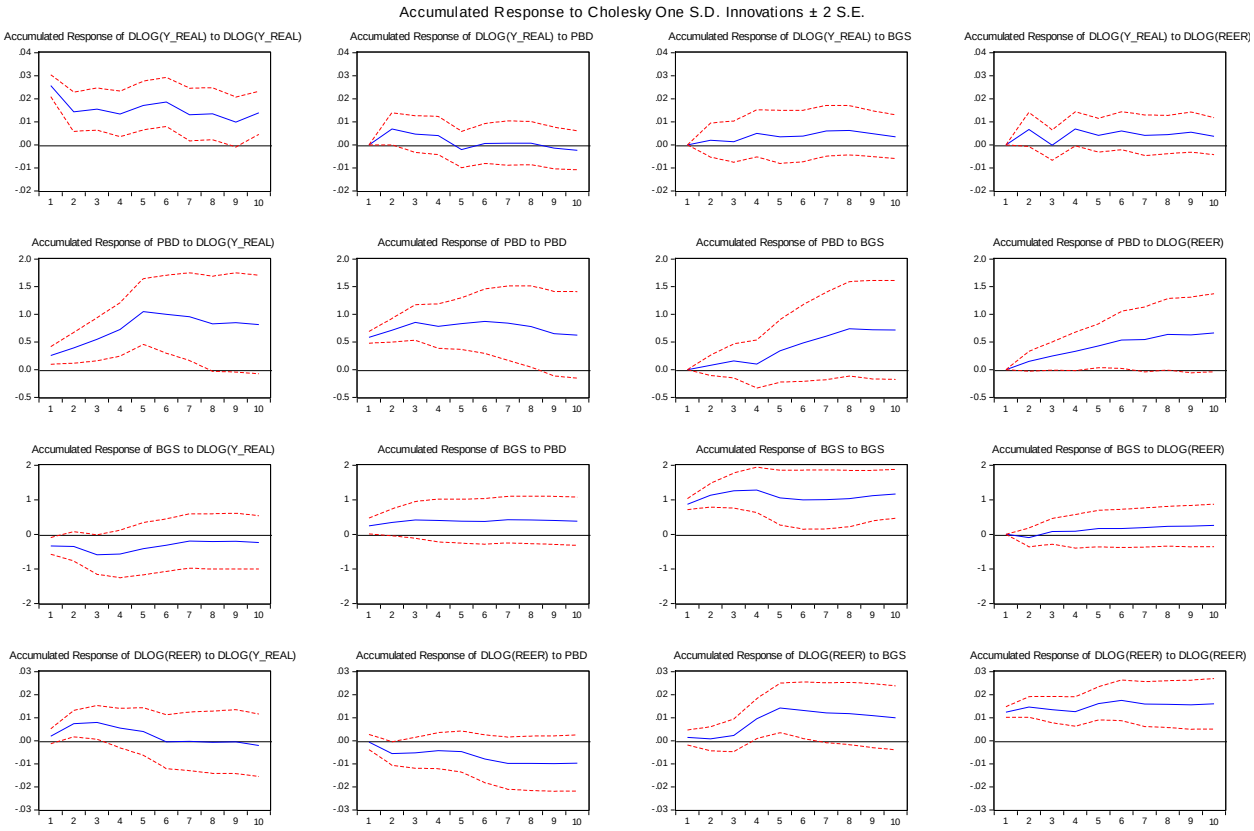
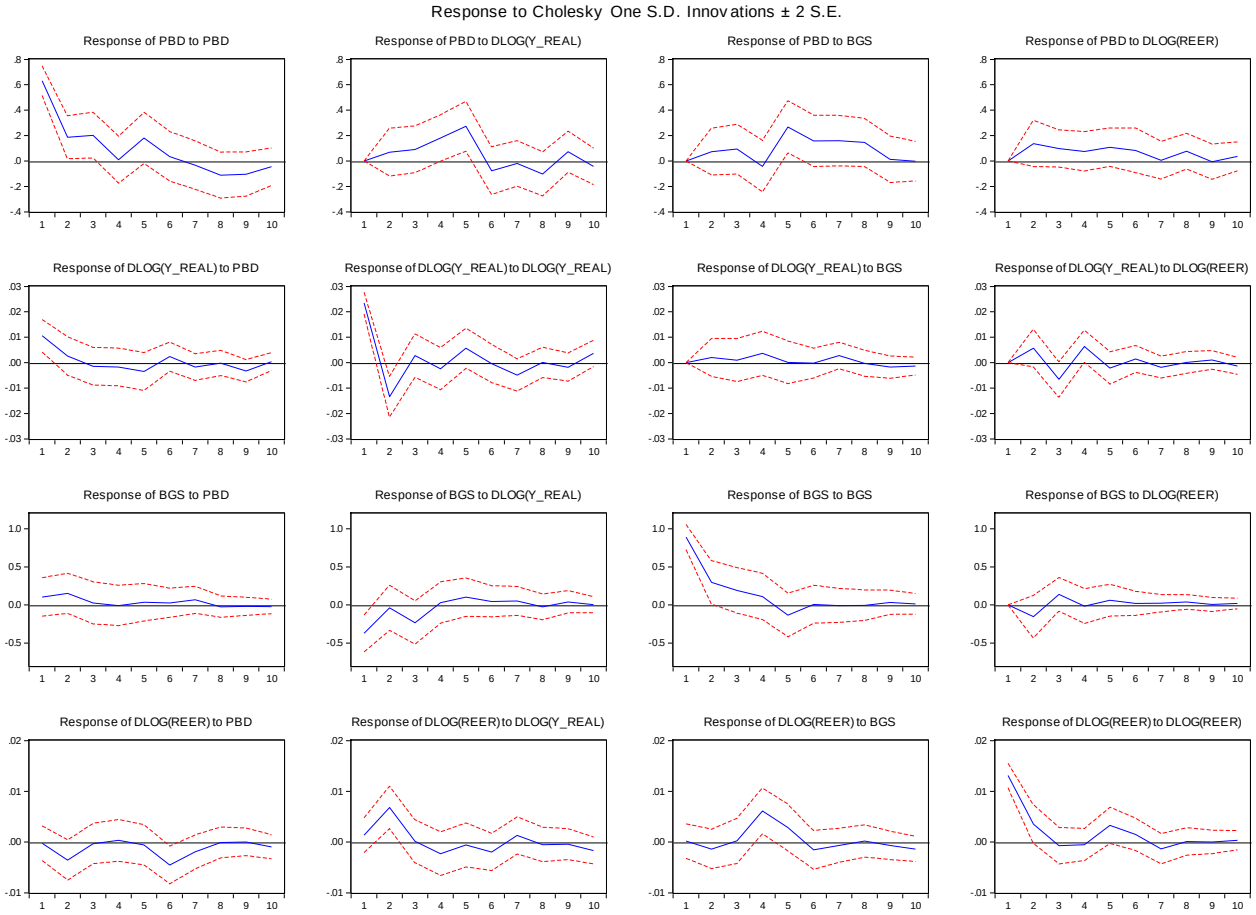
Figure 4. Impulse-response functions from the model with changed ordering of the variables