Fiscal Multipliers in the Slovak Economy: A DSGE Simulation[1]

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Abstract

In order to calculate fiscal multipliers for Slovakia, I use a small open DSGE model of Slovakia constructed by Zeman and Senaj (2009) that is augmented by a more sophisticated fiscal sector, which comprises government expenditure components (consumption, investment and social transfers to liquidity-constrained households), as well as government revenue components (personal income taxes, employer social contributions, VAT (value-added tax) and a lump-sum tax). The Slovak government has laid out a plan of public finance consolidation for the period from 2013 to 2017 in order to meet the Fiscal Compact criteria. According to the fiscal multipliers calculated in this paper, the consolidation will cause an aggregate loss of 3.1% of GDP during this period, which turns out to be a more precise estimate than official government projections.

Keywords: *fiscal multipliers, expenditure and revenue components, DSGE simulations*

JEL Classification: E32, E62, H20, H50

Introduction

In the aftermath of the euro area crisis, caused mainly by sovereign debt problems in some periphery countries, a Fiscal Compact has been introduced. This agreement stipulates the implementation of rigorous fiscal rules in all euro area countries; namely, balanced structural budgets and a debt limit of 60% of GDP. As most countries do not meet these requirements, they have to adopt

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fiscal and other macroeconomic policies that will guarantee fulfilling these criteria in the medium term. Slovakia belongs to a group of countries that have to consolidate their public finances. The consolidation is naturally painful, as it is accompanied by a slowdown in GDP growth. It is therefore important for policymakers to know both the short-run, as well as the long-run, effects of various consolidation instruments on economic activity.

Fiscal policy has traditionally been evaluated within a framework of large-scale macroeconomic models. However, these models have been subject to the Lucas critique. Therefore, new kinds of models, such as vector autoregressive (VAR) models and dynamic stochastic general equilibrium (DSGE) models, in particular, have recently become very popular in the literature. DSGE models can be used to assess and evaluate various policy instruments in both the short- and long-run, to compare the effects of temporary and permanent changes and to analyse the interactions of fiscal and monetary policies.

There are a large number of papers that estimate fiscal multipliers using DSGE models. To mention a few, an OECD study by Furceri and Mourougane (2010) examines the effects of fiscal policy on output and debt sustainability by developing a DSGE fiscal model calibrated using euro area data and an OECD tax and benefits database. The impact multiplier after a one-year rise in government investment is found to be close to 0.6, while the long-run multiplier after 10 years is close to 0.2. The rise in transfers is estimated to have the smallest impact multiplier among the examined spending shocks (approximately 0.1 after one year). Among the revenue measures, a temporary cut in wage income tax rates led to an increase in activity of approximately 0.2% after one year, which tended to vanish in the long-run, while a cut in the consumption tax had a positive effect on GDP in the short-run, leading to an increase in GDP of approximately 0.1% after one year. The study also tests the robustness of its results for a wide range of structural parameters. Stähler and Thomas (2011) simulate the fiscal consolidation of Spain within the euro area in a two-country DSGE model with comprehensive fiscal and labour sectors. They find that public investment cuts, with a multiplier equal to 0.6, are the least desirable way to consolidate and that a shift from direct to indirect tax financing of government expenditures can improve Spain's competitiveness. Baksa, Benk and Jakab (2010) calculate fiscal multipliers in Hungary using a small open DSGE model based on Hungarian data. They find large differences between the multipliers of different types of fiscal expansions. Multipliers are less than one for taxes: a maximum of 0.8 during the first year for personal income taxes, 0.5 for social security contributions and 0.46 for indirect taxes. In the case of government purchases of goods, the authors report multipliers above one (1.16). They also find that multipliers can

be greatly modified, depending on the future ways of financing expansions; i.e. different fiscal rules. Ambrisko et al. (2012) study the effects of fiscal policy on the Czech economy using a small open DSGE model, whose crucial fiscal parameters are estimated using Bayesian statistics. They report low multipliers for various expenditures and revenues (from 0 to 0.4). And by using these estimated multipliers, they quantify the effects of the Czech Republic's 2012 consolidation fiscal package on the economy.

Colláková et al. (2014) estimate fiscal multipliers for Slovakia using a structural VAR model, as well as a QUEST model.[2] They find that consolidation through tax increases is less painful in the short-term (about 0.15), but more damaging for the economy in the long-term. The consolidation carried out with expenditure instruments has higher negative effects on economic activity in the short-run (about 0.39) and stays negative in the case of public investment, but turns positive in the case of government consumption.

Mucka and Horvath (2015) study the consequences of fiscal policy shocks in a small open-economy DSGE model of Slovakia. They estimate multipliers for a range of fiscal instruments for both revenues and expenditures. Estimates of multipliers on the expenditure side range from 0.17 to 0.86 in the short-run and decrease towards 0.2 in the long-run, with a public wage-bill cut turning out to have positive consequences on the economy. Tax hikes have large long-run consequences. The labour tax multiplier is the most harmful in the long-term (3.46), although it seems to be the least damaging revenue instrument in the short-term (0.52). Furthermore, a capital tax is more detrimental (2.49) than a consumption tax (2.11) in the long-term.

Klucik (2015) estimates fiscal multipliers for Slovakia using a standard medium-scale macro-econometric model augmented with a detailed fiscal sector. He finds that indirect taxes have a smaller impact on the economy (VAT is 0.5 and an excise tax is 0.3). The social contributions paid by employers result in a multiplier of 0.3. On the other hand, social contributions paid by wage earners, personal income taxes and corporate income taxes are the worst options for consolidation, with a negative short-term impact of almost 0.7. The multiplier effects of expenditures range from 1.4 to 2.0, except for the capital transfers to firms and individuals, which have smaller effects in the short-run (0.2). However, these capital transfers mostly worsen the economy in the long-run.

The main objectives of this paper are estimating the fiscal multipliers for various fiscal instruments, comparing their values according to two different regimes (an autonomous monetary policy and a monetary union) and quantifying

[2] QUEST is a DSGE model developed by the European Commission and calibrated based on Slovak data.

the cost of the 2013 – 2017 consolidation package undertaken by the Slovak government. For this purpose, I augment the small open DSGE model developed by Zeman and Senaj (2009) using a more sophisticated fiscal sector that comprises such government expenditure components as consumption, investment and social transfers to liquidity-constrained households, as well as such government revenue components as personal income taxes, employer social contributions, VAT and a lump-sum tax.

This paper has the following format. In Section 1, I summarise the structure of the original DSGE model and describe an augmented fiscal sector, including the calibration of its parameters, in detail. Section 2 describes the simulation design and compares the multipliers of all fiscal instruments in the short- and long-runs. Section 3 evaluates the cost of the 2013 – 2017 planned consolidation of the Slovak government and Section 4 tests the model ex post. Section 5 summarises the main results and concludes.

1. The Model

The model used in this study is an augmented version of the small open DSGE model described in detail in Zeman and Senaj (2009). First, I summarise the main features of their model.

1.1. Original Model

Production

There are two sectors of production-intermediate goods and final goods.

Inputs for the intermediate goods are labour, capital and oil. Intermediate goods are tradable and can be used either domestically for producing final goods or exported abroad. Producers in this sector produce differentiated goods. There is imperfect competition in this sector and, hence, producers have market power in setting the price of goods used domestically.

Final goods are produced by intermediate goods, either domestic or imported, and by oil, and they are consumed privately or publicly, or invested. There is perfect competition in the final goods production sector. Final goods are non-tradable.

Households

There are two types of households-Ricardian and non-Ricardian. The former makes period decisions about current consumption, investment in physical capital, holdings of financial assets and hours worked, in such a way as to maximise their lifetime utility. The latter do not borrow or save, but, instead, spends all of their current labour income. There is imperfect competition in the labour market

that gives market power to workers in a wage setting. To improve the dynamics of the model, I assume habit formation in consumption and capital adjustment costs that imply costly transformations of investment into capital.

Price Setting

There is staggered price setting à la Calvo (1983) for the prices of domestic and imported intermediate goods, as well as for the price of labour (wages). Firms (workers) cannot change their prices, unless they receive a random 'price-change signal'. If they do not receive this signal, the price is automatically adjusted – partially to reflect previous period inflation and partially to reflect steady-state inflation.

Trade

Only intermediate goods can be traded. Domestic firms export a fraction of their intermediate goods abroad. Prices of exported intermediate goods can differ from prices of intermediate goods sold domestically (pricing to market). Imported intermediate goods cannot be consumed directly. Importing firms have market power in setting import prices. Hence, exchange rate pass-through is incomplete and the law of one price does not necessarily hold in the short-term.

Financial Markets

Domestic agents can insure against shocks by holding a portfolio of domestic bonds and foreign assets. To avoid excessive accumulation of net foreign assets in the domestic economy within the model, prices of assets increase with their level. The more a domestic country becomes indebted (higher level of net foreign assets), the costlier the borrowing costs for its citizens.

Monetary and Fiscal Policy

The monetary authority reacts to deviations in inflation, output and exchange rates from their steady-state values by setting nominal interest rates (Taylor rule).

The fiscal sector is very simple. Exogenous government expenditure is balanced with lump-sum taxes each period and, hence, the government deficit and debt are zero in equilibrium. There are no other taxes and transfers.

1.2. Augmented Fiscal Sector

To estimate multipliers of various fiscal instruments, the simple structure of the fiscal sector needs to be extended. The government collects revenue, gr_t, in the form of an income tax, tax_w_t, employer social contributions, tax_n_t, VAT, tax_c_t and a lump-sum tax, tls_t, to finance its expenditures, ge_t. A fraction of the expenditures is consumed by the government, gc_t, and the rest is returned to the

economy in the form of public investment, ig_t, and transfers[3] to the non-optimising (non-Ricardian) households, tr_t.

$$gr_t = \left(tax\_w_t + tax\_n_t\right) w_t h_t + tax\_c_t c_t + tls_t$$
$$ge_t = gc_t + ig_t + \lambda tr_t$$

where

w_t – the real wage,
h_t – hours worked,
c_t – real household consumption,
λ – a fraction of non-Ricardian households.

I assume that the tax rates – tax_w, tax_n and tax_c – are constant and all expenditure instruments are exogenous AR(1) processes.

Hence, the primary deficit, pd_t is given by:

$$pd_t = ge_t - gr_t$$

Taking into account interest payments with a gross interest rate, R_t, on the existing stock of debt, b_t, debt evolves as follows:

$$b_t = \frac{R_t b_{t-1}}{a_t \Pi_t} + pd_t$$

The term $a_t \Pi_t$ adjusts for inflation Π_t and for technological progress, a_t, as all model variables are expressed in real terms.

As in Leeper, Walker and Yang (2010), I assume that government investment becomes productive and promotes economic growth; i.e. the production function includes public capital with increasing returns to scale.

I consider two fiscal rules that stabilise debt in the long-run.

In the first case, stabilisation is achieved by a lump-sum tax that is paid by households. This taxation is optimal in the sense that it yields the highest welfare, given the amount of revenue to be collected.[4] Hence, it should only have a marginal impact on the magnitude of fiscal multipliers.

$$tls_t = \overline{tls} + \tau^b \left(\frac{b_t}{y_t} - b^T \right)$$

where

y_t – nominal GDP,
b^T – a long-run target of debt relative to GDP.

[3] Government transfers include social and healthcare contributions.

[4] That is why lump-sum taxation is usually called non-distortionary.

To test the robustness of fiscal multipliers with respect to the fiscal rule, I also use income tax as a stabilising instrument. I assume that the income tax rate is endogenous:

$$tax\_w_t = \overline{tax_w} + \tau^b \left(\frac{b_t}{y_t} - b^T \right) + e\_tax\_w_t$$

where

$e\_tax\_w_t$ – an i.i.d. shock to the income tax rate.

As this variable distorts the economy further, it will likely have a more harmful impact on output and the fiscal multipliers will probably be larger.

1.3. Calibration

Calibration of the parameters in the original model is explained in Zeman and Senaj (2009). In this subsection, I describe the setting of the steady-state ratios and the calibration of the augmented fiscal sector parameters.

For the steady-state ratios, I use the Ministry of Finance database of the Slovak Republic; i.e. the 2013 vintage (MF SR, 2014a) named 'Fiscal indicators'. These General Government (GG) indicators are divided into several areas:

1. Main indicators of GG – GG balance, gross and net GG debt and structural balance.
2. GG debt – data concerning the gross debt structure, net debt and contributions to the growth of GG debt.
3. Revenues and expenditures of GG (in detail) – data from Table 200, ESA95 Transmission Program.
4. One-offs and temporary measures by the Ministry of Finance of the Slovak Republic (MF SR).
5. Consolidation efforts of the MF SR.
6. Fiscal impulses according to the MF SR.
7. GG expenditures according to the classification of government functions (COFOG) – data from Table 200, ESA95 Transmission Program.
8. International comparisons – balance, debt, revenues and expenditures of GG within the EU.

Most of the fiscal indicators; in particular, those concerning the GG balance, are updated twice a year and always in accordance with the schedule of the Eurostat deficit and debt notification procedures (April, October).

From this data, I set steady-state values for government purchases, public investment and government transfers, such that their ratios relative to the steady-state

values of GDP are close to their actual counterparts. On the revenue side, the average implicit tax rates for VAT, income taxes and employer social contributions are calculated such that revenues from a given tax are divided by its corresponding base, which is private consumption for VAT and for the other two wage bases. Public debt and budget deficits to GDP are set as the averages of their actual values over the last three years.

Steady-state targeted values are listed in Table 1.

T a b l e 1

Steady-state Values

Target	Symbol	Values
Government purchases to GDP	gc/y	17.2
Public investment to GDP	ig/y	2.6
Government transfers to GDP	tr/y	18.9
VAT rate	tax_c	13.6
Income tax rate	tax_w	21.3
Employer contributions rate	tax_n	40.0
Public debt to annualised GDP	b/y	50.0
Budget deficit[5] to GDP	bd/y	2.8

Source: MF SR (2014a); own calculations.

Estimates of the elasticity of output with respect to public capital, which indicates its productivity, vary in the literature, but most studies indicate a positive value that is significantly different from zero. This analysis uses a value equal to 0.03, which is within the range of estimated values.

Regarding parameter b^T, I choose the value 0.5, which is the upper limit of public debt divided by GDP that is set by the Council of Budget Responsibility – an independent body for monitoring and evaluating the fiscal performance of the Slovak Republic. This value is deemed to be a suitable debt limit that separates the safe and critical debt levels for Slovakia.

Persistence coefficients of the fiscal instruments on the expenditure side were estimated from the ESA95 fiscal series and the persistence of all tax instruments were set to zero.

The feedback coefficient of the fiscal rule measuring the responsiveness of corresponding instruments (lump-sum and income taxes, respectively) to deviations of the debt ratio to GDP from its long-run average was set to 0.4. This value is used by Furceri and Mourougane (2010) in their OECD study and falls in the range of 0.2 – 0.5, as estimated by Gali, Lopez-Salido and Valles (2007) based on U.S. data.

Values of the parameters are listed in Table 2.

[5] Budget deficit is the sum of the primary deficit and interest payments.

T a b l e 2

Parameter Values

Parameter	Symbol	Values
Persistence of government purchases	ρ_{gc}	0.9
Persistence of public investment	ρ_{ig}	0.9
Persistence of government transfers	ρ_{tr}	0.9
Persistence of all tax instruments	ρ_{tax}	0.0
Feedback coefficient	τ^{b}	0.4

Source: MF SR (2014a); own calculations.

2. Main Results

In this section, I present the main findings about multipliers; but first, I provide a definition of fiscal multipliers and describe the simulation design.

2.1. Simulation Design

There are various definitions of fiscal multipliers in the literature. I follow Spilimbergo, Symansky and Schindler (2009) and define fiscal multipliers as the net present value; i.e. the discounted sum of output changes until each horizon divided by the sum of the discounted budget deficit changes until the same horizon. The steady-state value of the real interest rate is used as the discount factor. As this study concerns fiscal consolidation; i.e. the reduction of budget deficits and debt, I consider the negative shocks on the instrument spending side and the positive shocks on the tax-instrument revenue side.[6]

A negative government spending shock reduces the corresponding variable by 1 percentage point (p.p.) of its steady-state value and a positive tax shock increases the corresponding tax rate by 1 p.p. Shocks are assumed to be permanent and, for simplicity, the model is at its steady state before the shocks' impacts.

In the first set of simulations, each instrument at a particular time is disturbed, while all others are kept at their steady-state values, except the lump-sum tax, which responds in order to guarantee a return of debt to its long-run target. Checking for robustness, I run a second set of simulations, where I repeat the same exercise, but now with the income tax instrument playing the stabilising role.

[6] If the underlying model is linear or linearized, the impacts of mutually opposite shocks are symmetrical.

As the original model was calibrated with data originating from before the adoption of the euro in Slovakia, monetary policy is assumed to be autonomous. Hence, monetary policy may (and very likely does) interact with fiscal policy and mitigate the impact of fiscal tightening by monetary loosening. To assess the magnitude of this interaction, I try to eliminate the active Taylor rule and mimic the situation where Slovakia is in a monetary union in the next set of simulations. To achieve this objective, I run simulations in which the path of exogenous monetary shocks keeps the interest rate constant (exogenous).[7]

2.2. Fiscal Multipliers

Table 3 shows the multipliers of the fiscal instruments in the process of budget and debt consolidation when each instrument at a particular time is permanently reduced on the expenditure side and increased on the revenue side, respectively, and long-run debt sustainability is achieved by non-distorting lump-sum taxation. While the case of stimulating an economy with a larger multiplier is more desirable (as one unit of stimulus boosts GDP), in the case of consolidation it is just the opposite; the smaller the multiplier, the lower the negative effect of a one-unit reduction of the budget on GDP.

As a general observation, instruments on the expenditure side have larger negative effects in the first stages of consolidation and this negative impact diminishes with time, while consolidation of the revenue instruments is not as harmful to GDP at first, but becomes more damaging in the later stages.

Table 3 shows that raising the social contributions paid by employers have the worst effect on GDP in the long-run, followed by a reduction of public investment (both multipliers are greater than one).

T a b l e 3

Multipliers – Stabilization by Lump-sum Taxation

	4q	8q	12q	16q	100q
Government consumption	0.55	0.47	0.44	0.44	0.89
Government investment	0.57	0.50	0.48	0.49	1.20
Government transfers	0.59	0.45	0.37	0.33	0.41
Employer contributions	0.26	0.45	0.53	0.58	2.09
Income tax	0.17	0.18	0.20	0.22	0.92
VAT tax	0.40	0.44	0.45	0.47	0.99

Source: Own calculations.

[7] Keeping interest rates constant by using unanticipated (rather than anticipated) shocks is problematic because the agents in the Slovak economy are aware of the fact that the Slovak economy is part of a monetary union. The dynamics of the impact of unanticipated shocks can be very different from the impact of anticipated shocks in the short-run. However, these two impacts have similar effects in the long-run.

To check the robustness of fiscal multipliers with respect to the fiscal rule, I substitute the non-distortionary lump-sum tax with the income tax. The income tax rate now changes endogenously in a way to guarantee sustainable long-run debt. Table 4 indicates that the results are qualitatively similar in the short-run, but very different in the long-run. Because the lump-sum taxation is non-distortionary, the impact of fiscal instruments in the long-run is qualitatively similar to the impact in the short-run, only its magnitude is larger. Long-run effects of fiscal instruments under the income tax stabilisation regime can be seen as a combination of the permanent change in the corresponding fiscal instrument and the permanent reduction in the income tax rate implied by the fiscal rule. The last column of Table 4 indicates that the latter effect dominates for all instruments. Hence, consolidation under the income tax fiscal rule becomes beneficial for the economy in the long-run. The second to last column of Table 4 denotes the number of quarters after the consolidation becomes expansionary for a particular fiscal instrument.

T a b l e 4

Multipliers – Stabilization by Income Tax

	4q	**8q**	**12q**	**16q**	qtrs	**100q**
Government consumption	0.57	0.47	0.38	0.28	(29)	−0.56
Government investment	0.58	0.50	0.43	0.36	(37)	−0.39
Government transfers	0.61	0.44	0.29	0.15	(21)	−0.77
Employer contributions	0.30	0.67	0.84	0.89	(61)	−0.48
Income tax	0.17	0.13	0.08	0.02	(18)	−0.67
VAT tax	0.45	0.50	0.49	0.44	(51)	−0.22

Source: Own calculations.

Government transfers appear to be the best instrument of consolidation in the long-run.

Now, I check the role that monetary policy plays in these calculations. In the current model setting of active monetary policy, the interest rate reacts to inflation and the output gap. As fiscal consolidation conducted in previous simulations reduces economic activity and usually inflation, as well, the Taylor rule dictates a lower interest rate. So, there is conjecture that restrictive fiscal policy is counterbalanced by expansionary monetary policy and, consequently, fiscal multipliers are smaller than they would have been had monetary policy been passive. This is the case for Slovakia. As a member of the euro area since 2009, it has adopted interest rates that do not necessarily reflect its domestic economic situation.

Table 5 lists the fiscal multipliers calculated under the condition of passive monetary policy with income tax stabilisation.

T a b l e 5

Multipliers – Passive Monetary Policy

	4q	8q	12q	16q	100q
Government consumption	0.63	0.62	0.61	0.59	0.47
Government investment	0.65	0.66	0.67	0.68	0.66
Government transfers	0.69	0.63	0.57	0.52	0.32
Employer contributions	0.34	0.79	1.04	1.13	−0.39
Income tax	0.18	0.17	0.14	0.10	−0.17
VAT tax	0.52	0.67	0.76	0.82	0.97

Source: Own calculations.

It can be observed that all multipliers are larger at the time of the initial impact and, as the time horizon increases, the difference widens further. Only consolidation through employer contributions and income tax rates turns out to be beneficial in the long-run, although with smaller effects. Hence, conducting fiscal consolidation in the euro area is more painful than it would have been under an autonomous monetary policy.

3. Cost of Fiscal Consolidation, 2013 – 2017

The use of estimated fiscal multipliers can be illustrated in practice. The Slovak government has pledged to consolidate its public finances to stabilise public debt in accordance with the EU regulations contained in the Stability and Growth Pact and the Fiscal Compact. In April 2014, it announced a new fiscal consolidation package for the 2014 – 2017 period.[8] A summary of measures from this package and also from the 2013 consolidation package is listed in Table 6. The overall magnitude of these measures amounts to 4.3% of the cumulative 2013 – 2017 nominal GDP.

T a b l e 6

Consolidation 2013 – 2017 (First scenario)

	2013	2014	2015	2016	2017	Total
Mil. EUR	506	748	904	482	748	3 388
% GDP	0.7	1.0	1.2	0.6	0.9	4.3

Source: MF SR (2014b).

To quantify the macroeconomic effect of this consolidation, I use the estimated multipliers from Table 5, calculate the cumulative impact of each fiscal instrument and add them together.[9] The results are listed in Table 7.

[8] Details of this package are described in a document by the Ministry of Finance of the Slovak Republic (MF SR, 2014b).

Table 7

Cumulative Effect of 2013 – 2017 Consolidation

	2013	2014	2015	2016	2017
% GDP	−0.2	−1.1	−1.9	−2.5	−3.1

Source: Own calculations.

According to the calculations, the planned consolidation package for the 2013 – 2017 period will depress economic activity by 3.1 p.p. of the cumulative GDP, compared to the baseline model with unchanged fiscal policies.

4. Testing the Model ex post

With the benefit of hindsight, the model and its predicted cost of consolidation can be tested ex post. As of June 2017, data for GDP and the budget balance were available until 2016 and there were reliable estimates for 2017. In the abovementioned Stability Program, there is a forecast of GDP and the budget balance for the case where the government does not implement the consolidation package. I call this event the benchmark scenario. In this case, public debt would have reached dangerously high levels, which are not consistent with the debt limit imposed by constitutional law and enforced by the Council for Budget Responsibility. To prevent this result, the government committed to consolidate its finances. The consolidation pledge amounted to budget cuts equal to 4.3% of the cumulative GDP over the 2013 – 2017 period.

Observing the actual data against the benchmark case, the cumulative budget reduction is 4.5% of GDP (slightly above the original commitment of 4.3% GDP) and the cumulative loss of output is 4.8%. Calculations in the Stability Program estimate a 1.6% decrease in GDP for such a budget reduction, while the estimated multipliers in this paper show a 3.2% decrease in GDP (4.5/4.3*3.1). Of course, this comparison must be taken with various caveats. First, the benchmark scenario is a forecast based on certain assumptions that may not have been fulfilled. Second, despite the fact that the volume of the planned consolidation package is roughly equal to its actual value, the composition of instruments may have changed. Third, but most importantly, the trend of GDP depends on many factors other than fiscal policy.

Despite these caveats, it is worth observing that the actual reduction in economic activity (4.8%), although higher than both estimates (1.6%, 3.2%), is

[9] Although fiscal multipliers are valid for changes in the real variables and the fiscal package is expressed in nominal terms, we do not deflate nominal variables because of the very low inflation environment that persisted during the given period (the price deflator for domestic demand was constant over the 2013 – 2015 period).

clearly closer to the estimates provided in this paper. This seems to be consistent with the finding by Blanchard and Leigh (2013), in which the fiscal multipliers during consolidation tend to be higher than expected.

Conclusion

In this paper, I augment a small DSGE model of the Slovak economy with a more sophisticated fiscal sector to assess the impact of various fiscal instruments on the economic performance during fiscal consolidation. The set of instruments comprises VAT, income tax and employer social contributions on the revenue side, and government consumption, public investment and social contributions on the expenditure side. In general, consolidation through the expenditure instruments is initially more damaging, but this negative effect dissipates with time; the least desirable way of consolidating on the expenditure side in the long-run is by cutting public investment. Proceeding on the revenue side is different; the immediate effect of increasing taxes is mild, but it becomes more harmful with time, most notably in the case of increasing employer social contributions. The picture looks similar whether lump-sum or income taxes are used as the stabilising instrument in the short-run. In the long-run, however, the situation is qualitatively different. Consolidation under the lump-sum tax fiscal rule also negatively affects the economy in the long-run, while, under the income tax rule, consolidation initially slows the economy, but turns out to be beneficial in the long-run. We also show that consolidation is less painful in an environment of autonomous monetary policy, where the negative impact of restrictive fiscal policy can be counterbalanced by active monetary policy.

Finally, I estimate the negative impact of the 2013 – 2017 consolidation package that the Slovak government pledged to keep, in which the cumulative cost should be approximately 3.1% of aggregate GDP. My ex post assessment shows that the consolidation package has been accompanied by a 4.8% reduction in cumulative GDP, which is much closer to the estimates in this paper compared to the ex-ante government projections. However, it is not clear that the observed output decline has only been caused by fiscal consolidation.

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