Stabilisation policies in a small Euro area economy: taxes or expenditures? A case study for Slovenia

Klaus Weyerstrass

Macroeconomics and Economic Policy Group,
Institute for Advanced Studies,
Vienna, Austria
Email: Klaus.weyerstrass@ihs.ac.at

Reinhard Neck* and Dmitri Blueschke

Department of Economics,
Alpen-Adria-Universität Klagenfurt,
Klagenfurt, Austria
Email: reinhard.neck@uni-klu.ac.at
Email: dmitri.blueschke@aau.at
*Corresponding author

Boris Majcen

Institute for Economic Research,
Ljubljana, Slovenia
Email: majcenb@ier.si

Andrej Srakar and Miroslav Verbič

Institute for Economic Research,
Ljubljana, Slovenia
and
Faculty of Economics,
University of Ljubljana, Slovenia
Email: srakara@ier.si
Email: miroslav.verbic@ef.uni-lj.si

Abstract: In this paper, we investigate how effective stabilisation policies can be in Slovenia. In particular, we analyse whether policy or expenditure policy has stronger multiplier effects. Slovenia is an interesting case because it is a small open economy in Central Europe that was already in the Euro area before the Great Recession. Using the SLOPOL10 model, an econometric model of the Slovenian economy, we show that those public spending measures that entail both demand and supply side effects are more effective at stimulating real GDP than pure demand side measures. Measures that improve the education level of the labour force are very effective at stimulating potential GDP. Employment can be most effectively stimulated by reducing the tax wedge on labour income, thereby positively affecting Slovenia's international competitiveness. However, simulations show that fiscal policy measures can only mitigate but not undo the adverse effects of a crisis like the Great Recession.

Keywords: stabilisation policy; fiscal policy; tax policy; public expenditures; macroeconomics; Slovenia; public debt; econometric model; simulation.

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Biographical notes: Klaus Weyerstrass is a Senior Researcher at the Institute for Advanced Studies, Vienna, Austria. His research areas include macroeconomic modelling, business cycle forecasting and analysis, European economic integration, fiscal policy analyses as well as the estimation of potential output and the analysis of the drivers of productivity.

Reinhard Neck is a Full Professor of Economics at the Alpen-Adria-Universität Klagenfurt, Austria. He is the editor and co-author of about 50 books and 350 articles in scientific journals and collective volumes. His main research interests are in macroeconomics, economic policy, applied econometrics and the philosophy of economics.

Dmitri Blueschke is an Associate Professor of Economics at the Alpen-Adria-Universität Klagenfurt. His main research interests are in macroeconomics, applied econometrics, control and game theory and computational economics.

Boris Majcen is a Senior Researcher and the Director of the Institute for Economic Research in Ljubljana. He holds a PhD in Economics and has extensive experience in macroeconomic modelling and micro-simulation. In the new millennium, his research activities are focused on the economic effects of ageing and long-term sustainability of public finances. He is the Slovenian Team Leader of the SHARE project, a member of the European Social Policy Network, a member of Slovenian AWG group, and recently a member of the High-level group of experts on pensions, established by the European Commission.

Andrej Srakar is a Research Associate at the Institute for Economic Research in Ljubljana and Assistant Professor at the University of Ljubljana. In 2016, he enrolled for his second PhD in Mathematical Statistics at the University of Ljubljana. His main research interests include econometric and statistical applications, macroeconomics, economics of ageing, and cultural economics. He is the co-author of several reports for the European Commission, Council of Europe, and European Parliament, and has recently published in *Journal of Cultural Economics, European Planning Studies*, and *Review of Public Economics*.

Miroslav Verbič is an Associate Professor of Econometrics and Associate Professor of Finance at the University of Ljubljana, and Research Counsellor at the Institute for Economic Research in Ljubljana. His research interests include econometric modelling, general equilibrium modelling, asset pricing modelling, social security analysis, welfare economics, and environmental economics. He teaches econometrics at the graduate and undergraduate level at the University of Ljubljana, and abroad as a Visiting Professor. He is the author of five scientific monographs and more than 40 SCI/SSCI refereed scientific articles.

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1 Motivation

As a consequence of the Great Recession, the financial and economic crisis of 2007–2009, the effectiveness of macroeconomic stabilisation policies has become the subject of more intensive research recently. For the European Union and the Euro area in particular, with its common monetary policy, interest in the effects of fiscal policy has been aroused in several countries as this is the only remaining macroeconomic policy to deal with adverse shocks. Theoretical and empirical studies have not, however, succeeded in obtaining a consensus on how to design fiscal policies when facing a severe crisis. In particular, it is still an open problem as to whether taxes or public spending are more effective at preventing output and employment from decreasing excessively (see, for example, Erceg and Lindé, 2013; Bouakez et al., 2014; Dufrénot et al., 2016). The side effects on government debt, which are a relevant problem in view of the relatively high debt to GDP ratios in many Euro area countries, may also be affected differently by revenue and expenditure side measures.

Although there is a large body of evidence regarding the effects of macroeconomic policies in different countries during the Great Recession, its interpretation still diverges among adherents of different macroeconomic theories (see, for instance, Taylor, 2009; Romer and Romer, 2010; Coenen et al., 2008, 2013). In particular, the role of fiscal policy and the specific problems of countries within the Euro area are subject to ongoing controversies (see, e.g., Cogan et al., 2010, 2013). It is well-known that fiscal policy effects are smaller ceteris paribus in an open economy than in larger economies that are less open, but the empirical evidence is also mixed for open economies. Slovenia is an interesting case because it is a small open transition economy that was already in the Euro area before the Great Recession. Especially for small open economies, internationally coordinated fiscal action might be more effective than isolated policies. Furthermore, an already high level of public debt is likely to undermine the positive effects of fiscal stimuli. Hence, a clear commitment to fiscal consolidation after overcoming a crisis is required (see, e.g., Spilimbergo et al., 2009; IMF, 2008). Fiscal multipliers do not only depend on the openness of an economy but may also vary with the position in the business cycle. Auerbach and Gorodnichenko (2013) conclude that in particular, spending multipliers tend to be larger in recessions than in expansions. Furthermore, strict fiscal consolidation measures in a recession might contribute to a deepening of the recession (Blanchard and Leigh, 2013).

Here, we examine the question as to whether Slovenia would have gained more from tax reduction or increases in public spending during and after the Great Recession. The plan of the paper is as follows: Section 2 gives a brief overview of the recent past and present situation of the Slovenian economy. Section 3 briefly describes the macroeconometric model SLOPOL10 which is used for the empirical analysis. More details of the model are given in Figure 1. Section 4 presents the multipliers of the econometric model to give an impression of the relative effectiveness of each of the expenditure and revenue side fiscal policy instruments. In Section 5, we describe simulations of a few counterfactual scenarios with fiscal policy packages designed so as to mitigate the adverse effects of the Great Recession and the ensuing European and Slovenian second recession and present their main results. It turns out that expenditure side budgetary measures with a strong supply side content (especially research and development (R&D) related spending and the enhancement of human capital) would have

been most effective at stabilising Slovenian output, while income tax and social security contribution reductions would have been most successful with respect to stabilising the labour market. Government debt increases could be reduced by increases in indirect taxes but not completely avoided. Section 6 concludes.

2 Slovenia in the Euro area

During the Great Recession, real GDP in Slovenia declined by as much as 7.8% in 2009. As in nearly all industrial countries, irrespective of their initial situation, unemployment rose sharply. Partly due to government failures, namely inadequate action taken by its economic policy makers, Slovenia was hit particularly badly by the crisis.

Slovenia was the only country in former Yugoslavia to join the European Union in 2004, at the same time as most countries from Central and Eastern Europe, and it introduced the euro as legal tender as early as 2007. Its economic development was successful in terms of GDP growth and a reduction in unemployment before the Great Recession.

However, the positive macroeconomic development disguised emerging problems due to politically motivated management buyouts and privatisations and – to a certain extent – also a housing bubble. With the outbreak of the global financial and economic crisis, the real estate bubble burst and the impact of the recession was especially deep in Slovenia. In 2012 and 2013, the Slovenian economy contracted again and even at the end of 2016, seasonally adjusted real GDP was still lower than in the second quarter of 2008, the last pre-crisis quarter in Slovenia. As a result of this double dip, the unemployment rate rose from its low of 4.3% in 2008 to 10% in 2013 and only once a more vigorous economic recovery started in 2014 it declined again.

The double economic crisis resulted in an unprecedented increase in Slovenia's public debt. As the IMF (2015a) notes, the economic crisis culminated in a severe financial crisis in 2013. This required significant public support for six banks, at a fiscal cost of about 10% of GDP. As a result, Slovenia's fiscal position deteriorated significantly. The budget deficit rose from near zero in 2007–2008 to almost 14% of GDP in 2013 and the debt ratio quadrupled, rising to more than 83% in 2015.

Public debt did not only rise as a result of discretionary stabilisation policies and the working of automatic stabilisers but was also driven by public capital injections into the banking system. This state aid became necessary as some of the largest banks developed liquidity and solvency problems when loans resulting mainly from politically motivated management buyouts and privatisations became non-performing. Due to the ensuing high level of public debt and the large share of non-performing loans, both future macroeconomic development and public finances are still vulnerable in Slovenia. According to the IMF (2015b), the still prevailing deleveraging needs of the private and public sectors are weighing on medium-term growth. Therefore, public finances have to be consolidated through structural measures and reforms to put public debt on a sustained downward path. According to the IMF (2015a), consolidation should be mainly focused on the expenditure side, since expenditure, in particular social expenditure, was among the main drivers of the drastic deterioration in Slovenia's public finances. Even excluding one-off bank support costs, public spending has increased by more than 5 percentage points (pp) of GDP between 2008 and 2014, one of the largest figures in the group of Central and Eastern European countries. Moreover, with an expenditure to GDP ratio

now at about 46% (excluding bank support costs), Slovenia has switched from being below the OECD average prior to the crisis to now being even well above the OECD average. Social benefits are the largest expenditure category in Slovenia.

As the IMF (2015b) states, restructuring the banking sector is also important in the context of consolidating public finances. Large injections into the banking sector raise public debt, leading to a decline in the value of public bonds. As soon as these bonds are held by banks, their balance sheets deteriorate, necessitating further state aid, leading to a further deterioration of public finances. This link has to be broken.

Public finances may be insufficiently prepared to deal with the drop in aggregate demand resulting from such a crisis if automatic stabilisers are not well developed or if political authorities are under pressure from unions to continue making excess payments to public employees, pensioners, etc. This raises the question of the adequate reaction of the Slovenian Government budget and the effectiveness of alternative measures.

3 The macroeconometric model SLOPOL10

In this paper, we analyse the effects of different fiscal policy measures in Slovenia with a focus on the situation during and after the Great Recession. We use the SLOPOL model, an econometric model of the Slovenian economy constructed by us, to simulate the effects of various tax and spending policies on important macroeconomic variables as well as on the public debt level. Moreover, we investigate whether (and if so, how) fiscal policy can reduce the macroeconomic effects of the Great Recession. These simulations update and extend simulations with an earlier model version reported in Neck et al. (2013) by focusing on tax policy in addition to public expenditure policies.

For this study, we use an updated version of the SLOPOL model. SLOPOL is a medium-sized macroeconometric model of the small open economy of Slovenia. We use the most recent version SLOPOL10, consisting of 75 equations, 23 of which are behavioural equations and 52 identities. In addition to the 75 endogenous variables, the model contains 41 exogenous variables. For the present work, we built on earlier versions as described in Neck et al. (2011), updated and re-estimated the equations and made some amendments to the model.

The behavioural equations were estimated by ordinary least squares (OLS), except for the labour demand and supply equations which were estimated as censored Tobit models. Almost all behavioural equations were specified in error correction form. This requires inspecting the time series properties to ensure that the variables are either stationary or cointegrated. Most of the variables passed these tests; hence, it was decided to use the error correction specification. In the error correction models, the behavioural equations are defined in terms of the growth rates of the relevant endogenous variables; the equations comprise both the short-run dynamics of the endogenous variables and the long-run equilibrium between the endogenous and the explanatory variables.

The behavioural equations were estimated using quarterly data for the period 1995q1 to 2015q4. Data for Slovenia and for Euro area aggregates as well as the oil price were taken from the Eurostat database and world trade data came from the CPB Netherlands Bureau for Economic Policy Analyses.

The model contains behavioural equations and identities for the goods market, the labour market, the foreign exchange market, the money market and the government

sector. Rigidities of wages and prices are taken into account. The model combines Keynesian and neoclassical elements, the former determining the short and medium run solutions in the sense that the model is demand-driven and persistent disequilibria in the goods and labour markets are possible.

On the supply side, potential output is determined via a Cobb-Douglas production function with constant returns to scale. Potential GDP depends on trend employment, the capital stock and autonomous technical progress. In line with the literature on production functions as well as international practice in macroeconometric modelling (see, e.g., Havik et al., 2014), the elasticities of labour and capital were set at 0.65 and 0.35 respectively. These elasticities correspond approximately to the shares of wages and profits, respectively, in national income. Ex post, total factor productivity (TFP) is calculated as the Solow residual. In a second step, the trend of technical progress is determined by applying the HP filter. For simulations and forecasts, the trend of the TFP is explained in a behavioural equation. Technical progress is influenced by the proportion of people with tertiary education in the labour force, by the real investment ratio, i.e., gross fixed capital formation over GDP and by lagged real government spending on R&D.

On the demand side, private consumption, gross fixed capital formation, exports and imports are determined in behavioural equations. Consumption of private households is explained by a combination of a Keynesian consumption function and a function in accordance with the permanent income hypothesis and the life cycle hypothesis. Real gross fixed capital formation is influenced by the change in total domestic demand (in accordance with the accelerator hypothesis) and by the user cost of capital, where the latter is defined as the real interest rate plus the depreciation rate of the capital stock. Real exports of goods and services are a function of the real exchange rate and of foreign demand for Slovenian goods and services. Foreign demand is approximated by the volume of world trade. The real exchange rate captures the competitiveness of Slovenian companies on the world market. Real imports of goods and services depend on domestic final demand and on the real exchange rate.

On the labour market, labour demand and supply are divided into the main age group (15 to 64 years) and older people (65 years and above). Labour demand (actual employment) is modelled via the employment rates of the two age groups, i.e., employment as a proportion of the relevant age groups. Both employment rates are positively influenced by real GDP and negatively by the real net wage and additionally by the wedge between the gross and the net wage. Labour supply is modelled via the proportion of the labour force of the two age groups in the total population. It depends positively on the real net wage and negatively on the wedge between the gross and the net wage.

The wage-price system determines wages, the CPI and various deflators. The gross wage rate depends on the price level, labour productivity and the unemployment rate. This equation is based on a bargaining model of the labour market, where the relative bargaining power of the trade unions is negatively affected by unemployment. The consumer price index is linked to the private consumption deflator. The latter depends on domestic and international factors. Domestic cost factors comprise unit labour costs and the capacity utilisation rate. The inclusion of the capacity utilisation rate in the price equation represents a channel for closing an output gap by increasing prices in the case of over-utilisation of capacities and by decreasing prices if actual production falls behind

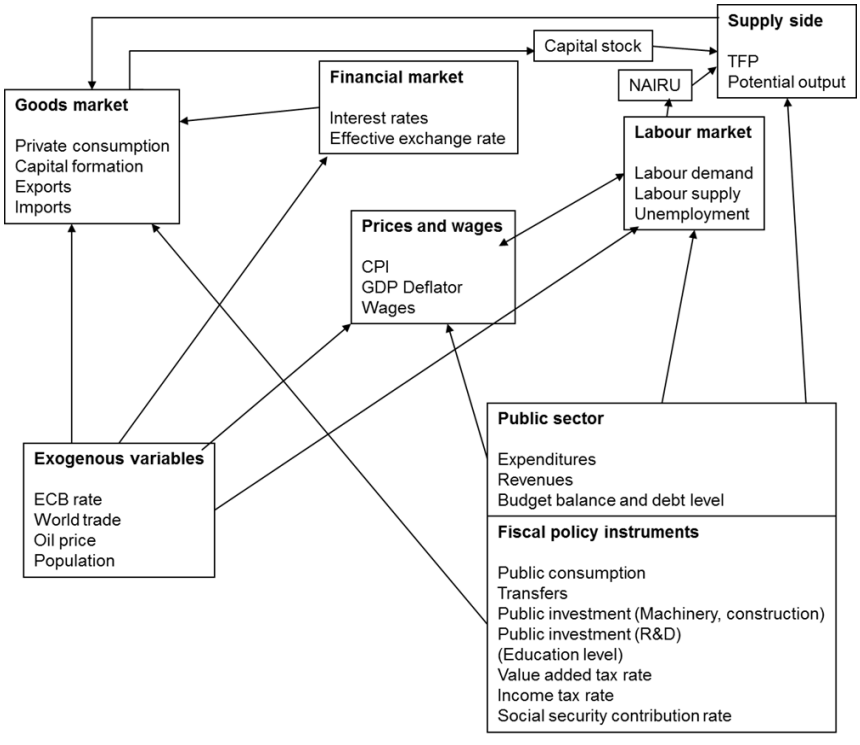
potential GDP. Foreign influences on Slovenian consumer prices are approximated by the import deflator.

The interest rates and the real effective exchange rate are determined on the money market. The short-term interest rate is linked to its Euro area counterpart so as to capture Slovenia's Euro area membership and the resulting gradual adjustment of interest rates in Slovenia towards the Euro area average. In the same vein, the long-term Euro area interest rate is included in the equation determining the long-term interest rate in Slovenia. In addition, the long-term interest rate is linked to the short-term rate, representing the term structure of interest rates. Furthermore, the long-term interest rate is influenced by the debt to GDP ratio, representing a risk premium that rises with the debt ratio. The foreign exchange market is modelled by the real effective exchange rate against a group of 41 countries.

The government sector block contains equations for social security revenues, profit taxes, value added tax (VAT) revenues, interest payments on public debt and other revenues and expenditures. These equations are based primarily on institutional features determining these aggregates. The model is rounded off by a number of identities and definition equations.

Figure 1 gives a sketch of the main blocks in the model and their principal links. A more detailed description of the model listing all equations is given in Weyerstrass et al. (2018).

Figure 1 Overview of the model SLOPOL10



Source: Authors' own illustration

Although the SLOPOL model is used for forecasting and policy simulations, it should be noted that the model – like every structural econometric model – may be subject to the famous Lucas (1976) critique. Lucas (1976) argued that the relations between macroeconomic aggregates in an econometric model should differ according to the macroeconomic policy regime in place. In this case, the effects of a new policy regime cannot be predicted using an empirical model based on data from previous periods when that policy regime was not in place. As Sargent (1981) argues, the Lucas (1976) critique is partly based on the notion that the parameters of an observed decision rule should not be viewed as structural. Instead, structural parameters in Sargent's (1981) conception are just 'deep parameters' such as preferences and technologies. These parameters would be invariant, even under changing policy regimes. Providing for such 'deep parameters' requires a different class of macroeconomic models, namely computable general equilibrium (CGE) or dynamic stochastic general equilibrium (DSGE) models.

An approach taking the Lucas (1976) critique into account in structural models like SLOPOL emerged in the so-called London School of Economics tradition initiated by Sargan (1964). According to this approach, economic theory guides the determination of the underlying long-run specification, while the dynamic adjustment process is derived from an analysis of the time series properties of the data series. Error correction models involving cointegrated variables combine the long-run equilibrium and the short-run adjustment mechanism and hence are compatible with this methodology.

In order to assess the forecasting performance of the model over the estimation period, we conducted a dynamic ex post simulation of the model over the period 1999 to 2015. Detailed results of this are contained in Weyerstrass et al. (2018). To test the quality of the ex post forecasting performance of the model, the root mean squared error or the root mean squared percent error, the mean absolute percent error or the mean absolute error and Theil's inequality coefficient were calculated. Overall, the results of these tests are quite promising. Among the demand components, the model simulation is worse for investment and imports than for the other GDP components. Employment and unemployment are in general tracked satisfactorily, with the exception of the labour market indicators of the older people, which is due to the very small absolute numbers of these variables. Otherwise, the relatively low values of the different measures suggest that the model exhibits a reasonable ability to track the development of the Slovenian economy over the estimation period, justifying its use for forecasting and policy analysis.

4 Multiplier analysis

In this section, we analyse the effectiveness of fiscal policies in Slovenia. For this purpose, we perform an ex post simulation of the SLOPOL10 model over the period 1999 to 2015. We distinguish between temporary and permanent fiscal policy measures. For the scenarios with temporary measures, we change the fiscal policy instruments in the year 2010 only. The permanent measures are implemented from 2010 onwards, i.e., the instruments are changed in 2010 and then kept at the new level afterwards. Although for most variables used in the model, the time series start in 1995, for some variables data are available from 1999 onwards only; therefore, we chose a simulation period for which reliable data are available. Regarding the implementation of fiscal policies, we chose 2010 as the starting year since this was the first year after the period of quite rapid growth prior to the Great Recession and after the Great Recession itself.

For the simulations, we consider the following instruments:

1 *GNFIN:* government consumption, nominal

2 *TRANSFERS:* transfers, nominal

3 *GINV:* public investment, nominal

4 *GERD:* government expenditures on R&D, nominal

5 *LFTER:* proportion of people with tertiary education in the labour force

6 *VAT:* value added tax rate

7 *INCTAX:* personal income tax rate

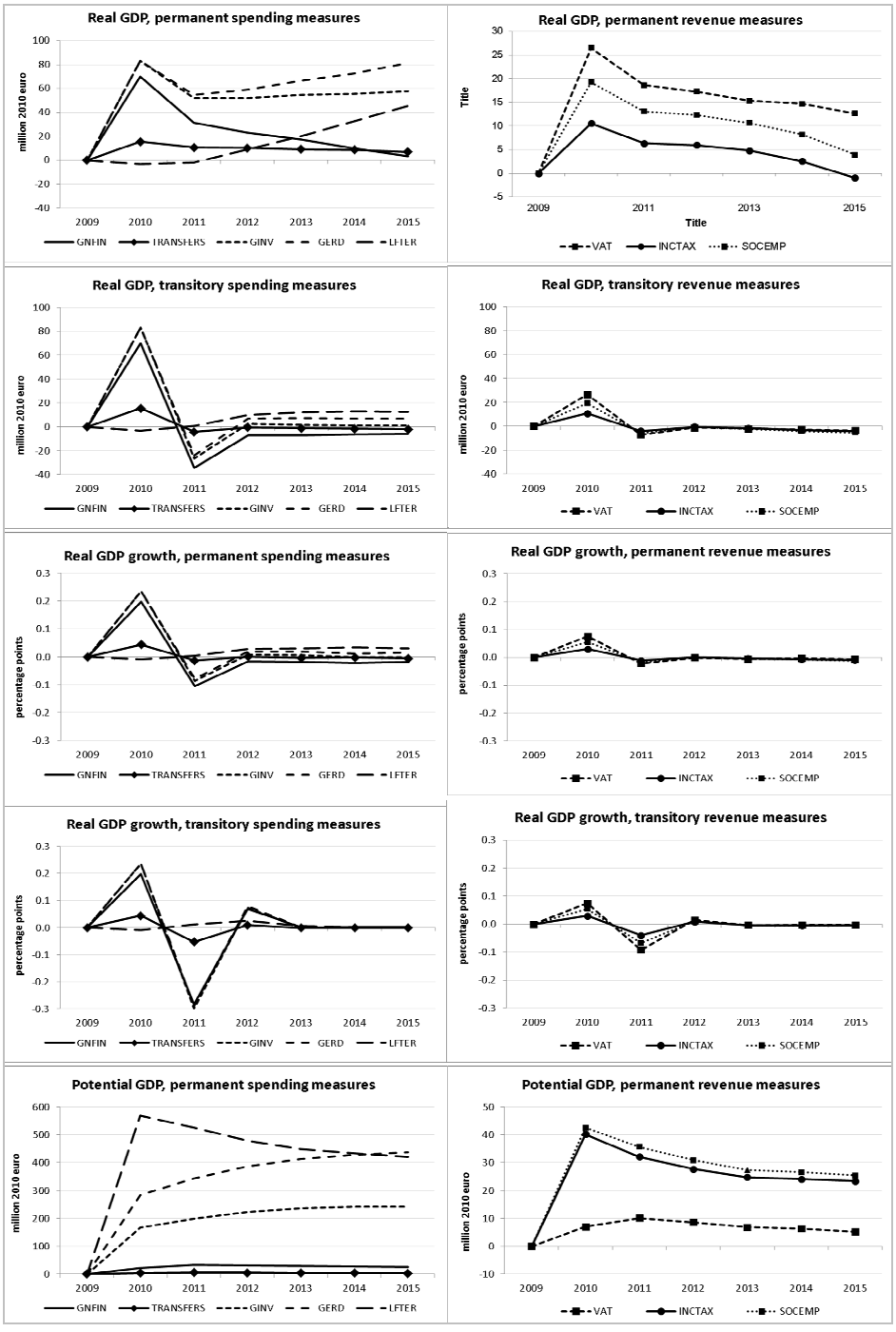
8 *SOCEMP:* employees' social security contribution rate.

These fiscal policy instruments operate via diverse channels. By definition, public consumption and transfers initially trigger pure demand effects, either directly or via private consumption. Public investment also enters the GDP expenditure identity directly, but in addition, it enters the capital stock and hence potential output. Furthermore, the investment ratio, i.e., real investment divided by real GDP, influences TFP and thereby also potential GDP. Public R&D spending also influences TFP and is also part of investment; hence, this spending category initiates both demand and supply effects as well. The difference between the impacts of *GINV* and *GERD* is that the former affects the TFP only indirectly via the investment ratio, while the latter has also a direct effect on TFP. In accordance with endogenous growth theory, the proportion of people with tertiary education in the labour force (*LFTER*) influences TFP and hence potential output. In contrast to the other instruments considered here, *LFTER* is not an instrument per se, but it can be viewed as an intermediate goal that can be reached by different policies, e.g., higher spending on education.

Ceteris paribus, a higher VAT rate raises revenues from indirect taxes which in turn reduce disposable income that is one determinant of private consumption. Changes in the income tax rate influence the tax wedge, i.e., the difference between the gross and the net wage. A higher tax wedge has negative effects on both labour demand and labour supply. Increases in the income tax rate, in addition, reduce disposable income. Finally, the social security contribution rate influences the tax wedge and disposable income in the same way as the income tax rate. Additionally, changes in employees' social security contributions also influence employers' contributions.

For each of the instruments listed, a separate *ceteris paribus* simulation is performed with expansionary policy measures (increases in expenditures, decreases in taxes). In the following, the results of these simulations are compared to a baseline simulation where the instruments are unchanged from their actual development. For the simulations, spending items (1) to (4) are increased by 25 million euro per quarter, i.e., 100 million euro per year, either in 2010 only (transitory change) or from 2010 onwards (permanent change). For simulation (5), the proportion of the labour force with tertiary education is increased by 1 pp. For simulation (6), the VAT rate is reduced by 1 pp and for simulations (7) and (8), the income tax rate or the social security contribution rate, respectively, is reduced by 0.5 pp.

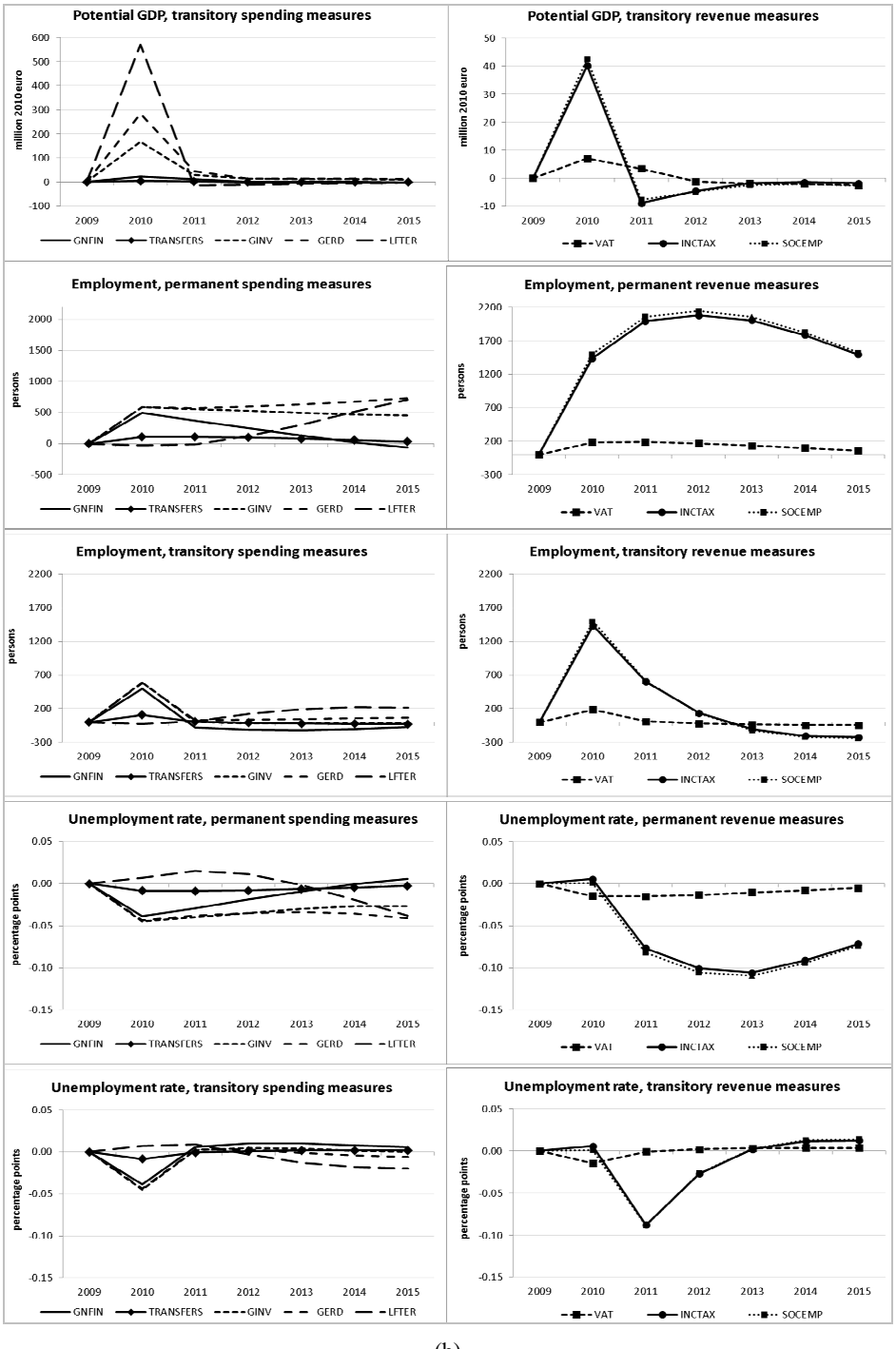
Figure 2 Fiscal multipliers in the SLOPOL model



(a)

Source: Authors' own calculations and illustrations

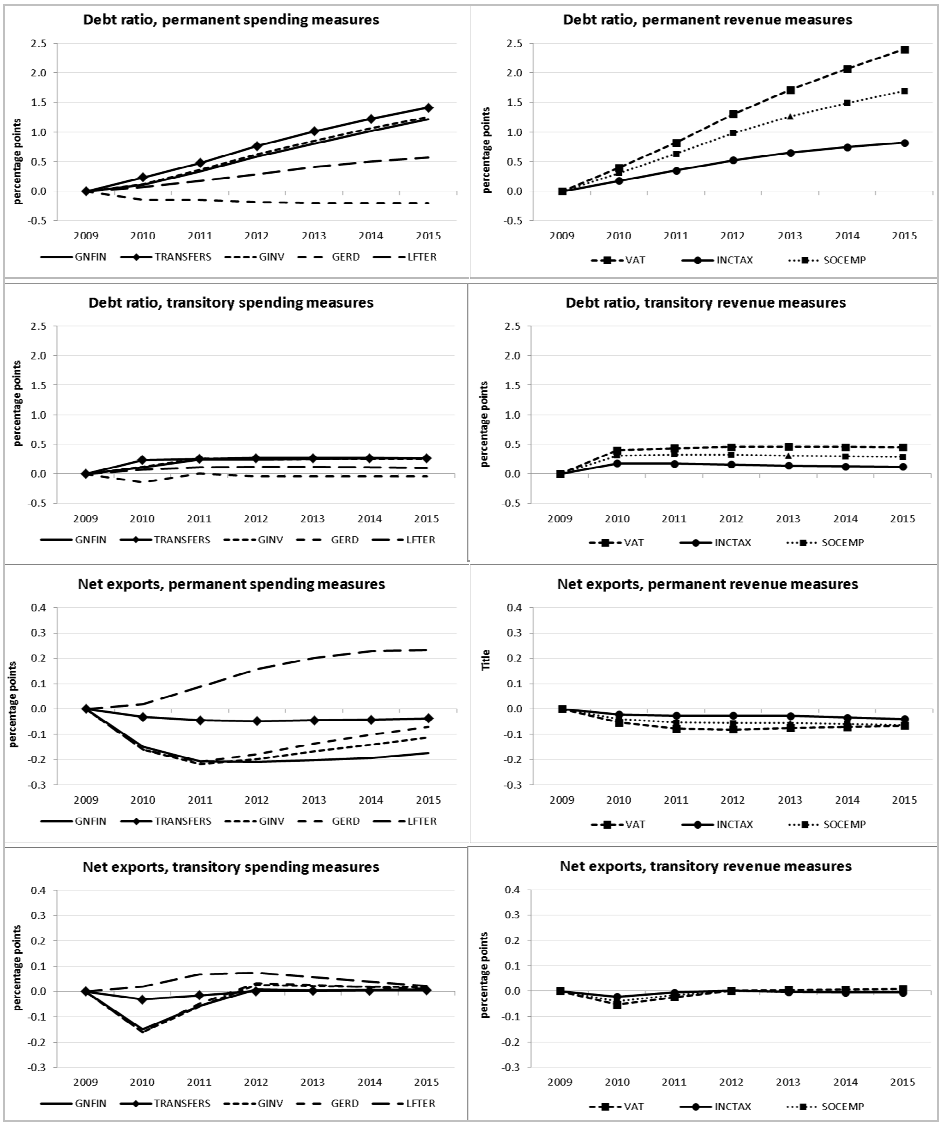
Figure 2 Fiscal multipliers in the SLOPOL model (continued)



(b)

Source: Authors' own calculations and illustrations

Figure 2 Fiscal multipliers in the SLOPOL model (continued)



(c)

Source: Authors' own calculations and illustrations

Figure 2 shows the resulting dynamic multipliers (impulse response functions) as absolute deviations from the baseline (the solution without any discretionary policy measures) of important macroeconomic aggregates which are generally regarded as policy targets (real GDP, employment, unemployment rate and debt to GDP ratio) in the various policy simulations. Supply side effects are captured by analysing changes in potential GDP. In addition, we show the effects on net exports (exports minus imports according to national accounts relative to GDP) as a proxy for the trade balance effects, which are relevant for a small open economy. In order to keep Figure 2 legible, transitory

and permanent measures are shown separately, as are the scenarios targeting the expenditure and revenue side of the budget.

Regarding real GDP, the effects of the transitory spending measures converge towards zero over time or even become slightly negative, with the exception of public investment in R&D (*GERD*) and the proportion of the population with tertiary education (*LFTER*). The effect of the latter even increases over time, in contrast to all other spending measures. The tax multipliers also decrease over time and become negative after two years. Regarding the permanent measures, the effects on real GDP are, as expected, largest for the investment variables. The effects of government R&D spending and human capital improvement even increase over time, while the multipliers of public consumption and transfer payments remain more or less constant and only slightly above zero. On the revenue side of the budget, the effects of cuts in the income tax rate, the social security contribution rate and the VAT rate peak in the first year of the implementation and decline afterwards. As to be expected, the temporary measures increase real GDP growth only temporarily. For the temporary measures, GDP growth is lower than in the baseline in the second year, and then the deviation from the baseline converges towards zero. In the case of the permanent measures, GDP growth also falls slightly below the baseline in the second year, with the exception of human capital improvements.

Turning to the price level and inflation (not shown in Figure 2 because of the small size of all the respective multipliers), the transitory public investment measures result in a lower price level, although the deviations from the baseline are very small. On the other hand, increases in those instruments triggering only a demand effect raise the price level, as expected. The same is true for tax cuts, although the effects are very limited. A similar pattern emerges from the permanent measures, but here the price depressing effect of tax cuts due to the reduction in the tax wedge lasts longer. The inflation rate is temporarily lower than in the baseline in the case of the increases in investment-related public expenditures. The same is true for the income tax and social security contribution rate cuts, but in these scenarios inflation is higher from the third year onwards and then again converges towards the baseline result. The permanent increases in investment-related public spending lower inflation permanently due to their positive impact on potential output. On the other hand, income and social security contribution rate cuts result in lower inflation only in the first two years and in higher inflation thereafter. VAT rate hikes influence inflation and hence the price level only marginally in our model.

As expected, employment can be improved by cuts in the tax wedge. However, if these measures are only implemented temporarily and then withdrawn suddenly, employment even falls below the baseline. Employment can also be raised effectively by increasing the education level of the labour force. In this case, the positive employment effects grow over time, even if the proportion of the population with tertiary education is raised only temporarily. The permanent increases lead to permanently lower unemployment, although the largest effect emerges from cuts to income tax and social security contribution rates. Out of the transitory measures, tax cuts decrease the unemployment rate only until the third year. Out of the expenditure measures, public investment and public R&D spending have larger and longer lasting impacts on the unemployment rate. The most significant effect on the unemployment rate can be achieved by raising the education level of the labour force permanently. In this scenario,

the unemployment rate is even higher than in the baseline in the first three years, but then falls more and more below the baseline.

The dynamic multipliers show also the impact of the policy changes on imports and exports. The effects of transitory policy actions are over after one or two periods at the most, with the exception of raising the education level the effect of which lasts longer. Permanent changes lower net exports relative to the baseline solution, which is mainly caused by increasing imports as a result of growth in aggregate demand. The only exception is the increase in the level of tertiary education, a supply side measure which primarily raises potential output and labour productivity, and hence international competitiveness, leading to an improvement in the trade balance.

All the fiscal policy measures analysed raise the public debt to GDP ratio, except for increased public spending on R&D. However, the profile of the effects on the debt ratio varies between measures and between temporary and permanent implementations. In the case of the permanent measures, the debt ratio deviates more and more from the baseline over time. The strongest increase in the debt to GDP ratio comes from the decrease in the VAT rate, which shows the importance of this tax as a source of financing public expenditures. Given this and the small effects on output and employment of changing the VAT rate, this instrument may serve to soften the adverse effects of expansionary measures on government debt by using it in a more restrictive way, that is, by accompanying increases in expenditure and decreases in other taxes by an increase in the VAT rate.

5 Could the Great Recession have been mitigated by fiscal policy?

Based on the multiplier analysis in the previous section, we now address the question as to whether the severe downturn in real GDP in 2009 and possibly also the recession of 2012–2013 could have been mitigated by fiscal policy. Specifically, we reduced the social security contribution rate and the income tax rate (revenue side instruments) and increased the expenditure side instruments (public investment in equipment and construction, spending on R&D, public consumption, transfers and spending on human capital). However, as the previous multiplier analysis already indicated, Slovenian policy makers would have had to implement rather drastic measures because of the relatively small size of most of the fiscal policy multipliers. We analysed three alternative scenarios, S1 to S3, with different policy mixes. The deviations in the policy instruments from the baseline simulation (in which we took the actual development of the instruments) are shown in Tables 1 to 3.

In the first alternative scenario (S1), we only used public investment and spending on R&D as well as the social security contribution rate as policy instruments. Since all the measures which were implemented are expansionary, this policy results in a considerable increase in public debt. Therefore, in scenario S2, we additionally increased the VAT rate from 2012 (the first year where public debt surpassed the Maastricht criterion of a 60% ratio to GDP) onwards to 25%. In both scenarios S1 and S2, the focus is on the attenuation of the Great Recession of 2009. Afterwards, the fiscal stimulus is gradually reduced.

Table 1 Fiscal policy measures in scenario S1

	GINV	*GERD*	*GNFIN*	*TRANSFERS*	*LFTER*	*VAT*	*INCTAX*	*SOCEMP*
2009	+50%	+50%	--	--	--	--	--	–0.5 pp
2010	+32%	+32%	--	--	--	--	--	–0.5 pp
2011	+12%	+12%	--	--	--	--	--	–0.4 pp
2012	+8%	+8%	--	--	--	--	--	–0.2 pp
2013	+5%	+5%	--	--	--	--	--	–0.2 pp
2014	+3%	+3%	--	--	--	--	--	–0.2 pp
2015	+1%	+1%	--	--	--	--	--	–0.2 pp

Table 2 Fiscal policy measures in scenario S2

	GINV	*GERD*	*GNFIN*	*TRANSFERS*	*LFTER*	*VAT*	*INCTAX*	*SOCEMP*
2009	+50%	+50%	--	--	--	--	--	–0.5 pp
2010	+32%	+32%	--	--	--	--	--	–0.5 pp
2011	+12%	+12%	--	--	--	--	--	–0.4 pp
2012	+8%	+8%	--	--	--	+5 pp	--	–0.2 pp
2013	+5%	+5%	--	--	--	+5 pp	--	–0.2 pp
2014	+3%	+3%	--	--	--	+5 pp	--	–0.2 pp
2015	+1%	+1%	--	--	--	+5 pp	--	–0.2 pp

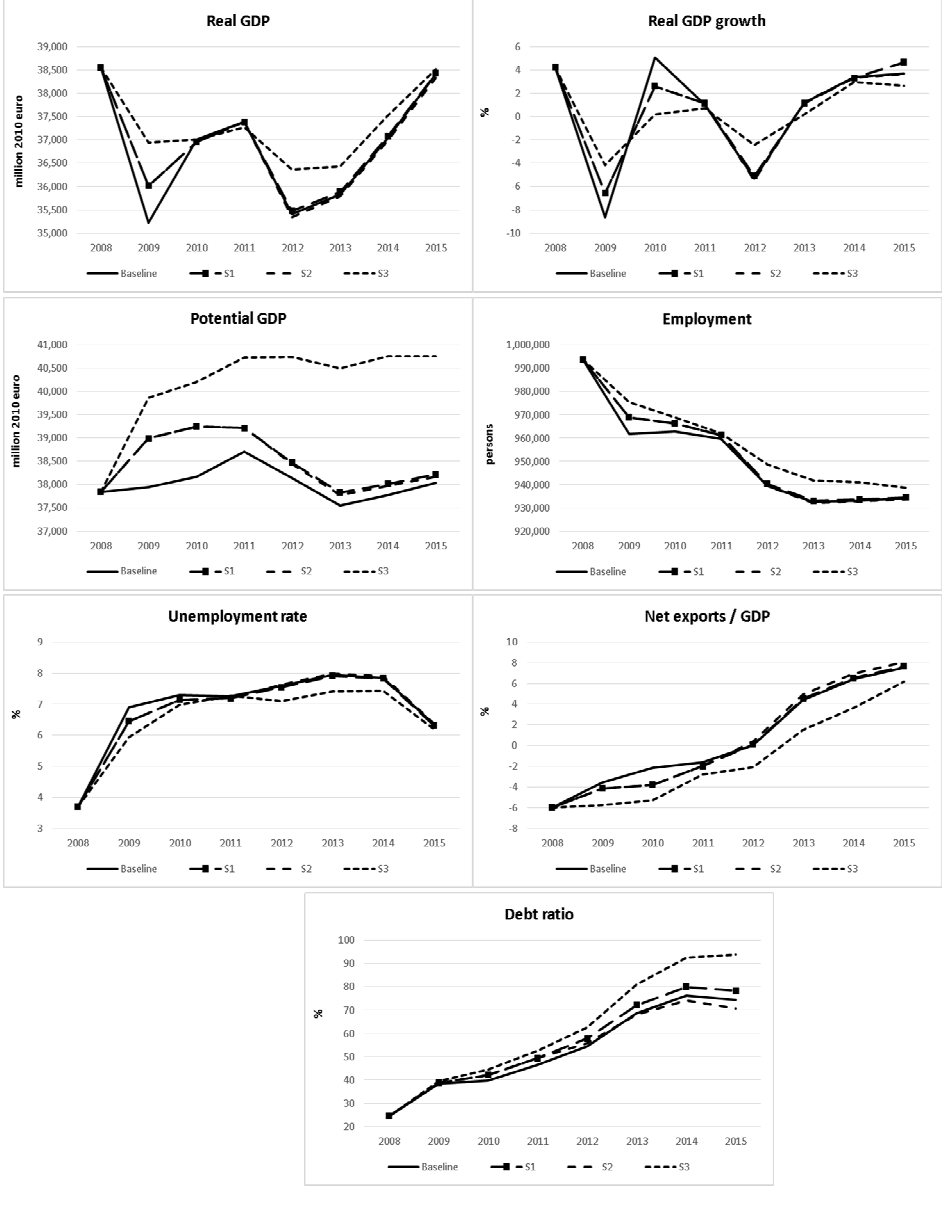
Table 3 Fiscal policy measures in scenario S3

	GINV	*GERD*	*GNFIN*	*TRANSFERS*	*LFTER*	*VAT*	*INCTAX*	*SOCEMP*
2009	+50%	+50%	+20%	+10%	+1 pp	+5 pp	–0.2 pp	–0.2 pp
2010	+32%	+50%	+10%	+10%	+1 pp	+5 pp	–0.3 pp	–0.3 pp
2011	+12%	+50%	+5%	+10%	+2 pp	+5 pp	–0.4 pp	–0.4 pp
2012	+50%	+80%	+20%	+10%	+2 pp	+5 pp	–0.5 pp	–0.5 pp
2013	+50%	+100%	+20%	+10%	+2 pp	+5 pp	–0.5 pp	–0.5 pp
2014	+40%	+100%	+20%	+10%	+2 pp	+5 pp	–0.5 pp	–0.5 pp
2015	+30%	+100%	+10%	+10%	+2 pp	+5 pp	–0.5 pp	–0.5 pp

In scenario S3, we tried to mitigate the second recession as well with its real GDP decline in 2012 and 2013. Hence, we implemented an additional fiscal stimulus in those years. In particular, we increased public R&D spending, the most effective measure to stimulate output, rather drastically (doubling it during the last three years). Furthermore, in this scenario, we reduced the income tax rate in addition to the social security contribution rate, and we raised the proportion of the population with tertiary education. To reduce the effect of this package on government debt, the VAT rate was increased to 25% from the beginning of the simulation period. Finally, we also increased the non-investment components of government expenditures, i.e., public consumption and transfers to private households.

Figure 3 shows the evolution of real GDP (level and growth), employment, the unemployment rate, net exports in relation to GDP and the debt ratio to GDP in the baseline and the three alternative scenarios. As usual, the model is not able to track the endogenous variables perfectly so we decided to use the baseline simulation rather than actual development as the basis for comparison.

Figure 3 Evolution of important macroeconomic indicators in the scenarios



Source: Authors' own calculations and illustrations

Scenario S1 shows that even the extremely expansionary fiscal policy implemented here is only able to mitigate the recession to a rather low degree while the debt ratio rises above the baseline values. This result is not surprising for a small and very open economy like Slovenia, as demand side effects are absorbed to a large extent by imports of goods and services. If however, the VAT rate is increased in addition (scenario S2), this increase in public debt can be avoided and even reversed in the years after the end of the recession without adverse effects on output and employment. This suggests that increasing indirect taxes may allow for an even more expansionary policy, both from the revenue and the expenditure side, without secondary effects on government debt.

The policy package assumed for strategy S3, however, shows that this is not true. Even under this policy mix, output remains considerably below potential output during the entire simulation period and the debt to GDP ratio rise by about 20 pp towards the end of that period. Figure 3 shows the main reason for the small output multiplier: the increase in real GDP due to additional spending and tax reductions is more than matched by the increase in imports resulting from higher aggregate demand. The effects on employment and unemployment are more satisfactory, although they do not completely sweep off the recession shock either. It is remarkable that the reduction in direct tax rates leading to a decrease in the tax wedge has stronger effects on employment and the unemployment rate than those of combined expenditure and revenue side demand management policies.

Similar results were obtained when considering changes in other categories of taxes or public expenditures. Thus, we have to conclude that fiscal policy measures, whether on the revenue side or on the expenditure side, can only partly mitigate but not eliminate the effects of a crisis like the Great Recession or the (European) recession following it when applied in an isolated way in a country like Slovenia with its strong international links. In addition, our simulations show that there should be some assignment of targets to instruments in the situation of a severe crisis, at least under the conditions similar to those of the Slovenian economy during and after the Great Recession. Tax policies are most effective when used to lower the burden of direct taxation on employment, while government spending should be used with the objective of raising not only aggregate demand but also potential output. It remains to be shown whether this particular case of a solution to the old assignment problem in the theory of economic policy (see Mundell, 1962; Fleming, 1968) can be generalised to other models.

6 Conclusions

Slovenia was hit particularly hard by the Great Recession. This recent macroeconomic and fiscal performance raises the question as to how the economy could be stimulated without increasing the public debt level at the same time. Moreover, the question is whether tax policy or spending policy measures are more effective at preventing output and employment from dropping too much. We used SLOPOL10, a medium-sized macroeconometric model for Slovenia, to simulate different fiscal policy measures on the revenue and expenditure sides.

Our results show that those public spending measures that entail both demand and supply side effects are more effective at stimulating real GDP than pure demand side measures. Measures that improve the education level of the labour force are very

effective at stimulating potential GDP and also GDP. Employment can be most effectively stimulated by cutting the income tax rate and the social security contribution rate, i.e., by reducing the tax wedge on labour income and positively affecting Slovenia's international competitiveness. Higher spending on R&D even reduces the debt to GDP ratio, while all other fiscal policy measures that we considered lead to higher public debt.

Fiscal policies would have to have been very expansionary merely to mitigate the severe recession of 2009 in Slovenia. One of the reasons for this result is the increase in imports, which counteracts the expansionary effects of demand management policies. Hence, a small open economy like Slovenia only has little scope for influencing macroeconomic development with the help of discretionary fiscal policies. An unwanted side effect of such an expansionary fiscal policy is a large further increase in public debt.

Our results clearly support the theory and empirical evidence that policy measures strengthening potential GDP bring about the best results in terms of stimulating economic growth and employment without putting a strain on public finances. Tax policy measures reducing the tax wedge have favourable effects on employment, while public spending directed at R&D and at improving the human capital of the labour force are most effective to increase output. Finally, the VAT may be used to reduce the increase in public debt associated with the expansionary policy measures.

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