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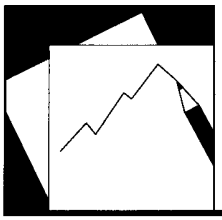

IMF Working Paper

Fiscal Multipliers in Bulgaria: Low But Still Relevant

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European Department

Fiscal Multipliers in Bulgaria: Low But Still Relevant[1]

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Abstract

With fiscal adjustment proceeding quickly in Bulgaria and given the weak economic growth environment, there is keen interest in making the budget composition more growth friendly. This paper quantifies the short-term impact of fiscal policy on economic activity in Bulgaria using econometric and model-based approaches. While fiscal multipliers have been modest in the past, as can be expected in a small open emerging economy, the effect on output is not independent of the speed of adjustment and the specific consolidation measures used. The impact of fiscal policy on economic activity is larger in downturns than in expansions and capital spending and direct taxes are associated with the largest effects on output, while non-targeted government transfers and indirect taxes are associated with a smaller impact. The results suggest that increased capital spending financed by higher indirect tax revenue collections through base broadening has sizeable growth effects over the medium and long-term.

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Keywords: Fiscal policy, fiscal consolidation, business cycle, nonlinear analysis, fiscal multipliers, general equilibrium models

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I. INTRODUCTION

Fiscal adjustment is proceeding rapidly in many countries in the context of a weak global economic environment. This has led to a resurgence of studies that try to quantify the effect of fiscal policy on output, frequently referred to as the fiscal multiplier. Fiscal multipliers are typically defined as the change in output following an exogenous change in the fiscal deficit with respect to their respective baselines (Spilimbergo and others, 2009).

To the best of our knowledge, the present paper is the first attempt to quantify the impact of fiscal policy on output for Bulgaria. Most studies that have investigated fiscal multipliers have either focused on advanced economies or employed a panel data approach, thereby providing average fiscal multipliers across countries. Neither of these approaches is tailored to the case of a small open emerging economy. Bulgaria is an interesting example in this regard since in addition to being a small open emerging economy it is also facing the challenge of how to promote growth while maintaining a currency board arrangement.

We first estimate a structural vector autoregressive model to examine the impact of fiscal policy on output historically. Recent studies (Auerbach and Gorodnichenko, 2012, Batini and others, 2012, Baum and others, 2012), have shown that multipliers are significantly larger in recessions than expansions. This paper analyzes how multipliers depend on the state of the economy using a threshold vector autoregressive model with the output gap as the threshold variable. The decision to use the output gap as the threshold variable is motivated by several factors, one of them is that under a negative output gap—independently of the sign of the GDP growth rate—excess capacities are available in the economy, reducing the crowding out of private investment following a government spending shock.

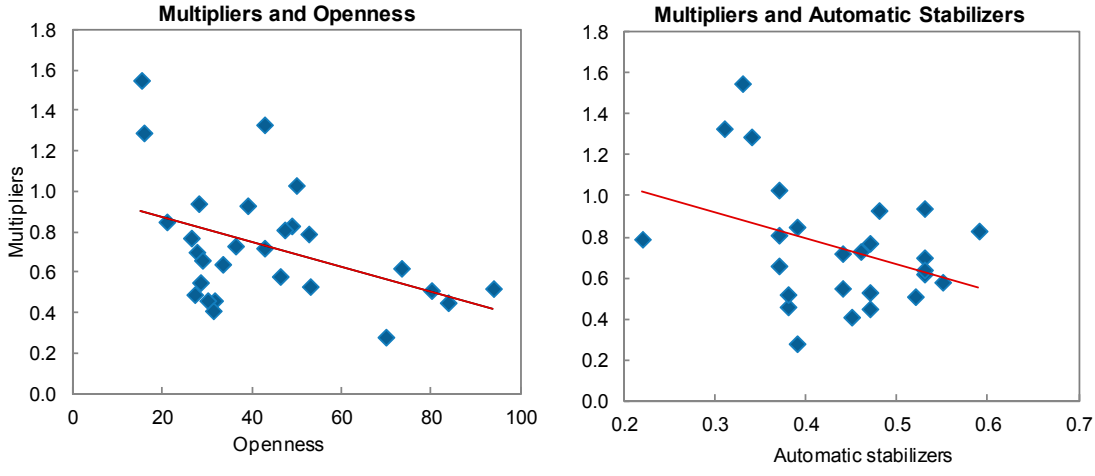
We then turn to the question of how to make the budget composition more growth friendly in Bulgaria. This question is answered by calibrating the IMF's Global Integrated Monetary and Fiscal model (GIMF) for Bulgaria in order to estimate instrument specific multipliers. A DSGE model, such as the IMF's GIMF, is well suited for this analysis since it is not subject to data constraints and by calibrating the economy around its steady state, it gives us an insight into the effects of fiscal consolidation on output going forward.

The paper is structured as follows. Section II summarizes the existing literature on fiscal multipliers with a special focus on studies investigating multipliers in emerging market economies. Section III presents details on empirical estimates of fiscal multipliers in Bulgaria. Section IV outlines some of the basic features and calibration of GIMF, and presents its estimates of fiscal multipliers. Section V uses GIMF to present a growth-friendly budget scenario. Section VI concludes.

II. Literature Review

The majority of studies on fiscal multipliers have focused on the advanced economies. A comprehensive literature review on fiscal multipliers in advanced economies can be found in Baunsgaard and others (2012), who extend and update Spilimbergo, Symansky, and Schindler (2009). Baunsgaard and others (2012) review a total of 37 studies including both model based (DSGE) and vector autoregressive (VAR) approaches. For those studies government spending multipliers range between 0 and 2.0, with a mean of 0.8 during the first year after fiscal measures are taken. Government revenue multipliers range from about –1.5 to 1.4, with a mean of 0.3. Coenen and others (2012) compare 7 models used at policy making institutions, and find that most models (of which 6 are DSGE models, including GIMF) have similar short-run multipliers for temporary changes in government spending (roughly 0.6 to 1.5 under the normal conduct of monetary policy) and revenues (roughly 0.1 to 0.5 under the normal conduct of monetary policy).

Figure 1. Country Characteristics and Multipliers



Sources: IMF, Fiscal Affairs Department Fiscal Rules database and Fiscal Transparency database; Organization for Economic Cooperation and Development (OECD); and IMF staff estimates.

Note: Multipliers are based on the OECD (2009). Openness is measured by import penetration, that is the 2008–11 average of Imports/(GDP – Exports + Imports)*100. Automatic stabilizers are measured as the semielasticity of the budget balance and are taken from André and Girouard (2005). The negative correlations in the panel are robust to outliers being removed using an automated Stata procedure based on leverage (a measure of how far an independent variable deviates from its mean) and residual in the equation.

In spite of an extensive literature, there is still no consensus regarding the size of fiscal multipliers, even in advanced economies. They tend to be smaller in more open economies and in countries with larger automatic stabilizers (Figure 1), but as the theoretical and empirical literature suggest, they differ widely across countries. For the advanced economies, Spilimbergo and others (2009) suggest that as a rule of thumb, government consumption multipliers are 0.5 or less in small open economies, with smaller values for revenue and

transfers and slightly larger ones for investment. Moreover, recent studies have concluded that multipliers are significantly larger when the economy is undergoing a recession than when it is in an expansion (Auerbach and Gorodnichenko, 2012, Batini and others, 2012, Baum and others, 2012).

Few papers have estimated fiscal multipliers in emerging economies. It is sometimes argued that fiscal multipliers should be lower in those countries since financial markets are less developed, the sovereign risk premium is higher, and a fiscal stimulus would have a stronger effect on interest rates, partly offsetting the initial impulse. The few empirical studies, which generally employ a panel data approach to estimate multipliers across emerging economies, tend to validate the hypothesis that multipliers are indeed lower (IMF, 2008, Mendoza and others, 2011 and Ilzetzki, 2011)). Some studies even conclude that multipliers are generally negative, particularly in the longer term (IMF, 2008) and when public debt is high (Ghosh and Rahman, 2008). Revenue-based stimulus measures seem to be more effective at boosting output in the short-term than expenditure-based measures, in contrast to advanced economies, perhaps reflecting concerns that, once implemented, increased expenditures are difficult to remove. Ilzetzki and others (2011) and Ilzetzki (2011) find that while spending multipliers are very small and not generally significant, revenue multipliers are positive and significant and lie around 0.3 in the short term. According to Mendoza and others (2010), the low overall spending multiplier in emerging economies could be due to the combination of a negative government consumption multiplier and a positive response of output to government investment with a multiplier of around 0.6 in the short-term.

Model-based approaches have typically been used to investigate fiscal multipliers by instrument. DSGE models are particularly suited for this analysis since they are not subject to data constraints when the number of explanatory variables is expanded. Based on these models, a clear ranking of fiscal instruments in terms of their negative short term growth impact has been established. These models conclude, in general, that spending multipliers are higher than revenue multipliers. On the spending side, investment has the highest negative short-term multiplier, followed by government consumption (wages and government purchases), followed by transfers to liquidity-constrained households, while transfers to households are associated with the lowest output impact among spending instruments. On the revenue side, the ranking of tax instruments reflects their perceived distortionary effects. Corporate income taxes and personal income taxes have the most negative effects on GDP. Consumption taxes do relatively better. And property taxes seem to be the most growth-friendly instrument (OECD 2009, OECD 2010, and EC 2010).

A previous study that is close to our paper is the work by Klyuev and Snudden (2011), which calibrates the IMF's GIMF to assess the impact of fiscal consolidation on output in the Czech Republic. The paper finds that fiscal multipliers are quite small, ranging from virtually zero to 0.5 in the first year. However, the effect of fiscal consolidation on output depends on the fiscal

instrument being used; with cuts in general transfers having the smallest negative impact on output, and cuts in government investment having the largest. Among tax instruments, for a lasting consolidation, higher consumption taxes have the lowest negative impact in the first few years, and the labor taxes the highest.

III. Fiscal Multipliers in Bulgaria—an Empirical Approach

In order to quantify fiscal multipliers for Bulgaria, we consider two different approaches. The first approach, explored in this section, is a vector autoregression, based on the seminal paper of Blanchard and Perrotti (2002).

A. Data and Methodology

The vector autoregression consists of three variables, namely real GDP, real net revenue and real net expenditure, as in Blanchard and Perotti (2002). In line with Blanchard and Perotti (2002), revenue is defined as total revenues excluding transfers and subsides and interest payments. Expenditure is defined as government consumption and investment. Further details on data including their sources are presented in Table A.1 in the Appendix.

We first estimate a structural VAR using quarterly accrual based fiscal data from 1999 to 2011 on general government revenues and expenditure, as well as GDP, all deflated with the GDP deflator. In order to test the robustness of the results and given that the quarterly series are very short, we then estimate the same model with monthly cash-based data from 2003 to mid-2012 with industrial production as a proxy for GDP.[1] Since the EU accession in 2007 is likely to have represented a significant structural break in the series, we also estimate the same structural VAR with data prior to 2007.

We then investigate whether multipliers differ depending on the state of the economy using a threshold VAR, which is a simple method to model changing dynamics of a set of variables over two or more distinct regimes. The regimes are determined by a transition variable, which is either endogenous or exogenous (Hansen 1996, 1997, Tsay 1998). In general it is possible to obtain more than one critical threshold value, but for simplicity we will focus on a model with only two regimes. Whether or not the system offers threshold behavior is determined by means of the Tsay (1998) multivariate threshold approach. A detailed explanation of the methodology can be found in Baum and others (2012).

The output gap is chosen as the threshold variable in our analysis to determine whether the economy is undergoing an expansion or downturn. The reasons to employ the output gap instead of the GDP growth rate are manifold. The output gap is the measure most commonly

[1] Industrial production growth and real GDP growth move together over time with a correlation of 0.4. Previous studies by the OECD have also found a close relationship between the cyclical profiles of the industrial production index and GDP for selected countries (OECD, 2002, 2006).

used to identify economic cycles, as it is seen not only as reliable ex-post but also as a reliable real-time indicator for policy-makers. More importantly, one argument for fiscal policy being more effective in downturns than in expansions is that under a negative output gap, excess capacities are available in the economy, making the crowding out of private investment lower. This argument is expected to hold as long as the output gap is negative, which can hardly be captured by low or negative growth rates.

Discretionary fiscal policy shocks are identified through exogenously determined revenue and expenditure elasticities that account for the impact of automatic stabilizers. This follows the Blanchard and Perotti (2002) structural identification approach. The shares of direct and indirect taxes, social security contributions and social spending (transfers) of total net revenue are determined and multiplied by their respective elasticities (1.1 for direct taxes, 1 for indirect taxes, 0.7 for social security contributions and -0.1 for social benefits).[2] One caveat of this approach is that the structural identification methodology is only able to filter out cyclical movements in revenues but not changes due to asset price cycles, which Bulgaria experienced prior to the crisis. This is a general drawback of this methodology (see IMF, 2010). Hence, the responses of output to revenue shocks have to be interpreted with caution.

B. Results

In Bulgaria fiscal multipliers have been modest, especially on the expenditure side (Table 1).

Table 1. Historical Fiscal Multipliers in Bulgaria

Frequency	*Quarterly*	*Monthly*	*Monthly*
Time period	1999–2011	2003–011	2003–2006
Revenue	0.33	0.32*	0.42*
Spending	0.04	0.31	0.16*

Source: IMF Staff estimates.

Notes: * denotes significance on impact according to a 95 percent confidence interval.

First year spending multipliers are found to lie around zero and first year revenue multipliers are 0.3, but are statistically insignificant when using quarterly accrual-based data between 1999 and 2011.[3] Using monthly data, over the whole sample, the impact on GDP growth of

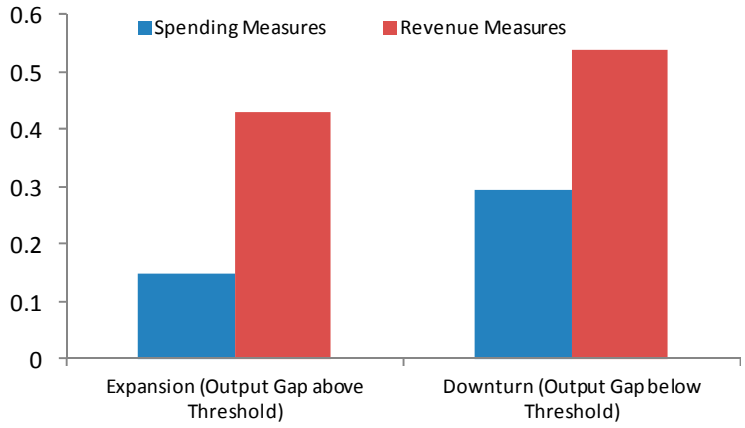
[2] These are standard elasiticities used in the literature.

[3] Adding inflation and interest rates to the specification did not affect the overall results.

revenue measures is now significant with an increase in tax collections decreasing economic activity, while expenditure multipliers remain insignificant. Further splitting the sample into a pre-and post-EU accession period, shows that prior to 2007 both revenue and expenditure multipliers were significant and positive with first-year multipliers of 0.4 and 0.2 respectively, meaning that a rise in spending and cut in taxes had a positive effect on growth and vice versa.

The impact of fiscal policy varies with the business cycle, with multipliers being larger in downturns than in expansions. This is intuitive since in times of a negative output gap, the proportion of credit-constrained households and firms, which adjust spending in response to a change in disposable income, is higher. The endogenously determined threshold values of the output gap above and beyond which the effect of fiscal policy on output changes is -1.73 percent. For simplicity, we refer to the two regimes as downturn and expansion. In a downturn revenue and expenditure first year multipliers are 0.5 and 0.3 respectively and in an expansion they are 0.4 and 0.2 respectively (Figure 2).

Figure 2. Bulgaria: First Year Fiscal Multipliers



Source: IMF Staff Estimates

The results are in line with the literature (see Ilzetzki and others, 2011 and Ilzetzki, 2011), which shows that short-term fiscal multipliers are mostly quite small in emerging economies. Moreover, the finding that tax multipliers exceed spending multipliers in the short run is also confirmed by Ilzetzki (2011).

However, the empirical results should be treated with caution. There are several caveats related to data constraints. First, cash based data often reflect fiscal policy actions with a lag. Moreover, multipliers reflect overall multipliers and not the effect of specific fiscal instruments. For instance, the spending multiplier captures the effect of productive and unproductive spending on output and the effects could have opposite directions decreasing the overall multiplier. The results are also averages over time and since Bulgaria's economy has seen significant structural changes, a model based approach that takes into account the current features of the economy is needed.

IV. Fiscal Multipliers in Bulgaria—Using The IMF's GIMF

Given the caveats associated with the empirical approach outlined above, we also compute fiscal multipliers using the IMF's GIMF. It is well suited for this analysis since it is not subject to data constraints. Using GIMF also allows us to calculate multipliers for a variety of fiscal instruments.

A. The Global Integrated Monetary and Fiscal Model (GIMF)

GIMF is a multi-country dynamic stochastic general equilibrium (DSGE) model with optimizing behavior by households and firms and full inter-temporal stock-flow accounting. It is widely used by the IMF and several central banks. Frictions in the form of sticky prices and wages, real adjustment costs, liquidity constrained households, along with finite planning horizons of households, imply an important role for monetary and fiscal policy in economic stabilization.

Non-Ricardian features of the model provide non-neutrality in both spending-based and revenue-based fiscal measures, which makes the model particularly suitable to analyze fiscal policy questions. In particular, fiscal policy can stimulate the level of economic activity in the short run, but sustained government deficits crowd out private investment and net foreign assets in the long run.

These non-Ricardian features include, in order of importance:

i) Overlapping generations (OLG) households who value government debt as part of their wealth. They consume out of a stock of wealth, and are able to smooth their consumption over time, by increasing or decreasing their marginal propensity to consume out of wealth in response to factors such as changes in taxes or wages.
ii) Liquidity constrained households who cannot access capital markets. They can only consume, every period, their post-tax labor income and any transfers they receive from the government.
iii) Multiple distortionary taxes that affect decisions by households and firms. There are taxes on labor income, corporate income and consumption (VAT)

Fiscal policy is conducted using a variety of fiscal instruments related to spending and taxation, while imposing that the government meets its long-term inter-temporal budget constraint. Government spending may take the form of consumption or investment expenditure or lump-sum transfers, to either all households, or targeted towards liquidity-constrained households. Revenue accrues from the taxes on labor and corporate income, consumption taxes, and lump-sum taxes. Government investment spending augments public infrastructure, which depreciates at a constant rate over time.

B. Data and Methodology

We use a 3-region model based on Bulgaria, the euro area, and the rest of the world. The calibration uses a variety of data sources. We use national account ratios, tax revenues for the different components, and general lump-sum transfers for 2011 (based on WEO data); trade decomposition data for 2011 (based on WEO data, direction of trade statistics, and U.N. COMTRADE data). The debt-to-GDP ratio is chosen to be 16 percent (equal to its medium-term value). The share of liquidity-constrained households is set to be 50 percent. We assume that Bulgaria faces nominal rigidities in line with the rest of the world, unlike the euro area, where nominal rigidities are 50 percent higher than the rest of the world.

In order to compute multipliers under fiscal consolidation, we consider the case where there is a permanent 1 percent of GDP decrease in the budget balance, financed by one of the seven fiscal instruments. On impact, the fiscal instrument will change by 1 percent of GDP. As the fiscal consolidation leads to a lower level of government debt, interest payments will decrease, providing the government with additional fiscal space. We assume the government will use that additional fiscal space to reverse as much as possible the change in the fiscal instrument being used in the consolidation process. In what follows, we will assume that the fiscal consolidation is credible. The adjustment path under full credibility is really a lower limit on the short-run costs from fiscal consolidation, as a temporarily noncredible adjustment will be more costly, of which we will provide an example, based on a consolidation path that uses government consumption expenditures.

C. Results

A ranking of the output loss over the first five years, associated with different consolidation measures, can be established based on GIMF. Multipliers differ significantly across instruments (Table 2).

Table 2. Fiscal Multipliers based on 1 Percent of GDP Permanent Change in the Budget Balance
(Percent Deviation from Baseline)

	Year 1	*Year 2*	*Year 3*	*Year 4*	*Year 5*
Government Investment	0.61	0.55	0.49	0.54	0.71
Government Consumption	0.51	0.33	0.13	0.02	0.01
Targeted Lumpsum Transfers	0.45	0.23	-0.07	-0.28	-0.35
General Lumpsum Transfers	0.30	0.13	-0.12	-0.28	-0.31
Corporate Income Taxes	0.53	0.56	0.51	0.58	0.80
Labor Income Taxes	0.40	0.44	0.42	0.41	0.43
Consumption Taxes (VAT)	0.38	0.32	0.17	0.07	0.05

Source: IMF staff calculations.

As these results are explained, it should be kept in mind that even though the consolidation in debt is permanent, the change in the fiscal instrument is merely temporary, because of the evolution of government debt explained in the previous section.

In the first year, cuts in government consumption and investment are associated with the largest multipliers among spending instruments, since the decrease in government spending enters real GDP directly, while all other fiscal instruments have to enter through indirect channels on trade, consumption and investment. Government investment has the highest multiplier, as a decrease in government investment in infrastructure will act as a negative shock to the productivity of the economy, in addition to entering real GDP directly. For both measures, there is an offset provided as there is less crowding out of domestic investment, plus there is a decrease in imported goods.

The other two spending measures, general and targeted transfers have lower multipliers, as they are lumpsum additions to household income, and therefore are non-distortionary. Those transfers that go to liquidity-constrained households cause an immediate change in their income, while temporary changes in transfers to OLG households will have little effect on their spending, as they consume out of their expected stock of wealth, and not directly from their current income. Therefore, general transfers to households are associated with the lowest first year output impact among spending instruments, while targeted transfers have a larger effect, as they move consumption immediately.

On the revenue side, the degree of economic distortion determines the multipliers for the different taxes. Corporate income taxes have the most negative effect on GDP, as they have a large distortionary effect on investment, which leads to long-run decreases in the level of the capital stock, and hence the productive capacity of the economy. Labor income taxes are the second-most distortionary instrument. They reduce the productive capacity of the economy like corporate income taxes, but more temporarily. Moreover, they also reduce consumption by the liquidity-constrained households, but have a smaller effect on OLG households, who understand the temporary nature of the cut in labor taxes. Finally, consumption taxes have the lowest impact on GDP, as they only affect consumption demand, mostly through liquidity-constrained households, with little impact on OLG households, who understand the tax increase is temporary, and redistribute their wealth across time accordingly to continue smoothing their consumption.

The cost of fiscal consolidation could potentially be higher than stated here. In Table 2, households and firms believe the announced fiscal consolidation path of the government. However, the results in Table 3 demonstrate what would happen if households and firms did not initially believe that the fiscal consolidation would be permanent, that is, it would not be immediately credible.

Table 3. Fiscal Multipliers based on 1 Percent of GDP Permanent Change in the Budget Balance, Considering Issues of Credibility
(Percent Deviation from Baseline)

	Year 1	*Year 2*	*Year 3*	*Year 4*	*Year 5*
Government Consumption					
Immediately Credible	0.51	0.33	0.13	0.02	0.01
Credible in Year 2	0.48	0.42	0.25	0.10	0.04
Credible in Year 3	0.48	0.38	0.34	0.20	0.10
Credible in Year 4	0.48	0.38	0.29	0.29	0.21

Source: IMF staff calculations.

In this example, we consider a 1% of GDP consolidation, based on a reduction in government consumption expenditures. The immediately credible case is the same as in Table 2. In the other scenarios, households and firms believe that spending (and consequently the deficit) will revert to its old path the following year. The second line shows the consequences if households and firms believe the consolidation is temporary in the first year, but then accept that it is permanent as of year 2. The third line is the case where households and firms believe the government will revert to its old spending patterns two years in a row, until accepting that the consolidation is permanent, as of year 3. In the case of the fourth line, the consolidation is not credible and is not accepted as permanent until year 4.

While the consolidation is noncredible, and is perceived as temporary, the reduction to output is smaller, as firms and households do not permanently adjust their behavior. However, when they finally accept the consolidation as being permanent, and it is fully credible, the costs are higher than if the consolidation had been credible from the beginning. Households and firms must change their behavior more than expected, and face greater accumulated costs in doing so. In the case of Bulgaria, the government over performed on its fiscal targets both in 2011 and 2012, making the non-credible cases less likely.

V. Is There a Better Way to Structure the Budget to Support Growth in Bulgaria in the Future?

With most of the adjustment needed to reach the Bulgarian authorities' target of a balanced budget by 2015 already completed (IMF, 2012), making the budget composition more growth friendly is the priority. We can also use GIMF to analyze this question based on the calibration results for the fiscal multipliers in the previous section.

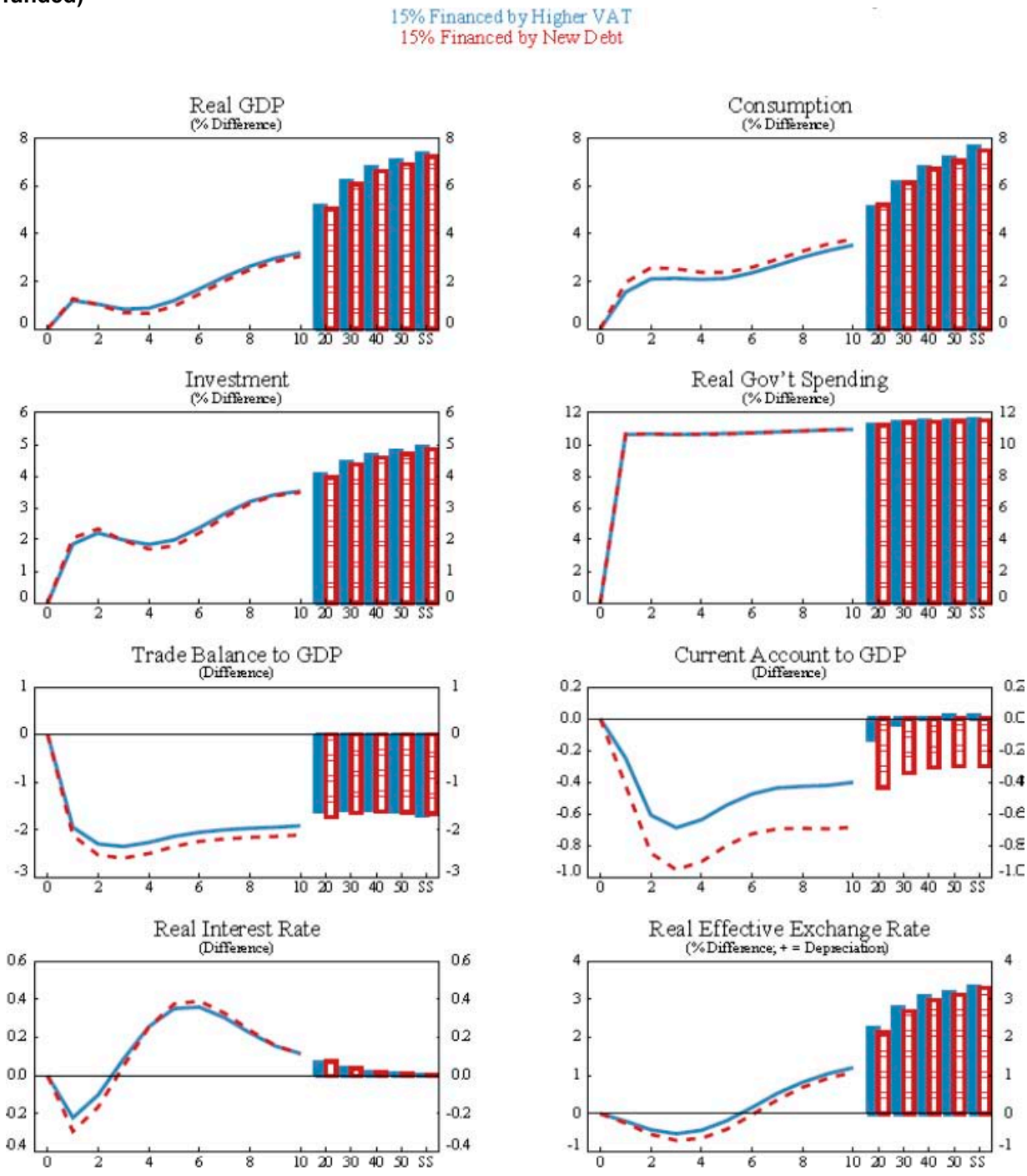
As the previous section demonstrates, multipliers differ significantly by instrument for consolidation, so it follows that the choice of instruments has important implications for the optimal budget composition. Currently, the Bulgarian budget is growth friendly on the revenue side: direct taxes rates are low and most revenues are collected through indirect taxes.

Furthermore, our results suggest that an ideally designed adjustment package that would best stimulate growth would be based on an increase in public investment financed by EU funds. Specifically, we look at the case of: a permanent 2 percent of current GDP increase in public investment of which 85 percent is financed by grants from the rest of the European Union. However, EU-financed investment spending is subject to a 15 percent co-payment. Therefore, we consider two variants: (i) the 15 percent co-payment is financed in a budget neutral way by a broadening of the tax base. (ii) the co-payment is financed by a higher deficit.

Increasing capital expenditure permanently raises real GDP. Increasing spending by 2 percent of nominal GDP leads, in the long run, to a 30 percentage point increase in the stock of public infrastructure. This, in turn increases the productivity of factors of production in the economy, so that real GDP increases about 3 percent relative to its baseline value (Figure 3). Moreover, a permanent increase in government investment can be more effective than an increase in private investment, as government investment is typically on infrastructure such as roads, hospitals, public institutions, etc., which depreciate at a slower rate than the stock of machinery and equipment. Private investment begins rising immediately. Consumption also increases since higher productive capacity lowers prices. The currency board means that while nominal interest rates remain unchanged, real interest rates eventually fall, providing additional stimulus. As the short-run level of aggregate demand in Bulgaria increases, there are greater domestic inflationary pressures, leading to an appreciation of the real exchange rate in the short-run. However, in the long-run there is a significant real depreciation (about 3 percent) since the increase in government investment behaves the same as a permanent economy-wide increase in productivity, making Bulgaria-produced goods cheaper to its trading partners.

Financing the increased public investment in a budget neutral way (through a broadening of the indirect tax base) is preferable to letting the deficit increase. The results under the two methods of financing are qualitatively the same, but there are some quantitative differences. In the short-run, consumption will be lower under the broader tax base than under deficit financing, as the increase in the VAT has a direct impact on consumption. However, in the medium term, deficit financing will lead to higher government demand for debt in local markets (crowding out funding for private investment) and also a larger current account deficit, relative to the case of a broader tax base. Without the downward pressure on investment from the higher debt load, there is a stronger expansion of the economy's productive capacity, allowing for higher wage income and household wealth, and higher consumer spending (despite the drag of the higher VAT). This is reinforced by the greater depreciation of the real exchange rate resulting from less Bulgarian demand for foreign funding for its government debt when broadening the tax base.

Figure 3. Scenario Analysis: 2 Percent Increase in Government Investment (85 percent EU funded)



Source: IMF staff calculations.

Note: SS denotes the long-run value of the variable being graphed.

VI. Conclusions and Policy Implications

This paper is one of the relatively few studies investigating fiscal multipliers in an emerging economy. To the best of our knowledge it is the first attempt to estimate fiscal multipliers for Bulgaria. We first employ an econometric approach, which estimates the historical relationship between fiscal policy and output, taking into account that multipliers may differ in expansions and downturns. We then also calibrate the IMF's GIMF model for Bulgaria to provide insights into the likely effects of future fiscal consolidation on the economy.

As can be expected for a small open economy, our results show that the impact of fiscal policy on output has been modest in the past. However, the empirical results show that the effect of fiscal policy on output is not independent of the underlying state of the economy with fiscal multipliers being larger in downturns than in expansions. This is intuitive since in times of a negative output gap, the proportion of credit-constrained households and firms, which adjust spending in response to a change in disposable income, is higher.

Using the IMF's GIMF, a clear ranking of fiscal instruments in terms of their growth impact can be established for Bulgaria. On the spending side, capital spending has the largest multiplier, both on impact and in the medium term. It is followed by government consumption and transfers. On the revenue side, corporate income taxes have the largest impact on output, followed by labor income taxes and consumption taxes.

The GIMF analysis also shows that multipliers have a much larger or longer impact, if they represent consolidations that are not immediately and fully credible to agents in the economy. Therefore, policy changes work best when they are transparent, and are conducted in a policy framework with a reputation for maintaining its previously announced plans.

The fact that multipliers differ significantly by instrument has important implications for the optimal budget composition. Currently, the Bulgarian budget is growth friendly on the revenue side: direct taxes rates are low and most revenues are collected through indirect taxes. However, the tradition of underperforming on capital spending is clearly undesirable. In terms of future plans, the analysis suggests the undesirability of raising government consumption, whereas a strategy of higher capital spending financed by increasing indirect tax revenue collection through base broadening and has sizeable growth effects over the medium and long-term.

The analysis points to several additional steps to make the budget more growth friendly:

- The authorities should address barriers to EU funds absorption to increase capital spending on infrastructure. Tackling the large shadow economy to broaden the tax base would also create resources for higher productive spending on infrastructure, as

increasing government debt would lead to undesirable crowding-out effects elsewhere in the economy.

- Subsidies and other non-targeted government transfers (i.e. general lumpsum transfers in the analysis using GIMF) need to be reviewed to make room for more growth enhancing expenditure. In Bulgaria until the 2013 budget, subsidies of SOEs in particular have been growing over time but are associated with small multipliers.

- Further pension reforms that increase the length of working lives will also have a salutary effect on potential growth as this is effectively a permanent increase in labor supply (Karam and others, 2010). Although such pension reform likely entails lower permanent pension spending (which would act as a reduction in either general or targeted lumpsum transfers in the analysis using GIMF), this change would be associated with a relatively small short term multiplier, while helping contain projected spending increases.

VII. APPENDIX

A. Data Sources and Description

Quarterly Data 1999Q1-2011Q4

Variable	Definition	Sources	Notes
Real GDP	Gross domestic product (production approach) at average 2005 prices, million levs	National Statistical Institute	Data were seasonally adjusted with Tramo seats in EViews.
Nominal GDP	Gross Domestic Product (production approach) – current prices	National Statistical Institute	Data were seasonally adjusted with Tramo seats in EViews.
GDP deflator	Nominal GDP/Real GDP	Own calculations	
Real net revenue	Net revenue=total revenue on production and imports+ current taxes on income and wealth+ total social security contributions received+ other current transfers received + total capital transfers received-total social benefits-subsidies payable-other current transfers payable-capital transfers payable; million levs	National Statistical Institute	Data are on ESA95 basis (accrual). Data were converted into real terms by dividing it by the GDP deflator and then seasonally adjusted using Tramo seats in EViews.
Real expenditure	Expenditure= Intermediate consumption+ Gross Capital Formation, Acquisitions less disposals of non-financial non-produced assets+ Compensation of employees; million levs	National Statistical Institute	Data are on ESA95 basis (accrual). Data were converted into real terms by dividing it by the GDP deflator and then seasonally adjusted using Tramo seats in EViews.

Monthly Data 2003M1-2012M5

Variable	Definition	Sources	Notes
Industrial production	Industrial production index (2005=100)	National Statistical Institute	Data were seasonally adjusted with Tramo seats in EViews.
Production Price Index	PPI/WPI.	IFS	Index number.
Real net revenue	Net revenue=total tax revenue +nontax revenue-social contributions-net interest spending-social expenditure-subsidies; million levs	Ministry of Finance Fiscal program-National definition Gross consolidated budget	Data are on cash basis. Data were converted into real terms by pre-multiplying them by 100/PPI and then seasonally adjusted with Tramo seats in EViews.
Real expenditure	Expenditure=Wages and salaries+ maintenance+ capital expenditure; million levs	Ministry of Finance Fiscal program-National definition Gross consolidated budget	Data are on cash basis. Data were converted into real terms by pre-multiplying them by 100/PPI and then seasonally adjusted with Tramo seats in EViews.
Output Gap	In percent of GDP.	Own calculations	HP filter on IP, λ=10000.

REFERENCES

Auerbach, A.J., and Y. Gorodnichenko, 2012b, "Fiscal Multipliers in Recession and Expansion," in "Fiscal Policy after the Financial Crisis," A. Alesina and F. Giavazzi, (eds.), University of Chicago Press.

Batini, N., G. Callegari, and G. Melina, 2012, "Successful Austerity in the United States, Europe and Japan," IMF Working Paper 12/190 (Washington: International Monetary Fund).

Baum, A., A. Weber, and M. Poplawski-Ribeiro, 2012, "Fiscal Multipliers and the State of the Economy," IMF Working Paper 12/286 (Washington: International Monetary Fund).

Baunsgaard, T., A. Mineshima, M. Poplawski-Ribeiro, and A. Weber, 2012, "Fiscal Multipliers," in *Post-Crisis Fiscal Policy*, C. Cottarelli, P. Gerson, and A. Senhadji (eds.) (forthcoming; Washington, International Monetary Fund).

Blanchard, O., and R. Perotti, 2002, "An Empirical Characterization of the Dynamic Effects of Changes in Government Spending and Taxes on Output," *Quarterly Journal of Economics,* Vol. 117, pp. 1329–68.

Coenen, G., C. Erceg, C. Freedman, D. Furceri, M. Kumhof, R. Lalonde, D. Laxton, J. Lindé, A. Mourougane, D. Muir, S. Mursula, C. de Resende, J. Roberts, W. Roeger, S. Snudden, M. Trabandt, and J. in't Veld, 2012, "Effects of Fiscal Stimulus in Structural Models," *American Economic Journal: Macroeconomics*, American Economic Association, 4(1), pp. 22–68, January.

European Commission, 2010, "Fiscal Policy, Debt Reduction, and Growth after The Crisis," chapter III of *Public Finances in EMU*,

Ilzetzki, E., 2011, "Fiscal Policy and Debt Dynamics in Developing Countries," Policy Research Working Paper Series 5666 (Washington: The World Bank).

Ilzetzki E., E. G. Mendoza and C. A. Vegh, 2011. "How Big (Small?) Are Fiscal Multipliers?" IMF Working Papers 11/52(Washington: International Monetary Fund).

International Monetary Fund, 2010, *World Economic Outlook*, October (Washington: International Monetary Fund).

———, 2012. Bulgaria: 2012 Article IV Consulation – Country Report No. 12/328 (Washington: International Monetary Fund).

Karam, P.D., D. Muir, D., J. Pereira, and A. Tuladhar, 2010, "Macroeconomic Effects of Public Pension Reforms," IMF Working Paper 10/297 (Washington: International

Monetary Fund).

Klyuev, V. and S. Snudden, 2011, "Effects of Fiscal Consolidation in the Czech Republic," IMF Working Paper 11/65 (Washington: International Monetary Fund).

Kumhof, M., D. Laxton, D. Muir and S. Mursula, 2010, "The Global Integrated Monetary and Fiscal Model: Theoretical Structure", IMF Working Paper No. 10/34 (Washington: International Monetary Fund).

OECD, 2002, "An Updated of the OECD Composite Leading Indicators", http://www.oecd.org/dataoecd/6/2/2410332.pdf.

OECD, 2006, "Composite Leading Indicators for Major OECD Non-Member Countries: Brazil, China, India, Indonesia, Russian Federation, South Africa", Statistics Working Paper N. 16 - 2006/1.

OECD, 2009, "The Effectiveness and Scope of Fiscal Stimulus," OECD Economic Outlook Interim Report (Paris: Organization for Economic Cooperation and Development).

OECD, 2010, "Fiscal Consolidation: Requirements, Timing, Instruments and Institutional Arrangements" OECD Economic Outlook 2010/2 (Paris: Organization for Economic Cooperation and Development).

Spilimbergo, A., S. Symansky, and M. Schindler, 2009, "Fiscal Multipliers," IMF Staff Position Note, SPN/09/11, May (Washington: International Monetary Fund).