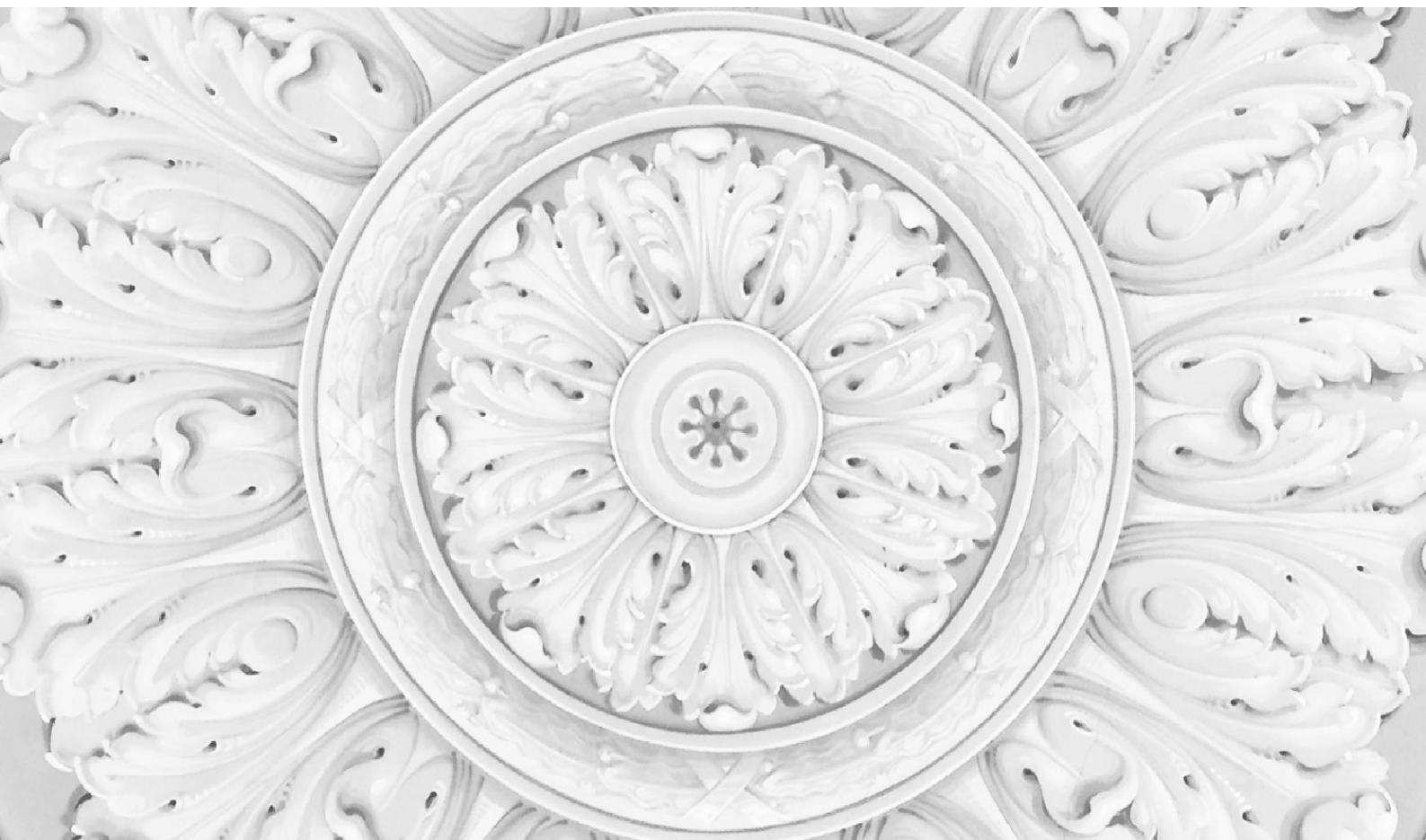Банк России
Центральный банк Российской Федерации

WORKING PAPER SERIES

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Fiscal multipliers in Russia

No. 28 / January 2018

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Summary

The paper covers the theoretical and practical issues related to estimating fiscal multipliers for the Russian economy. The analysis of the main determinants affecting the size of multipliers suggests a relatively low effect of changes in fiscal variables on output growth. Estimation of the general government revenue and spending multipliers are generally in line with these expectations as well as with the results available for emerging market economies and stands at the values of -0.75 and 0.28 respectively. The negative direct impact on GDP growth from the medium-term fiscal consolidation is estimated as relatively small (cumulatively about 0.3 percentage points through 2018-2020). Fiscal consolidation scheduled for the medium-term is expected to have a negative impact on output. However, since it is intended to be carried out mainly at the expense of the expenditure part of the budget, this should be less harmful to output growth and could promote greater efficiency in public spending. The direct impact from a reduction in expenditures can be fully offset by a significant positive indirect impact on GDP from an increase in confidence about long-term fiscal sustainability.

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INTRODUCTION

Fiscal multipliers measure the response of output ($ΔY$) on horizon i to the discretionary change in fiscal indicators (spending/revenue – $ΔFI$) in period t.

$$Fiscal\ \ multiplier\ \ at\ horizon\ \ i = \frac{ΔY(t+i)}{ΔFI(t)} \qquad (1)^{[1]}$$

Fiscal multipliers are important for macroeconomic forecast accuracy. Knowledge of the values of multipliers of different fiscal components enables the regulator to choose the optimal policy. It is of particular importance to the Russian economy, as over the last decade Russia's public finances were in the process of gradual fiscal easing and since 2017 have come through fiscal consolidation intended to bring budget deficit to a more sustainable level. Fiscal multipliers show a direct impact of fiscal policy on GDP growth. Besides, there is also an indirect impact, which can be attributed to the credibility of the fiscal policy conducted by the authorities.

This paper is devoted to theoretical considerations about the size of fiscal multipliers in Russia and the estimation of the general government revenue and spending multipliers. The estimation shows that the spending multiplier is substantially lower than that for revenues. Taking this into account, we can conclude that the direct impact of fiscal consolidation should have a temporary negative impact on GDP growth but, since it is intended to be carried out mainly by spending cuts, it should be relatively small, cumulatively about 0.3 percentage points throughout 2018-2020. Moreover, the negative direct impact of fiscal consolidation can be fully offset by a significant positive indirect impact on GDP from an increase in economic agents' confidence about long-term fiscal sustainability. Macroeconomic stability, including fiscal, allows the Bank of Russia to switch gradually from moderately tight to neutral monetary policy.

The paper is further organised as follows. Section 1 contains a brief review of the literature devoted to the assessment of fiscal multipliers and the analysis of the determinants of their size for the Russian economy. In Section 2, we estimate fiscal multipliers for the Russian general government revenue and spending by means of a Structural Bayesian autoregressive model (SBVAR). The final section offers a conclusion.

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[1] The special case with i=0 determines *impact multiplier*. See Batini et al. (2014) for details on fiscal multipliers' definitions.

1. LITERATURE REVIEW AND FISCAL MULTIPLIERS DETERMINANTS FOR RUSSIA

The last decade has seen a large number of studies devoted to the estimation of fiscal multipliers. The main finding is the existence of a wide range of results with no conventional benchmark. This can be explained by both objective and subjective factors affecting the results of the estimation. The difference in methods and assumptions applied by authors as well as the length and the frequency of time series can be classed as subjective factors. By applying meta regression analysis to a set of 89 studies, Gechert and Will (2012) found that the results of the estimation crucially depend on the chosen class of models and methods as well as on the length of time series.

The literature relies on two main methods for fiscal multipliers estimation: Vector autoregressive (VAR) and Dynamic stochastic general equilibrium (DSGE) models. Extensive use was made of structural vector autoregressive models (SVAR). In one of the most famous studies, Blanchard, Perotti (2002) use identification assumptions to extract structural shocks and estimate their impact on GDP growth. Later on, various SVAR model identifications were actively used to identify exogenous fiscal shocks (Favero, Giavazzi (2012), Mertens, Ravn (2012)), generalise and explore the characteristics of countries, employ non-linearity to examine changes in value of fiscal multipliers across the business cycle (Auerbach, Gorodnichenko (2012), Baum et al. (2012)). VAR models provide an estimate of the "average" response of output to exogenous fiscal shocks, so the multipliers estimated within these models are better to use when the state of the economy is close to "normal"[2]. If the state of the economy differs significantly from "normal", estimates made using DSGE models can be more useful if they adequately reflect current economic conditions. For a review of DSGE models, see Coenen et al. (2012).[3]

The IMF was prompted to prepare a paper with a simple method for computation of the overall fiscal multiplier by scoring a set of determinants that affect its size (Batini et al. (2014b)) owing to the fact that a substantial number of countries are without long time series for conducting qualitative analysis.

Russia has a problem with having long and comparable time series for a number of indicators. This can be explained by the differences in Soviet and conventional statistics standards and the continuous transition to the new data processing methods that is often undertaken without the appropriate revisions to the previous data. In this paper we assess fiscal multipliers by means of a Bayesian SVAR model since it allows us to deal with short and volatile data series (see Section 2.2.). We use this approach drawing on Caldara, Kamps (2012).

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[2] Characterised by small output gap, interest rates not constrained by the zero lower bound etc.
[3] See Batini et al. (2014b) for details on main methods for fiscal multipliers estimation including their advantages and disadvantages.

The differences in determinants of their size, i.e. different structural country characteristics, differences in fiscal and monetary policies and the state of the economy are the objective factors for the wide range of fiscal multipliers' estimates among countries and time periods. Based on the literature, we can indicate the following main determinants:

- **Labour market rigidity.** Higher rigidity of contracts on a labour market and lower negotiating power held by the employers leads to a higher response from output to a demand shock (Gorodnichenko et al. (2012)). Compared to advanced economies, Russia is characterised by relatively low negotiating power among employees and labour unions as well as a low percentage of the fixed part of total income (Gimpelson, Kapellushnikov (2015)). Moreover, Russia is associated with a large shadow economy: about 16 per cent of GDP according to Federal State Statistics Service estimates. This all reduces the size of fiscal multipliers.

- **Propensity to import.** Small and closed-to-trade countries tend to have less fiscal stimulus "leakage" abroad (Ilzetzki et al. (2013)). Russia is a large and, to a certain extent, open economy and the combination of the latter factors has a negative impact on the size of fiscal multipliers.

- **Public expenditure management and revenue administration.** Greater efficiency of fiscal measures leads to a greater impact on output. In Russia, even with the supposed positive dynamics in recent years, the efficiency of government spending and revenue administration is rather low (MFR (2017)). The latter is associated with the large shadow economy and, it is also posited, high sensitivity to the increase in tax burden. This reduces the values of fiscal multipliers.

- **Fiscal sustainability aspect.** Low level of public debt and its healthy dynamics are associated with higher credibility of the current fiscal policy and a lower propensity to save a part of a stimulus in fear of a similar increase in future taxes to compensate for policy easing (Ilzetzki et al. (2013)). Though Russia has low public debt (at the end of 2016 general government debt was equal to 16.1 per cent of GDP, 3.2 per cent of GDP of which are government guarantees[4]), the credibility of the current fiscal policy cannot be considered high. This can be explained by Russia's sovereign default in 1998 as well as by the economy's high dependency on non-renewable resources and the state of the economies of its main trading partners.[5] This may have a negative effect on the size of fiscal multipliers in Russia.

- **The exchange rate regime.** Under a fixed exchange rate regime, monetary authorities are forced to accommodate fiscal policy, and exchange rate movements do not offset the impact

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[4] Calculated based on the data from the Russian Ministry of Finance and Federal State Statistics Service.
[5] According to the Russian Ministry of Finance estimates, the safe value of the Russian government debt is 25 per cent of GDP. Meanwhile, Reinhart et al (2003) showed that a critical value of public debt for countries with a history of default is only 15 per cent of GDP.

of discretionary fiscal policy on the economy[6] (Corsetti et al. (2012)). On 10 November 2014, the Bank of Russia switched to a floating exchange rate. Prior to that, the Bank of Russia had conducted its exchange rate policy in a managed floating exchange rate regime, but often substantially influenced the exchange rate with its instruments.

- **The reaction of monetary policy.** Fiscal multipliers are larger if monetary authorities do not increase the nominal interest rate in response to fiscal expansion so that there is less crowding out of domestic investment and consumption (Spilimbergo et al. (2009)).[7] The Bank of Russia increased its policy rate several times in 2008 and in 2014 but never did so as a response to fiscal policy easing.

- **Financial market development.** Countries with a relatively low degree of financial market development and, consequently, a lower possibility for economic agents to distribute income over time tend to have larger fiscal multipliers (Batini et al. (2014a)). Russia has a relatively low degree of financial market development, which does not put additional pressure on the size of fiscal multipliers.

- **The state of the business cycle.** Studies show that fiscal multipliers are larger during economic downturns than in upturns and this is true both for fiscal consolidation and expansion periods (Auerbach, Gorodnichenko (2012)). One possible explanation is a better targeting of government spending, i.e. distribution of spending more to (non-Ricardian) households with a high propensity to consume.

There are also some theoretical and empirical considerations about the interrelation between revenue and spending multipliers as well as multipliers of their main components:

- The government spending multiplier tends to be larger than the revenue multiplier since it is considered that households save a part of the tax cut (Padoan (2009)). Meanwhile, many studies show the opposite (Ilzetzki (2011)).

- Among government spending components, those with a direct impact on aggregate demand have the largest multiplier (government consumption and investment) while consumption taxes usually have the largest effect among taxes, partly due to the fact that they directly build into the price and it is hard to evade paying them (Coenen et al. (2010).

The literature shows that fiscal multipliers in advanced economies (AEs) are (substantially) larger than those in emerging market economies (EMEs) and low-income countries (Ilzetzki (2011)), which can be explained by a better composition of their determinants, particularly, better efficiency of government spending.

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[6] In the Mundell-Fleming model under conditions of flexible exchange rate regime, economic growth stimulation by means of an increase in budget expenditures is ineffective since it leads to the crowding out of government consumption by net export.

[7] At the zero lower bound, the positive effect of the increase in government spending can be several times larger (Christiano et al. (2011)).

In Russia, most of the determinants, as it is shown above, negatively affect the size of fiscal multipliers, allowing us to expect a relatively low size of multipliers in "normal" times. This is in keeping with the estimates available for the Russian economy. By applying Federal State Statistics Service statistics of national accounts (SNA), Ponomarenko, Vlasov (2010) found the three-year cumulative government spending multiplier to be equal to 0.6 and the revenue multiplier to -0.1. By using Federal Treasury public finance statistics Ivanova, Kamenskih (2011) obtained a government spending multiplier equal to 0.13 with a multiplier for the crisis period of 2009-2010 almost twice larger than that for the pre-crisis period. Fiscal multipliers for government spending components in accordance with the functional classification range from -0.77 to 0.55. Kulikov, Skrypnik (2013) found that for downturns with a horizon of one and two years, the weighted average values of the government spending multiplier are 0.25 and 0.4 correspondingly, while the multiplier for the "normal" times is close to zero. By applying Federal Treasury Public Finance statistics for 2000-2016, Kudrin, Knobel (2017) obtained a government spending multiplier equal to 0.91 and multipliers for spending components in accordance with the functional classification from 0.22 to 1.64 with higher values for productive spending as compared to unproductive. Finally, using data of 2000-2009, Eller et al. (2013) showed that fiscal discretionary measures have a substantial impact on economic growth in Russian regions and can cause macroeconomic instability.

In contrast to the above-mentioned studies for the Russian economy, focused on the effect on output from the expenditure side of the budget (overall and/or by components, in different business cycle phases), this study contains the estimates of both revenue and spending multipliers allowing us to compare the effectiveness of these measures. Furthermore, in contrast to Ponomarenko, Vlasov (2010), in this study we use the more familiar Federal Treasury public finance statistics instead of SNA, which makes the estimates more convenient for forecasting purposes and general use (see Section 2.1 for data description and Section 2.3. for further discussions of limitations on the use of the estimates obtained).

2. ASSESSMENT OF FISCAL MULTIPLIERS FOR RUSSIA

2.1. Data

We select the data for the estimation with the further practical applicability of the results in mind. The main criteria are the following:

- General government data showing the cumulative effect of all budgets in the budget system;
- A short lag in data publication;
- Comparability with the way fiscal indicators are applied for the planning period.

In accordance with these criteria, we choose public finance statistics of the Russian Federal Treasury. It is available with a short lag[8] and is applied by the Ministry of Finance to prepare budget laws.

We estimate the fiscal multipliers by using quarterly data for the period of 2000 Q1-2015 Q4. The Bayesian method that is used in this study (see Section 3.2.) allows us to apply a relatively short time series (see Canova (2007)).

Apart from Russia's GDP, the following indicators are used as endogenous in the model: the nominal interest rate on loans to non-financial organisations for a period of more than three years (as a monetary indicator), the Russian GDP deflator (as a price indicator), European Union GDP (EU GDP) and the oil price in ruble terms (as external sector indicators). We use data from the Bank of Russia, the Federal Treasury, the Federal State Statistics Service and Eurostat.

We adjust the government revenues and expenditures for one-off payments, the presence of which is likely to provoke biased estimates. These are revenues from Yukos's repayment of debt to the budget in 2004-2007 and spending on commercial bank capitalisation in 2014 Q4. We use data from the Economic Expert Group supervised by the Ministry of Finance of the Russian Federation.

All indicators are taken in logs (except for the nominal interest rate), in real terms – deflated with the GDP deflator (except for the nominal interest rate, the GDP deflator and the oil price in ruble terms, while EU GDP was deflated with the EU GDP deflator) and seasonally adjusted with the TRAMO/SEATS procedure (except for the nominal interest rate and the oil price in ruble terms). The lag length was set at one quarter.

2.2. Econometric approach

The estimation of the fiscal multipliers is made using SBVAR[9].

The reduced form of vector autoregression is the following:

$$Y_t = \mu + B(L)Y_{t-1} + u_t \qquad (2)$$

where Yt is a vector of n endogenous variables (GDP, Revenue, Spending, EU GDP, *Oil rubl*, Interest rate, GDP deflator), μ is a constant, *B(L)* is a lag operator, u_t is a reduced-form of disturbances with zero mean and covariance matrix Σ.

Drawing on Banbura et al (2007) we impose the Normal inverted Wishart conjugate prior with dummy observations. We use conventional values of hyperparameters of a priori distributions (see, for instance, Blake, Mumtaz (2012).

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[8] SNA statistics are published with a lag of more than one year.
[9] See Section 1 for discussion about different methods for fiscal multiplier estimation. See, for instance, Blake, Mumtaz (2012) for details regarding the use of SBVAR models.

We employ an agnostic identification scheme by imposing sign and zero restrictions on the impulse response functions following Arias et al. (2014).

We identify structural shocks e_t that have an economic interpretation in the following way:

$$u_t = Ae_t \qquad (3)$$

where *AA'= Σ, E[e$_t$e$_t$']=I.*

We construct a model for the estimation of multipliers for the government revenue and spending and include general government revenue and spending indicators as well as all macroeconomic indicators listed in Section 2.1. An overall revenue and overall spending shocks are examined.

The impulse response functions are computed by generating draws from the posterior distribution of parameters obtained via the Gibbs sampling algorithm with 30,000 total iterations and 10,000 last iterations saved.[10] For model identification, we introduce sign and zero restrictions on a contemporaneous reaction of the impulse response functions based on theoretical considerations about the reaction to these shocks (see Table 1). We suppose that output has a positive response to an increase in government spending and a negative response to an increase in taxes in the quarter when a shock occurs. In order to isolate the required shocks, we assume a non-negative response of spending to the positive revenue shock as well as a non-negative response of revenue to the positive spending shock. This scheme excludes the possibility of the existence of two shocks simultaneously (decrease (increase) in spending and increase (decrease) in revenues) allowing us to isolate their impact on GDP. Also, we assume that fiscal shocks do not have a contemporaneous effect on EU GDP and the oil price in ruble terms and introduce zero restrictions. This assumption allows us to treat these variables within the model as endogenous at the moment of the shock. All sign restrictions are introduced for the moment of shock, while other periods are not restricted.

Table 1. Zero and sign restrictions on impulse response functions for the shocks of government revenue and spending

	GDP	Revenue	Spending	EU GDP	Oil rubl
Revenue shock	–	+	≥ 0	0	0
Spending shock	+	≥ 0	+	0	0

"+" – positive response, "–" – negative response, "≥ 0" – nonnegative response, "0" – zero restrictions.

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[10] Parameters of the reduced form of the model, shock identification, impulse response functions and historical decomposition are obtained for all saved iterations via Gibbs sampling.

2.3. Results

We define multipliers as the maximum value of output response (peak multiplier). The analysis of impulse response functions shows the maximum effect on output in the subsequent quarter after the shock in the case of government spending shock (see Figure 2), while in the case of revenue shock the effect builds up quarter by quarter and reaches its peak in the eighth quarter (see Figure 1). The values are statistically significant. It is in line with the results in other studies showing that the changes in government transfers and consumption that account for the most part of general government spending have a more short-run impact on output than the change in taxes (Anderson et al. (2013), Coenen et al. (2012)). Other indicators in the model are statistically insignificant.

Figure 1. Impulse responses to the government revenue shock
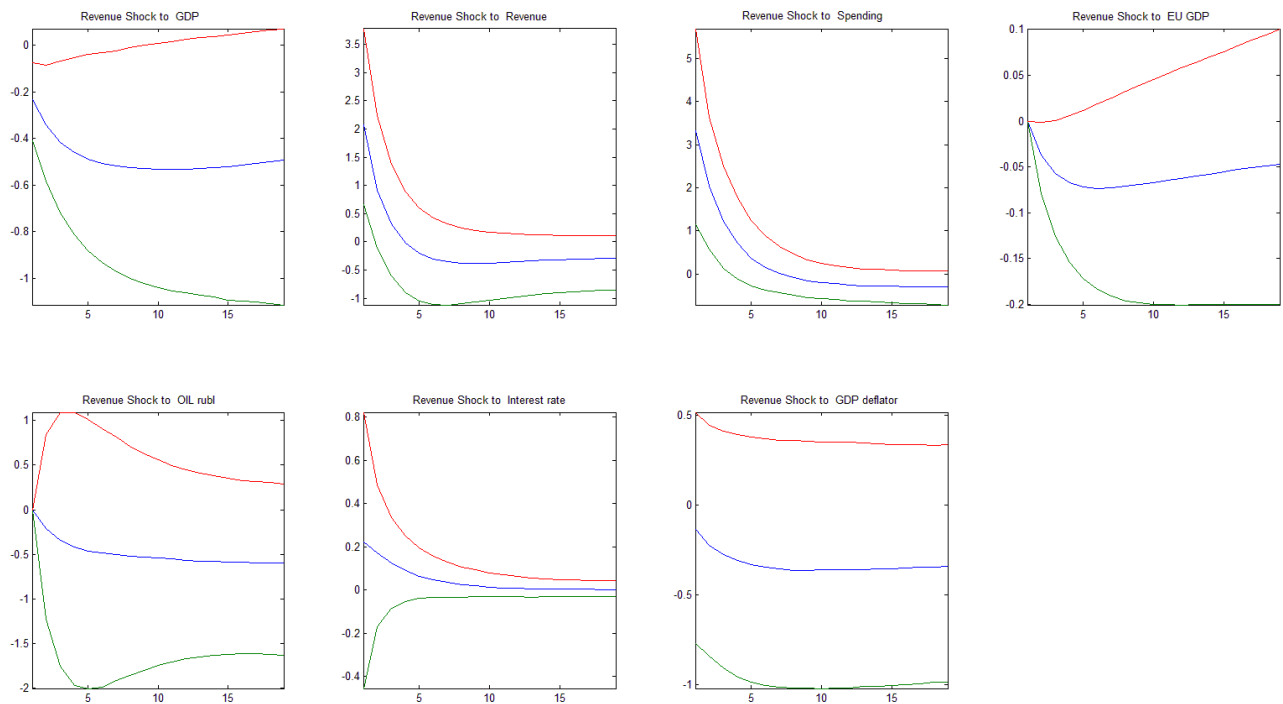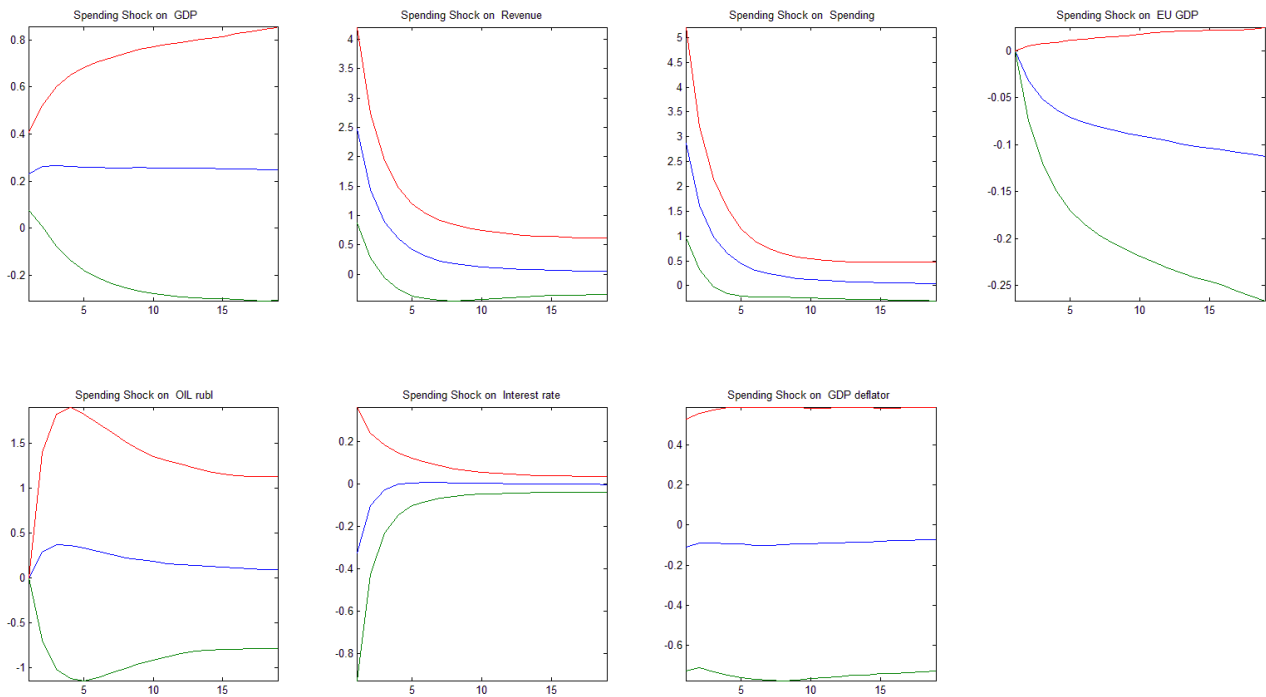(the median and the 16th and 84th quantiles of the distribution)

Figure 2. Impulse responses to the government spending shock

(the median and the 16th and 84th quantiles of the distribution)

We calculate fiscal multipliers based on the impulse response functions. We evaluate the changes in indicators as a percentage of GDP, i.e. percentage of output response to the fiscal shocks of 1 per cent of GDP. We proceed from the magnitude of initial revenue and spending shocks, the response of GDP to these shocks and average shares of revenue and expenditure in GDP based on the sample considered. We obtain the multiplier for the government revenue and spending equal to -0.75 and 0.28 correspondingly, i.e. an increase in government revenue (spending) by 1 per cent of GDP leads to a decrease (increase) in output of 0.75 (0.28) per cent. The values of multipliers for various horizons are presented in Table 2.

Table 2. The values of fiscal multipliers for different horizons

	Quarters after the shock					
	0	1	2	4	8	12
Revenue	-0.33	-0.48	-0.59	-0.69	**-0.75**	*-0.75*
Spending	0.25	**0.28**	*0.29*	*0.28*	*0.28*	*0.27*

Peak multipliers are marked with bold type, statistically insignificant values are marked with italics

The values of fiscal multipliers for Russia that we obtained correspond to the theoretical considerations made in Section 2 based on the analysis of their determinants. The interrelation

between revenue and spending multipliers also does not contradict the theoretical considerations and is most probably the result of low efficiency of government spending in Russia.

The results are also generally in line with other estimates made for EMEs. For the panel of 13 EMEs, Ilzetzki (2011) found that spending multipliers lie between 0.1 and 0.3 and revenue multipliers range from -0.4 to -0.2. Jooste (2012) obtained spending and revenue multipliers for South Africa equal to 0.3 and -0.7 and Stoian (2012) obtained corresponding calculations of 0.5 and -0.9 for Romania.

Our estimates are robust to the change to the set of macro indicators applied in the model, in particular, to the use of the oil price in US dollar terms, change in the number of iterations and examining on a shorter sample.

We note that the estimates of fiscal multipliers obtained in this study cannot be considered as entirely reliable and should be used for forecasting purposes with caution. The calculations do not take into account the possible effects of economic agents having a precocious reaction to the announcement of discretionary measures before their direct implementation. However, we believe this effect is relatively low in Russia compared to advanced economies. There are also limitations on the use of the estimates for forecasting purposes due to the difference in economic conditions and change in the structure of budget revenues and expenditures on the forecast horizon compared to the period for which estimates are made.[11] However, we believe the estimates of fiscal multipliers, including the ratio of their values, can be applied for propositions regarding the effect of main fiscal policy indicators on output for the forecast horizon.

Ошибка! Не указано имя закладки.Figure 3 represents the historical decomposition of real GDP growth in Russia. Usually, the effects of government revenue and spending played a rather small role in the total dynamics. Fiscal policy was reasonably contractionary until the middle of the 2000s against the background of the use of fiscal rule, large public debt repayment and accumulation of stabilisation fund[12]. Over 2000-2006, general government budget balance increased by 5 percentage points of GDP. In 2007, fiscal policy changed to an expansionary pattern: this contributed to economic "overheating" in pre-crisis period, supported the economy in 2009-2010, and promoted GDP growth in the following years. Over the last decade, general government budget balance dropped by 11.5 percentage points of GDP.

Historical decomposition allows us to see that the effects of revenue and spending were usually codirectional. This is in line with the reporting data showing that both in 2000-2006 and in 2007-2016 almost 2/3 of budget balance dynamics was caused by the changes in government spending, while the rest was triggered by the changes in revenues.

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[11] Time series volatility and changes in political and economic conditions can be taken into account within the TVP-BVAR model (BVAR model with time-varying parameters). However, due to relatively short time series we limited ourselves to SBVAR model.
[12] See Vlasov (2011) for the main facts regarding the evolution of the Russian public finance system.

Figure 3. Contributions of structural shocks to real GDP growth for 2000-2015
(deviation from baseline projection, in logs)
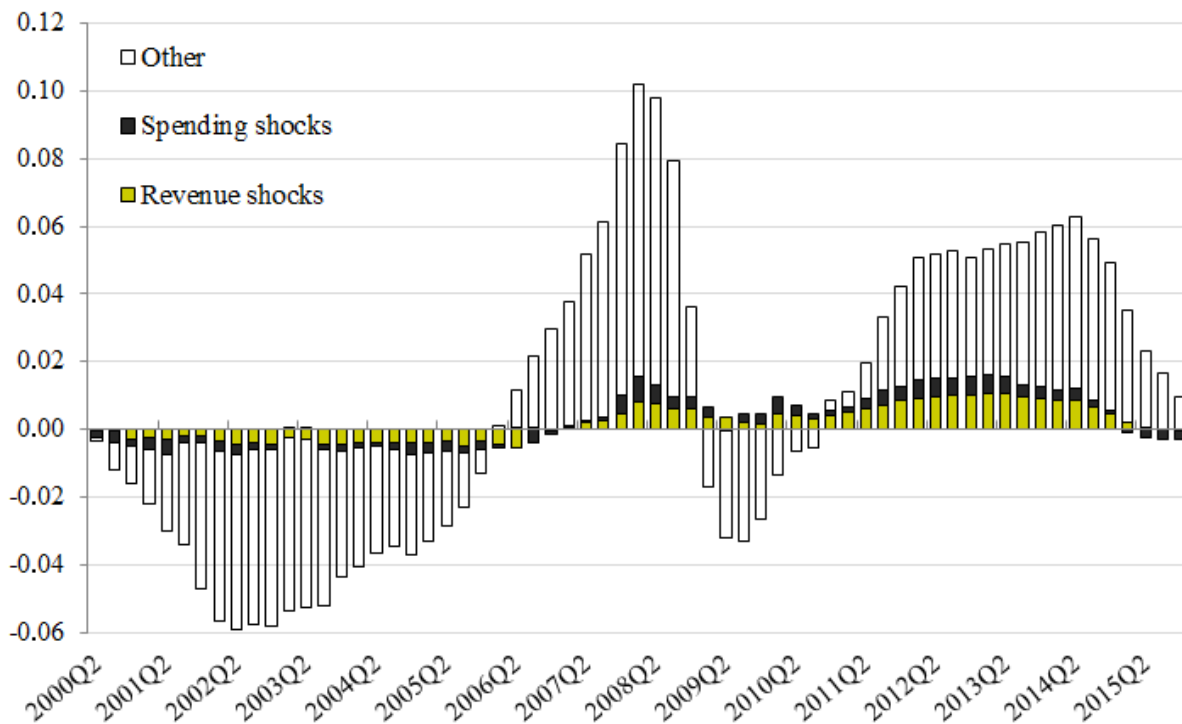
Fiscal policy easing in recent years has resulted in high budget deficit that cannot be considered as sustainable and has to be cut. In accordance with draft Guidelines for the fiscal, tax, customs and tariff policy in 2018-2020, the Russian government has the intention to cut general budget deficit through 2017-2020 by nearly 3 percentage points of GDP. This allows us to expect a negative direct impact on economic growth in the medium-term. At the same time, while a possible increase in tax rates can be applied as well, the main source of fiscal consolidation should come from lower expenditures. The estimates of fiscal multipliers show that a cut in public spending is less harmful to economic growth than the corresponding raise in tax burden. Based on the estimates of fiscal multipliers, the negative direct impact on GDP growth from fiscal consolidation is estimated at just about 0.3 percentage points cumulatively throughout 2018-2020. Moreover, the following years can be used to improve the efficiency of public spending.

The negative direct impact of fiscal consolidation can be fully offset by a significant positive indirect impact on GDP from an increase in economic agents' confidence about long-term fiscal sustainability. Macroeconomic stability, including fiscal, reduces uncertainty and has a positive impact on economic growth in the medium-term as well as an indirect effect on the monetary policy of the Bank of Russia. The current fiscal policy, under which the growth rate of public spending for the medium-term is roughly in line with the inflation target, has a certain anti-inflationary effect and allows the Bank of Russia to refrain from overtightening its policy and switch gradually from moderately tight to neutral monetary policy.

CONCLUSIONS

The analysis of the determinants of the size of fiscal multipliers allows us to come to the conclusion that fiscal variables have a relatively low effect on output in Russia. The estimation of the government revenue and spending multipliers is in line with these expectations. The increase in government spending by 1 per cent of GDP leads to output growth of 0.28 per cent in the quarter that follows the shock. The increase in taxes by 1 per cent of GDP results in a decrease in output of 0.75 per cent; the effect builds up quarter by quarter and reaches its peak in the eighth quarter. This does not contradict the results available both for the Russian economy and for the EMEs.

Over the last decade, fiscal policy had, on average, a stimulative impact on GDP growth in Russia because of both substantial increase in general government spending and decrease in its revenue. On the contrary, beginning from 2017, the budget deficit cut should have a temporary negative direct impact on output growth. Reduction of the government expenditures relative to GDP as the main source of fiscal consolidation is in line with the estimates of fiscal multipliers allowing us to expect a relatively small negative direct impact on GDP – cumulatively about 0.3 percentage points throughout 2018-2020. The upcoming years can also be used to raise the efficiency of budget spending. Moreover, the negative direct impact on GDP growth can be fully offset by a significant positive indirect impact on GDP from an increase in confidence about long-term fiscal sustainability. Macroeconomic stability, including fiscal, allows the Bank of Russia to switch gradually from a moderately tight to neutral monetary policy.

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