



Bank of Russia



# Measuring fiscal impulse and its heterogeneous effect on inflationary processes in Russian regions

Working Paper Series  
No. 118 / October 2023

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The Bank of Russia's Working Papers are subject to blind review by members of the Bank of Russia Advisory Board and external reviewers.

The authors are grateful to Sergey Sheremeta, Dmitry Korshunov, Anastasia Khazhgerieva, anonymous reviewers, and the participants of Bank of Russia research workshops for their assistance and cooperation in the preparation of this working paper.

Cover photo: Shutterstock/FOTODOM

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**ABSTRACT**

Fiscal policy analysis is an important part of a national or regional macroeconomic analysis. The use of a broader range of tools to analyse fiscal policy helps conduct a comprehensive assessment of its impact on national macroeconomic indicators and facilitates more effective fiscal and monetary policy coordination.

In this paper we use the fiscal impulse as an indicator of fiscal policy easing or tightening. It shows the initial impact of fiscal policy on growth or reduction in aggregate demand in a regional economy. This information proves useful in assessing the effect of public finance on inflationary processes in order to make future monetary policy decisions.

The key findings of this study are the measurement of the fiscal impulse indicator, which comprehensively reflects fiscal flows in each particular Russian region, and the development of a retrospective database containing fiscal impulse components for all Russian regions. The effect of fiscal impulse on inflation in Russian regions is heterogeneous and negatively correlated with the level of economic development of the regions. Over the period under study from 2011 to 2021, the average fiscal impulse was higher in the regions with a lower gross regional product (GRP) per capita (below the Russian average). An expansionary fiscal policy has a more pronounced effect on inflationary processes in this group of regions than in regions with a higher GRP per capita (above the Russian average).

**Keywords:** regional finance, budget, regional budget, fiscal and tax regulation, fiscal impulse.

**JEL codes:** C33, C54, H30, H50, H61, H62, H68, H71, H77.

## INTRODUCTION

Fiscal policy is a key component of economic policy. Key fiscal policy tools include the fiscal balance, i.e. the difference between fiscal revenue and expenditure, which helps the government influence aggregate demand in the economy. Assessment of the fiscal balance position based on the phase of the business cycle or other factors is important for shaping effective monetary policy.

As a result of fiscal policy, aggregate demand may be above or below the equilibrium level, influencing inflation dynamics and the conditions for the implementation of monetary policy.

Fiscal policy may be neutral, expansionary or contractionary in terms of its impact. A neutral fiscal policy implies that the ratio of fiscal revenue to expenditure is at a certain structural level, which neither constrains nor boosts economic activity relative to its long-term trend.

An expansionary fiscal policy is aimed at boosting economic performance and increasing aggregate demand (usually to overcome negative economic shocks). Under such a policy, fiscal expenditure exceeds revenue thanks to public procurement, transfers, and a lower tax burden (deferral of tax payments, tax exemptions, and cancellation of some tax payments).

A contractionary fiscal policy implies that fiscal revenue rises relative to expenditure due to a decrease in public procurement and transfers, and/or an increase in the revenue of the fiscal system. This policy constrains intensive growth in aggregate demand in the economy and household incomes.

When analysing fiscal policy, it is insufficient to consider only the overall or primary fiscal balance, as these indicators reflect not only discretionary changes in fiscal policy but also the impact of the business cycle and factors beyond it. This is largely associated with the fact that an existing fiscal deficit at a certain point in time reflects both trends in fiscal policy changes and the impact of a country's economic situation on tax revenues and public spending. Having excluded these effects from the analysis, one may obtain the cyclically adjusted balance (CAB) showing the 'net' assessment of the fiscal policy stance. In addition, one may rule out the effects of factors indirectly related to the business cycle, such as asset and commodity price movements. In this paper some revenues (federal taxes) are adjusted for commodity (oil) price movements.

It appears appropriate to regard CAB changes as the fiscal impulse measure. In this study a positive (negative) budget impulse means that fiscal policy is more expansionary (contractionary) in the current period than in the previous one. Therefore, if we apply the values of the fiscal impulse and compare them with movements in the business cycle indicator (e.g., GDP gap), we may draw some preliminary conclusions on the fiscal policy stance and its countercyclical effect [Fedelino, Ivanova and Horton, 2009].

## 1. LITERATURE REVIEW

The use of the overall fiscal balance to determine the fiscal policy stance appears problematic due to cyclical factors. Brown (1956) was among the first researchers to highlight the necessity of considering fiscal policy net of business cycle effects. He noted that it was important to draw a distinction between the effects of built-in stabilisers and discretionary policy to assess the fiscal position properly. However, Brown did not propose any method for adjusting fiscal indicators. After his research it became necessary to have a single indicator to measure the stance of fiscal policy. His successors Muller and Price (1984) and Blanchard (1990) examined the benefits of using the cyclically adjusted budget and related limitations. The authors concluded that tax collections and the government fiscal surplus increased (or the fiscal deficit decreased) along with a rise in economic revenue. Tax revenues are more sizeable when economic activity is high for any set of tax rates. A positive correlation between net tax revenue and economic expansion is associated with a decline in fiscal transfers, especially unemployment allowances. If there are no discretionary changes in policy, there is no reason to expect public spending to respond to changes in the level of economic activity. Consequently, public spending may be kept as exogenous. Thus, the net effect of an increase in revenue suggests a larger fiscal surplus or a smaller fiscal deficit.

Apart from providing information on the response of the fiscal balance to CAB economic fluctuations, this makes it possible to efficiently manage and plan short- and medium-term budgets, identify cyclical violations of budgets, and counterbalance the effects of fiscal balance built-in stabilisers to ensure economic stability [Helgadottir et al., 2012].

According to Balassone (2006), in countries where fiscal revenue is mainly derived from commodity export proceeds, the fiscal balance greatly depends on price fluctuations in the relevant commodity market. This means that in order to analyse the stabilisation function of fiscal policy, one should exclude oil revenues from the fiscal balance and thus examine a non-oil fiscal balance, or rule out their effect by analysing the fiscal balance based on fixed oil prices.

Mourre (2019) believes that the elasticity of cyclical revenues is above 1 for corporate and personal taxes and below 1 for social security contributions. In general, the value of elasticity is higher when the government is more involved in the economy, the portion of non-tax revenue is lower, and the share of progressive taxes is higher. Yet another factor may be the belonging to certain groups of countries and the effect of competition between neighbouring territories (countries) [Götttert and Wollmershäuser, 2021].

Many countries made fiscal interventions after the COVID-19 pandemic. The average fiscal deficit amounted to -10% of GDP in advanced economies [IMF, 2022]. According to the IMF's World Economic Outlook for October 2022, advanced economies demonstrate a correlation between inflation deviation and fiscal expenditure. In these economies, the fiscal stimulus of an

extra 10% of GDP is associated with a 0.8pp upward deviation of core inflation from the expected level.

This paper highlights that national inflation rates have been persistently higher than expected since 2021 Q2. Therefore, inflation forecasts have been consistently raised for headline and core inflation in both advanced and emerging market economies. In the IMF's outlook, errors in core inflation forecasts for 2021 were partially explained by a stronger-than-expected recovery in demand in advanced economies. The COVID-19 fiscal stimulus packages might also have played a certain role. In advanced economies, fiscal policy supported steady demand while supply was still disrupted. This prompted errors in inflation forecasts [IMF, 2022].

The relationship between the fiscal balance (deficit or surplus) and inflation goes both ways. On the one hand, the deficit exerts inflationary pressure via its impact on monetary aggregates and expectations; on the other hand, high inflation has a feedback effect and pushes up the deficit. This stems from considerable lags in tax collection. Yet another important factor is the indexation of public statutory obligations. The problem is a lag between the accrual of tax obligations and their payment. The persistent fiscal deficit influences inflation, which in turn results in a decrease in real tax revenues. To cover lower tax revenues, authorities have to expand the fiscal deficit even further [Bazzaoui and Nagayasu, 2021].

Among the studies of the relationship between fiscal policy and inflation, we can highlight Catão and Terrones (2005), where a non-linear correlation between inflation and fiscal deficit was modelled. Based on results obtained for 107 countries from 1960 to 2001, a strong positive correlation exists between fiscal deficits and inflation in high-inflation developing countries rather than in low-inflation advanced economies.

Lin and Chu (2013) explore the deficit-inflation relationship for 91 countries from 1960 to 2006. The empirical results show that the effect of fiscal deficits on inflation is strong in periods of high inflation and weak when inflation is low.

Therefore, we can assume that the effect of fiscal policy on inflationary processes in Russian regions may be heterogeneous, depending on the level of regions' economic development.

The European Commission (EC), the Organisation for Economic Cooperation and Development (OECD), and the IMF publish annual fiscal policy reviews and fiscal impulse measures for their member countries. The EC, OECD and IMF apply different approaches to the analysis of budget items. The IMF measures CAB as the gap between cyclically adjusted revenue and expenditure, while the EC calculates it as the difference between the overall balance and the cyclical balance [Fedelino, Ivanova and Horton, 2009].

According to the IMF's approach, cyclically adjusted revenue and expenditure are calculated as the ratio of potential output and the relevant elasticity of revenue and expenditure to

the output gap. The EC measures CAB using the gap between different macroeconomic variables and their potential levels, which are then assumed to be directly linked to the relevant fiscal categories and elasticities. The IMF's approach does not provide for any differences between various components of revenue and expenditure, whereas the approach applied by the EC contains a breakdown of macroeconomic variables and elasticities by component based on fiscal categories and hence examines budget items at a disaggregated level for cyclical adjustments [Larch and Turrini, 2009; Bouthevillain et al., 2001]. The above methodologies differ in terms of their approaches to calculating potential output, adjusting for one-off changes in budget items, computing the elasticity of revenue/expenditure to the output gap, and excluding budget items with low sensitivity to cyclical fluctuations in economic activity.

Aggregate revenue and expenditure elasticities can be sourced from the literature [Fedelino, Ivanova and Horton, 2009]. Values commonly assumed are 1 for revenues and 0 for expenditures. Although this approach does not distinguish between the various components of revenue and expenditure (which are treated as aggregate variables), the loss of accuracy may be acceptable in certain cases. Some empirical evidence points to the aggregate elasticity assumptions being a good approximation of the weighted average of disaggregated elasticity estimates [Girouard and Andre, 2006].

Expenditure is often treated as fully discretionary and independent of the business cycle. If the elasticity of expenditure is assumed to be zero, the cyclically adjusted expenditure is equal to actual expenses.

Some expenditure items (for example, unemployment allowance payments) will have a cyclical nature in practice. However, such expenditures are difficult to derive from fiscal reporting.

Many advanced economies (Canada, New Zealand and the USA) include the cyclically adjusted fiscal balance in their assessment of the fiscal policy stance. Transparency of fiscal policy is ensured through the disclosure of cyclically adjusted fiscal balance projections, thereby improving the quality of policymaking [Götttert and Wollmershäuser, 2021].

There are only a few CAB assessments in the Russian research literature. Platonov (2012) studies fiscal policy in Russia in the period from 2004 to 2010 with the aid of structural budget balance and fiscal impulse measures. The author used three methods to estimate potential GDP. Under each method he calculates the structural balance and fiscal impulses and compares them with the dynamics of output gaps. To estimate potential GDP, the researcher uses smoothing with a quadratic trend, production function and the Hodrick–Prescott (HP) filter.

Income taxes (i.e. personal income and corporate profit taxes) turn out to be sensitive to the output gap. The author assesses the regression of the relationship between the logarithm of

revenue and the output gap. Corporate tax shows the highest elasticity (6.4pp), and VAT shows the lowest (0.4pp).

Bakalova (2012) calculates the structural balance of the state budget using the method for estimating elasticities of fiscal revenue and expenditure based on the output gap and the Brent crude oil price per barrel (modification of the method used by Hagemann (1999) and Platonov (2012)). The said study assumes that not only revenue but also expenditure of the state budget may depend on the price of oil in the global market.

To calculate elasticities, the author estimates the dependence of the logarithm of fiscal revenue and expenditure in real terms on their lag values and on the logarithm of the Brent crude oil price. The author concludes that the impact of Brent crude oil price movements on the fiscal balance is considerable, i.e. it would be better to exclude this impact from the fiscal policy analysis. The elasticity of fiscal revenue to oil prices is equal to 0.32.

Gurvich et al. (2009) conclude that countries exporting hydrocarbons experience quasi-business cycles – fluctuations driven by the volatility of oil and gas prices. This complicates the analysis of such economies. The authors identify a number of channels directly or indirectly influencing fiscal revenue and expenditure, and hence other macroeconomic indicators, in both nominal and real terms.

Vasilieva, Vlasov and Ponomarenko (2009) calculated Russia's structural fiscal surplus over the period from 2003 to 2008 using the OECD methodology. The elasticity of tax revenue was estimated in two stages in relation to the output gap calculated using the multivariate HP filter. First, they estimated the elasticity of revenue to the tax base and then the elasticity of the tax base to the output gap. The authors concluded that in Russia's fiscal system, corporate and total income taxes were sensitive to the output gap (1.72), while the elasticity of personal income tax revenue to the output gap was 0.44.

The assessment of the fiscal position and CAB is limited by difficulties in estimating the results of business cycle indicators (the output gap) and selecting an appropriate assessment technique.

In our view, the fiscal impulse is negative growth in the balance between revenues to and expenditures from the relevant budget in a region. Hence, if the negative balance grows, the fiscal impulse is positive; if it falls, the fiscal impulse is negative.

It is worth noting that the measurement of fiscal policy effects on the economy should not be limited to one indicator. The fiscal impulse may be regarded as a factor of the primary effect on aggregate demand in the economy [Blanchard, 1990]. An increase in government spending may initially have a certain stimulating effect on the economy from the demand side. However, firms and households may change their investment and consumption behaviour in response to such an



increase. It is impossible to extract these secondary changes using the fiscal impulse as an indicator. Such effects may be recorded using complex structural macroeconomic models based on the modelling of economic agents' behaviour [Andreyev, 2022].

## 2. RESEARCH METHODOLOGY AND DATA SOURCES

The OECD and IMF methodologies are widely used in the literature to measure CAB. They rely on different approaches to estimate the output gap and the cyclical sensitivity of fiscal revenue and expenditure to economic growth [Fedelino, Ivanova and Horton, 2009].

The CAB calculation includes a number of steps:

- Identify and remove one-off fiscal operations. Large non-recurrent fiscal operations may distort the analysis of the underlying fiscal position and should be excluded from the structural fiscal balance estimates;

- Assess the impact of the business cycle on revenue and expenditure. This can be achieved via an aggregated method (when elasticities are used to measure the sensitivity of total revenue and expenditure to the output gap) or via a disaggregated approach (with elasticities specific to various revenue and expenditure components). At this step, we have arrived at a cyclically adjusted balance;

- Estimate the effects of other economic cycles or factors, such as those related to asset and commodity prices and output composition effects. At this stage, we have arrived at a structural balance.

The purpose of cyclical adjustment is to decompose the overall balance into cyclical and cyclically adjusted components:

$$(1) \quad OB = CB + CAB,$$

where

$OB$  is the overall balance;

$CB$  is the cyclical balance (the part of the overall fiscal balance that automatically reacts to the business cycle);

$CAB$  is the cyclically adjusted balance (the part of the overall balance that is left after cyclical movements are taken out), expressed in nominal terms.

As CAB measures the fiscal balance when output is at its potential level, the cyclical adjusted balance is computed relative to the potential output:

$$(2) \quad CAB = R_{ca} - G_{ca}.$$

An easy way to compute CAB is to evaluate equation (2), where revenues and expenditures are assessed as follows [Fedelino, Ivanova and Horton, 2009, Bornhorst et al., 2011]:

$$(3) \quad R_{ca} = R * (Y_p/Y)^e$$

$$(4) \quad G_{ca} = G * (Y_p/Y)^e,$$

where

$R_{ca}$  is the cyclically adjusted revenue;

$R$  is the fiscal revenue;

$Y_p$  is the potential output;

$Y$  is the actual output;

$e$  is the revenue or expenditure elasticity ratio;

$G_{ca}$  is the cyclically adjusted expenditure;

$G$  is the fiscal expenditure.

Under the assumption of zero expenditure elasticity, the cyclically adjusted expenditure is equal to the actual expenditure  $G_{ca} = G$ , in which case the business cycle does not trigger any response in expenditure levels. Thus, the cyclically adjusted primary balance is computed as follows:

$$(5) \quad CAB = R_{ca} - G.$$

The fiscal impulse is calculated as follows:

$$(6) \quad FI = -\Delta CAB.$$

Growth in deficits is regarded as a positive fiscal impulse and vice versa. The negative cyclically adjusted balance (-CAB) represents a country's fiscal position, with any change in this position being a fiscal impulse.

Although methods to calculate potential output and relevant output gap are numerous, they have serious weaknesses. This makes output gap estimates prone to significant uncertainty.

The IMF uses the HP filter to estimate potential output. This filter is a method to smooth data at all actual GDP data points using weighted moving averages. Deviations calculated by deducting actual output from estimated underlying output are symmetrical during the business cycle regardless of any structural shifts. Such a method is simpler, as it requires only actual output data.

However, the HP filter does not have any economic rationale. This casts doubt on the legitimacy of the application and interpretation of the obtained results. Moreover, the potential output estimate turns out to be sensitive to adding new data at the end of a series [Fedelino, Ivanova and Horton, 2009].

The question of whether asset or commodity prices should be used in the model depends on whether price deviations from fundamentals can be reasonably well established and whether these effects are significant. This can be gauged by the statistical significance of the corresponding coefficient in the regression.

This study explores fiscal policy in Russian regions and measures cyclically adjusted balances. The paper uses the term cyclically adjusted balance (CAB). The revenue elasticities in Russian regions are computed here using equation (3), which has been transformed as follows:

$$(7) \quad \log(R) = c + e * \log\left(\frac{Y}{Y_p}\right) + u,$$

where

$\log$  is the logarithm operator;

$e$  is the revenue elasticity to the output gap;

$R$  is the fiscal revenue of a Russian region adjusted for the index-deflator for Russia;

$Y_p$  is the potential GRP;

$Y$  is the actual GRP.

To take into account business and commodity cycles, we use the following equation:

$$(8) \quad \log(R) = c + e * \log\left(\frac{Y}{Y_p}\right) + b * \log\left(\frac{P}{P_p}\right) + u,$$

where

$b$  is the elasticity ratio;

$P_p$  is the underlying trend in Urals oil prices deflated by the US inflation rate;

$P$  is the Urals oil price movements deflated by the US inflation rate.

The equilibrium commodity price (oil price, in particular) may be determined using different approaches. The issue of choosing an equilibrium price appears debatable, as the existing approaches rely on, among other things, averages over a forecast horizon [Vladkova Hollar and Zettelmeyer, 2008] or a certain historical period [Ardanaz, 2015], as well as marginal production and processing costs of marginal oil producers [Fattouh, 2013]. Researchers apply the HP filter to extract the trend and cyclical components of oil prices. For example, the OPEC and the Oil Market working paper by [Yousef and Pescator, 2022] uses this filter to identify the trend component of the Brent crude oil price. In our study, the HP filter is applied to measure the equilibrium oil price and its cyclical component.

To compute CAB and the fiscal impulse, we estimate regression elasticities for each region using equation (5).

To measure the effect of the fiscal impulse on inflationary processes in Russian regions, this paper applies a dynamic regression model of instrumental variables [Arellano and Bond, 1991] for panel data evaluated by the generalised method of moments (GMM) in order to avoid endogeneity, i.e. a correlation between explanatory variables and regression errors. We cannot employ the least square panel data regression, since the explained variable is inflation, whereas the explanatory variable is one-year lagged inflation. The instruments of the model are the lags of

variables included in the specification. The econometric model has the following regression equation:

$$(9) \quad \Delta inf_{i,t} = \beta_1 \Delta inf_{i,t-1} + \beta_2 \Delta bi_{i,t} + u_{i,t},$$

where

$inf_{i,t}$  is the inflation rate in region  $i$  over year  $t$ ;

$bi$  is the fiscal impulse in region  $i$  over year  $t$ ;

$\beta_1$  is the inertia coefficient for lagged inflation;

$\beta_2$  is the fiscal impulse coefficient.

The instrument of the explanatory variable of lagged inflation is its value in the previous period. There is no free term, as the constant term disappears when we proceed to differences, with no linear trend assumed for any individual effect.

The generalised method of moments automatically eliminates multicollinearity, making it possible to solve the problem of checking for a high correlation between independent variables. Heteroscedasticity may be yet another problem related to breaching the least squares method assumptions (obtaining incorrect model results). To solve this problem, the covariance matrices of coefficient estimators are assessed subject to possible heteroscedasticity of and a correlation between random errors in observations according to White.

To measure the elasticity ratios of regional fiscal revenue, we use quarterly budgets of Russian regions on the 1Q2010:1Q2020 sample (41 observations) based on the Federal Treasury reporting data and author calculations. This paper analyses 77 Russian regions. To measure the effect of the fiscal impulse on inflationary processes in the regions, we use annual data from 2010 to 2021, i.e. regional inflation and the fiscal impulse as a percentage of GDP.

We accumulate data on fiscal flows at different budget levels, namely federal, regional and extra-budgetary funds, and break them down by Russian region.

The revenue and expenditure of the federal budget across regions are assessed using proxy variables and data from the Federal Tax Service of Russia; those of regional budgets – data from the Federal Treasury; and those of extra-budgetary funds – data from Rosstat.

The proxy variable selection criteria are the age of federal and regional statistical data (a sample age), economic sense and coherence between the variable and the unknown budget item, as well as the availability of data on statistical indicators in regional statistics.

To measure the fiscal impulse in a region, we consider three components, enabling us to take into account the impact of the execution of the federal budget and extra-budgetary fund budgets on the regional economy (Table 1). To assess the effects of fiscal policy at a regional level, we distribute among constituent territories of the Russian Federation the revenues and

expenditures of the federal budget and state extra-budgetary funds (Territorial Compulsory Medical Insurance Funds, the Federal Compulsory Medical Insurance Fund, the Pension and Social Insurance Fund of the Russian Federation) representing fiscal authorities throughout the country.

**Table 1****Scheme for compiling statistical data on fiscal flows across regions to assess fiscal impulse**

No.	FI component	Fiscal revenues	Fiscal expenditures
1	Federal	FB revenue – external FB revenue	FB expenditure (including outgoing transfers to RB and GEBF) – external FB expenditure – FB expenditure to service external debt
2	Regional	RB revenue – incoming transfers to RB	RB expenditure (including outgoing transfers to TEBF) – incoming transfers to RB
3	Extra-budgetary	GEBF and TEBF revenue – incoming transfers to GEBF and TEBF	GEBF and TEBF expenditure – incoming transfers to GEBF and TEBF

Note. FI means the fiscal impulse; FB means the federal budget; RB means a regional budget; GEBF and TEBF mean government and territorial extra-budgetary funds.

To assess stand-alone balances of regional budgets, federal transfers are deducted from both revenues and expenditures. Federal transfers are included in federal budget expenditures in regions. This enables us to describe the impact of federal fiscal policy on regional economies more accurately.

The database is divided into two major parts: fiscal revenues and expenditures at all levels of budgets and extra-budgetary funds by region net of incoming and outgoing fiscal flows. There is no statistical information on revenues and expenditures of the federal budget by region in the overall statistics. To compile data on regional budgets and extra-budgetary funds, we use data from the Federal Treasury and Rosstat.

We obtain the amount of federal budget revenue in a region as the sum of accrued and received taxes, duties and other mandatory payments due to the fiscal system of the Russian Federation, and foreign trade revenue assessed at the value of export (import) operations by constituent territory of the RF.

The sources of data on revenue and expenditure of the federal budget are the Federal Treasury, Federal Tax Service Inspectorate (FTSI) and Rosstat. Fiscal flow data are mostly presented for Russia in general without regional distribution.

To measure federal budget expenditures in regions, we also apply annual proxies as weights to distribute the figures (Tables 2 and 3). Hereinafter, federal fiscal flows are excluded from outgoing transfers to regional budgets and extra-budgetary funds.

**Table 2****Proxies for compiling data on federal budget revenues by region**

No.	Federal budget revenue in a territory	Proxies
1.	Revenue, total:	
2.	Corporate income tax and revenue	FTSI (form No. 1-NOM) or Rosstat
3.	Taxes on goods (services, works) sold inside Russia	FTSI (form No. 1-NOM) or Rosstat
4.	Statutory fee	Proxy: the statutory fee payable to the federal budget as per the FTSI statistics (form No. 1-NM) or Rosstat
5.	Taxes, duties and regular payments for using natural resources	FTSI (form No. 1-NOM) or Rosstat
6.	International trade revenue	Proxy: the value of export operations by constituent territory of the RF (Rosstat)
7.	Income from operating government and municipal property	Proxy: dividends payable to the federal budget (in relation to joint-stock companies) by constituent territory of the RF (Rosstat). The remaining amount can be attributed to Moscow, as the major part of revenue under this item is profits attributed to shares in authorised capitals of companies or dividends on shares held by the Russian Federation (federal authorities, the Bank of Russia, governing boards of extra-budgetary funds of the Russian Federation) and income from investment of federal budget funds
8.	Payments for using natural resources	Proxy: payments for using natural resources in the revenue of consolidated budgets of constituent territories of the RF (the Federal Treasury)
9.	Revenues from commercial services and compensation for government spending	Proxy: payments for using natural resources in the revenue of consolidated budgets of constituent territories of the RF (the Federal Treasury)
10.	Taxes on imports to Russia	Proxy: the value of import operations by constituent territory of the RF (Rosstat)
11.	Taxes and social security contributions	FTSI (form No. 1-NOM) before 2010
12.	Other revenues	Proxy: other revenues of consolidated budgets of constituent territories of the RF (the Federal Treasury)

**Table 3****Proxies for compiling data on federal budget expenditure by region**

No.	Federal budget expenditure items, YoY	Proxies
1.	General government issues National defence National security and law enforcement Education Healthcare Culture Sports and physical fitness	Proxy: the average number of employees across all entities (people, an annual average) by constituent territory of the RF (Rosstat)
2.	National economy	Proxy: federal budget funds by constituent territory of the RF (Rosstat)
3.	Social policy	Proxy: the number of recipients of monthly allowances (people) by constituent territory of the RF (Rosstat)
4.	Housing and utility services	Proxy: utility payments payable by (due from) households (in thousand rubles) by constituent territory of the RF (Rosstat)
5.	Environment	Proxy: current (operating) environmental costs (per annum) by constituent territory of the RF (Rosstat)
6.	Media	Proxy: the annual circulation of newspapers and magazines by constituent territory of the RF (Rosstat)
7.	Subsidies, grants, and other transfers	They are not distributed among regions, as they are deducted from the federal budget expenditure items

Given that there is no historical data where revenue and expenditure are broken down by levels of the fiscal system across regions, it appears impossible to check the robustness of the obtained proxy estimates. However, some data on federal budget revenues collected in some territories are available in the open data of the Federal Tax Service (nearly 55% of total revenues).

To compare the effects on the conclusions of the research, we change the proxy to distribute federal budget expenditure weights among regions. As a control variable, we use the total payroll across all entities in industries corresponding to the expenditure items.

We compare the results over the period from 2017 to 2021. The average deviation of federal budget distribution estimates (prior and post) under the above expenditure items is 8.2% and shows relevant movements. Notably, the change in the approach to the distribution using an alternative proxy did not have a substantial effect on the conclusions of the study. The maximal deviation of the fiscal impulse related to the federal budget is around 0.1% of GRP. This discrepancy appears acceptable.

We use the output gap (a gap between the GRP of a constituent territory of the RF and its potential level) as a business cycle indicator to adjust fiscal revenues of the federal and regional budgets, and extra-budgetary funds in Russian regions. This paper relies on the results of the calculation of the leading GRP indicator made using the temporal disaggregation method [Boyko, 2020], enabling us to compile quarterly data on output gaps in Russian regions with the aid of the HP filter.<sup>1</sup>

To take into account commodity cycles, the authors use the Urals oil price to adjust federal budget revenues in Russian regions.

The elasticity of revenue based on the structural cycle phase is considered at the federal level, since the federal budget revenue largely depends on oil and gas revenues (compared to regional budgets and extra-budgetary funds), foreign trade proceeds, and the value added tax. Between 2010 and 2021, there were considerable portions of labour taxes and social security contributions in the revenues of regional budgets and extra-budgetary funds (in particular, to the Pension Fund of the Russian Federation), respectively. As applied to some regions, it may be helpful to use a different definition of the commodity cycle and consider the dependency of their fiscal revenues on other commodities. This study assumes that the oil price is a multi-purpose indicator of a commodity cycle and the most important indicator in Russia on average.

The quarterly data were tested for seasonality and seasonally adjusted using the Tramo/Seats method.

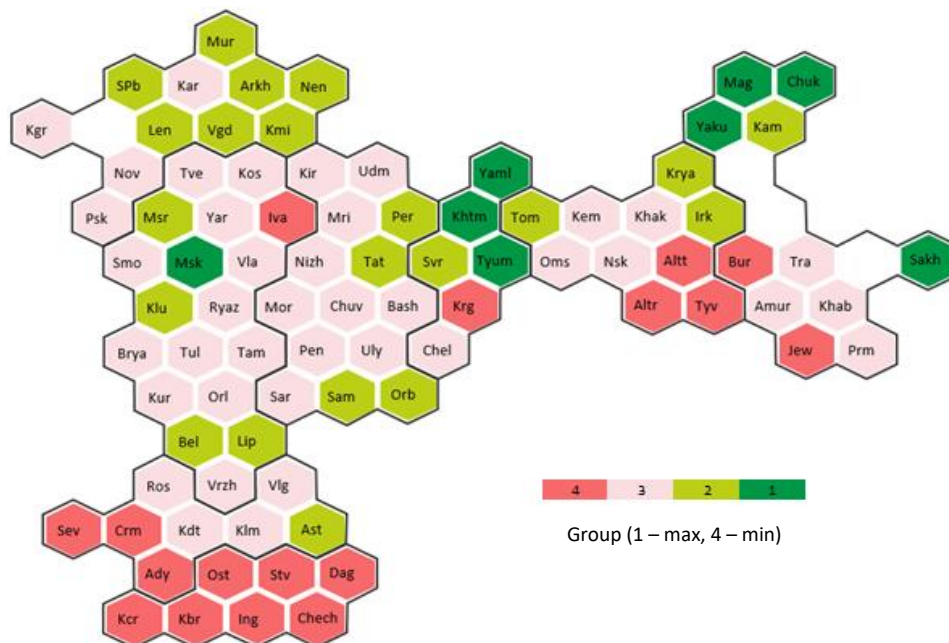
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<sup>1</sup> The lambda ratio of the quarterly data is 1,600.

### 3. EMPIRICAL RESULTS

To measure the heterogeneity of the fiscal impulse effect on inflationary processes in regions, we grouped regions by the level of their economic development based on the classification by Zubarevich (2022). As an indicator, we use GRP per capita adjusted for nationwide average prices (Russia = 100%). Over the past 20 years, there have been no considerable changes in the classification of Russian regions' development, measured as GRP per capita. Hence, we have formed four groups of regions by GRP per capita relative to the national average (Figure 1).

Figure 1. Russian regions grouped by price-adjusted GRP per capita



Note. GRP rates are not yet calculated for the new Russian regions.

Ady	Republic of Adygeya	Kos	Kostroma Region	Sam	Samara Region
Altt	Altai Territory	Krya	Krasnoyarsk Territory	Sar	Saratov Region
Altr	Republic of Altai	Kdt	Krasnodar Territory	Sakh	Sakhalin Region
Amur	Amur Region	Crn	Republic of Crimea	Svr	Sverdlovsk Region
Arkh	Arkhangelsk Region (without the autonomous area)	Kur	Kursk Region	Sev	City of Sevastopol
Ast	Astrakhan Region	Krg	Kurgan Region	Smo	Smolensk Region
Bash	Republic of Bashkortostan	Kcr	Karachayevo-Circassian Republic	SPb	City of Saint Petersburg
Bel	Belgorod Region	Len	Leningrad Region	Stv	Stavropol Territory
Brya	Bryansk Region	Lip	Lipetsk Region	Tam	Tambov Region
Bur	Republic of Buryatia	Mag	Magadan Region	Tat	Republic of Tatarstan
Vla	Vladimir Region	Mri	Republic of Mari El	Tve	Tver Region
Vlg	Volgograd Region	Msr	Moscow Region	Tom	Tomsk Region
Vgd	Vologda Region	Mor	Republic of Mordovia	Tul	Tula Region
Vrzh	Voronezh Region	MsK	Moscow	Tyv	Republic of Tyva
Dag	Republic of Dagestan	Mur	Murmansk Region	Tyum	Tyumen Region (without autonomous areas)
Jew	Jewish Autonomous Region	Nen	Nenets Autonomous Area	Udm	Republic of Udmurtia
Tra	Trans-Baikal Territory	Nizh	Nizhny Novgorod Region	Uly	Ulyanovsk Region
Iva	Ivanovo Region	Nov	Novgorod Region	Khab	Khabarovsk Territory
Ing	Republic of Ingushetia	Nsk	Novosibirsk Region	Khak	Republic of Khakassia
Irk	Irkutsk Region	Oms	Omsk Region	Khtm	Khanty-Mansi Autonomous Area – Yugra
Klm	Republic of Kalmykia	Orb	Orenburg Region	Chel	Chelyabinsk Region
Klu	Kaluga Region	Orl	Orel Region	Chech	Chechen Republic
Kam	Kamchatka Territory	Ost	Republic of North Ossetia – Alania	Chuv	Chuvash Republic
Kar	Republic of Karelia	Pen	Penza Region	Chuk	Chukotka Autonomous Area
Kbr	Kabardino-Balkarian Republic	Per	Perm Territory	Yaku	Republic of Sakha (Yakutia)
Kem	Kemerovo Region – Kuzbass	Prm	Primorye Territory	Yaml	Yamal-Nenets Autonomous Area
Kir	Kirov Region	Psk	Pskov Region	Yar	Yaroslavl Region
Kgr	Kaliningrad Region	Ros	Rostov Region		
Kmi	Komi Republic	Ryaz	Ryazan Region		



We estimated the elasticity of fiscal revenues for 77 Russian regions as per equations (7) and (8) across the following budget levels (see Table 4):

- federal budget depending on the business and commodity cycles;
- regional budgets (regional consolidated revenues) depending on the business cycle;
- extra-budgetary funds depending on the business cycle.

**Table 4**

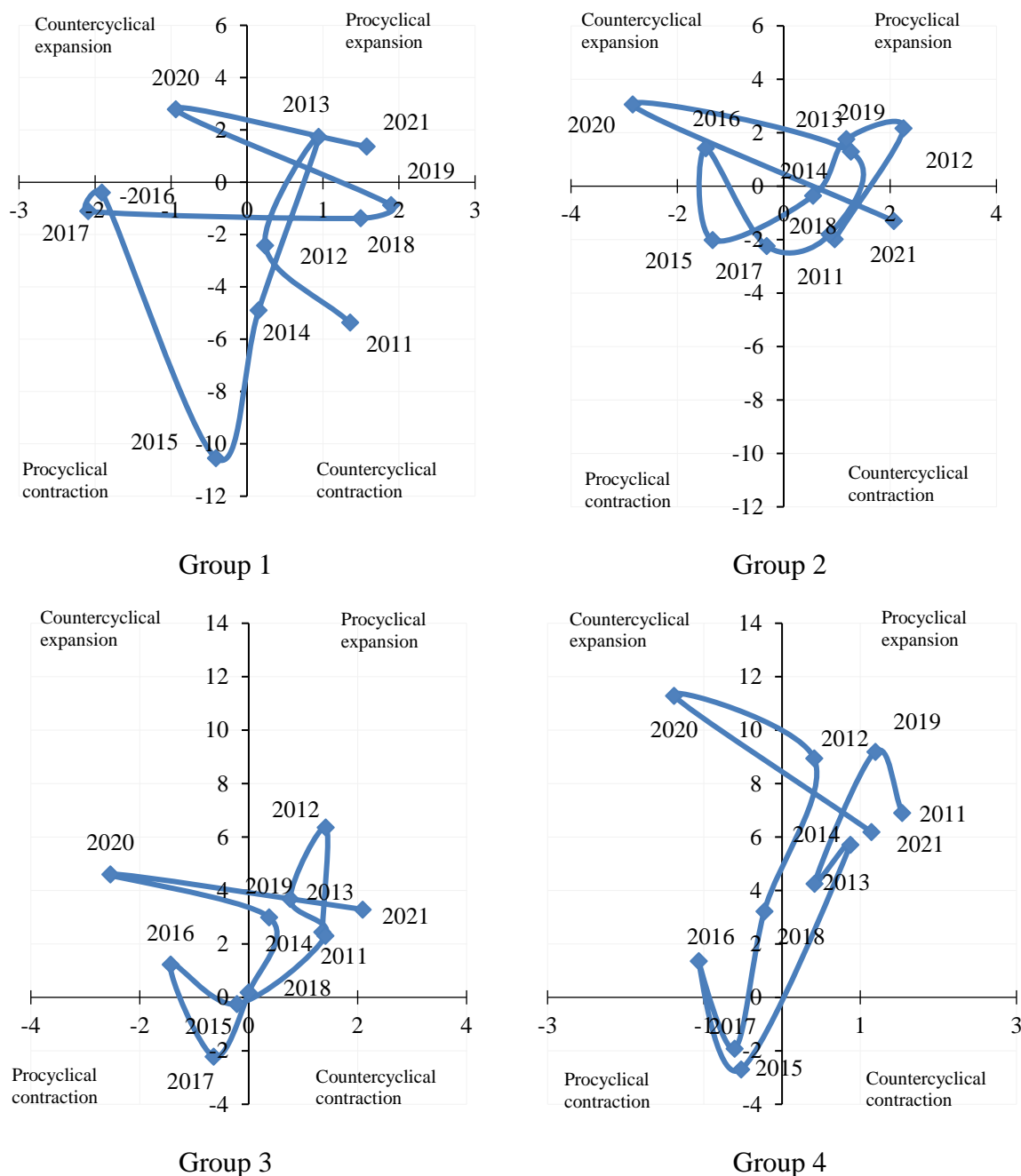
**Median elasticity of fiscal flow revenues by group of regions**

No.	Group of regions	Number of regions	Elasticity of extra-budgetary fund revenues to output gap	Elasticity of federal fiscal revenues to output gap	Elasticity of regional fiscal revenues to output gap	Elasticity of federal fiscal revenues to oil prices
1	Group 1	5	1.05	1.69	1.11	0.45
2	Group 2	20	1.00	2.03	1.09	0.40
3	Group 3	39	0.92	1.53	1.12	0.39
4	Group 4	13	1.00	1.78	1.00	0.65
5	Russian average	77	1.00	1.64	1.07	0.41

In the regressions measuring the elasticity ratios of fiscal revenues in Russian regions, residuals were checked for autocorrelation using the Lagrange multiplier test and for heteroscedasticity using the Breusch–Pagan–Godfrey and White tests. Based on the tests, hypotheses that there is neither autocorrelation nor heteroscedasticity in the residuals are not rejected at the 5% level. This allows us to proceed with the analysis of the obtained ratios. For some regions the specific values of the ratios are not important, and we use the average value for the corresponding federal district.

We use the estimated elasticity ratios, annual GRP data from Rosstat, regional fiscal revenues and expenditures, and annual data on regional output gaps calculated on the basis of quarterly data using the HP filter [Boyko, 2020] to obtain the annual measures of fiscal impulses in regions. The results show that the tax revenue from a constituent territory of the RF to the federal budget is more sensitive to changes in business activity and commodity cycle than the revenues of regional budgets and extra-budgetary funds (Figure 2). The likely reason is that the revenue of extra-budgetary funds and a sizeable portion of regional fiscal revenue are generated due to personal income tax collections. Contrastingly, the federal fiscal revenue is mainly derived from VAT and foreign trade income tax collections. For example, the federal fiscal revenue is primarily formed by tax collections related to business activity and external economic conditions. However, the labour tax, which is more stable by nature, comprises the major portion of regional fiscal revenues.

**Figure 2. Fiscal policy stance in different phases of business cycles in regions**



Note. In the figures, the vertical axis denotes the fiscal impulse as a percentage of GRP, and the horizontal axis denotes the output gap as a percentage of GRP.

According to the European Commission’s study measuring the average elasticity ratios of revenues in EU countries, the obtained results are higher for business taxes than for household taxes. The elasticity of social security contributions proves to be below 1 (0.74). Non-tax revenues have zero elasticity. According to the EC and IMF technical notes on measuring cyclically adjusted balances (revenue less expenditure), expenditure is deemed discretionary. Although some expenditure items (e.g. unemployment expenditure frequently mentioned in the literature) may have a cyclical composition. According to the EC methodology, unemployment expenditure may have a negative elasticity, with the other expenditures showing zero elasticity. Given that the

labour market is less flexible in Russia than in advanced economies and the share of unemployment expenditure in total government spending is minor and difficult to extract, this study assumes that all expenditures are discretionary and non-cyclical. In this paper all expenditures are assumed to be non-cyclical.

Notably, no significant difference was identified in revenue elasticity between the above groups of regions.

In regions with lower GRP per capita rates (Group 4), the period when the positive output gap was accompanied by the positive fiscal impulse was considerable. Most regions pursued a countercyclical fiscal policy in 2020 when fiscal stimuli were provided to the economy in response to a fall in output. In regions with lower GRP per capita rates, the positive output gap was often accompanied by the positive fiscal impulse. According to the figures below, regions with lower GRP per capita rates (Groups 3 and 4) tended to pursue a procyclical and expansionary fiscal policy in the period from 2011 to 2020.

The analysis of the fiscal impulse by budget level across the groups of regions showed that Group 4 had a considerable period when the positive output gap was accompanied by the positive fiscal impulse from the federal budget. The federal fiscal impulse as a percentage of GRP was much lower in regions where the GRP per capita was above the Russian average than in those where the GRP per capita was below the Russian average. The regional fiscal impulse was mainly positive in all groups of regions over the reviewed horizon. The common thing was that all reviewed groups of regions had a negative or close to zero fiscal impulse from 2015 to 2018. The fiscal impulse from extra-budgetary funds was predominantly observed in regions with lower GRP per capita rates. The highest fiscal impulse was recorded by all regions in 2020 during the COVID-19 pandemic. In regions with lower GRP per capita rates, fiscal stimuli to support business activity were higher on average in 2020–2021. In these regions, the share of government loans in the total amount of public debt increased substantially in 2020–2021 (by 67% and 74% in Group 3 and Group 4, respectively, as of 1 January 2022). This may indirectly suggest that these regions have some limitations in raising private capital (bonds, bank credits) as compared to those with higher GRP per capita rates. Limited capital raising in turn may cause difficulties in financing expenditure during regional economic downturns.

It is noteworthy that government loans to regions are cheaper than those issued by credit institutions. These facilities may be a source of relatively cheap, albeit limited, funding for regions with lower GRP per capita rates to finance their fiscal deficits.

Given the comparable average growth rates of revenue and expenditure, the fiscal impulse adjusted for business activity is generally higher in subsidised regions than in those with higher GRP per capita rates. Fiscal impulses were weak in the period from 2015 to 2018 when fiscal

consolidation occurred. Noticeable fiscal impulses were registered by subsidised regions in 2020 during the COVID-19 pandemic when the government was stimulating the economy in response to the drop in output. However, in 2015, to respond to the fall in output, regions pursued a fiscal policy of procyclical contraction.

At the next stage, we find a correlation between inflation and the fiscal impulse in Russian regions (Table 5).

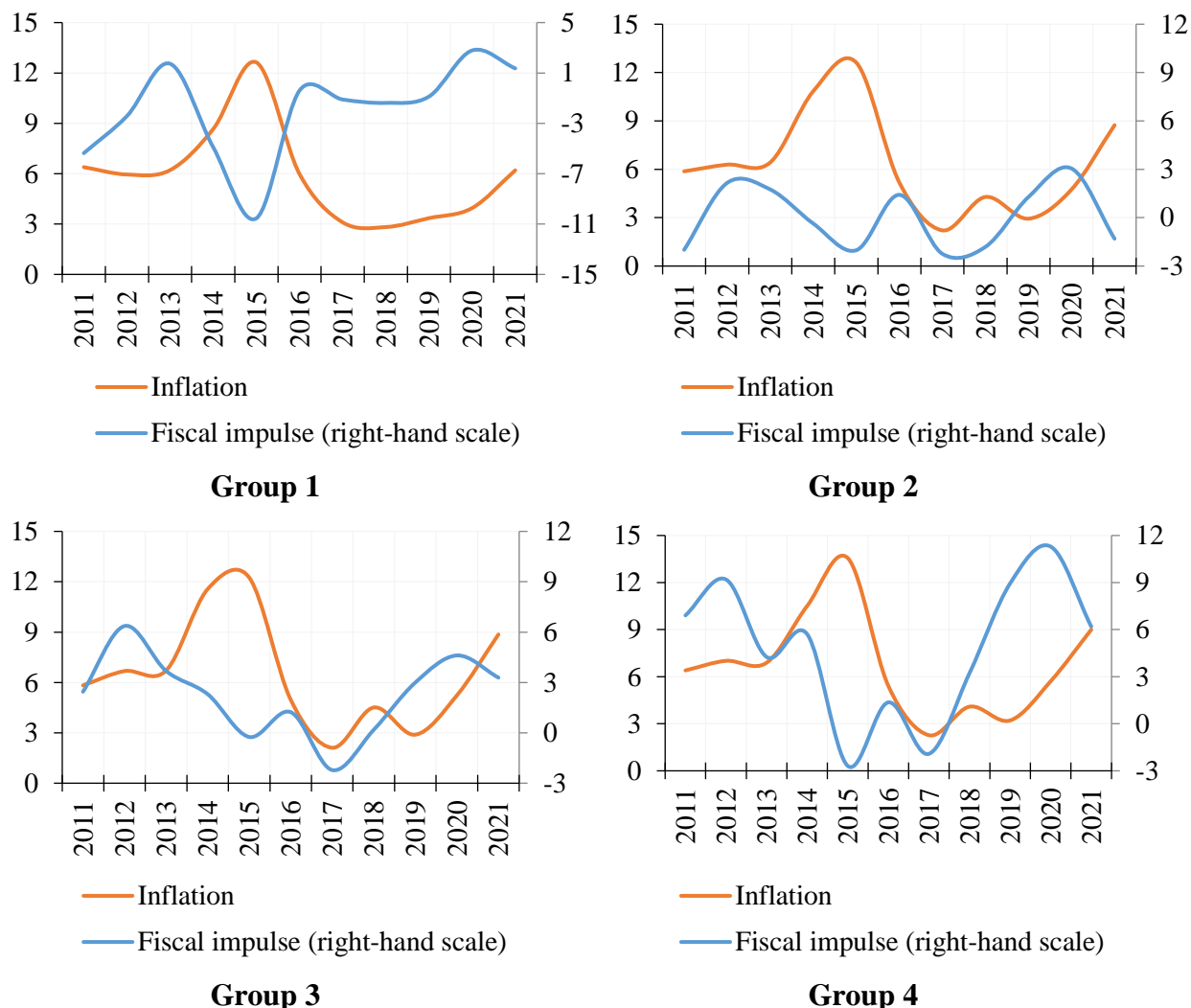
**Table 5****Correlation between inflation and fiscal impulse in Russian regions**

Indicator	Correlation (0 lag)	Correlation (1 lag)	Correlation (2 lags)	Correlation (3 lags)	Note
<b>Average</b>	<b>-0.01</b>	<b>0.26</b>	<b>0.47</b>	<b>0.22</b>	
<b>Median</b>	<b>-0.02</b>	<b>0.29</b>	<b>0.53</b>	<b>0.24</b>	
<b>Number of regions</b>	16	7	3	12	Correlation is below -0.2
	43	21	10	25	Correlation is below 0.2 but above -0.2
	11	20	19	12	Correlation is below 0.4 but above 0.2
	8	30	46	29	Correlation is above 0.4

The assessment of the correlation between inflation and the fiscal impulse in regions shows that there is no correlation between variables over a comparable period. However, such correlation arises when we consider the fiscal impulse lags with a maximum median correlation of 0.53 with fiscal impulse lag 2. The proportion of regions with a correlation of over 0.4 is 38% and 59% of all regions for fiscal impulse lags 1 and 2, respectively.

The analysis of average annual inflation dynamics and the fiscal impulse in Russian regions grouped by the level of economic development shows that inflation and fiscal impulse paths are correlated in Groups 3 and 4 (Figure 3). On the contrary, inflation and the fiscal impulse in the most developed regions (Group 1) diverge, suggesting no or a weak correlation between inflation and the fiscal impulse.

**Figure 3. Average annual inflation and fiscal impulse (% of GRP) in Russian regions**



The assessment of correlation between the fiscal impulse and inflation in regions grouped by the level of economic development shows that the correlation between these indicators is considerable in the least developed regions compared with the developed and especially the most developed regions (Table 6).

**Table 6**

**Correlation between inflation and fiscal impulse in Russian regions grouped by level of economic development**

Group of regions	Indicator	Correlation (0 lag)	Correlation (1 lag)	Correlation (2 lags)	Correlation (3 lags)
Group 1	Median	-0.23	-0.06	0.35	0.14
Group 2		-0.1	0.25	0.5	0.03
Group 3		0.1	0.27	0.58	0.33
Group 4		-0.12	0.42	0.58	0.5

Based on this assessment, it is possible to group regions by the value of fiscal impulse and inflation. When grouping regions by the 10-year average fiscal impulse, regions with a higher fiscal impulse have higher inflation figures (Table 7), and vice versa. This conclusion is confirmed

by the extended sample used for the regional grouping (top 20 and top 30). Therefore, it is possible to state that there is a positive correlation between the variables.

**Table 7**

**Regions grouped in descending order of absolute values of fiscal impulses, average % of GRP**

Group of regions	Fiscal impulse, 2011–2020 average	Inflation, 2011–2020 average
Top 10	6.67	6.37
Bottom 10	-1.67	6.25
Top 20	5.36	6.56
Bottom 20	-0.96	6.41
Top 30	4.56	6.54
Bottom 30	-0.35	6.45

To measure the effect of the fiscal impulse on regional inflation, we use a dynamic panel regression (9) on annual data from 2011 to 2021 for all groups of regions (Figure 1). The regression uses two variables: annual inflation and annual fiscal impulse (% of GRP) across Russian regions. The fiscal impulse is presented in real terms. A dummy variable is applied to take into account the 2015 inflation spike. Given the specifics of the fiscal process (more active spending at the year-end) and the external lags of fiscal policy, a variable of fiscal impulse lag 1 is added to the model. No model of adequate quality has been derived using a complete sample with the GRP per capita rate as a control variable reflecting the level of economic development. However, we arrive at significant models by decomposing the sample into groups of regions by the level of their economic development.

We test the balances for autocorrelation using the Arellano-Bond test. Based on the test results, it is possible to conclude that the balances have an autoregression of the second order AR(2).

The Sargan test of the chosen analysis instruments' accuracy shows that the instruments in the model are valid. Therefore, we cannot reject the hypothesis that the instruments do not correlate with the regression remainder (p-value proved to be above the 5% level of significance). In other words, the zero hypothesis regarding the effective use of the instrumental variable matrix cannot be rejected. All independent variables are significant at any reasonable level of significance and meet economic considerations. The model appears to be appropriate. The exception is the estimates for regions with higher GRP per capita rates.

According to the results of panel regression assessments for groups of regions, the response of inflation to the fiscal impulse shock is higher in regions with lower GRP per capita rates than

in those with higher GRP per capita rates (Table 8). The response is insignificant in the most developed regions. The confidence intervals of fiscal impulse measures for regions with higher GRP per capita rates (Groups 1 and 2) and lower GRP per capita rates (Groups 3 and 4) do not overlap at any reasonable level of significance. This suggests that there is a statistical difference between fiscal impulse effects on inflationary processes in various regions, depending on the level of their economic development.

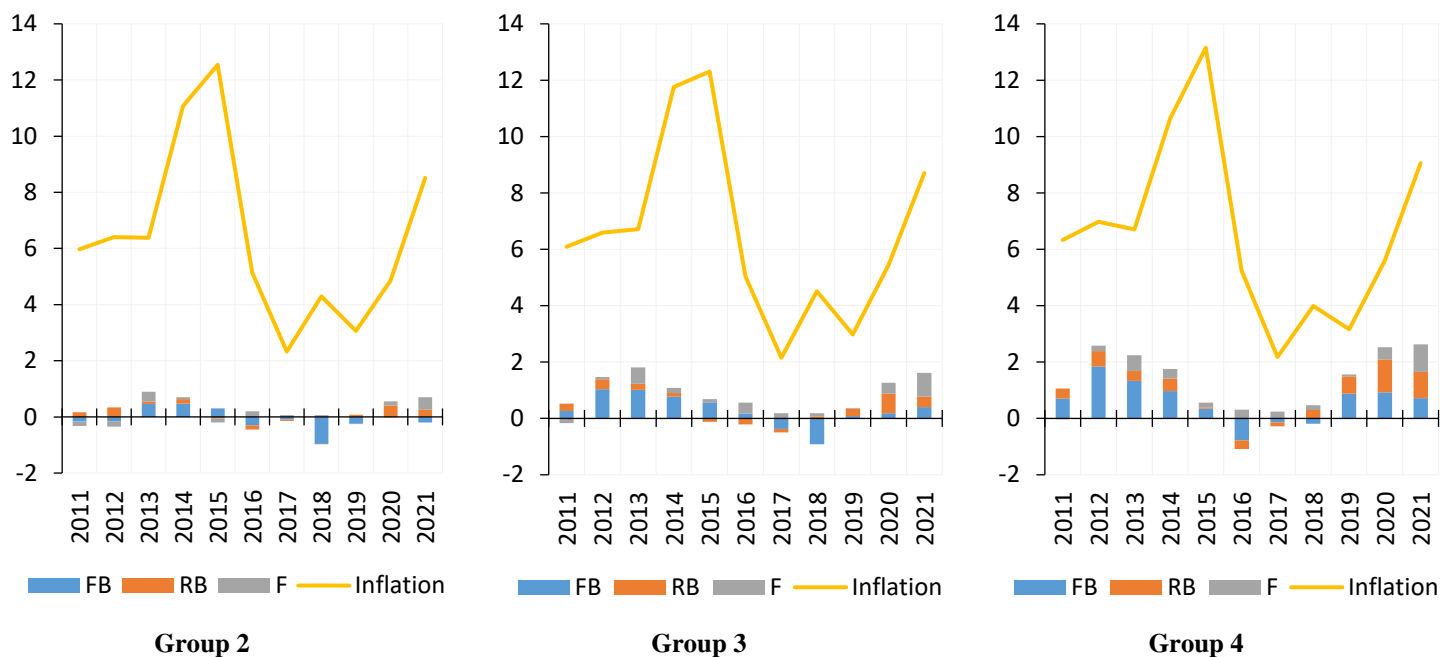
The analysis of the fiscal impulse contribution decomposed by fiscal flow to average annual inflation across groups of regions shows that fiscal injections into the economy make more sizeable contributions to inflationary processes in regions with lower GRP per capita rates than in those with higher GRP per capita rates (Figure 4). In regions with higher GRP per capita rates (Group 2), the 11-year average fiscal impulse is -0.3pp of GRP, with the average contribution to inflation equalling 0.11pp. In Group 3, the average fiscal impulse is 2.2pp, with the average contribution to inflation of 0.72pp. In Group 4, the average fiscal impulse amounts to 4.6pp and the average contribution to inflation is 1.3pp.

**Table 8**  
**Dynamic panel regression (GMM) parameters to measure fiscal impulse effects on inflation in groups of regions**

No.	Variables	Complete sample	Groups 1 and 2	Groups 3 and 4	Group 1	Group 2	Group 3	Group 4
1	Inflation with lag 1	0.10***	0.20***	0.19***	1.12	0.15***	0.13***	0.33***
2	Fiscal impulse	0.10***	0.07***	0.13***	-0.37***	0.10***	0.16***	0.11***
3	Fiscal impulse with lag 1	0.17***	0.19***	0.18***	0.37	0.20***	0.19***	0.15***
3	2015 dummy variable	5.76***	5.86***	5.77***	-0.28	5.98***	5.73***	6.35***
3	GRP per capita	-0.02***	–	–	–	–	–	–
4	Observations	693	468	45	180	351	117	468
5	Arellano-Bond test,							
	AR(1)	0.00	0.00	0.88	0.00	0.00	0.00	0.00
	AR(2)	0.83	0.13	0.98	0.96	0.20	0.11	0.13
6	Sargan test (J-prob)	0.00	0.19	0.84	0.22	0.30	0.20	0.19

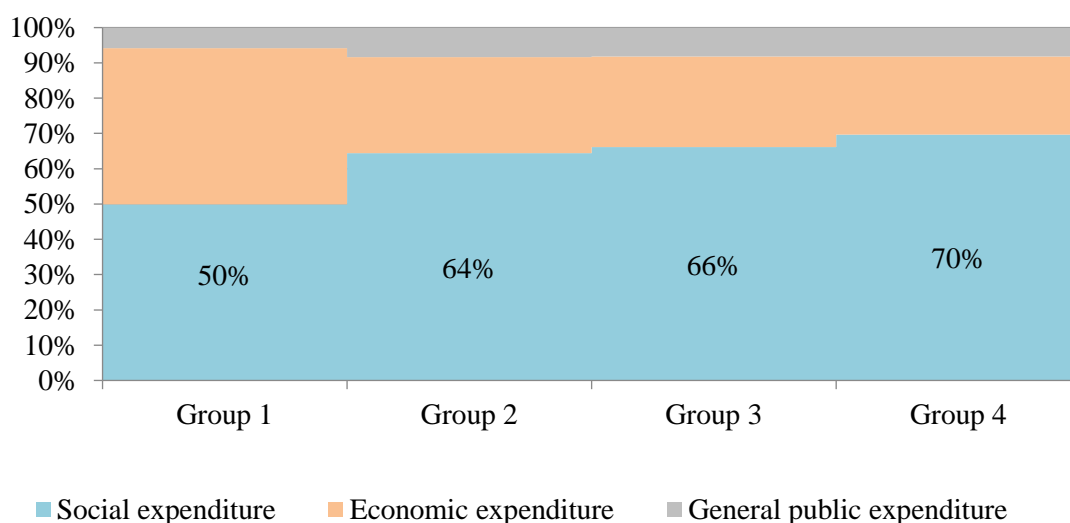
Note. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

**Figure 4. Fiscal impulse contributions (% of GRP) to inflation by fiscal flow, % (FB – federal budget, RB – regional budget, F – extra-budgetary funds)**



Fiscal impulses from the federal budget and extra-budgetary funds substantially differ between groups of regions, whereas those from regional budgets are not as different. A possible reason for a higher inflation response to the fiscal impulse shock in regions with lower GRP per capita rates than in those with higher GRP per capita rates is the composition of expenditure (Figure 5). The 11-year average portion of social expenses in the total expenditure of regional consolidated budgets is nearly 50% in Group 1 and 70% in Group 4.

**Figure 5. Composition of consolidated budget expenditure of regional groups, by item, on average from 2011 to 2021**





Thus, the assessment of the dependence between the fiscal impulse and inflation in groups of regions formed based on the level of their economic development shows that the correlation between these indicators is considerable in regions with lower GRP per capita rates. In regions with higher GRP per capita rates, a fiscal impulse of 1% of GRP results in a weaker inflation response than in those with lower GRP per capita rates. The latter have a high portion of social expenses.

We would like to note that the resulting estimates of fiscal impulses and the effects of regional fiscal policies on inflationary processes need to be used carefully. When using the results of this study, other researchers should take into account approximations and approaches applied to the analysis of the fiscal impulse in regions, such as the use of the HP filter to identify business and oil cycles and an extensive use of proxy variables to assess federal budget revenues and expenditures in regions.

Limitations of the use of the obtained estimates for forecasting purposes are also explained by the different fiscal policy conditions over the forecast horizon relative to the period for which the estimates were made (2010–2021). They may become irrelevant due to changes in the structure of economies, including regional ones. If changes to fiscal policy are announced, the estimates may disregard changes related to the response of economic agents to such changes. However, the conclusions of this paper are in line with the results obtained by the authors mentioned above, whose studies are focused on fiscal impulses. We find it possible to use the obtained results in debates regarding the fiscal policy stance pursued by regions based on the level of their economic development, fiscal impulse, and a possible heterogeneous effect of the fiscal impulse on inflationary processes in regions.

## **CONCLUSION**

Fiscal impulse is an important factor in a fiscal policy analysis. It reflects a fiscal policy stance based on the effect of business activity fluctuations towards its easing or tightening. In addition, it is important to differentiate between structural shifts in fiscal policy and cyclical changes prompted by a turn in the business cycle.

The key results of this study are the fiscal impulse measures that comprehensively reflect fiscal flows in each Russian region and the retrospective database of fiscal impulse components for all Russian regions. To measure the fiscal impulse, we use estimates of fiscal revenues and expenditures at various levels of the fiscal system (the federal budget, regional budgets, and extra-budgetary funds) in the constituent territories of the Russian Federation. This enables us to assess the general nature of fiscal policy pursued at various levels of the fiscal system in a constituent territory of the Russian Federation. The cyclical adjustment of regional budget balances also includes an allowance for the sensitivity (elasticity) of revenues of various budget levels collected

in a constituent territory of the RF to the regional output gap. It has also been found that given the comparable average growth rates of revenue and expenditure, the fiscal impulse adjusted for business activity was generally higher in subsidised regions than in those with higher GRP per capita rates over the reviewed period from 2011 to 2021. Regions with lower GRP per capita rates tended to pursue a procyclical expansionary fiscal policy when the positive output gap was accompanied by a positive fiscal impulse. Most regions were pursuing a countercyclical fiscal policy in 2020.

The obtained elasticity rates of revenues of Russian regional budgets and extra-budgetary funds to the output gap are close to a theoretical assumption of approximately 1. In regions federal tax collections appear to be more sensitive to movements in regional economic activity (1.64). A possible reason is that business taxes (corporate profit tax, foreign trade income tax, etc.) account for a sizeable portion of federal fiscal revenues. For example, Vasilieva, Vlasov and Ponomarenko (2009) conclude that taxes of this type are more sensitive to the output gap than personal income tax. Individuals' personal income tax collections make a substantial portion of the revenues of regional budgets and extra-budgetary funds. This circumstance makes them less sensitive to fluctuations in regional business activity, as stated in the conclusions drawn by other authors.

The possible reason why regions with lower GRP per capita rates are more inclined to pursue a procyclical fiscal policy is the relatively limited opportunities for them to raise funds in foreign debt markets and the smaller capacity of the domestic debt market. Borrowings in these markets may help them limit potential rises in expenditure during periods of cyclical downturns.

Based on the fiscal impulse measures obtained using econometric tools, we have found that the effect of the fiscal impulse on inflation in Russian regions is heterogeneous and negatively correlated with the level of regions' economic development. The effect of the fiscal impulse on inflationary processes is greater in regions with lower GRP per capita rates than in those with higher GRP per capita rates. Given that fiscal policies in regions with lower GRP per capita are subsidy-centred, an expansionary fiscal policy makes a sizeable contribution to inflation in these regions.

A monetary policy stance impacts the cost of funds to finance fiscal deficits. The rising cost of financial borrowings (loans from credit institutions, bonds) may hinder regional authorities from expanding fiscal deficits as planned in regions with higher GRP per capita rates. However, more heavily subsidised regions depend to a greater extent on federal fiscal transfers.

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**APPENDICES**

**Figure 1. Distribution of ratios of income dependency on business and commodity cycles across budget levels, by region, pp**

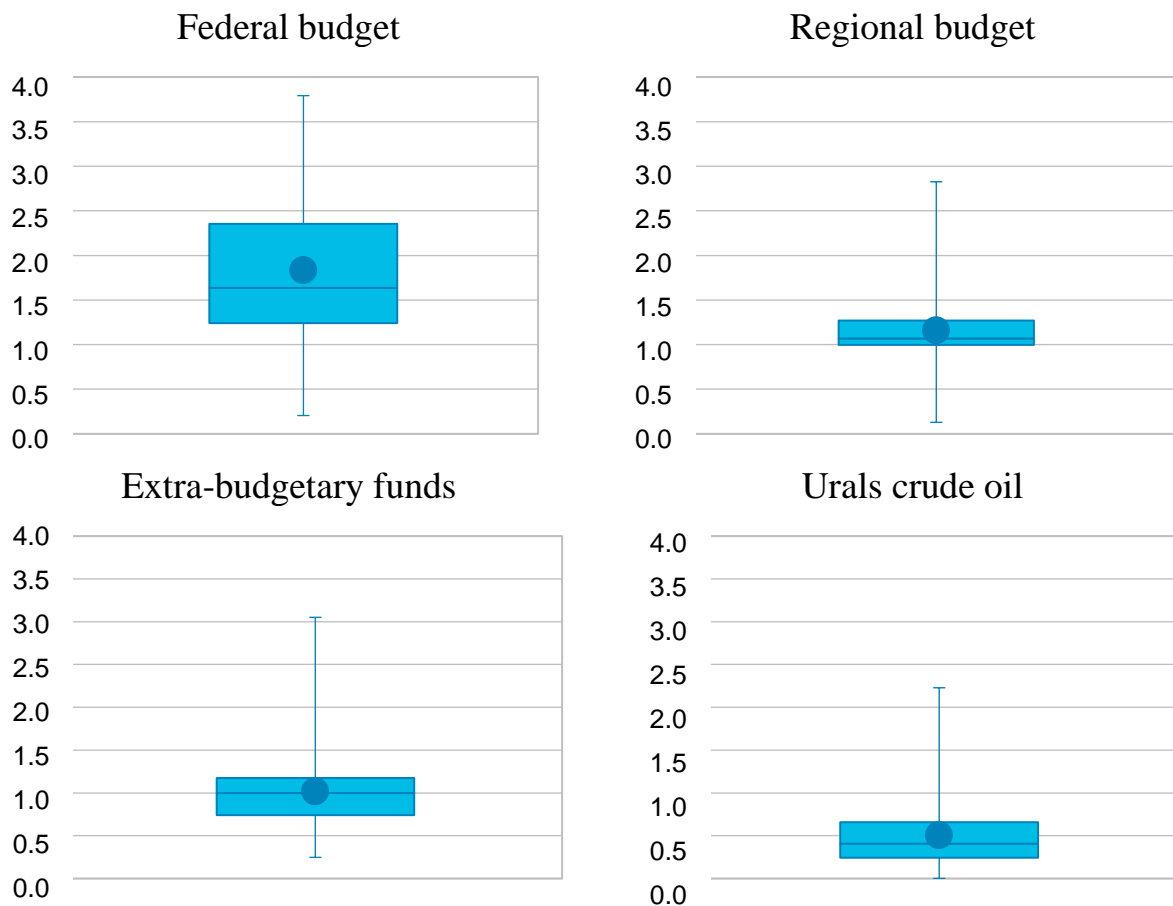
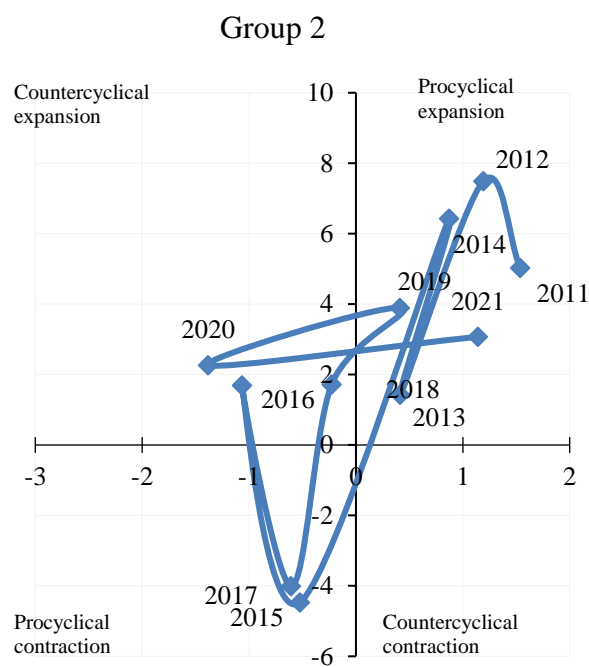
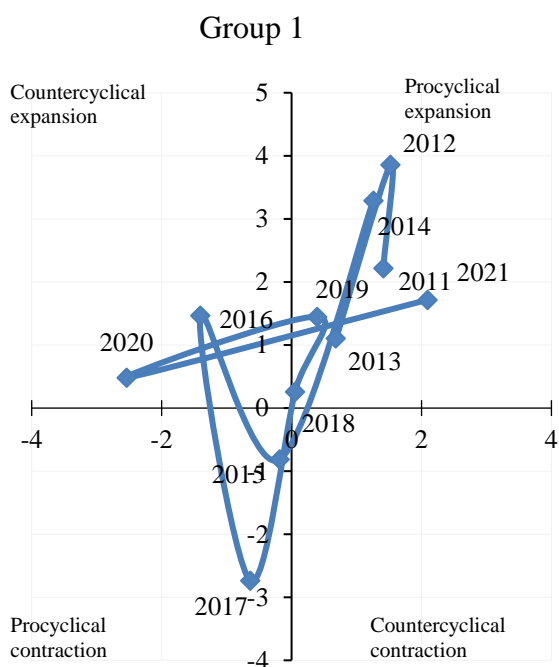
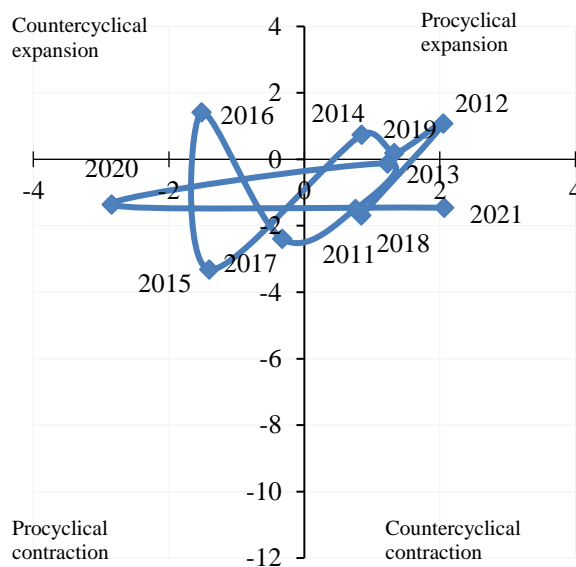
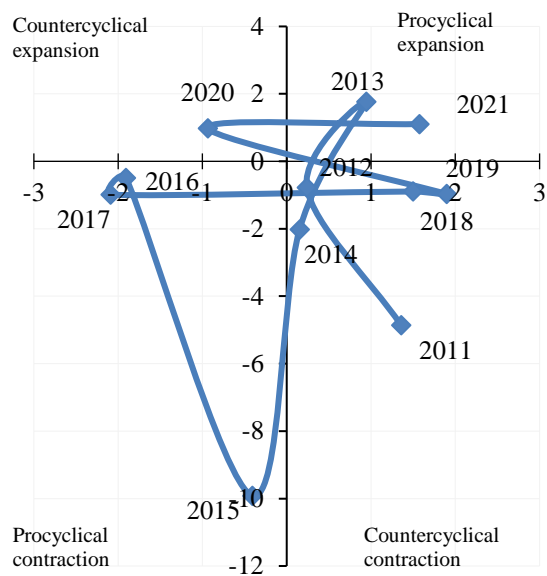
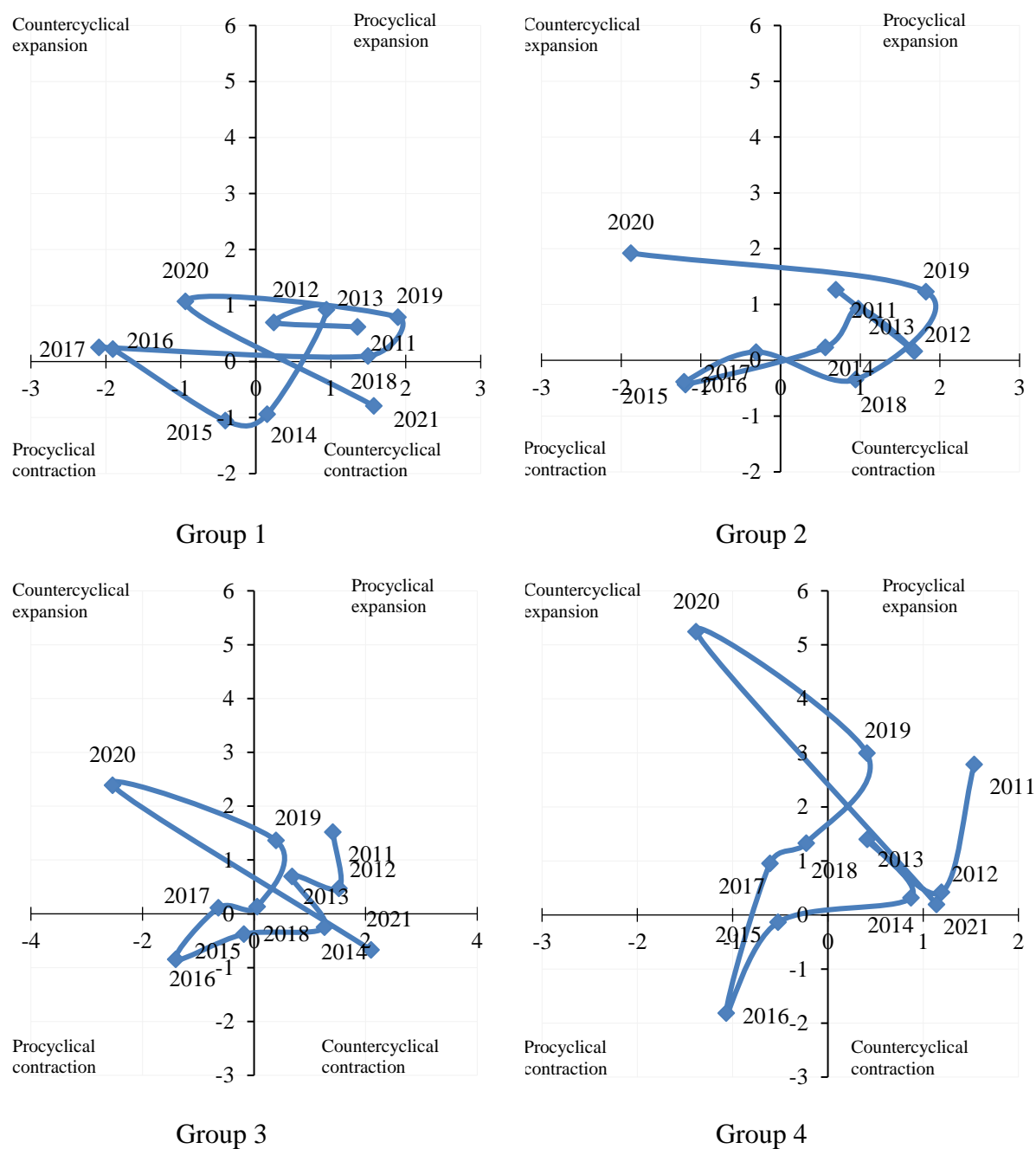


Figure 2. Federal fiscal policy stance in different phases of business cycles in regions



Note. In the figures, the vertical axis denotes the fiscal impulse as a percentage of GRP, and the horizontal axis denotes the output gap as a percentage of GRP.

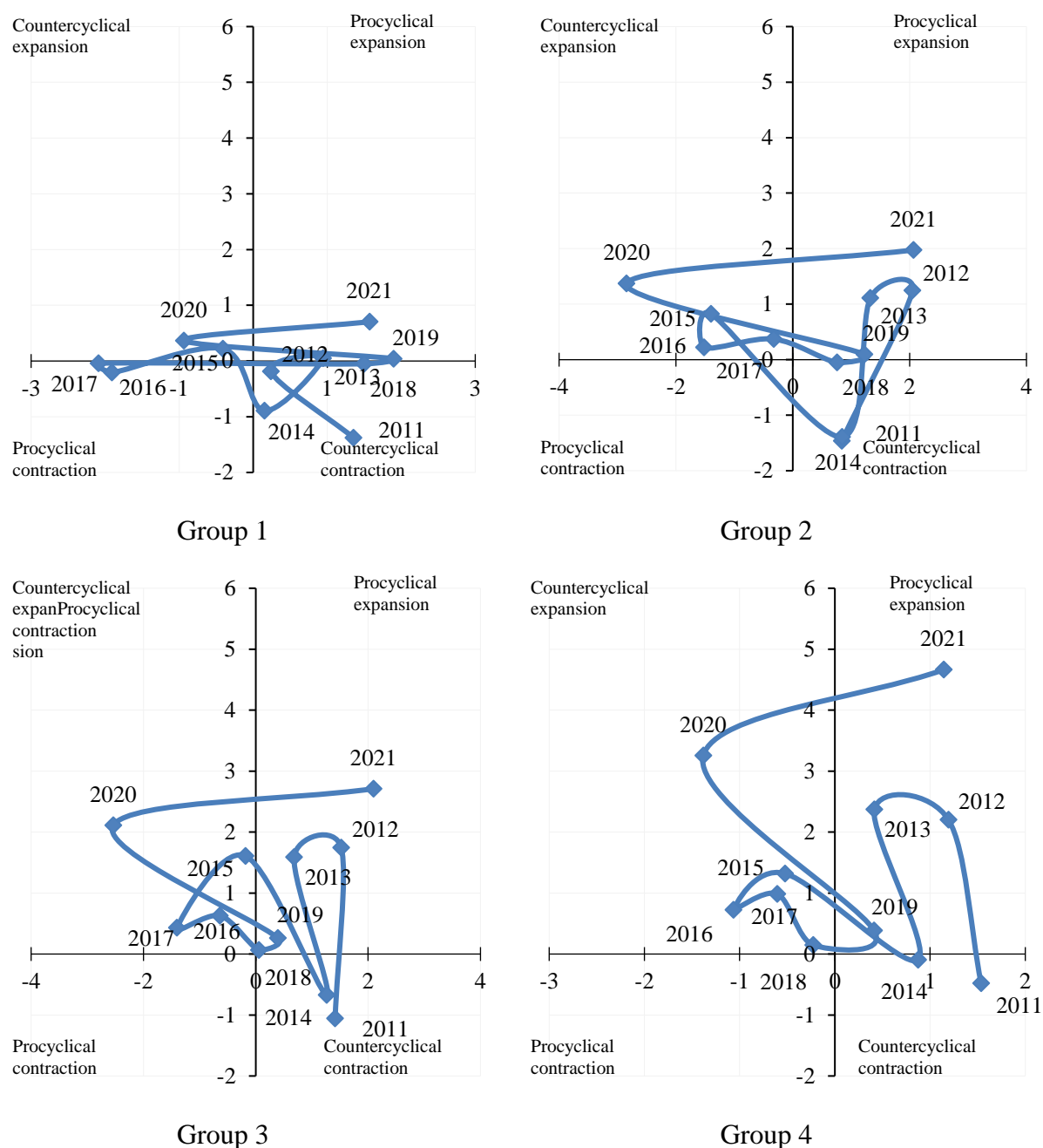
Figure 3. Regional fiscal policy stance in different phases of business cycles in regions



Note. In the figures, the vertical axis denotes the fiscal impulse as a percentage of GRP, and the horizontal axis denotes the output gap as a percentage of GRP.

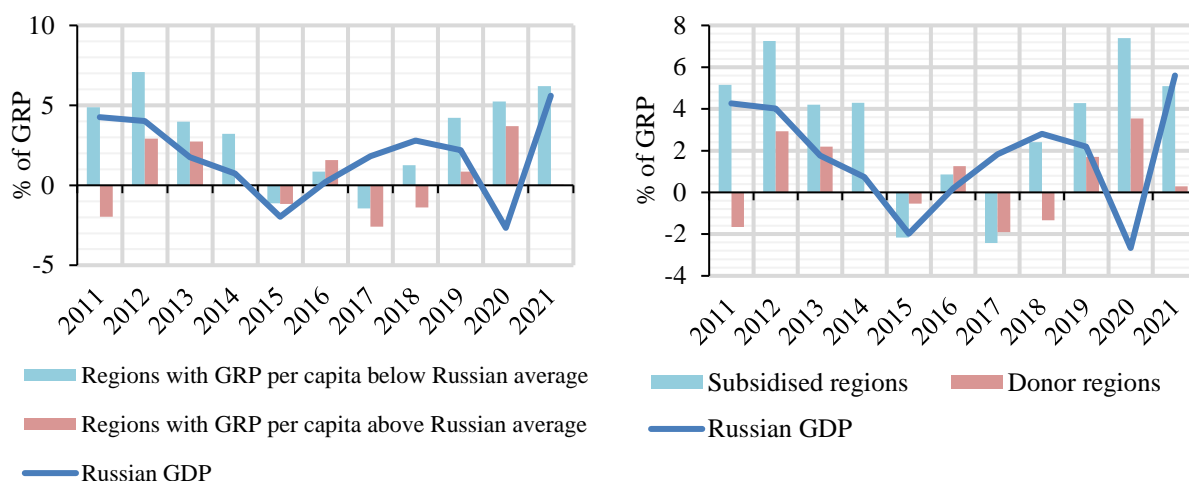


**Figure 4. Fiscal policy stance of extra-budgetary funds in different phases of business cycles in regions**



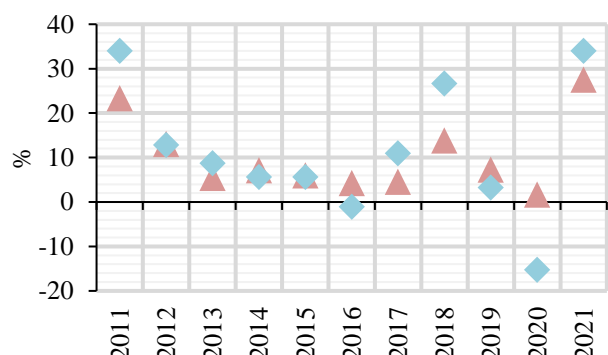
Note. In the figures, the vertical axis denotes the fiscal impulse as a percentage of GRP, and the horizontal axis denotes the output gap as a percentage of GRP.

**Figure 5. Fiscal impulse across regions grouped by level of economic development\* and subsidy level\*\*, and overall economic activity in Russia, %**

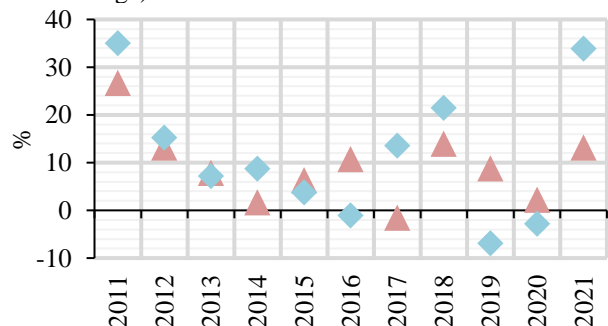


**Figure 6. Annual growth rates of fiscal revenues and expenditures at all budget levels in groups of regions**

Revenue growth rate across groups of regions

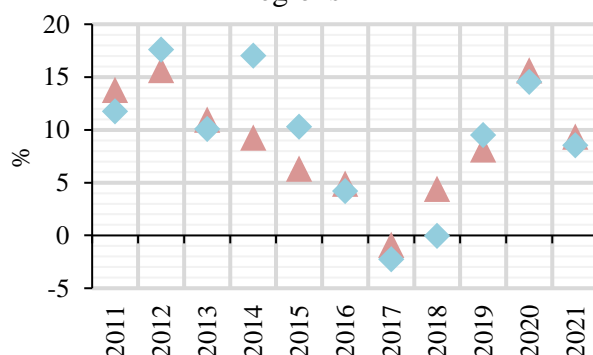


▲ Least developed regions' revenues (YoY, 10.4% on average)  
 ◆ Most developed regions' revenues (YoY, 11.4% on average)

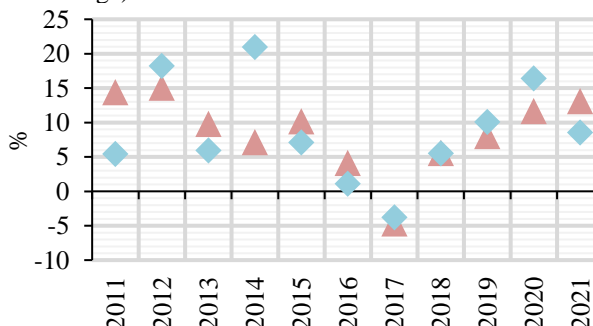


▲ Subsidised regions' revenues (YoY, 9.4% on average)  
 ◆ Donor regions' revenues (YoY, 11.6% on average)

Expenditure growth rate across groups of regions



▲ Least developed regions' expenditures (YoY, 8.9% on average)  
 ◆ Most developed regions' expenditures (YoY, 9.2% on average)



▲ Subsidised regions' expenditures (YoY, 8.6% on average)  
 ◆ Donor regions' expenditures (YoY, 8.7% on average)

\* The indicator is GRP per capita.

\*\* The indicator is the 10-year average ratio of fiscal transfers to consolidated fiscal revenues.