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Regional Disparities and Fiscal Federalism in Russia

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Abstract

This paper examines how regional disparities have evolved in Russia and how Russia's system of intergovernmental fiscal relations is managing these disparities. Regional disparities have fallen over the past two decades but remain relatively high. Socioeconomic outcomes remain worse in lagging regions despite faster growth and convergence in income levels. The twin shocks of COVID-19 and lower oil prices appear to have impacted richer regions disproportionately. Compared to other large countries with federal systems of government, Russia stands out with its high reliance on direct taxes as a revenue source for its regions. Transfers from the federal budget to the regions provide some redistribution by reducing the dispersion in real per capita fiscal spending, but also tend to be associated with lower growth. The Russian fiscal system offers degrees of redistribution and risk sharing of around 26 and 18 percent, respectively—with in-kind social transfers contributing the most. Finally, federal transfers in the aggregate tend to be procyclical and are also fairly unresponsive to shocks to regions' own revenues.

JEL Classification Numbers: H7, R1

Keywords: inequality, regional disparities, fiscal federalism, Russia
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I. INTRODUCTION

Slowing convergence and rising economic disparities across regions within countries continue to attract interest during the ongoing COVID-19 pandemic. The impact of crises is seldom evenly distributed, and this pandemic has had a disproportional impact on regions with a high share of employment in non-essential sectors or in small firms. This pattern is already evident in Europe's poorer regions which have experienced a larger decline in mobility so far, exacerbating existing disparities (Balakrishnnan *et al*, forthcoming).

In contrast, Russia's richer regions—densely populated big cities like Moscow and St. Petersburg and oil-rich regions—have been hit harder by the twin shocks of COVID-19 and lower oil prices. As a matter of fact, the last three recessions in Russia—the global financial crisis in 2008-09, the 2014-15 dual sanctions/oil price shock, and the ongoing COVID-19 pandemic—have all seen sharp drops in oil prices, disproportionately affecting rich oil-producing regions and playing a "leveling" role in reducing disparities through convergence to the bottom.

Though decreasing, regional disparities remain particularly large in Russia. World Bank (2018) estimates Russia's richest region to be 17 times richer than its poorest one, and explains this finding with the Soviet legacy and the unique geography of a continent-sized, sparsely populated country with pockets of abundant natural resources.

Large regional disparities could be the byproduct of the standard growth process. For instance, agglomeration effects could lead to a greater concentration of economic activity in some regions leading them to grow faster (Krugman, 1991; Nunn, 2014). In this instance, subnational differences in per capita incomes would be consistent with efficient resource allocation. Alternatively, large income differences across regions may also reflect market inefficiencies, such as barriers to the movement of labor and capital across regions, which government policies could ameliorate in theory. Regional disparities could also be the product of a sub-optimal fiscal system that amplifies economic cycles and dis-incentivizes regions from raising their own revenues (Rodríguez-Pose and Ezcurra, 2010; Kline and Moretti, 2014).

Russian policymakers have made efforts to reduce regional disparities by designing a federal transfer system that intends to close vertical imbalances,[2] achieve redistribution, and insure regions against both common shocks ("stabilization") and idiosyncratic ones ("risk-sharing").[3] The government's flagship national projects are focused on developing the regions. The federal government has assumed the responsibility for COVID-19 health spending, provided additional financial support to regions through grants, and postponed amortization payments on federal budget credits extended to regions.

The empirical literature on fiscal federalism has focused on the role fiscal policies play in mitigating regional disparities through risk sharing and redistribution. It is important to

[2] The vertical fiscal gap is the shortfall of the regions' own revenues from the spending responsibilities assigned to them plus any debt service.
[3] The distinction is due to Poghosyan, Senhadji, and Cottarelli (2016).

distinguish between the two concepts. Risk-sharing can be thought of as insurance against temporary asymmetric shocks, and is typically studied by focusing on differences in the growth rates of key variables of interest (income, consumption, etc.). Redistribution to alleviate regional income disparities and diminish inequalities in publicly provided services could be conceptualized as insurance against permanent (or persistent) shocks, with an analytical focus on differences in the levels of income or consumption.

Asdrubali, Sorensen, and Yosha (1996) pioneered a methodology for estimating the amount of consumption risk sharing across US states over 1963-90. The authors use panel regressions to decompose US interstate risk sharing into three distinct channels. They find that 39 percent of shocks to gross state product are smoothed by capital markets (via cross ownership of assets), 13 percent are smoothed by the federal government's tax-transfer system, and 23 percent are smoothed by credit markets (through borrowing and lending in response to shocks to gross state product). The authors further decompose federal government smoothing into subcategories: taxes, transfers, and grants to states. They find that the largest part of income smoothing by the federal government occurs through federal direct transfers to individuals, which smooth 6.3 percent of shocks to gross state product. While the tax system also contributes to risk sharing overall, social contributions typically have a dis-smoothing effect, that is, they provide negative risk sharing.

Melitz and Zumer (1998) investigate redistribution and risk sharing through the fiscal system in Canada, France, the UK, and the US. They focus on shocks to regional personal income and find that risk sharing between regions in France or in the United Kingdom is similar to risk sharing among US states (10-15 percent). Redistribution, however, is about twice as large in France (38 percent) and 50 percent larger in the United Kingdom (26 percent) than in the United States.

Decressin (2002) investigates income redistribution and risk sharing in Italy, a country whose stark regional economic contrasts are similar to Russia's. First, the paper uses a "traditional measure" in estimating risk sharing through the fiscal system which relies on the statistical relationship between household incomes and disposable incomes. Thus, it focuses on the risk sharing properties of personal income taxes, social security contributions, and welfare payments. The traditional approach estimates redistribution and risk sharing in Italy at around 20 percent and 6 percent, respectively, but it omits risk sharing in non-pecuniary forms through the government, including those that take place through public consumption, investment, and in-kind welfare assistance. Next, the paper deploys a "broader concept" which estimates risk sharing through the entire array of public expenditures and revenues, and finds that the magnitude of redistribution and risk sharing through Italy's fiscal system is 25-35 percent and 10-15 percent of GDP, respectively, with public consumption playing a large role. The paper also finds that fiscal revenue amplifies the effects of shocks on disposable income, that is, it provides negative risk sharing.

Poghosyan, Senhadji, and Cottarelli (2016) assess the extent to which fiscal transfers smooth regional shocks in the US, Canada, and Australia. They find that fiscal transfers offset 4-11 percent of idiosyncratic shocks (risk-sharing) and 13-24 percent of permanent shocks

(redistribution). This is in line with a common pattern in the literature, with estimates of the redistributive motive generally larger than those for risk sharing.

Fidrmuc and Dagler (2018) is the only study of interregional consumption risk sharing in Russia we are aware of. It finds that regional consumption risk sharing in Russia is relatively high, with 70 to 90 per cent of idiosyncratic consumption risk being smoothed across Russian regions by the fiscal system and by credit markets. This is substantially higher than the levels of risk sharing reported in other studies for both developed and emerging economies. For example, Du, He, and Rui (2011) find that only about 40 percent of income shocks at the provincial level in China were smoothed across provinces between 1980 and 2007.

Bozhechkova *et al* (2018) investigate the relationship between federal transfers and the tax revenues of regions over 2001-15. The study finds that after the global financial crisis income redistribution from richer to poorer regions became more effective. Federal transfers decrease with higher regional tax revenues for the period 2010-15 for middle-income and rich regions—a 1 percent increase in tax revenues was associated with 0.7-0.9 percent lower federal transfers—but not for poor regions.

IMF (2017b) finds that federal transfers reduce the cross-regional dispersion of fiscal spending in Russia. Of the three kinds of transfers analyzed—equalization grants (*dotatsii*), subsidies, and subventions—equalization grants seemed to be the most effective in redistributing toward poorer regions.

This paper examines how regional disparities have evolved in Russia and how Russia's system of intergovernmental fiscal relations is managing these disparities. We use a comprehensive annual dataset for 82 regions from 2000 to 2018, covering socioeconomic, labor market, financial, fiscal, and structural variables. However, data on federal fiscal transfers is only available from 2007, while survey data on household inequality are only available from 2004 to 2014. We complement these datasets with cross-country regional economic data from IMF (2019) and from the IMF's Fiscal Decentralization Dataset.

Section II documents several stylized facts about regional disparities in Russia. In particular, both household inequality and regional income disparities in Russia have fallen recently but remain relatively high. Socioeconomic outcomes are worse in lagging regions despite faster growth and convergence in income levels. Finally, the twin shocks of COVID-19 and lower oil prices appear to have impacted richer regions disproportionally.

Section III focuses on the role played by Russia's system of intergovernmental fiscal relations in managing regional income disparities. It finds that Russia has a complex and centralized system of intergovernmental fiscal relations. Compared to other large countries with federal systems of government, Russia stands out with its high reliance on direct taxes as a revenue source for its regions. While transfers from the federal budget to the regions achieve some redistribution by reducing the dispersion in real per capita fiscal spending, they also tend to be associated with lower long-term growth of regions. The Russian fiscal system offers degrees of redistribution and risk sharing of around 26 and 18 percent, respectively—

with in-kind social transfers contributing the most. Finally, federal transfers in the aggregate tend to be procyclical and are also unresponsive to shocks to regions' own revenues.

Section IV concludes by offering policy recommendations that flow out of our empirical analysis.

II. REGIONAL DISPARITIES IN RUSSIA

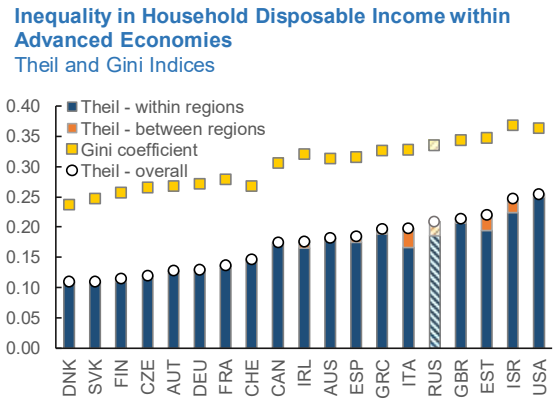
This section documents regional disparities in Russia. The main conclusions of its five sub-sections are as follows:

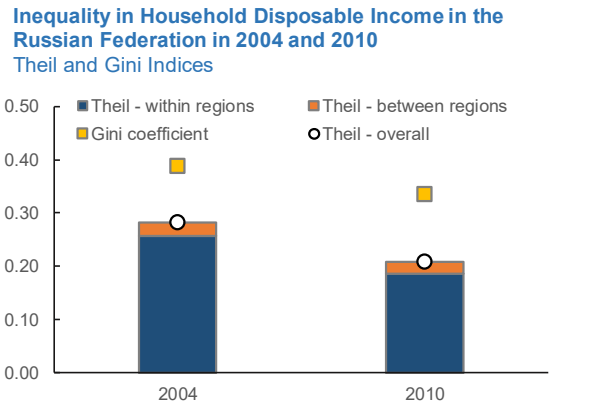
- Household inequality in Russia has declined but remains relatively high—and is dominated by income differences among households within regions, as opposed to income differences across regions.
- Similarly, regional income disparities have declined but they are still larger than in most other countries.
- Lagging regions have worse socioeconomic outcomes.
- Poorer regions are growing faster than richer regions.
- The twin shocks of COVID-19 and lower oil prices appear to have impacted richer regions disproportionally.

A. Household inequality in Russia has declined but remains relatively high—and is dominated by income differences among households within regions.

Figure 1 below compares inequality in household disposable incomes in Russia to that in several advanced economies. It uses two measures of inequality: Gini coefficients and Theil's L indices. The latter is defined as the mean log deviation of equivalized household disposable incomes (household incomes after tax and transfers, transformed to account for differences in household sizes). The index is then decomposed into two components: (1) inequality attributable to average income differences across regions (the "between" component); and (2) inequality attributable to income differences across households within regions, after adjusting for average regional income differences (the "within" component). Inequality in household disposable incomes is relatively high in Russia, but has declined between 2004 and 2010. Inequality within regions is the dominant driver of household income, with inequality across regions playing a minor role, probably due to factor mobility and fiscal federalism arrangements. Specifically, the contribution of cross-regional inequality to total household inequality is 10 percent in Russia, compared to less than 1 percent in Austria and 15 percent in Italy. The decline in household inequality in Russia has also been driven mostly by lower inequality within regions than a reduction in inequality across regions. Figure 2 illustrates that richer regions tend to be more unequal, an intuitively plausible result.

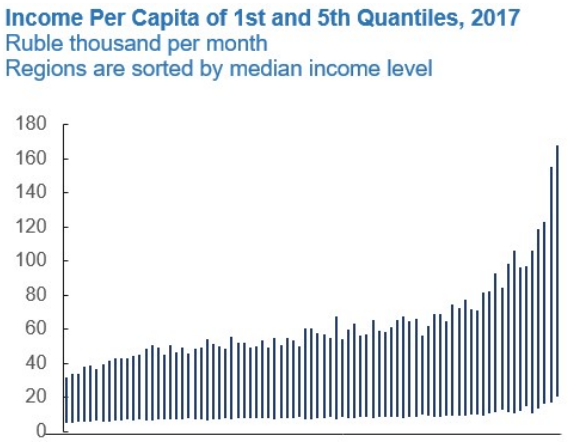
Figure 1. Inequality in Household Disposable Income





Sources: OECD; Rosstat; and IMF staff calculations.

Figure 2. Inequality within Regions



Sources: Rosstat; IMF staff calculations.

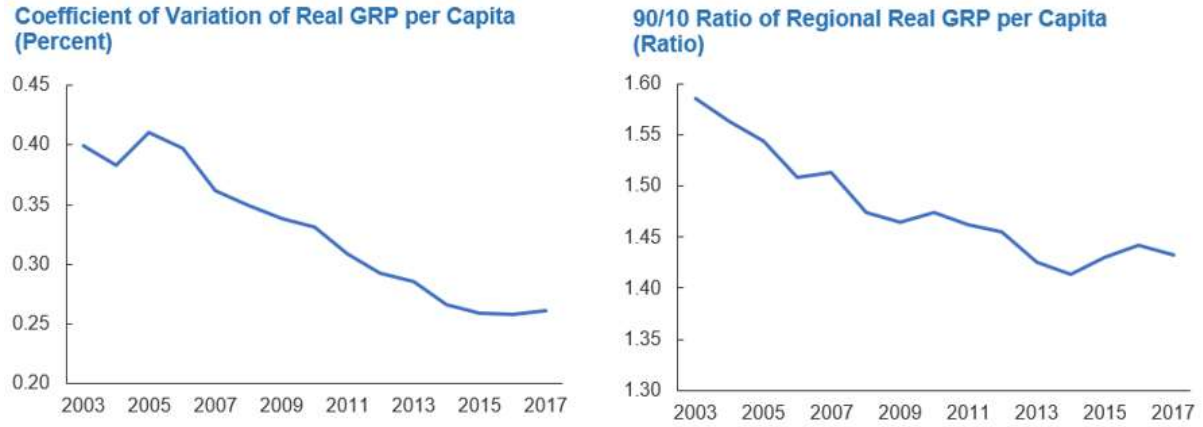
B. Regional income disparities have declined but are larger than in other countries.

Figure 3 shows that disparities among Russia's regions have declined since 2003 and real per capita incomes across regions have converged, as measured by two measures of dispersion: variation coefficients (the ratio of the standard deviation to the mean) and 90/10 ratios.[4] The latter are defined as the ratio of real per capita GDP in the region at the 90th percentile of the distribution to that of the region at the 10th percentile. Compared to coefficients of variation, 90/10 ratios are mean-independent, less sensitive to outliers, and invariant to the number of regions.[5]

[4] The list of covered regions is consistent over time.

[5] As a robustness check, we also calculated the population-weighted coefficient of variation (with standard deviations weighted by each region's share in the country's total population), to account for the large disparities in population sizes across Russia's regions. Results are not reported here but are available upon request.

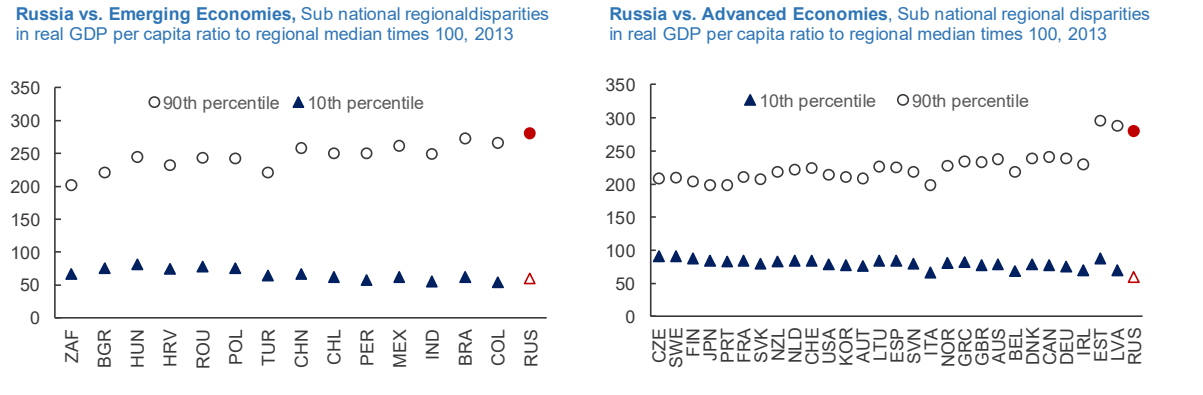
Figure 3. Regional income disparities (2003-2017)



Sources: Rosstat; IMF staff calculations.

Figure 4 compares regional income disparities in Russia to those in a selection of advanced and emerging economies. Russia's regional income disparities are higher than in most other countries. For example, the real GDP per capita of the Russian region at the 90th percentile of the distribution is about 200 percent higher than that of the 10th percentile region, a number which is about three times higher than Japan's. Inequality among Russia's regions is more pronounced than in emerging markets such as Hungary and Poland, where regional disparities (with western regions in both countries integrated into German manufacturing value chains) have been flagged as threatening social cohesion (Dusek et al, 2014; IMF, 2016).

Figure 4. Extent of Regional Income Disparities Across Countries



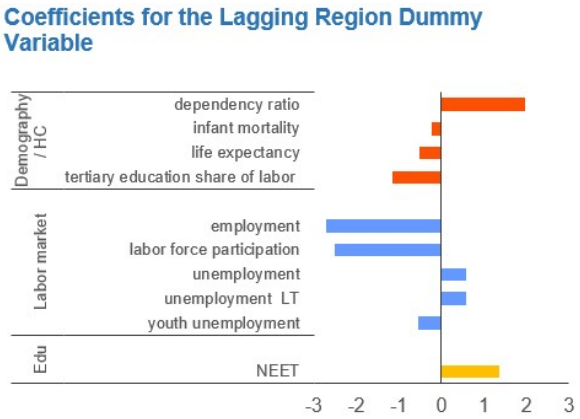
Sources: Luxemburg Income Study; IMF staff calculations.

C. Lagging regions have worse socioeconomic outcomes.

Figure 5 illustrates the difference between lagging regions (defined as low-income, slow-growth regions) and other regions for a set of demographic and labor market indicators. Bars show the difference between lagging regions and other regions for each of the variables. Results are based on regressing each variable on a dummy for whether a region is lagging or not, controlling for year fixed effects. The difference for each socioeconomic variable is statistically significant at the 10 percent level. Regional disparities are associated with worse

health, education, and labor market outcomes, as well as a higher share of informality in the economy. On average, lagging regions have higher dependency ratios, lower life expectancy, a lower share of employees with tertiary education, and a higher share of youth that are not in employment, education, or training (the NEET ratio). Other labor market outcomes are also worse, with lower labor force participation, lower employment, and higher short and long-term unemployment. Despite the higher share of youth in populations in lagging regions, youth unemployment outcomes are slightly better in lagging regions, probably reflecting the migration of younger people to more dynamic regions in search of better opportunities.

Figure 5. Socioeconomic Outcomes in Lagging Regions



Sources: Rosstat; IMF staff calculations.

D. Poorer regions have been growing faster than richer regions.

We use a standard panel regression to test for unconditional income convergence across regions. Under this hypothesis, in the long run the growth rate of per capita income is inversely correlated with the starting level of income per capita across regions. In Table 1 below, we regress the growth rate of region *i* in year *t* on its per capita income in year *t-7*. We obtain a negative β coefficient, which is highly statistically and economically significant—that is poorer regions grow faster than richer ones.

Section III.F below discusses conditional convergence, with a focus on the role played by transfers from the federal budget to the regions.

Table 1. Unconditional Convergence in Russian Regions, 2007-18

	Real GDP growth
GDP in year t-7	**-12.285*** **
	(0.920)
Constant	**38.263*** **
	(2.686)
Observations	632
Number of regionid	79
R-squared	**0.244**

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

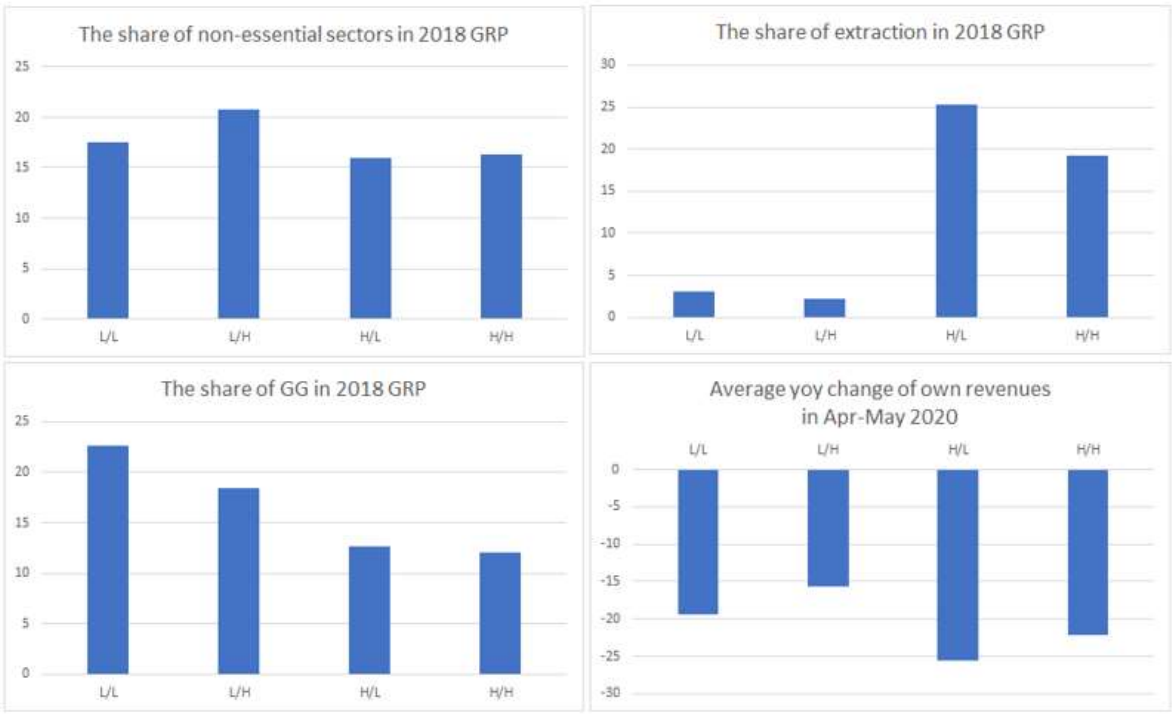
E. The twin shocks of COVID-19 and lower oil prices have disproportionally impacted richer regions.

Figure 6 illustrates the differential impact of the crisis on regions. Regions are divided by income and growth rates into 4 groups: low-income/low-growth (or LL), low-income/high-growth (LH), high-income/low-growth (HL), and high-income/high-growth (HH). The division is made on the basis of 2018 GRP per capita and 2018 GRP growth: H/L means above/below the median, respectively.

Wealthier regions (HL or HH) on average have a higher share of natural resource extraction in GRP and a lower share of general government (defined as government administration, education, and healthcare) in the economy. Dependence on global commodity prices (which fell during the pandemic) and relatively low shares of protected state employment appear to have been the reasons why the crisis has disproportionally affected the own fiscal revenues of richer regions (densely populated big cities, like Moscow and St. Petersburg, as well as oil-producing regions). Own revenues in richer regions (HL and HH) have seen a year-on-year decline of 24 percent compared to 18 percent in poorer regions (LL and LH). Since own revenues are mainly direct taxes, excises, and property taxes, this suggests larger declines in incomes, consumption, or wealth in richer regions.[6] In other words, the twin shocks of COVID-19 and oil prices are likely to reduce regional disparities in Russia. World Bank (2018) found a similar "convergence to the bottom" in the aftermath of the 2014-15 recession when growth rates in wealthier regions declined by more than those in poorer ones.

[6] A potential limitation of this analysis is that poorer regions have not only higher shares of non-essential sectors but also higher levels of informality. Even if their economies suffered more due to higher shares of sectors under lockdown, the impact on budget revenues might be muted as informal workers pay little tax even in normal times.

Figure 6. Economic Structure of Regions by Income and Growth



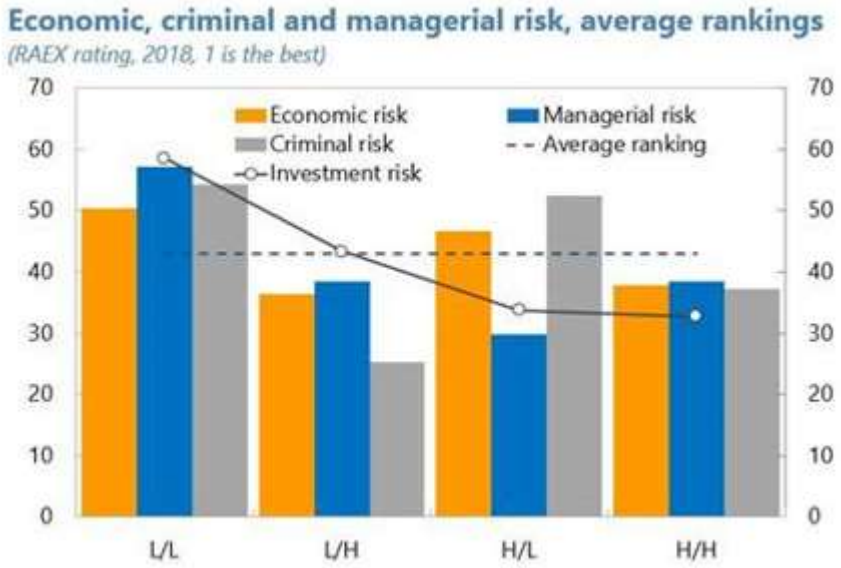
Sources: Rosstat; Federal Treasury of the Russian Federation.

Surprisingly, poorer but fast-growing (LH) regions,[7] the group with the highest share of non-essential sectors in the economy,[8] suffered the least in this pandemic (as proxied by the April-May drop in own fiscal revenues). This group suffered less than even poorer slow-growing regions (LL) where the share of protected state employment is higher, the share of market services highly affected by the pandemic is lower, and the share of extraction is broadly the same.

It is important to note that the initial six-week national lockdown was imposed across the entire country at the end of March. Thus, different pandemic management strategies by the regions would not explain cross-regional differences in fiscal revenue performance. Instead, better governance in LH regions might explain this puzzle. Indeed, Figure 7 shows that economic and criminal risks to investment are lowest in LH regions.

[7] The group includes 15 regions: Bryansk, Voronezh, Kursk, Smolensk, Tambov, Tver, Rostov, Penza, Altay, Adygeya, Crimea, Altay, Bashkortostan, Buryatiya, Sevastopol.
[8] Non-essential sectors are defined as the sectors subject to lockdowns in April-May 2020, estimated as half of the transport and trade sectors, and the entire hospitality, real estate, catering, entertainment, and personal services sectors.

Figure 7. Investment Risks Across Regions



Note: The chart shows average ranking for every region group.
Sources: RAEX; Rosstat; and IMF staff calculations.

Table 2 below reports results from cross-regional regressions on the performance of regions' own fiscal revenues during the April-May 2020 lockdown as a function of the underlying economic structures of the regions.[9] Two correlations emerge. First, a higher share of the state in the economy has been associated with more resilient own revenues, possibly due to more stable employment and, thus, revenue base. Second, own revenues declined more in regions with higher shares of oil and gas extraction in GRP, due to the collapse in oil prices and the resulting fall in corporate income taxes (CIT).

Section III.B below will show that CIT is a highly procyclical source of tax revenues for the regions. The observed positive correlation between the performance of own revenues during the lockdown in the spring of 2020 and the share of non-essential sectors in GRP might be due to omitted variables (informality or governance) or the high negative correlation (around -0.7) between the share of non-essential sectors and the share of oil and gas extraction in the economy.

[9] Three outliers with very large increases in income tax revenues were removed: Chukotka, Khanty-Mansi, and Belgorod.

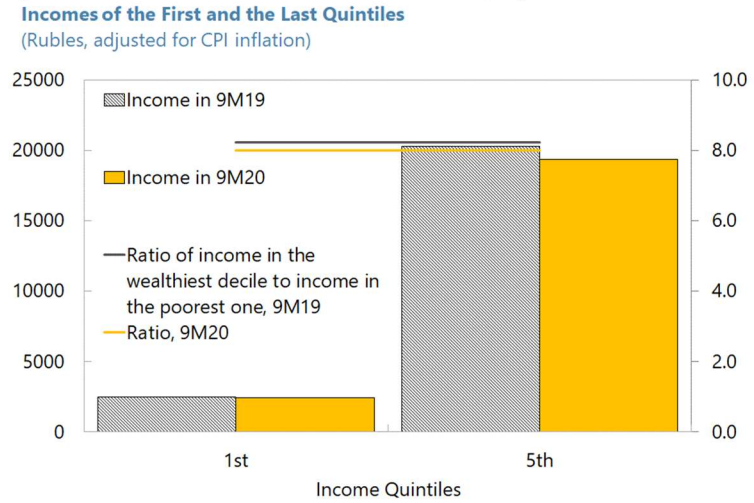
Table 2. Explaining The Drop in Own Fiscal Revenues in April-May 2020 with Economic Structure

	Own revenues in Apr-may, yoy growth, percent			
	(1)	(2)	(3)	(4)
Constant	**-51.21*** **	**-40.93*** **	**-19.14*** **	**-50.10*** **
	(8.81)	(5.64)	(1.48)	(8.94)
The share of GG in 2018 GRP	**0.29***	**1.71*** **		
	(0.15)	(0.56)		
(The share of GG in 2018 GRP)^2		**-0.03** **		
		(0.01)		
The share of extraction in 2018 GRP			**-0.43** **	
			(0.18)	
(The share of extraction in 2018 GRP)^2			**0.00**	
			(0.00)	
The share of non-essential sectors in 2018 GRP	**2.34** **			**2.78*** **
	(1.02)			(1.01)
(The share of non-essential sectors in 2018 GRP)^2	**-0.05***			**-0.06** **
	(0.03)			(0.03)
Observations	83	83	83	83
R-squared	**0.17**	**0.13**	**0.15**	**0.13**

Standard errors in paranthesis
*** p<0.01, ** p<0.05, *p<0.1

Figure 8 shows that convergence to the bottom was observed in household incomes as well. In the first nine months of 2020, the real incomes of the first quintile (the poorest) declined by less, year on year, than those of the 5th quintile (the richest). The first quintile received more support from anti-crisis social payments. The 90/10 ratio of household incomes declined from 14.4 to 13.7 over the same period, also suggesting convergence.

Figure 8. Real Household Incomes by quintile



Source: Rosstat; IMF staff calculations.

III. FISCAL FEDERALISM IN RUSSIA

Given the large remaining regional disparities uncovered in Section II above, this section focuses on the role played by Russia's system of intergovernmental fiscal relations in managing these disparities. The main conclusion of the seven sub-sections below are as follows:

- Russia has a complex and centralized system of intergovernmental fiscal relations.
- Compared to other large countries with federal systems of government, Russia stands out with its high reliance on direct taxes as a revenue source for its regions, and those tend to be procyclical. In addition, the revenue-sharing arrangements which allow regions to keep 85 percent of corporate and personal income tax (CIT and PIT) revenues tend to reinforce regional disparities, as a wealthy region collects 2-3 times more in income tax revenues *per worker* than the average region.
- Transfers from the federal budget to the regions achieve some redistribution by reducing the dispersion in real per capita fiscal spending, with some kinds of transfers having more success than others.
- Standard redistribution and risk sharing regressions suggest degrees of redistribution and risk sharing through Russia's fiscal system of around 26 and 18 percent, respectively—in line with the literature—with in-kind social transfers contributing the most to reducing the differential impact of permanent or temporary shocks on regions.
- Results from panel vector autoregressions (PVARs) suggest that federal transfers in the aggregate have tended to be procyclical and also fairly unresponsive to shocks to regions' own revenues in recent years, with considerable heterogeneity across types of transfers.
- Federal transfers to the regions tend to be associated with lower growth.

A. Russia has a complex and centralized system of intergovernmental fiscal relations.

This section provides a short summary of fiscal federalism arrangements in Russia. More details are available in Appendix 1 as well as in IMF (2017b).

Russia is a federal state whose fiscal constitution is more centralized than in other federal countries. Fiscal federalism arrangements in Russia are quite involved. There are three levels of government (federal, regional and local), with the local level further subdivided into a hierarchy of around 21,000 municipalities. The Budget Code states that each of the three levels is autonomous.

Russia's legal framework reflects a centralized (integrated) fiscal constitution, characterized by relatively low levels of autonomy and responsibility for subnational governments, as well as relatively strong fiscal rules and frameworks. The Budget and Tax Codes establish multiple fiscal restrictions for sub-federal governments, including budget balance requirements; tax and expenditure limits; and constraints on borrowing, debt, and debt service.

According to OECD (2016), Russia's subnational governments have less autonomy with taxes than with spending. Although this is the norm for the average advanced and emerging market economy in the sample in OECD (2016), the disparity appears larger in Russia. For borrowing and budgeting autonomy, Russia ranks below the average of advanced economies and similarly to the average of emerging economies.

The main building blocks of Russia's system of intergovernmental fiscal relations are a relatively centralized tax authority, expenditure mandates, and a complex system of federal transfers.

On the revenue side, Russia's regions have limited scope to set tax rates, define tax bases, or introduce new taxes and fees. There is revenue sharing for personal and corporate income tax, as well as for some mineral extraction taxes, excises, fees, stamp duties, and royalties. While the regions do not have a say in setting the rate or defining the base for PIT, they receive 85 percent of PIT revenues (and share the rest with municipal governments).[10] Regarding CIT, regions typically get 85 percent of the revenues (the rest goes to the federal budget)[11] and also have some limited ability to introduce tax expenditures.

On the expenditure side, regions are subject to expenditure mandates from the federal government, for example, with respect to spending on health, education, and social protection (including unemployment benefits). About 40 percent of consolidated general government spending occurs in regions and through territorial medical extra-budgetary funds (EBFs).

Regions' own revenues fall short of their expenditure mandates. To cover the ensuing vertical fiscal gap and to also level cross-regional (horizontal) fiscal inequalities, regions receive several different kinds of transfers from the federal government. These transfers are set annually in the context of the budget and include:

- **non-earmarked and non-matching grants** or *dotatsii* (around 40 percent of total transfers in 2019), of which equalization grants constitute about 75 percent;
- **earmarked and matching transfers** or *subsidies* (around 25 percent of the total), to finance spending on infrastructure, social policy, and agriculture;
- **earmarked and non-matching transfers** or *subventions* (around 15 percent of the total), to finance spending responsibilities devolved from the federal government, mostly in the area of social policy; and
- **other transfers** (around 20 percent of the total), to provide miscellaneous support to regions for large one-off projects (for example, the 2018 FIFA World Cup), infrastructure, etc.

In addition, the Federal Medical Insurance Fund makes transfers to Territorial Medical Insurance Funds, which totaled 1.9 percent of GDP in 2019. Consolidated federal transfers (through the budget or federal EBFs) to the regions (including territorial EBFs) represented

[10] PIT on interest income from deposits in Russian banks and from Russian corporate bonds in rubles, introduced at the end of 2020, will go entirely to the federal budget.
[11] However, in some special cases (such as CIT on dividends or CIT under oil and gas field development agreements) the share of the federal budget is much higher (up to 100 percent).

4.1 percent of GDP in 2019 (about 55 percent of federal oil and gas revenues). Transfers finance a large share of regional fiscal spending ("the vertical fiscal gap"), up to 70 percent in some regions.

B. Russia stands out with its excessive reliance on direct taxes as a revenue source for its regions.

Figure 9 below uses data from the IMF's Fiscal Decentralization Dataset and compares Russia to nine other countries with federal systems of government: Australia, Austria, Belgium, Brazil, Canada, Germany, Switzerland, the United Arab Emirates, and the United States.[12] While Russia is close to the middle of the pack on most indicators, it stands out in one: Russia's subnational governments receive 92 percent of Russia's direct taxes (PIT and CIT), the second highest percentage after the United Arab Emirates. The median across the ten countries in Figure 9 is 29 percent. Thus, Russia's regions appear to be relatively more dependent on income taxes as a revenue source, compared to other countries. Indeed, those have contributed 58 percent of regions' total revenues over 2015-19, on average.

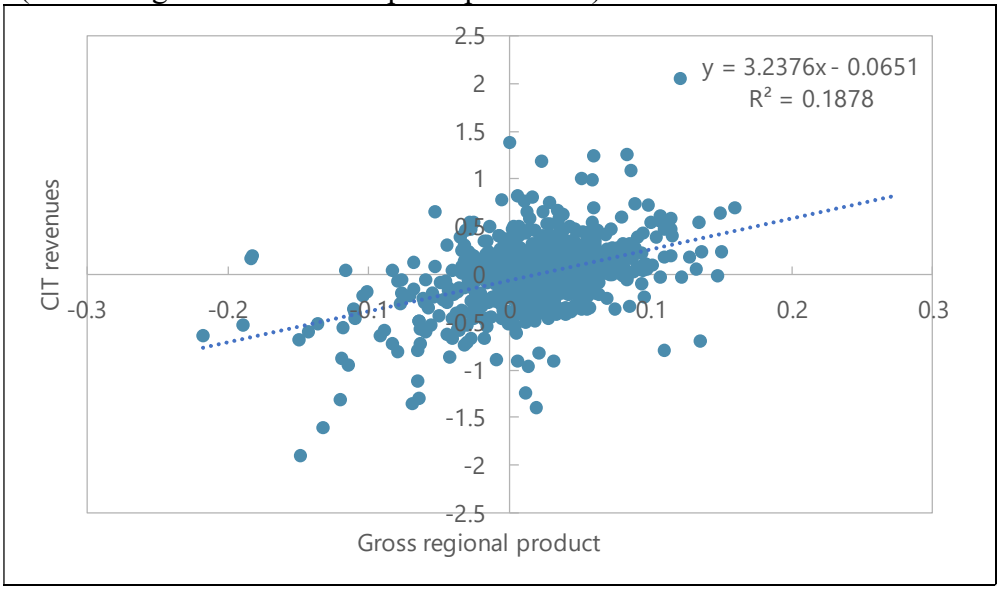
[12] Other prominent federal countries that are not covered by the dataset include Argentina, Ethiopia, India, Malaysia, Mexico, Nigeria, Pakistan, and Venezuela.

Figure 9. Measures of Fiscal Decentralization

Sources: IMF, Fiscal Decentralization Dataset.

The problem with a high dependence on direct taxes is that those tend to be procyclical. Figure 10 below offers a simple scatterplot of the growth rate of each region's CIT revenue versus the growth rate of its GRP. Both variables enter in real per capita terms. The data are for 79 regions over 2008-18. There is a strong positive relationship between the two variables: a 1 percent increase in real per capita GRP is associated with a 3 percent increase in real per capita CIT revenues. A more formal panel estimate, with time and country fixed effects, results in elasticity estimates of around 2. Either way, an elasticity greater than unity illustrates the point that regions are dependent on a procyclical revenue source.

Figure 10. CIT revenues versus GRP (2008-18)
(both in log-differenced real per capita terms)



Sources: Rosstat, Federal Treasury of the Russian Federation.

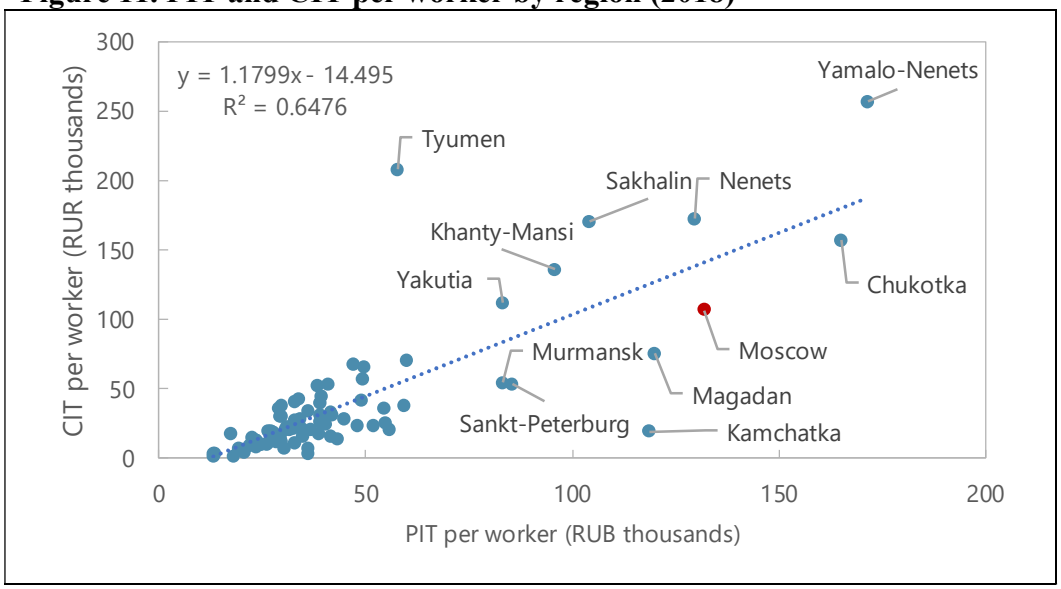
Furthermore, as will be shown in sub-section F below, federal transfers to the regions have tended to be procyclical in recent years as well. Thus, whenever the Russian economy goes into a recession, regional budgets tend to get hit with the twin shocks of falling own revenues and falling transfers from the federal government. It is important to keep in mind that regions have a limited ability to borrow, so their response to declining own revenues and transfers has typically been to cut spending. As noted by World Bank (2018), the federal government reduced transfers to regions by as much as 22 percent in real terms between 2013 and 2016 during the last recession. Regions, in turn, adjusted by considerably cutting expenditures, including on human capital, that is, education, health, and social protection.[13]

In addition to being procyclical, the revenue-sharing arrangements which allow regions to keep 85 percent of CIT and PIT revenues tend to reinforce regional disparities, as a wealthy

[13] Boadway and Eyraud (2018) have noted the procyclicality of subnational government's fiscal policies in countries around the world, not only because their market access deteriorates in bad times but also because subnational budgets are relatively inflexible, both on the revenue and expenditure sides. Gurvich and Krasnopeeva (2020) document this procyclicality for Russia.

region collects 2-3 times more in CIT and PIT revenue *per worker* than the average region.[14] Figure 11 below plots CIT revenue per worker as a function of PIT revenue per worker by region for 2018. The figure clearly illustrates the large regional disparities in incomes and productivity, with about a dozen outliers in the upper right corner of the figure. With the exception of Moscow and St. Petersburg, all of these outliers are commodity-rich regions.[15] There is a tight positive relationship between the two variables, with an R^2 of 0.65. The slope is not statistically different from unity and illustrates that an extra ruble in PIT revenue per worker is associated with an extra ruble in CIT revenue per worker. In other words, Russian companies tend to earn their profits (and pay CIT) where their workers are. However, in certain regions labor tends to be more productive and capital tends to be more profitable, either because of agglomeration effects in big cities or because of natural resource rents. These are also the regions that earn the most in CIT and PIT revenues per worker. Finally, note that both Moscow and St. Petersburg lie below the regression line. In other words, there is no evidence that CIT is "siphoned off" from other regions to Russia's two major cities, as Moscow and St. Petersburg are not getting a disproportionate share of CIT.

Figure 11. PIT and CIT per worker by region (2018)



Source: Federal Treasury of the Russian Federation.

C. Transfers from the federal budget to the regions reduce the dispersion in real per capita fiscal spending.

Figure 12 below shows the redistributive impact of various kinds of federal transfers to the regions. The figure uses 90/10 ratios as a measure of dispersion, as in Section II.B above. According to the top left chart in Figure 12, the dispersion in real per capita fiscal spending across regions is lower once total transfers are included. The remaining charts in Figure 12 break down the separate contributions of the various kinds of federal transfers to the regions.

[14] Boadway and Eyraud (2018) have also noted that revenue-sharing arrangements tend to exacerbate regional disparities in countries around the world.

[15] Data for workers in commodity-rich regions might be distorted by the large number of shift/rotation workers (*vakhtoviki*).

Dotatsii (grants) has played the largest role in reducing the dispersion of real per capita spending, a result consistent with IMF (2017b). Subsidies and transfers to Territorial Medical Insurance Funds are also important in reducing dispersion. Finally, subventions and other transfers do not play much of a role in reducing the dispersion of real per capita spending across regions.

Figure 12. Dispersion in Real Per Capita Fiscal Spending in Russian Regions (2008-17)

Source: Federal Treasury of the Russian Federation.

D. The Russian fiscal system offers a degree of redistribution of around 26 percent—with in-kind social transfers contributing the most.

To further study the extent of redistribution through Russia's fiscal system, we use the following regression equation, in line with Bayoumi and Masson (1995) and the "traditional measure" in Decressin (2002):

$$\bar{y}_i = \alpha + \beta \bar{x}_i + \varepsilon_i \qquad \textbf{(1)}$$

We define "redistribution" as insurance against *permanent* asymmetric shocks. Above, $\bar{y}_i$ is the average of the natural log of per capita disposable income in region *i* over time, and $\bar{x}_i$ is the average of the natural log of per capita income in region *i* over time.

If β is estimated to be zero, that would be a sign of complete redistribution through the fiscal system, that is, a permanent shock to average per capita income in region *i* has zero impact on its average per capita disposable income, because the shock is absorbed by taxes and transfers. In contrast, if β is estimated to be unity, that would be a sign of no redistribution through the fiscal system, that is, a permanent shock to average income in region *i* is passed through completely to average disposable income, so taxes and transfers play no redistributive role. In other words, $1 - \beta$ measures the degree of redistribution across regions provided by the fiscal system.

To compare the amount of redistribution provided by the fiscal system to the one provided by credit markets (through borrowing and saving decisions), we estimate a version of equation (1) above in which $\bar{y}_i$ is the average of the natural log of per capita c**onsumption** in region *i* over time, and $\bar{x}_i$ is the average of the natural log of per capita **disposable income** in region *i* over time. Once again, if β is estimated to be zero, that would be a sign of perfect redistribution through credit markets, so a permanent shock to average disposable income in region *i* in year *t* has zero impact on its average consumption, because the shock is absorbed through borrowing and saving decisions. If β is estimated to be unity, that would be a sign of no redistribution through credit markets.

We use four increasingly broader measures of disposable income:

- **DI-1** is defined as cash income plus in-kind social transfers (defined as government spending on healthcare, education, and culture).
- **DI-2** is defined as DI-1 plus cash social transfers.
- **DI-3** is defined as DI-2 minus personal income tax.
- **DI-4** is defined as DI-3 minus social contributions.

Note that the first measure of disposable income includes government spending on healthcare, education, and culture. Thus, our measure of redistribution is somewhat broader than the "traditional measure" outlined in Decressin (2002), but perhaps not as comprehensive as that paper's "broader concept," since it does not include the entire array of public expenditures and revenues.

All variables enter in real per capita terms, that is, they are deflated for price differences both over time and across regions. The underlying data are annual and cover 82 regions over 2010-17. Table 3 reports the results from estimating equation (1). In-kind social transfers redistribute about 18 percent of permanent shocks to incomes across regions (column 1). Cash social transfers, PIT, and social contributions increase that percentage to around 20, 22, and 26 percent, respectively (columns 2-4). To illustrate the final number, if permanent per capita income in a region drops by 100 rubles, disposable per capita income in that region would drop by only 74 rubles. According to column 5, credit markets provide no

redistribution in response to permanent shocks, a result which is intuitively plausible and in line with findings in the literature.

Table 3. Redistribution in Russian Regions

Dependent variable	(1) DI-1	(2) DI-2	(3) DI-3	(4) DI-4	(5) Consumption
Independent variables					
Constant	0.317***	0.455***	0.424***	0.379***	-0.284***
	(0.006)	*(0.013)*	*(0.012)*	*(0.010)*	*(0.075)*
Income	0.825***	0.804***	0.781***	0.736***	
	(0.009)	*(0.025)*	*(0.021)*	*(0.017)*	
DI-4					1.001***
					(0.099)
total degree of redistribution (1-β)	0.175	0.196	0.219	0.264	-0.001
marginal degree of redistribution (1-β)	0.175	0.021	0.023	0.045	
Observations	80	80	80	80	82
R-squared	0.986	0.958	0.967	0.969	0.754

Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1
All variables are in logged real per capita terms.
DI-1 is defined as income plus in-kind social transfers.
DI-2 is defined as DI-1 plus cash social transfers.
DI-3 is defined as DI-2 minus personal income tax.
DI-4 is defined as DI-3 minus social contributions.

E. The Russian fiscal system offers a degree of risk sharing of around 18 percent—with in-kind social transfers again contributing the most.

The previous two sections studied how the Russian system of intergovernmental fiscal relations redistributes from richer to poorer regions to diminish inequalities in publicly provided services. To study the extent of risk sharing through Russia's fiscal system, we use the following regression equation, also in line with Bayoumi and Masson (1995) and the "traditional measure" in Decressin (2002):

$$\Delta y_{it} = \alpha_t + \beta \Delta x_{it} + \varepsilon_{it} \quad \textbf{(2)}$$

We define "risk sharing" as insurance against *temporary* asymmetric shocks. While the federal tax-transfer system is primarily intended to redistribute rather than provide risk sharing, a redistributive policy may turn out to have implications for risk sharing as well. Above, Δy_{it} is the first difference of the natural log of per capita disposable income in region *i* and year *t*. Δx_{it} is the first difference of the natural log of per capita income in region *i* and year *t*. Regressing the growth rate of disposable income on the growth rate of income tells us how much risk sharing happens through the fiscal system, via taxes and transfers. If β is estimated to be zero, that would be a sign of perfect risk sharing through the fiscal system, that is, a temporary shock to average income in region *i* in year *t* has zero impact on its average disposable income, because the shock is absorbed by taxes and transfers. If β is estimated to be unity, that would be a sign of no risk sharing through the fiscal system, that is, a temporary shock to average income in region *i* in year *t* is passed through completely to average disposable income. In other words, taxes and transfers provide no insurance. Therefore, $1 - \beta$ measures the degree of risk sharing provided by the fiscal system.

Once again, to compare the amount of risk sharing provided by the fiscal system to the one provided by credit markets (via borrowing and saving decisions), we estimate a version of equation (2) above in which Δy_{it} is the first difference of the natural log of per capita **consumption** in region *i* and year *t*, and Δx_{it} is the first difference of the natural log of per capita **disposable income** in region *i* and year *t*. Once again, if β is estimated to be zero, that would be a sign of perfect risk sharing through credit markets, that is, a shock to average disposable income in region *i* in year *t* has zero impact on its average consumption, because the shock is absorbed through borrowing and saving decisions. If β is estimated to be unity, that would be a sign of no risk sharing through credit markets. $1-\beta$ would measure the degree of risk sharing provided by credit markets.

We use the same four increasingly broader measures of disposable income as in sub-section D above. All variables enter in log-differenced real per capita terms, that is, they are deflated for price differences both over time and across regions. The data are annual and cover 82 regions over 2010-17. However, data for in-kind social transfers are available only for 2012-16.[16] Table 4 reports the results from estimating equation (2) with both fixed effects and random effects panel estimators. All estimates include time fixed effects. In terms of the distinction between "stabilization" and "risk-sharing" in Poghosyan, Senhadji, and Cottarelli (2016), estimates with time fixed effects control for common shocks and thus focus on risk-sharing, that is, insurance against shocks whose impact differs across regions ("interregional insurance"). Table 5 below presents results without time fixed effects, which measure the combined effect of risk sharing plus stabilization, that is, insurance against common shocks that affect all regions ("intertemporal insurance").

Looking at the results in Table 4, in-kind social transfers smooth about 18 percent of shocks to incomes across regions (columns 1-2) and cash social transfers increase that percentage to around 24 percent (columns 3-4). PIT and social contributions do not provide any additional risk sharing, and might actually reduce it, to around 18 percent overall (columns 5-8). To illustrate the final number, if per capita income in a region drops by 100 rubles, per capita disposable income in that region would drop by only 82 rubles. According to columns 9-10, credit markets smooth out around 39-48 percent of shocks to disposable income.

Finally, the fiscal system combined with credit markets insures against 48-53 percent of shocks to incomes (columns 11-12). This is substantially lower than the findings in Fidrmuc and Degler (2018). However, note that their sample period (1999-2009) does not overlap with ours, and their econometric approach is also different. Our results for Russia are consistent with the findings for China in Du, He, and Rui (2011) that about 40 percent of income shocks at the provincial level are smoothed across provinces between 1980 and 2007, with the interprovincial fiscal transfer system smoothing 9.4 percent of the shocks to gross provincial product. Our results are also broadly in line with those reported in Asdrubali, Sorensen, and Yosha (1996) for US states; by Melitz and Zumer (1998) for Canada, France, the United Kingdom, and the United States; and by Decressin (2002) for Italy.

[16] Due to varying data availability, the different columns in Table 4 cover slightly different samples. As a robustness check, we have estimated all regressions using a matched sample, and found that the regression coeffcient estimates in Table 4 are little changed. These results are not reported in the paper, but are available upon request.

Table 4. Risk Sharing in Russian Regions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dependent variable	DI-1	DI-1	DI-2	DI-2	DI-3	DI-3	DI-4	DI-4	Consumption	Consumption	Consumption	Consumption
Estimation method	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects
Independent variables												
Constant	0.012***	0.013***	0.012***	0.012***	0.013***	0.013***	0.011***	0.011***	0.005	0.002	0.075***	0.073***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.004)	(0.004)	(0.004)	(0.004)
Income	0.820***	0.816***	0.762***	0.764***	0.783***	0.785***	0.819***	0.818***			0.472***	0.520***
	(0.009)	(0.008)	(0.019)	(0.014)	(0.021)	(0.015)	(0.022)	(0.016)			(0.042)	(0.037)
DI-4									0.517***	0.607***		
									(0.055)	(0.047)		
total degree of risk-sharing (1-β)	0.180	0.184	0.238	0.236	0.217	0.215	0.181	0.182	0.483	0.393	0.528	0.480
marginal degree of risk-sharing (1-β)	0.180	0.184	0.058	0.052	-0.021	-0.021	-0.036	-0.033				
Country fixed effects?	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Time fixed effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	550	550	314	314	314	314	314	314	322	322	470	470
R-squared	0.976	0.976	0.945	0.945	0.941	0.941	0.940	0.940	0.551	0.557	0.748	0.750
Number of regions	80	80	80	80	80	80	80	80	82	82	80	80

Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1
All variables are in log-differenced real per capita terms.
DI-1 is defined as income plus in-kind social transfers.
DI-2 is defined as DI-1 plus cash social transfers.
DI-3 is defined as DI-2 minus personal income tax.
DI-4 is defined as DI-3 minus social contributions.

Table 5 reports the results from estimating equation (2) without time fixed effects, in order to measure the combined effect of risk sharing plus stabilization. The results in Table 5 are quite similar to those in Table 4. The only significant difference is the somewhat smaller degree of risk-sharing and stabilization reported on columns 1-2 compared to the degree of risk sharing reported in columns 1-2 of Table 4. This seems to suggest that the degree of stabilization (insurance against common shocks that affect all regions equally) provided by in-kind social transfers might be negative.

Table 5. Risk Sharing and Stabilization in Russian Regions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable	DI-1	DI-1	DI-2	DI-2	DI-3	DI-3	DI-4	DI-4
Estimation method	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects
Independent variables								
Constant	0.003***	0.003***	-0.002**	-0.003***	-0.001	-0.001	-0.000	-0.000
	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Income	0.877***	0.868***	0.813***	0.802***	0.844***	0.830***	0.881***	0.864***
	(0.010)	(0.009)	(0.021)	(0.017)	(0.021)	(0.017)	(0.020)	(0.016)
DI-4								
total degree of risk-sharing and stabilization (1-β)	0.123	0.132	0.187	0.198	0.156	0.170	0.119	0.136
marginal degree of risk-sharing and stabilization (1-β)	0.123	0.132	0.064	0.066	-0.031	-0.028	-0.037	-0.034
Country fixed effects?	Yes	No	Yes	No	Yes	No	Yes	No
Time fixed effects?	No	No	No	No	No	No	No	No
Observations	550	550	314	314	314	314	314	314
R-squared	0.949	0.949	0.882	0.882	0.889	0.889	0.905	0.905
Number of regions	80	80	80	80	80	80	80	80

Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1
All variables are in log-differenced real per capita terms.
DI-1 is defined as income plus in-kind social transfers.
DI-2 is defined as DI-1 plus cash social transfers.
DI-3 is defined as DI-2 minus personal income tax.
DI-4 is defined as DI-3 minus social contributions.

F. In the aggregate, federal transfers tend to be procyclical and fairly unresponsive to shocks to regions' own revenues.

In order to explore the dynamic interactions among gross regional product, the regions' own revenues, and federal transfers, we estimate panel vector autoregressions (PVARs) using the methodology and Stata code outlined in Abrigo and Love (2015). Their setup estimates a homogeneous panel VAR model in a generalized method of moments (GMM) framework. They consider a k-variate homogeneous panel VAR of order p with panel-specific fixed effects represented by the following system of linear equations:

$$Y_{it} = Y_{it-1}A_1 + Y_{it-2}A_2 + \cdots + Y_{it-p+1}A_{p-1} + Y_{it-p}A_p + X_{it}B + u_i + e_{it} \quad \textbf{(3)}$$
$$i \in \{1,2,\ldots,N\}, t \in \{1,2,\ldots,T_i\},$$

where Y_{it} is a $(1xk)$ vector of dependent variables; X_{it} is a $(1xl)$ vector of exogenous covariates; u_i and e_{it} are $(1xk)$ vectors of dependent variable-specific panel fixed-effects and idiosyncratic errors, respectively. The (kxk) matrices $A_1, A_2, \ldots, A_{p-1}, A_p$ and the (lxk) matrix B are parameters to be estimated. They assume the innovations to have the following characteristics: $E[e_{it}] = 0, E\left[e_{it}^{'} e_{it}\right] = \Sigma$ and $E\left[e_{it}^{'} e_{is}\right] = 0$ for all $t > s$.

Total transfers from the federal budget are broken down into grants (*dotatsii*), subsidies, subventions, transfers from the Federal Medical Insurance Fund to Territorial Medical Insurance Funds (TMIFs), and other transfers. All variables enter in natural logs and in first differences. They are also in real per capita terms—they are deflated for price differences, both over time and (importantly) across regions. The model is identified by the following assumptions about the contemporaneous feedback among the three variables:

- Transfers from the federal budget are affected by their own contemporaneous innovations only. Federal transfers typically respond to shocks to regions' GRPs and own revenues with a lag, due to delays in the budgetary process. In other words, a shock in GRP or own revenues in year *t* only affects federal transfers to that region in year *t+1*.
- GRP is affected by its own contemporaneous innovations and by contemporaneous innovations in federal transfers. It is not affected by contemporaneous innovations in regions' own revenues.
- Own revenues are affected by contemporaneous innovations in GRP and federal transfers, in addition to their own innovations. Higher GRP and higher federal transfers filter into higher incomes, consumption, or wealth. All of these should lead to higher revenues from PIT, CIT, excises, and property taxes.

The Cholesky ordering described above was selected as the most plausible one. There are 6 different ways of ordering the variables (because 3! = 6). However, the empirical results reported below are fairly robust to that. In addition, all panel VARs include the Urals oil price in rubles as an exogenous shock, again deflated using each region's price index. Figure 13 below and Appendix 2 present the impulse response functions. To summarize (detailed discussion is available in Appendix 2):

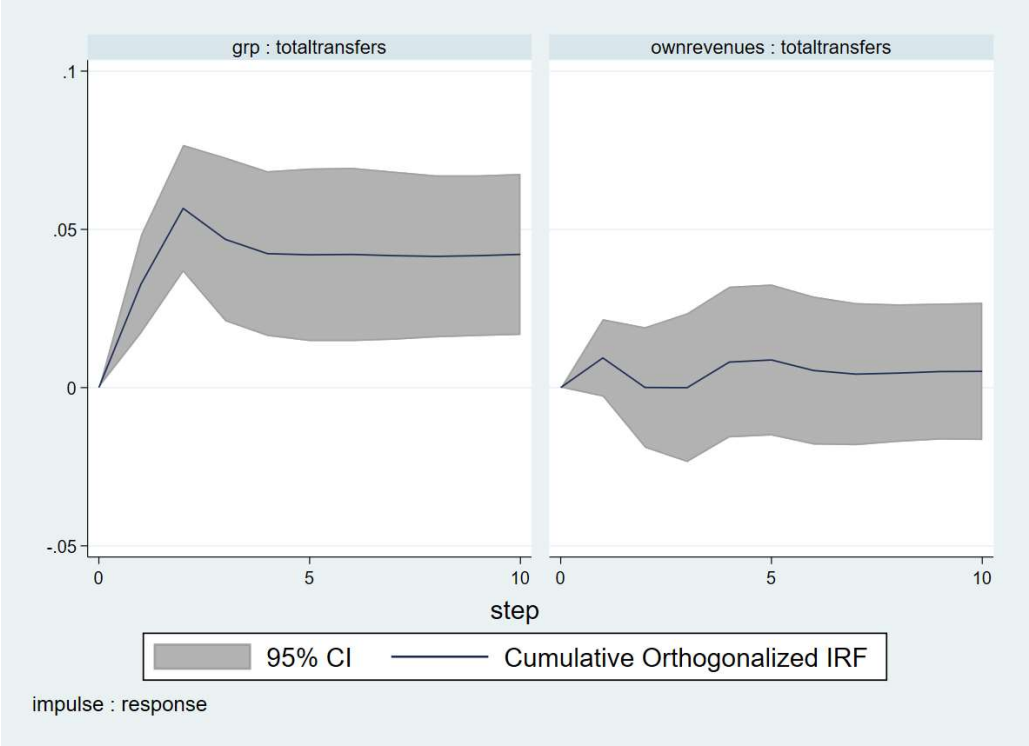
- Total federal transfers have tended to be procyclical, at least during the sample period.[17] The procyclicality of transfers seems to be driven mostly by transfers to TMIFs. However, grants (*dotatsii*) and perhaps subventions (which finance social benefits) tend to play a counter-cyclical role and thus facilitate risk sharing across regions.
- During the sample period, federal transfers tended not to be very responsive to shocks to regions' own revenues overall. In Figure 13 below, a positive shock to regions' own revenues leads to a statistically insignificant increase in total transfers. Thus,

[17] Boadway and Eyraud (2018) note that transfers rarely play a stabilizing cyclical role, particularly in countries with federal systems of government. IMF (2017a) finds that overall transfers from the center to states appear to be procyclical in India as well.

there is no evidence that total transfers tend to play a stabilizing role and reward regions with declining own revenues.[18] However, grants (*dotatsii*) and subsidies (earmarked and matching transfers) tend to reward regions with increasing own revenues, while subventions (linked to social benefits) tend to do the opposite.

- An important caveat to keep in mind is that the empirical results reported here might be specific to the sample period, which mostly covers the 2014-15 recession and the subsequent recovery.

Figure 13. Dynamic Interactions Among GRP, Own Revenues, and Total Federal Transfers



Source: Rosstat; IMF staff calculations.

G. While federal transfers to the regions offer some degree of risk sharing and redistribution, they tend to be associated with lower long-term growth.

To extend the unconditional growth convergence analysis in Section II.D above, we test for income convergence across regions focusing on the role of fiscal transfers. Specifically we test for conditional β-convergence, that is, do poorer regions grow faster and catch up to richer regions after controlling for factors that could produce different steady-state growth rates across regions? Such factors include human and physical capital accumulation—captured by investment in fixed assets, the share of employed workers with a tertiary education, working age population, and net migration—and transfers from the federal budget.

[18] However, during the ongoing COVID-19 recession, the federal government appears to be targeting transfers to the regions hit hardest by the pandemic, where own revenues have declined the most. Bozhechkova *et al* (2018) found that federal transfers played a stabilizing role in their sample, but only over 2010-15 and only for regions with average fiscal capacity.

Fiscal transfers could affect long-term growth—and thus output convergence—by influencing the allocation of labor and capital (both physical and human).

Table 6. Conditional Convergence in Russian Regions, 2007-2018

	Real GRP growth FE	Real GRP growth IV	Real GRP growth FE	Real GRP growth IV	Real GRP growth FE	Real GRP growth IV	Real GRP growth FE	Real GRP growth IV	Real GRP growth FE	Real GRP growth IV	Real GRP growth FE	Real GRP growth IV
GDP in year t-7	**-7.088*** **	**-7.062*** **	**-6.852*** **	**-7.730*** **	**-7.623*** **	**-7.864*** **	**-7.086*** **	**-3.363**	**-6.047*** **	**-6.502*** **	**-6.848*** **	**-6.729*** **
	(1.589)	*(1.591)*	*(1.612)*	*(1.717)*	*(1.598)*	*(1.671)*	*(1.600)*	*(4.935)*	*(1.689)*	*(1.836)*	*(1.604)*	*(1.640)*
Investment	**0.062*** **	**0.062*** **	**0.062*** **	**0.062*** **	**0.065*** **	**0.066*** **	**0.060*** **	**0.095** **	**0.061*** **	**0.062*** **	**0.062*** **	**0.062*** **
	(0.006)	*(0.006)*	*(0.006)*	*(0.007)*	*(0.006)*	*(0.007)*	*(0.006)*	*(0.037)*	*(0.006)*	*(0.006)*	*(0.006)*	*(0.006)*
Employment w/ tertiary education	**0.122***	**0.119***	**0.101**	**0.157** **	**0.121***	**0.127** **	**0.099**	**0.148**	**0.098**	**0.100**	**0.096**	**0.070**
	(0.062)	*(0.062)*	*(0.063)*	*(0.071)*	*(0.062)*	*(0.063)*	*(0.062)*	*(0.134)*	*(0.062)*	*(0.063)*	*(0.063)*	*(0.066)*
Working age population	**0.329** **	**0.327** **	**0.307** **	**0.391*** **	**0.373*** **	**0.393*** **	**0.394*** **	**-1.109**	**0.246***	**0.281***	**0.296** **	**0.235***
	(0.128)	*(0.128)*	*(0.130)*	*(0.140)*	*(0.128)*	*(0.135)*	*(0.133)*	*(1.535)*	*(0.135)*	*(0.145)*	*(0.129)*	*(0.137)*
Net migration	**0.005**	**0.006**	**0.009***	**0.002**	**0.006**	**0.006**	**0.008**	**0.032**	**0.010***	**0.009***	**0.009***	**0.009***
	(0.005)	*(0.005)*	*(0.005)*	*(0.006)*	*(0.005)*	*(0.005)*	*(0.005)*	*(0.026)*	*(0.005)*	*(0.005)*	*(0.005)*	*(0.005)*
Fiscal transfers	**-0.203*** **	**-0.178***										
	(0.059)	*(0.094)*										
Grants (Dotatsii)			**0.014**	**-0.563***								
			(0.101)	*(0.309)*								
Subsidies					**-0.439*** **	**-0.581***						
					(0.119)	*(0.307)*						
Subventions							**-0.660** **	**10.916**				
							(0.284)	*(11.656)*				
Other transfers									**-0.256**	**-0.115**		
									(0.166)	*(0.277)*		
Transfers to medical funds											**-0.161**	**-0.902***
											(0.152)	*(0.492)*
Constant	2.249	2.151	1.484	-0.474	0.144	-0.272	-2.183	61.275	3.456	2.345	2.342	6.532
	(11.991)	(11.996)	(12.122)	(12.513)	(11.974)	(12.018)	(12.158)	(68.336)	(12.161)	(12.295)	(12.135)	(12.674)
Observations	632	632	632	632	632	632	632	632	632	632	632	632
R-squared	0.389		0.376		0.391		0.382		0.379		0.377	
Number of regionid	79	79	79	79	79	79	79	79	79	79	79	79
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
IV		YES		YES		YES		YES		YES		YES

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 6 presents the results on conditional convergence. We regress the annual growth rate of GDP growth on the initial level of per capita GDP in 2000 (a negative coefficient confirms convergence) in a model with annual panel data from 2007 to 2017 for 79 regions. Total federal fiscal transfers and their disaggregated components—*dotatsii, subsidies, subventions, other transfers* and *transfers to medical funds*—are entered one by one to analyze the role they play in driving convergence of real per capita gross regional product.

Total federal transfers are associated with a decrease in long term growth across regions. The result holds after controlling for the endogeneity of fiscal transfers (higher transfers are granted to poorer regions) by using population size and the share of own revenues to total

revenues as instrumental variables. These variables are plausibly correlated with transfers but not GRP growth.[19]

The negative correlation between federal transfers and growth holds for the various types of transfers, including subsidies (transfers earmarked for infrastructure projects) which we expected to have a positive effect on growth. In this particular instance, the positive effect of subsidies on growth is captured through higher investment in fixed assets.[20] A similar result is reported in Di Bella, Dynnikova and Grigoli (2018) who find GRP per capita to be negatively affected by federal transfers which lead to a larger public sector.

Regarding other determinants of regional growth, higher investment and working age population are correlated with higher growth in real per capita GRP. Tertiary education and net migration are also positively correlated with growth, but the correlation is somewhat weaker.

As a robustness check, Table 7 presents results from a cross-regional regression. The dependent variable is the average annual growth rate over 2007-18. For all explanatory variables (except for initial GRP per capita), we use their 2007 values to minimize simultaneity and estimate the lagged impact of these variables on growth. Once again, regression coefficients on fiscal transfers are always negative and statistically significant for most kinds of transfers.

[19] Admittedly the instruments could be correlated with growth. Population size may respond to growth differences—people leave to more prosperous regions in case of a negative shock in the region; own revenues in total revenues could increase with a region-specific shock to GDP. And even with fixed effects, omitted variable bias remains a problem—poorer regions get more transfers but may have worse governance which negatively affects growth.

[20] Indeed, if investment is dropped from the model, the coefficient on subsidies becomes positive and statistically significant.

Table 7. Conditional Convergence: Cross regional regressions (average 2007-17)

	Real GRP growth	Real GRP growth	Real GRP growth	Real GRP growth	Real GRP growth	Real GRP growth
Initial GRP	**-0.031****	**-0.028****	**-0.025***	**-0.028****	**-0.029****	**-0.043*****
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.015)
Investment	**0.148*****	**0.140*****	**0.133*****	**0.158*****	**0.134*****	**0.145*****
	(0.037)	(0.036)	(0.039)	(0.037)	(0.033)	(0.032)
Employment w/ tertiary education	**-0.084****	**-0.087****	**-0.097****	**-0.082****	**-0.098*****	**-0.072***
	(0.039)	(0.039)	(0.039)	(0.038)	(0.037)	(0.037)
Working age population	**0.040**	**0.052**	**0.041**	**-0.045**	**0.069**	**-0.040**
	(0.101)	(0.102)	(0.103)	(0.110)	(0.101)	(0.101)
Net migration	**0.007**	**0.007***	**0.009****	**0.007***	**0.009****	**0.003**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Fiscal transfers	***-0.038***					
	(0.023)					
Grants (dotatsii)		***-0.050***				
		(0.036)				
Subsidies			***-0.057***			
			(0.098)			
Subventions				***-0.513*****		
				(0.256)		
Other transfers					***-0.772****	
					(0.397)	
Transfers to medical funds						***-0.654*****
						(0.214)
Constant	2.871	2.044	2.861	7.979	1.530	8.701
	(5.576)	(5.612)	(5.680)	(6.145)	(5.557)	(5.700)
Observations	79	79	79	79	79	79
R-squared	0.264	0.258	0.241	0.278	0.276	0.325

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

IV. CONCLUSION AND POLICY RECOMMENDATIONS

Though declining, regional income inequality in Russia is high compared with most advanced economies and emerging markets. Moreover, convergence in regional GRP per capita has stalled in recent years. Inter-regional differences in household incomes play less of a role in explaining total household inequality; instead, household inequality is dominated by income differences among households within regions. To tackle household inequality, social support programs targeting low-income households should play a key role. Wealthier

regions, where inequality is especially high, could consider using own revenues to supplement existing support from federal programs.

There are five policy recommendations that flow out of our analysis of fiscal federalism in Russia. First, Russia's complex system of intergovernmental fiscal relations might benefit from some simplification and improved transparency. Second, Russia might benefit from either making federal transfers more countercyclical or decreasing the reliance on procyclical direct taxes as a revenue source for the regions. With the ongoing COVID-19 recession in 2020, CIT revenues have become a major source of fiscal risks for the regions. According to budget outturn data, the biggest year-on-year drop on the revenue side during the April-May 2020 lockdown was recorded precisely for CIT (34 percent). One way to reduce procyclicality would be to increase reliance on property taxes, which are typically less procyclical.[21] Regional governments could accomplish this by accelerating the shift to market value as the basis for assessing the tax on corporate property, the land tax, and the building tax. In the context of the COVID-19 pandemic, revenues from property taxes also fell dramatically across regions, by 32 percent in April-May 2020, yoy. However, this happened because of policy measures implemented by the regions (tax waivers and deferrals), not because property taxes are particularly responsive to the business cycle.

Third, while currently the revenue sharing arrangements for CIT and PIT reinforce regional disparities, in theory they could play a greater role in redistributing across regions. For example, the authorities could consider changing the revenue-sharing formula for CIT revenues. The federal government in 2017 increased the federal portion of CIT (from 2 to 3 percentage points) to finance equalization grants. Though a step in the right direction, the measure has not increased the total amount of equalization grants substantially. Instead of regions keeping 85 percent of CIT revenues, they could keep slightly less (though this may be unpalatable to some regions). The remainder could go to the federal government and be used to finance equalizing transfers to regions. However, see the caveats in the next two paragraphs.

Fourth, transfers from the federal budget to the regions could play a bigger role in redistributing by reducing the dispersion in real per capita fiscal spending, for example, by increasing the amount of grants (*dotatsii*) relative to other transfers. However, it is important to heed the warnings in Bartolini, Stossberg, and Blöchliger (2016) who argue that transfers from the central government are beneficial only to the extent that they do not provide a disincentive for good policies (including to raise own tax revenues). Transfers tend to equalize the fiscal capacity of regions, thus allowing common standards of public goods and services across the country. At the same time, they provide little incentive, at the margin, for lagging regions to catch up with the frontier. Indeed, the analysis in section III.G above suggests that fiscal transfers are associated with lower long-term growth across Russia's regions and may not help poorer regions catch up to richer ones. Transfers from central government could also create the perception of a soft budget constraint by providing implicit bailout guarantees, according to Boadway and Eyraud (2018).

[21] In addition, the factor being taxed (real estate) is less mobile than labor and capital.

In contrast, greater decentralization of revenue-raising ability provides local governments with a strong incentive to enlarge the tax base and also become more efficient in the use of these resources. That enhances regional growth but not necessarily convergence. In addition, Boadway and Eyraud (2018) argue that the larger transfers from the central government are, the more likely it is for the central government to respond to an economic shock it faces by reducing them. The problem here is that it is difficult for the central government to commit to maintaining existing transfer policies in the event of a large negative shock. The best that can be done is to minimize the problem by basing transfers on formulas rather than on central government discretion, and to have in place institutions like fiscal councils that oversee intergovernmental fiscal relations.

In general, Boadway and Eyraud (2018) note that all these tradeoffs are difficult to resolve, because they reflect the fact that decentralized systems try to pursue multiple objectives with few policy instruments. Therefore, coming up with a good system of intergovernmental fiscal relations is necessarily a matter of judgement and pragmatism.

Finally, the Russian fiscal system should provide a greater degree of risk sharing across regions.

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Appendix 1. Further background on federal government transfers to the regions

Transfers by federal government to the regions include:

- **Non-earmarked and non-matching transfers** or *dotatsii* (around 40 percent of total in 2019):
  - equalization grants (around 75 percent of *dotatsii*);
  - other *dotatsii* include:
    - grants to support measures targeting budgetary balancing (*inter alia*, partial compensation of extra spending by regions on budgetary sector wages, grants rewarding growth in tax capacity); and
    - grants to ZATO (closed/secret territories).
- **Subsidies** (around 25 percent of total) – earmarked, matching grants to finance priorities falling within the jurisdiction of a level of government or within a joint jurisdiction:
  - national economy support (around 75 percent of subsidies) – mostly spending on agriculture and roads;
  - social policy (around 10 percent of subsidies); and
  - other.
- **Subventions** (around 15 percent of total) – earmarked, non-matching grants to finance spending responsibilities devolved from a higher level of government:
  - social policy (around 85 percent of subventions); and
  - other.
- **Other transfers** (around 20 percent of total): FIFA World Cup, roads, support to Kaliningrad region, etc.

Equalization grants. The total amount must ensure that all regions can get an "estimated spending capacity" at or above a threshold set by the government.[22] In addition, the total amount budgeted for the following year cannot be lower than the amount budgeted for the current year. Furthermore, for every region equalization grants budgeted for the first two

[22] There is no guarantee that all regions will reach the threshold, as regions above the threshold but below average also get equalization transfers.

years of a three-year budget cycle cannot be lower than the grants budgeted for the correspondent (second and third) years in the previous three-year budget cycle.

Starting in 2017, the federal government has centralized one percentage point of CIT revenues and has used it to finance equalization grants.

The total amount is distributed among eligible regions in line with a methodology approved by the government in line with Budget Code requirements.

"Estimated spending capacity" is defined as the ratio of a region's own tax revenue capacity per capita (measured in standardized baskets of public goods and services) and the average own tax revenue capacity per capita across all regions. In essence, the measure shows what amount of state services could be financed by the region's own potential tax revenues (in the absence of any regional tax exemptions), relative to the average level for all regions.

A region's own tax revenue capacity is estimated separately for CIT, PIT, property tax, excises, mineral extraction tax, and other revenues for the current and the previous two years, aggregated first into annual indicators and finally into a composite indicator with weights of 0.35, 0.35, and 0.3 for years *t*, *t-1*, and *t-2*, respectively.[23]

A region's budget spending price index (the price of a standardized basket of public goods and services) is calculated as a weighted average of the regional wage index, the regional utilities price index, and the regional consumer price index, divided by the average across all regions. Weights reflect the average shares of wages, utilities, and other spending in regional budget expenditures and are set to 0.55, 0.10, and 0.35, respectively. The wage index takes into account regional top-ups to wages, cost of travel to vacation destinations, and the share of population living in small communities. The utilities price index takes into account utility prices in the region, access to transportation, and household capacity to pay for utilities. The consumer price index takes into account the level of consumer prices in the region, access to transportation, and the share of non-working-age population in the region.

Equalization grants are provided to regions with an "estimated spending capacity" below the threshold. Equalization grants are conditional on the implementation of an agreed plan of measures promoting economic development and improving the region's financial status.

The methodology for distributing equalization grants among regions was adopted by the government in November 2004. The methodology sets the threshold for "estimated spending capacity" as the average "estimated spending capacity" across all regions excluding the top 10 and bottom 10 regions (79 percent in 2019).

The methodology prescribes equalization grants to be distributed in two steps. Each step sets an eligibility threshold, and regions whose "estimated spending capacity" is below the threshold get grants proportional to the region's shortfall:

[23] If data for the current year are not available, the weights are 0.6 and 0.4 for years *t-1* and *t-2*, respectively.

- **First step (60 percent equalization criterion):** All regions with "estimated spending capacity" below 60 percent are assigned grants equaling 85 percent of the shortfall.

- **Second step (100 percent equalization criterion):** 30 percent of the total amount of subsidies is set aside first. The remaining equalization grants are distributed in proportion to remaining shortfalls. Afterwards, the 30 percent which were set aside are distributed in proportion to remaining shortfalls, with adjustment to the ratio of actual expenditures and some normative expenditures calculated for every region by the Ministry of Finance. The idea is to offer relatively more support to regions with insufficient expenditures and relatively less support to regions whose expenditures are deemed to be excessive. If equalization grants budgeted in the previous three-year budget cycle suggest an "estimated spending capacity" higher than 100 percent for a region, the region gets the previously budgeted grants but not more than that.

Subsidies. Subsidies are intended to improve the spending capacity of a region and to support the implementation of specific types of regional spending. With some exceptions, subsidies extended from the federal budget to the regions must be stipulated in a federal law or a government regulation, and be consistent with a list of priorities for federal co-financing of regional spending set by the current federal budget law.

In September 2014, the government adopted general rules for distributing subsidies from the federal budget to regional budgets. According to the regulation, rules for distributing subsidies among regions are elaborated by line ministries together with the Ministry of Finance, and are submitted to the government as a part of the draft federal budget law package. Rules for subsidies for co-financing of capital investment, the purchase of immovable property, as well as subsidies under the federal programs framework must also be agreed with the Ministry of Economic Development.

Rules for subsidies must include:

- terms for granting and spending the subsidies;

- eligibility criteria;

- a methodology for distributing subsidies taking into account "estimated spending capacity," number of beneficiaries, estimated construction costs, and other criteria, if necessary;

- a procedure for efficiency assessments of subsidies and a list of performance indicators;

- sanctions in case of non-compliance with the subsidy agreement terms; and

- an upper limit on federal budget co-financing, which depends on "estimated spending capacity."

If a region's "estimated spending capacity" is equal to or more than 1, then the upper limit of federal co-financing is given by this formula:

$$Y = 50\% - 45\% * \left(\frac{\text{the number of regions in the group} - (\text{the region's "estimated spending capacity" rank} - 1)}{\text{the number of regions in the group}} \right)^{2/3}$$

For the best region (Rank = 1), the maximum co-financing equals 5 percent. Co-financing cannot be higher than 50 percent.

If a region's "estimated spending capacity" is less than 1, then the upper limit of federal co-financing is given by this formula:

$$Y = 95\% - 45\% * \left(\frac{\text{the number of regions in the group} - \text{the region's "estimated spending capacity" rank}}{\text{the number of regions in the group}} \right)^{2}$$

For the best region (Rank =1), the maximum co-financing equals 50 percent. Co-financing cannot be higher than 95 percent.

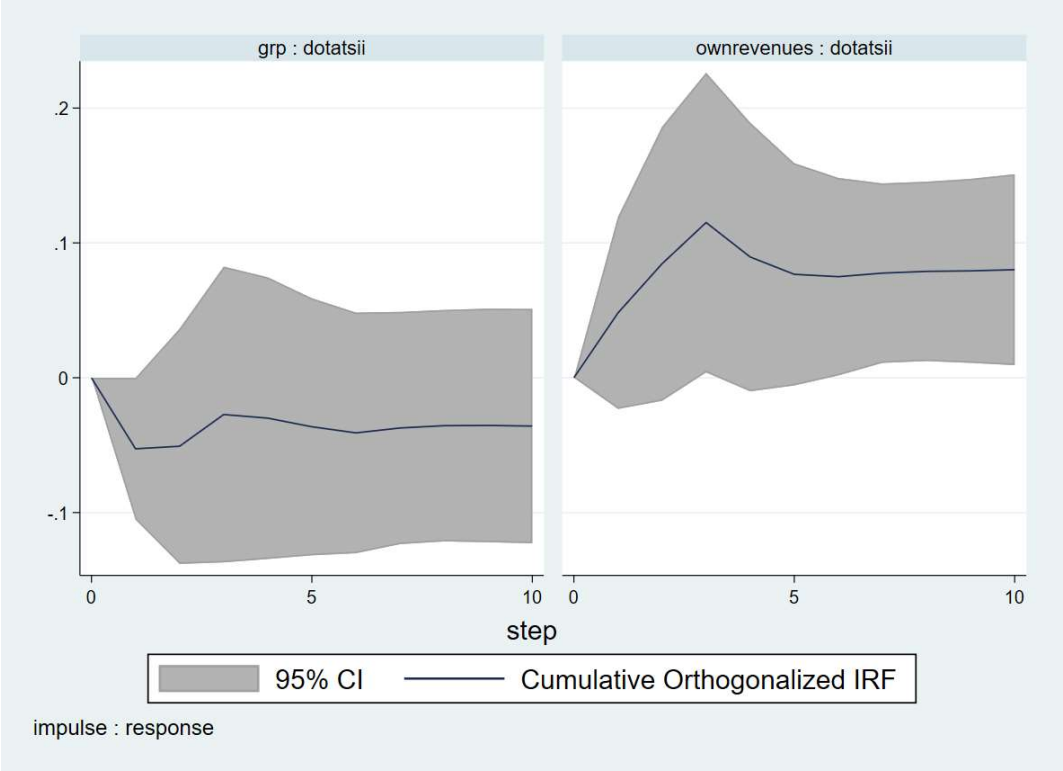
Subventions. Subventions are distributed among all regions according to a methodology approved by government and submitted to the State Duma as a part of the draft federal budget law package. Distribution is proportional to the number of beneficiaries from the corresponding public services, taking into account budgetary spending norms and regional cost differences. Own revenue indicators cannot be used as criteria for distributing subventions.

Appendix 2. More detailed presentation and discussion of results from panel vector auto-regressions

Figure 13 in Section III.F explored the dynamic interactions among gross regional products, regions' own revenues, and total transfers from the federal budget. In this appendix, we break down total transfers into grants, subsidies, subventions, transfers to TMIFs, and other transfers.

Figure A2.1 explores the dynamic interactions among GRPs, regions' own revenues, and grants (*dotatsii*) from the federal budget. A positive GRP shock leads to a fall in grants, which is statistically significant in the first period. Thus, grants appear to be counter-cyclical and play a useful role in risk sharing across regions. A positive shock to regions' own revenues leads to a statistically significant increase in grants from the federal budget. During the sample period, federal grants thus tended to reward regions with increasing own revenues, perhaps because a portion of federal grants is explicitly designed to reward growth in tax-raising capacity (see Appendix 1).

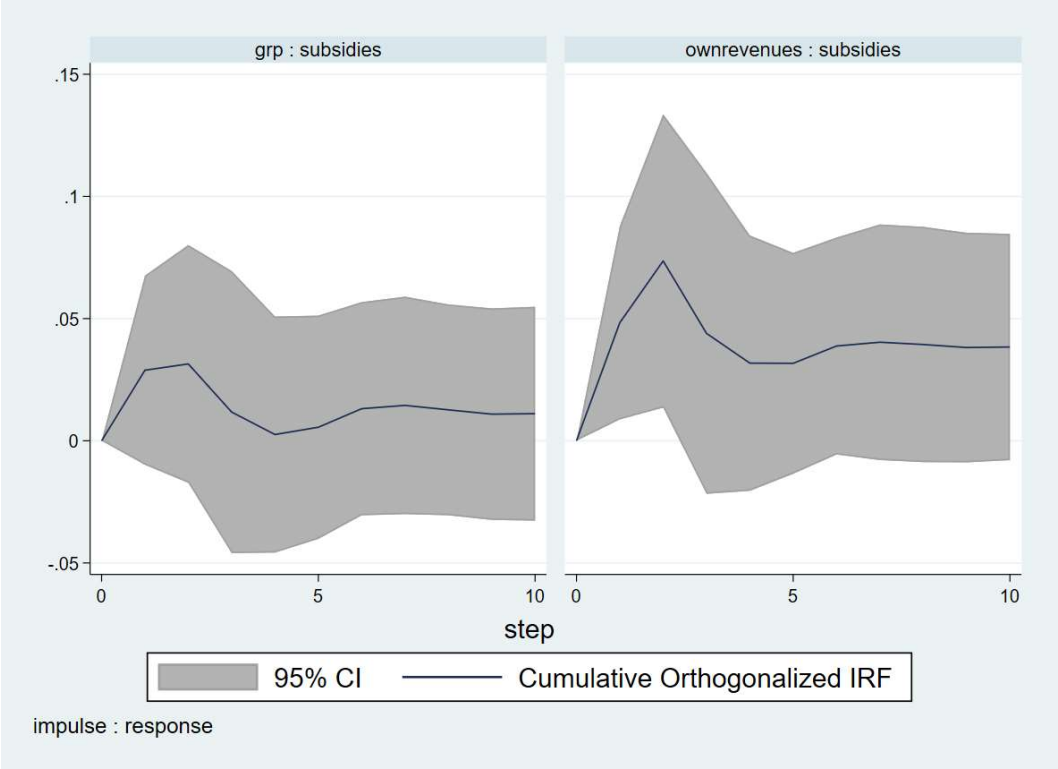
Figure A2.1. Dynamic Interactions Among GRP, Own Revenues, and Federal Grants (*Dotatsii*)



Source: IMF staff calculations.

Figure A2.2 explores the dynamic interactions among GRPs, regions' own revenues, and subsidies from the federal budget. A positive GRP shock leads to a statistically insignificant increase in subsidies. That is, there is no evidence that subsidies play a countercyclical role.[24] A positive shock to regions' own revenues leads to a statistically significant increase in federal subsidies. Recall that subsidies are earmarked matching transfers to finance spending priorities in the areas of social policy and the national economy (agriculture, road infrastructure). Given that subsidies are matching transfers, the positive relationship is intuitively plausible.

Figure A2.2. Dynamic Interactions Among GRP, Own Revenues, and Federal Subsidies

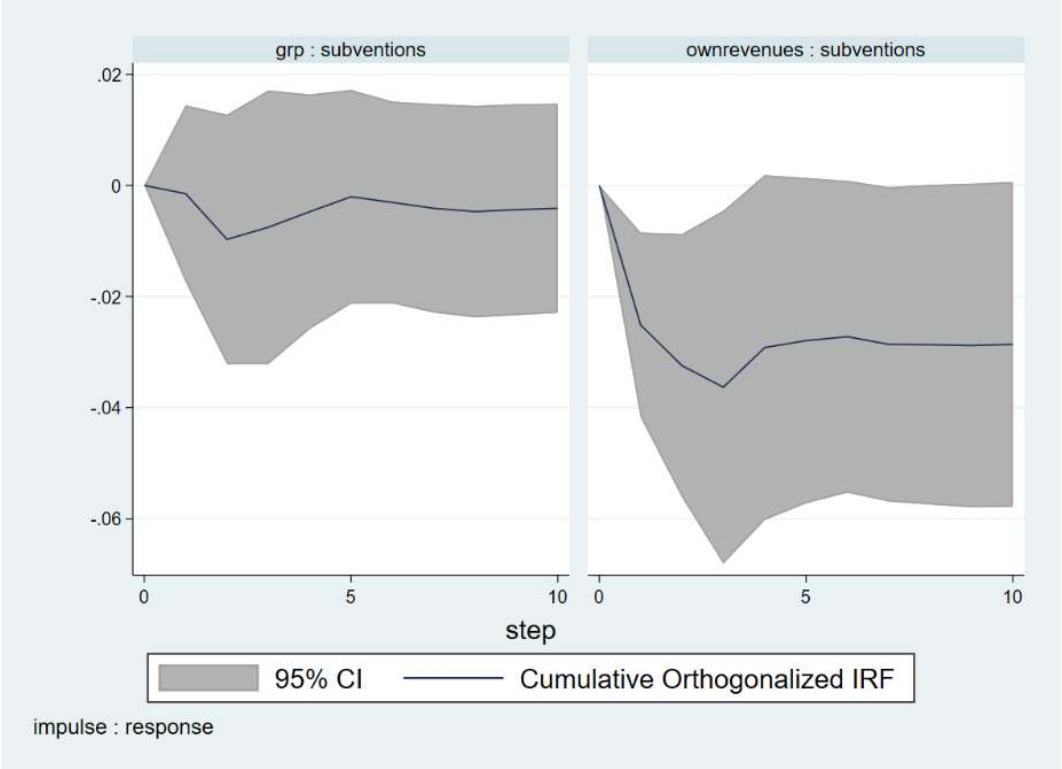


Source: IMF staff calculations.

[24] IMF (2017b) found subsidies to be procyclical.

Figure A2.3 explores the dynamic interactions among GRPs, regions' own revenues, and subventions from the federal budget. A positive GRP shock leads to a small decrease in subventions. Subventions are earmarked non-matching transfers to finance devolved spending responsibilities, particularly in the area of social policy. Given the link to social benefits, the negative relationship is intuitively plausible, although it is statistically insignificant. A positive shock to regions' own revenues leads to a statistically significant drop in subventions from the federal budget. While own revenue indicators are not allowed to be used directly in allocating subventions, increasing own revenues appear to be correlated with a smaller need for social benefits, and, in turn, a smaller need for subventions.

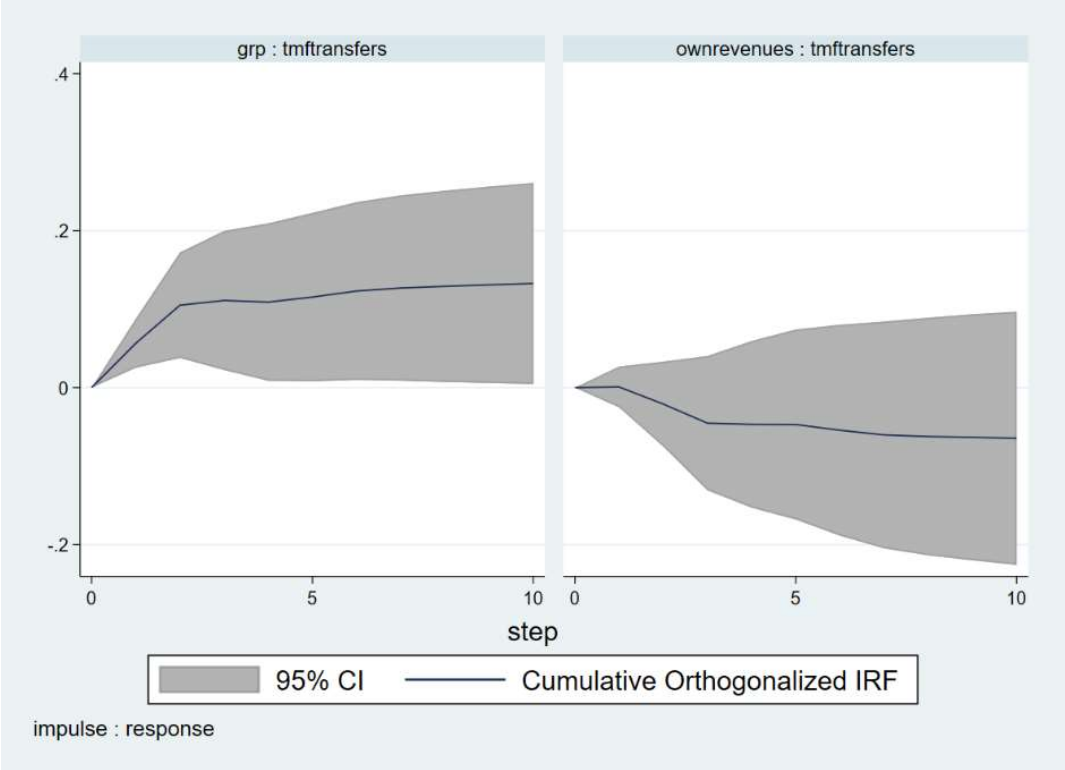
Figure A2.3. Dynamic Interactions Among GRP, Own Revenues, and Federal Subventions



Source: IMF staff calculations.

Figure A2.4 explores the dynamic interactions among GRPs, regions' own revenues, and transfers from the Federal Medical Insurance Fund to Territorial Medical Insurance Funds (TMIFs). A positive GRP shock leads to a statistically significant increase in transfers to TMIFs. In other words, these transfers tend to be procyclical. A positive shock to regions' own revenues leads to a decrease in federal transfers to TMIFs. Thus, transfers to TMIFs tend to reward regions with declining own revenues, although the effect is not statistically significant.

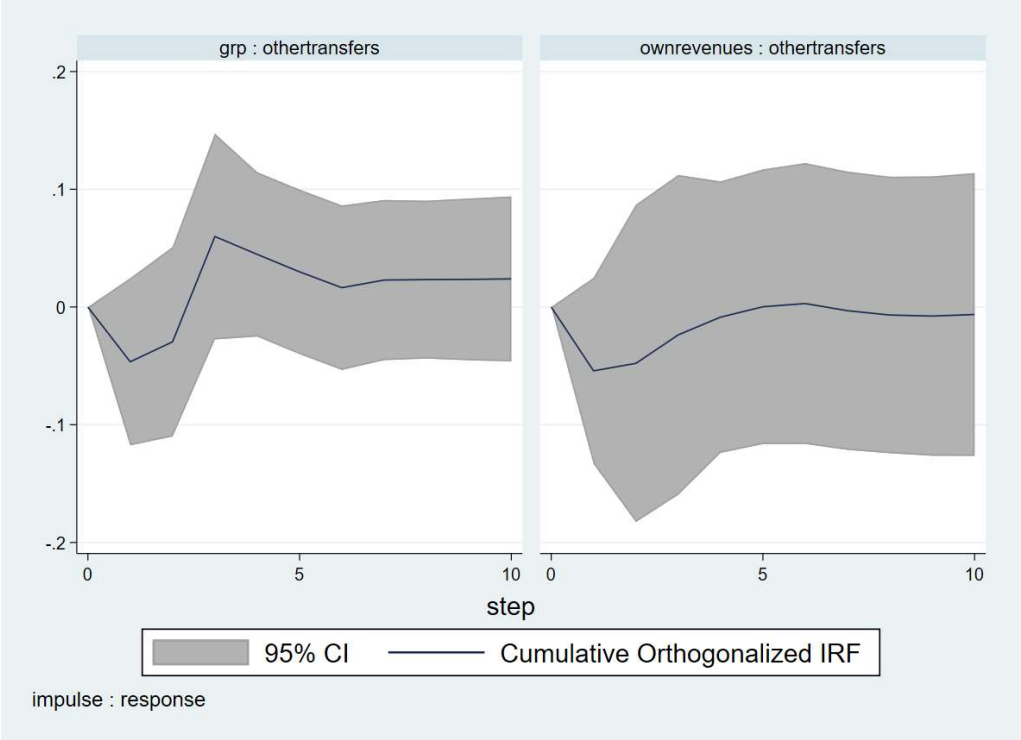
Figure A2.4. Dynamic Interactions Among GRP, Own Revenues, and Federal Transfers to Territorial Medical Insurance Funds (TMIFs)



Source: IMF staff calculations.

Finally, Figure A2.5 explores the dynamic interactions among GRPs, regions' own revenues, and other transfers from the federal budget. A positive GRP shock leads to a statistically insignificant increase in other transfers, while a positive shock to regions' own revenues leads to a statistically insignificant decrease in other transfers.

Figure A2.5. Dynamic Interactions Among GRP, Own Revenues, and Other Federal Transfers



Source: IMF staff calculations.