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Intra-regional Equalization and Growth in Russia

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Abstract

Until 2009, the Russian economy had been enjoying above 5% annual growth since it hit bottom along with the oil prices in 1998. However, the dynamics of the economic recovery have been very uneven across Russian regions. Thus, the determinants of regional economic growth are likely to have a strong sub-national level component. In this paper we examine the potential role played by the fiscal relations between regional governments and their constituent localities. Our empirical results strongly suggest that intra-regional fiscal inequality across local governments and inter-jurisdictional equalization policies pursued by the regional governments have a substantial impact on regional growth. Specifically, we find the following policy tradeoff: one standard deviation higher level of regional equalization translates into half a standard deviation lower rate of regional growth. One question for future research is whether decentralization designs into a hierarchical system result in more local government equalization in comparison to other inter-governmental design, such as a bifurcated system, where the central government is in charge of local equalization.

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We are indebted to an anonymous referee of our previously published work for giving us an idea for this study. Special thanks to the Center for Fiscal Policy (Moscow) for providing some of the data used in this study. This research also benefited from discussions at the 64th Congress of the International Institute of Public Finance, 22-25 August 2008 in Maastricht, The Netherlands.

Introduction

Until 2009, the Russian economy had been enjoying above 5% annual growth since it hit bottom along with the oil prices in 1998. At the same time the national poverty headcount dropped from 30% in 1999 to under 14% in 2007. Partially this is explained by the favorable world prices as illustrated by a close relationship between Russia's economic performance and oil prices depicted in Figure 1. Indeed the two oil price dips of the 1990s coincide with the two financial crises in Russia: the Black Tuesday of 1994 and the Default of 1998. While it has become a commonplace to link Russia's economic performance to oil—and some even go far back to explain the collapse of the Soviet Union (Gaidar 2007)—oil does not explain everything that happens in Russia. Three fourths of Russian regions recorded positive growth in 1999 compared to three fourths of regions showing negative growth a year before. At the same time only one third of regions produced any oil and the oil price increased only modestly from US$12/barrel in 1998 to US$17/barrel in 1999.

[FIGURE 1 ABOUT HERE]

Besides oil prices, the 1999 recovery is more likely to have been related to the devaluation of the ruble as a result of the 1998 crisis which gave a tremendous boost to Russia's producers.. Whatever the cause (oil prices or a monetary boost from devaluation), these sources of growth appear to have been exhausted by the mid-2000s as manifested by the reversal of import substitution and wage increases outpacing labor productivity growth. For some time, construction and household consumption, in part fueled by booming consumer credit, became the next source of growth. However, the meltdown in the latter two sectors as a result of the global credit crunch raises concerns about the robustness of Russia's economic growth.

There is now wide consensus among observers of the Russian economy that the long-term viability of Russia's economic growth hinges on the improvement of productivity in the non-resource-based sectors of the economy. Besides removing barriers for market competition, the most effective government contribution to the productivity growth would be through improving economic infrastructure, especially roads. According to a recent World Bank study, the impact on productivity from bringing the level of infrastructure to the OECD average would be higher than the combined impact of closing the gap in terms of financial development, quality of institutions, and education—in that order of magnitude (World Bank 2007).

Thus, Russia's economic recovery and long-term growth prospects are more complex than can be suggested by a simple macroeconomic story, such as oil price boost. What interests us in this paper is that the dynamics of economic recovery has been very uneven across Russian regions. Therefore, the determinants of long-term growth need also be sought at the sub-national level. Among those potential determinants we are particularly interested in here in this paper is the potential role played by the fiscal relations between regional governments and their constituent local governments. In hierarchical organizations of government structures—of which Russia represents a typical example— where central governments rely on regional governments to implement their policies toward local governments, including equalization, regional authorities ultimately determine the allocation of public resources within the area and the fiscal incentives faced by localities.

In a recent study, Martinez-Vazquez and Timofeev (2008) find that the vast majority of Russia's regions achieve a larger reduction of within-region fiscal disparities

than is the case for between-region disparities being addressed by federal grants. Thus, in most regions, national equalization standards seem to be overshot by regional authorities. In this paper we are interested in understanding what may be the economic consequences of different degrees of equalization being pursued in Russia's regions. More precisely, by estimating the economic outcomes of inter-regional differences in the extent of intra-regional equalization, we attempt to answer whether there is a tradeoff between equalization and economic growth across Russia's regions. This tradeoff may arise because of diminished incentives for local economic development or because of fewer regional public resources allocated to infrastructure and other uses with significant growth impact.

Until recently, not many studies have looked at regional growth patterns in Russia. This is partly because, until the transition shock subsided and recovery took off in 1999, one could only look at the extent of structural changes (e.g., privatization and deregulation) that were expected to determine eventual recovery. In this paper, we look at the same regional-level factors that have been used in the previous studies of regional economic restructuring but in addition we examine the role of intra-regional fiscal arrangements in explaining regional growth patterns.

The rest of this paper is organized as follows. First, we survey theoretical links between equalization and economic outcomes conjectured in the traditional fiscal federalism literature. Next we review those past studies that link intergovernmental relations to economic outcomes in Russia. Then we present empirical evidence on the extent of fiscal inequality and equalization between and within Russian regions. Finally,

we examine the empirical relationship between the extent of intra-regional equalization and economic growth in Russian regions. In the final section we conclude.

Theoretical links between equalization and economic efficiency

In the first-best theory of fiscal federalism there is no place for general-purpose grants. Local governments are prescribed to engage only in the provision of local public goods financed with benefit taxation. When the benefits of local public goods spill over the jurisdiction border, the central government is supposed to internalize these benefits through conditional matching grants to local governments. However, in the second-best world it might not be feasible for local governments to rely exclusively on benefit taxation.[1] At the same time non-benefit taxation necessary to make up the difference would be associated with a larger deadweight loss when undertaken at the local level due to mobility of economic agents across local jurisdictions.

In practice, block grants constitute a prevalent form of intergovernmental transfers in many countries. Thus England's Grants in Aid go as far back as 1830 (Webb, 1920). Moreover, the notion of "fiscal equity" has been the prime goal for grant schemes in many countries since the beginning of the twentieth century, when the notion of a "national minimum" level of services for all citizens entered the policy debate. This is attributed to the switch of local governments from protective to social services thus moving further away from the textbook maximum of benefit taxation (Buchanan 1950). Federal countries with more recent constitutions often have a constitutional requirement

[1] There are many practical constraints to the implementation of benefit taxation. But, there are also some theoretical reasons. For, example if the production of local public goods exhibits decreasing costs, revenue generated through benefit taxation would not be sufficient to cover total costs with marginal costs being below average costs. See, for example, the discussion in Tresch (2002, p. 844).

of equalization payments to federating units.[2] The common equalization targets include equal service for a given level of tax effort or equal tax effort for a given level of service provision. Easing the burden of providing the standard quality of public services requires larger assistance in the form of grants to sub-national units with smaller revenue capacity and larger expenditure need.

The traditional fiscal federalism literature does not provide clear-cut implications of inter-jurisdictional equalization efforts for economic growth. Theoretically, equalization of fiscal capacity can improve economic efficiency as it allows local governments to provide equal service for a given level of tax effort (Buchanan, 1950). This potentially restores horizontal equity (and reduces economic losses from tax avoidance and evasion) as 'equals' face the same net fiscal residuum (inclusive of local services) regardless of the place of residence. However, in addition to horizontal equity, equalization of fiscal capacity also brings some vertical equity—associated with economic losses—by equating "net fiscal residua" for "everybody" not just among "equals" (Mieszkowski and Musgrave, 1999). Therefore, inter-governmental grants are efficiency enhancing when it comes to disparities in rent and source-based government revenues but less so with respect to disparities in household income.[3]

Enhancing efficiency with equalization grants is even more problematic when there is disparity of tax rates on top of unequal fiscal capacities. This is because

[2] For example, Section 36 of Canada's Constitution Act of 1982 establishes the "principle of making equalization payments to ensure that provincial governments have sufficient revenues to provide reasonably comparable levels of public services at reasonably comparable levels of taxation." Other examples include Germany and South Africa.

[3] Inefficient migration induced by local rents can be prevented without equalization grants by the capitalization of rent differentials in real property values but, that would be at the expense of creating inefficiencies in the consumption of housing.

inefficient resource allocation arises from the actual differentials in net fiscal residua rather than from the potential to have equal net fiscal residua achieved with equalization grants based on the *average* tax rate, such as is done, for example, with the Representative Tax System (RTS) (Boadway, 2004). At the same time, compensating for differentials in tax burdens actually imposed by local governments would lead to strategic tax setting by these same local governments. Progressive or regressive incidence of local taxes and expenditures makes the designing of efficiency-enhancing equalization grants even more difficult.

Similar to the case of equalization of tax capacity, compensating for disparities in demand for government services or the costs of those services does not have clear-cut efficiency implications. The issue of higher demand for government services, for example stemming from a larger number of children per household, is analogous to equalization of per capita fiscal capacity discussed above. Instead of equalizing per capita fiscal capacity, here we need to consider disparities per eligible resident (e.g., per school-age child).[4] Thus efficiency would improve from preventing fiscally induced migration to localities where per child tax price of education is cheaper due to access of the local government to some rent revenue, such as natural resource royalties. However, compensating for cost differentials due to diseconomies of scale would impede efficiency–enhancing migration and thus prevent achieving the optimal scale of producing government services (e.g., the optimal school size).

Other economic impacts of fiscal equalization have been conjectured in studies considering local government inputs to economic production (on top of migration of

[4] Indeed, in the USA court-mandated schemes of state-wide equalization of education finances are often set up in terms of taxable property value per student (Fisher 1996, p. 329).

labor). Thus fiscal equalization can affect local government incentives to allow location of businesses through zoning, environmental regulation, public right of way, and so on (Fischel, 1975). Similarly, fiscal equalization can affect local government incentives to allocate public resources towards inputs to economic production: economic infrastructure, training of local labor, law and order, etc. (Matheson, 2005). While the literature suggests potential behavioral response of local governments to fiscal equalization, there is no clear-cut implication for economic efficiency one way or another. Therefore, this study aims to determine empirically how these numerous causal links play out in one specific country case. In particular, we are interested in clarifying whether an empirical tradeoff exists between the extent of equalization efforts and the rate of economic growth.

Economic performance of Russian regions

Figure 2 shows the disparities in economic growth among Russia's regions over the period 2001-2007. Over this period, the median regional growth rate fluctuated between 3.9-8.2 percent, but with wide disparities in the rate across regions. In any year the inter-quartile range of regional growth rates was in excess of 2 percentage points and the coefficient of variation was above 0.5. Moreover, regional growth rates do not show convergence; in fact, as we show in our regression analysis below, the growth rate is positively related to the income level of the region.

[FIGURE 2 ABOUT HERE]

It should be noted that even though the economic growth is measured in terms of physical production (value added in constant prices), it nevertheless can be influenced by

accounting procedures in particular with respect to business entities and holding companies operating in more than one jurisdiction. Thus, for example, in 2001 the Chukotka Autonomous District (region code 81 on the boxplot) exhibits the highest growth rate of 29 percent following the election of billionaire Abramovich as the governor of the region. At that time, taxes from regional subsidiaries of Abromovich's oil companies (Sibneft and Slavneft) accounted for sixty percent of the regional budget (Loos, 2007), However, in 2005 Chukotka shows the largest economic decline (-14 percent), when Abromovitch sold Sibneft and Slavneft to the state monopoly Gazprom.

Overall, the dynamics of economic recovery has been very uneven across Russian regions. Therefore, the determinants of economic growth should also be sought at the subnational level, including relations between regional governments their local governments. Indeed, accepted determinants of growth, such as barriers to competition, quality of education services, and development of economic infrastructure are affected by intergovernmental fiscal relations. According to Matheson (2005), sub-national public investments in Russia are affected by fiscal equalization. The transition literature has also identified tax revenue retention as an important fiscal incentive for local governments to promote development of the private sector in their localities (see Desai et al., 2005, and Jin et al, 2005). In Russia, less equalization is achieved in regions that allow localities to retain a larger share of tax revenue at the point of collection (Martinez-Vazquez and Timofeev, 2008). This is suggestive of trade-off between equity and growth as being hypothesized in the literature (Qiao et al., 2008).

Until recently, not many studies have looked at regional growth in Russia. This is partly because, until the transition shock subsided and recovery took off in 1999, the

focus was on the extent of structural changes (e.g., privatization and deregulation) that were expected to determine eventual recovery. Desai et al. (2005) link regional economic recovery and structural adjustments to differences in tax revenue retention by the regions interacted with their dependence on federal transfers and natural resources. They find that revenue retention and availability of grants and natural resources have a positive association with economic recovery; however, the presence of federal transfers and natural resources inhibit the positive effect of revenue retention.

Fiscal disparity and equalization between and within Russian regions

For the measures of inequality and equalization between and within Russian regions we draw on Martinez-Vazquez and Timofeev (2008), who find a wide variation in local governments' per capita revenue from their own taxes and from federal and regional tax sharing sources in 2001. The lack of data did not allow determining in that paper whether the initial disparities were due to variations in revenue capacity or revenue-raising efforts. As a result, these authors could not interpret the efficiency implications of the documented equalization. To fill that gap, in this paper we attempt to control for local revenue-raising effort by using data for earlier years for which municipal-level statistics are available.

We use two indexes of inequality belonging to the class of general entropy measures: square coefficient of variation (I_2) and mean log deviation (I_0), also known as Theil's second measure. These measures have a number of useful properties further discussed in Martinez-Vazquez and Timofeev (2008). In particular, these indexes allow

us to quantify relative contributions of between-region and within-region disparities to the nationwide level of inequality. In addition, these two measures nicely complement each other as I_0 gives more weight to disparities in the lower tail and I_2 gives more weight to disparities in the upper tail of the distribution.

[TABLE 1 ABOUT HERE]

Table 1 reports values of the two inequality measures for per capita fiscal resources (before and after cumulatively adding the three main categories of intergovernmental revenues to the own-source revenues) among local governments of the 70 regions of Russia (1,953 localities in total) for 1999. The category of "own-source" revenue encompasses all revenue sources whose yield can be affected at the margin by local governments. The category of "assigned sources" of revenue refers to legislated long-term entitlements to (a share of) the yield from tax instruments over which local officials have no discretion. The category of "regulated revenue" refers to tax-revenue sharing at variable rates determined by the higher-level government as part of the annual budget process. The final category of intergovernmental grants, compiles all discretionary transfers to local governments whether formula-based or completely discretionary.

The coefficient of variation in own-source and assigned revenue stands at a rather high level of 1.55 (which is a square root of the I_2 measure). This disparity is somewhat lessened after the allocation of regulated tax revenues among localities, so that the coefficient of variation decreases from 1.55 to 1.41. However, considerable equalization is achieved only after the distribution of regional-local grants, after which the coefficient of variation drops to 1.13.

The true extent of cross-jurisdictional equalization achieved with the allocation of regulated tax revenue and grants is somewhat disguised in the descriptive statistics computed over the sample pooling localities from different regions. Decomposition of the square coefficient of variation (I_2) reveals that the between-region disparity in local fiscal outcomes is actually larger –mainly due to the counter-equalizing effect of assigned revenue— than it was for the initial between-region disparity in own-source revenue (see the top panel in table 1). For both I_0 and I_2 measures most of the reduction in total variation should be attributed to narrowing disparities within regions. This is evident from the reduced share of the within-region inequality in the total inequality compared to the respective share before equalization.

The same story holds if we adjust per capita resources of local governments for the region-wide index of cost of living (see the bottom panel of table 1).[5] Generally, because of the differences in input prices and socio-economic environment, local governments differ in the amount of money they must spend to achieve a given quality of public services. For example, in the Northern territories, inputs to public provision are likely to be more expensive due to high transportation costs. In addition, the harsh climate might require more inputs (e.g., heating fuel) to achieve the same outcome of public provision. However, accounting for inter-regional cost differences reduces total variation, which nevertheless undergoes a similar transformation at each stage of resource allocation as the inequality in nominal per capita resources.

[5] Unfortunately, there is no municipal-level data that would allow us to make adjustments for differences in relative expenditure need across localities. Adjustments using region-level data will not affect our measures of within-region equalization, which is the main interest of this study. However, regional-level adjustments help strengthen our finding of weak between-region equalization.

We can consider one additional stage of resource allocation, which is constituted by direct expenditures undertaken by regional governments. Assuming that expenditures from the regional budget uniformly benefit residents of all constituent localities, we can add a per capita amount of regional expenditures to the per capita amount of local expenditures. In particular, it will account for the different extent of local governments' involvement in the provision of public services in different regions, that is, expenditure decentralization within regions.

Inclusion of regional expenditures into local fiscal outcomes considerably decreases within-region disparities as shown in the last column of Table 1. However, this equalizing effect hinges on our assumption of uniform distribution of benefits from regional expenditures. At the same time, between-region disparities increase with the inclusion of regional expenditures. This suggests that between-region disparity in local fiscal resources is mostly determined by the total tax yield in the region rather than the local share of that yield proportional to the scope of expenditure responsibilities devolved to the local level.

The adjustments for differences in the costs of service provision and the scope of assigned responsibilities allow the local budget data to reveal disparities in the level of public services in Russia's localities. The next question we explore is whether these disparities result from the failure of the higher-level government to assign adequate sources of revenue to the local level or the failure of local governments to fully utilize those resources.[6] To answer this question we transform actual tax collections into a measure of revenue capacity by adjusting for the local level of tax effort. Revenue

[6] We are indebted to Vladimir Popov for this point.

capacity concerns the ability of the jurisdiction to raise revenue for public spending given the level of economic activity within the boundaries of the jurisdiction and the devolved authority to translate this economic activity into public revenues.

We describe the estimation of the local tax effort in Annex 1. Because municipal-level statistical data are not available for some regions, the adjustments for tax effort can be only performed for a somewhat smaller sample comprised of 1,602 localities in 59 regions. In this smaller sample, the inequality in nominal and price-adjusted per capita resources (top and middle panels of table 2) undergoes a similar transformation at each stage of resource allocation to the inequality measures computed for the larger sample (table 1).

[TABLE 2 ABOUT HERE]

Adjusting for the local tax effort produced slightly larger measures of inequality but still following the same pattern at each stage of resource allocation (see the bottom panel of table 2). Overall, if we account for differences in costs and tax capacity, the impact of equalization on the between-region variation appears somewhat stronger. However, the degree of between-region equalization is still short of what we observe for within-region equalization as manifested in a smaller share of the total inequality of fiscal outcomes accounted for by the within-region inequality when compared to the respective share before equalization.

[TABLE 3 ABOUT HERE]

Finally, we note a dramatic increase in fiscal inequality that occurred between 1999 and 2001, as is evident from Table 3. This is due to the reshuffling of tax assignments between the levels of government, in particular authorization of a local

surtax on the federal corporate income tax to compensate for the loss of revenue from the local turnover tax, eliminated in the name of economic efficiency in 2001. As the turnover tax had had a more evenly distributed tax base than the corporate income tax, concentrated in the (mainly urban) places of incorporation, the within-region variation accounts for a larger share of the total inequality in 2001 than in 1999. Another tax assignment reform that occurred between 1999 and 2001 was the elimination of the sub-national retention of the VAT revenue and redistribution of these resources in the form of grants earmarked for the fulfillment of federal social entitlements in proportion to the number of the eligible persons. As a result, in the lower tail of the distribution, the between-region inequality in per capita expenditures inclusive of regional spending is lower in 2001 than in 1999.

Fiscal Equalization and Growth

We now set out to examine how these cross-regional differences in the extent of inequality and equalization translate into differences in economic performance. Following Martinez-Vazquez and Timofeev (2008), we measure the extent of equalization by regional governments as the ratio of the inequality indexes (either I_2 or I_0) before and after equalization. Moreover, the extent of equalization is measured separately first, in the narrow definition and second, in the broader definition inclusive of regional own expenditures. Because the scope of own sources in local revenues changed between 1999 and 2001, resulting in different values for the inequality and equalization measures, in our growth regressions we perform separate estimation on data for 1999 and 2001. Moreover, for 1999 we also attempt to perform estimation for the equalization measure

computed on figures adjusted for local tax effort in addition to the estimation with the equalization measure computed on nominal figures. However, the equalization measure computed on figures adjusted for local tax effort turns out to be insignificant and therefore we do not report the results of those estimations.

As control variables we include regressors commonly used in growth equations; in addition, we include other control variables identified in previous studies of regional economic performance in Russia. Specifically, real per capita economic product is included to control for regional income convergence. Regional tax effort is included to isolate the equalization effect from tax policy effects. Following Desai et al. (2005), we also include tax revenue retention by localities, dependence on federal transfers and natural resources, and the interaction among those variables. Finally, following Brown et al. (2009), we include the number of civil servants per capita to control for the interference by state actors, or alternatively institutional support for private economic activity. To address possible endogeneity, all regressors are lagged by one year relative to the beginning of the period over which economic growth is computed as the dependent variable. Descriptive statistics for our explanatory variables are reported in the Appendix.

[TABLE 4 ABOUT HERE]

Table 4 reports the estimation results for the 2000-04 average growth rate of Gross Regional Product as the dependent variable and the 1999 inequality and equalization measures as the main explanatory variables. According to our estimates, inequality in own-source revenue in 1999 is associated with higher average growth rate in the next five years. At the same time equalization through shared taxes and grants in 1999 is associated with lower average growth rate in the next five years. The effect of

equalization through centralization of resources to the regional budget is not statistically significant.

[TABLE 5 ABOUT HERE]

Table 5 reports the estimation results for the 2002-06 average growth rate of Gross Regional Product as the dependent variable and the 2001 inequality and equalization measure as the main explanatory variables. The 2001 inequality in own-source revenue is associated with lower average growth rate in the next five years. Equalization through shared taxes and grants seems to impede growth while equalization through the centralization of resources to the regional budget is associated with higher average growth rate in the next five years.

There are many similarities in results from the two periods of time. Thus, in both time periods our regressions have higher explanatory power when using the I_0 measures of inequality, which are more sensitive to the disparities in the lower tail. Thus, fiscal incentives faced by poorer localities seem to matter more for regional growth than the treatment of the rich localities. In both time periods, equalization through shared taxes and grants is associated with lower average growth rates. In both time periods, more intensive oil extraction is associated with less economic growth; however, this effect is dampened when localities are allowed to retain more tax revenue collected in their jurisdiction. Finally, a larger number of prosecutorial and judicial staff per capita is associated with less economic growth. The latter result suggests that this group of civil servants represent more of a "grabbing hand" than a "helping hand," using the jargon of the literature debate on that question.[7]

[7] Our funding of different impacts for different types of bureaucracy is consistent with those obtained in Brown et al's (2009) study of the impact of privatization on firm productivity in Russia. They find that only

Despite the aforementioned similarities, the results from the two time periods differ on several accounts. First, subsequent economic growth is positively related to the initial level of inequality in the 1999 own-source revenue—dominated by the turnover tax—while it is negatively related to inequality in the 2001 own-source revenue—dominated by the surtax on corporate income. Besides pointing out that these are very different revenue sources having different spatial incidence, one can speculate about the fact the turnover tax is more of a benefit tax than the corporate income tax is. Another difference between the two time periods is that most regressors have higher statistical significance in the 2001 regression than in the 1999 regression. In particular, the positive impact of equalization through the centralization of resources to the regional budget is highly statistically significant in 2001.

The impact of statistically significant control variables suggested in other studies have the expected signs in our analysis: tax burden (negative), dependence on federal transfers (negative), oil extraction (negative), interaction of tax revenue retention with availability of oil and federal grants (opposite to the sign at the uninteracted term).

Overall, our results suggest that intra-regional fiscal inequality and equalization have a substantial impact on regional growth. In 1999, one-standard-deviation change in the inequality index for own-source revenue of local governments translates into a change of subsequent regional growth rate in the magnitude of 0.67 of its standard deviation. One standard deviation change in regional equalization measure through shared tax revenues and grants translates into half of a standard deviation change in regional growth rate. In 2001, one-standard-deviation change in the inequality index for own-source revenue of

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the state-local bureaucracy has a positive impact on the effectiveness of privatization while the number of federal and prosecutorial staff has no significant impact.

local governments translates into a change of regional growth rate in the magnitude of 0.13 of its standard deviation. One standard deviation change in regional equalization through shared tax revenues and grants translates into half of a standard deviation change in regional growth rate. Finally, one standard deviation in equalization through centralization of resources to the regional budget translates into more than one standard deviation change in regional growth rate.

Conclusion

The purpose of this study has been to explore how cross-regional differences in the extent of fiscal inequality and equalization within Russian regions translate into differences in their economic performance. Overall, our results suggest that intra-regional fiscal inequality and equalization have a substantial impact on regional growth. The impact of equalization becomes particularly significant after the 2001 tax reforms dramatically increased inequality in own-source revenues among local governments. We find that subsequent economic growth is positively related to the initial level of inequality in the 1999 own-source revenue—dominated by the turnover tax—while it is negatively related to inequality in the 2001 own-source revenue—dominated by the surtax on corporate income.

Consistently across different time periods, we find that intra-regional equalization through shared tax revenues and grants is negatively related to subsequent economic growth. To allow for the possibility of more uniformity in the level and quality of public services when the regional government plays a larger role in public provision, one of our measures of inequality adjusts local fiscal resources for the extent of regional service co-

responsibility by adding per capita regional spending to per capita local spending. This measure of equalization through centralization of resources to the regional budget is positively related to regional growth. Furthermore, in our regressions, inequality in the lower tail of the distribution has a higher statistical significance, suggesting higher importance of fiscal incentives for less affluent localities in a region.

The most direct policy implication of our study is that policymakers may face a tradeoff; choices about higher equalization levels can translate in lower rates of economic growth as a result. These results raise some other questions for further research; in particular it would be interesting to consider whether decentralization design into a hierarchical system might result in higher levels of local government equalization, leading to slower economic growth, in comparison to other intergovernmental arrangements, such as bifurcated systems, where central governments are directly responsible for the design of transfer systems for both regional and local governments.

Annex 1: Sources of data

The budgetary data were obtained from a survey of subnational budget reports for fiscal years 1999 and 2001. The survey was conducted by the Center for Fiscal Policy (Moscow) by requesting from individual regional governments the annual budget report for the regional government and constituent local governments. In 1999 and 2001, the number of responding regions totaled about 70 out of a total 89 regions of Russia, with about 1,900 out of total 2,500 local governments. In regions with two-tier local governments, data are aggregated at the top tier.

The constructed measure of revenue-raising capacity is estimated for a sum of taxes that are commonly retained by local governments and on average account for 75 percent of their pre-transfer revenue. These taxes include: personal income tax, corporate income tax, retail sales tax, property taxes, land taxes, and a number of minor local taxes. To estimate tax yields in specific localities, figures for local government receipts from each tax were adjusted for the regionally set retention rates to derive the amount of total collections for each tax in the locality. Information on tax revenue retention rates derives from regional budget laws for the year 1999.

Locality-level information on non-fiscal indicators derives from a survey of regional statistical offices conducted by the federal statistical office in 1999. Region-level non-fiscal data derive from the 2007 Russian Statistical Yearbook.

Information on the region-wide tax effort is taken from the 2001 calculations of federal grants.

Table A1. Summary statistics for the 2000-04 regresssors

	Mean	Std. Dev.	Min	Max
Inequality in own-source revenue (I_0)	0.083	0.040	0.015	0.262
Equalization effort (I_0)	7.020	5.750	1.095	32.222
Equalization through centralization (I_0)	20.013	22.011	1.716	134.410
Inequality in own-source revenue (I_2)	0.435	0.460	0.049	3.686
Equalization effort (I_2)	6.921	6.271	0.521	36.933
Equalization through centralization (I_2)	19.335	20.221	0.857	112.291
Tax effort	1.097	0.537	0.543	5.256
Local retention of tax revenue	0.576	0.125	0.211	0.851
Dependence on federal grants	0.209	0.183	0.000	0.820
Oil extraction	3.553	17.557	0.000	132.035
GRP per capita	20.253	7.308	0.000	41.249
Federal bureaucracy	3.055	1.080	1.545	8.705
Regional bureaucracy	1.319	0.944	0.203	4.523
Local bureaucracy	3.659	1.096	1.201	7.079
Judicial bureaucracy	0.892	0.274	0.240	1.976

Table A2. Summary statistics for the 2002-06 regresssors

	Mean	Std. Dev.	Min	Max
Inequality in own-source revenue (I_0)	0.156	0.189	0.016	0.929
Equalization effort (I_0)	7.445	5.957	0.157	23.709
Equalization through centralization (I_0)	29.418	48.527	0.291	383.175
Inequality in own-source revenue (I_2)	1.418	3.949	0.049	25.254
Equalization effort (I_2)	6.691	5.520	0.471	23.826
Equalization through centralization (I_2)	25.539	37.328	1.145	263.940
Tax effort	1.005	0.341	0.545	2.645
Local retention of tax revenue	0.550	0.109	0.232	0.831
Dependence on federal grants	0.329	0.226	0.007	0.905
Oil extraction	3.794	18.253	0.000	138.535
GRP per capita	46.183	43.865	11.049	303.661
Federal bureaucracy	3.366	2.291	1.576	19.333
Regional bureaucracy	1.664	2.336	0.207	14.889
Local bureaucracy	3.920	2.435	0.124	20.778
Judicial bureaucracy	0.974	0.496	0.244	3.690

Annex 2: Estimating Local Revenue Capacity and Revenue-Raising Effort

This annex discuses the concept of local government revenue capacity and suggests approaches to measuring this capacity in Russia based on available data. Essentially, revenue-raising capacity is comprised of three main elements: economic activity, taxing powers, and institutional constraints. By running regression analysis on more than 1,600 observations we obtain high quality estimates of the marginal impacts on the revenue capacity of two statistical indicators: manufacturing output and average wage. We utilize the obtained estimates in assessing revenue-raising capacity of local government in 1999.

We perform the regression analysis using 1998 statistical data and 1999 tax collection data. The choice of the year is determined by the fact that we have access to district-level statistical indicators only for the period 1996-1998. Note, however, that estimates of revenue capacity obtained on 1999 data cannot be directly applied for the assessment of revenue-raising capacities in later years. This is because taxing powers of local governments have undergone some changes since 1999 (see Martinez-Vazquez et al., 2006). Second, on average, the economy has risen by eighty percent in the period 1998-2007. However, because the growth was induced with international trade factors, different local economies have been affected to varying extents. Thus the current distribution of economic activity can be quite different from that in 1998. Two of the three components of the revenue-raising capacity, that is, the level of economic activity and taxing powers, have changed considerably since 1999. While these changes limit our ability to extrapolate revenue capacity from 1999 to more recent years, we think that

revenue-raising effort, which is a ratio of actual collections over the tax capacity, is more likely to persist.

In 1999, a dominant portion of the locally retained revenue came from taxes on payroll, corporate income, general sales, corporate assets, land, and individual property (Martinez-Vazquez and Timofeev, 2008). We have several variables that should capture the size of these taxable bases in each locality: manufacturing output, and average wage, share of urban population, and share of working-age population. We tried to use these variables in various functional forms, interactions among them, and a set of regional dummies to explain variation in local revenue yield adjusted for region-wide revenue-raising effort. Below we report the results of estimation with the best explanatory power.

Table A3 Marginal Impact of Revenue Capacity Determinants (1999)

	Estimates	Mean	Std. Dev.
Dependent variable: local revenue yield adjusted for region-wide tax effort 1999, RUR per capita	—	1,525.8	3,928.7
Annual production in manufacturing 1998, RUR per capita	0.1341*** (0.016)	5,207.8	14,493.8
Average monthly wage in 1998, RUR	1.8342*** (0.3478)	775.9	533.7
Overall R^2	0.64		
Between R^2	0.77		
Within R^2	0.54		
# of observations	1,602		
# of regions	58		

Note: Estimates produced using the least squares dummy variable estimator (LSDV) with region dummies employed. Cluster-robust standard errors are provided in parentheses.

*** — statistically significant at the 1% level.

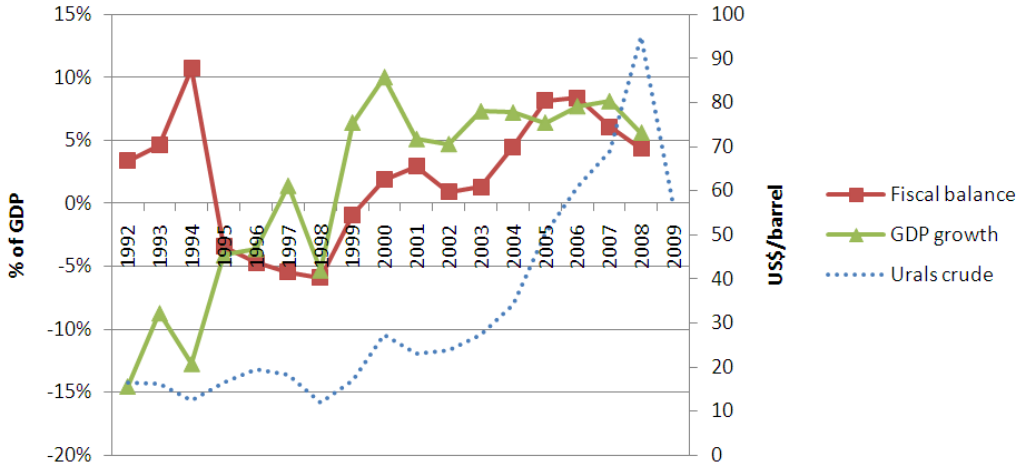
The second column of Table A3 shows that the employed variables explain over 60 percent of variation in local government own-source revenue in 1999. One standard deviation in manufacturing output per capita translates into half of a standard deviation in local revenue yield per capita. At the same time one standard deviation in the average wage translates into only seven percent of a standard deviation in local revenue yield per capita. We use the obtained estimates to impute revenue capacity of local governments in 1999. For example, for Ivanovo Oblast the imputation is performed as follows:

Capacity = -260.4+ 0.1341* <manufacturing> + 1.8342*<wage>,

where –260.4 is a region-specific dummy (the fixed effect).

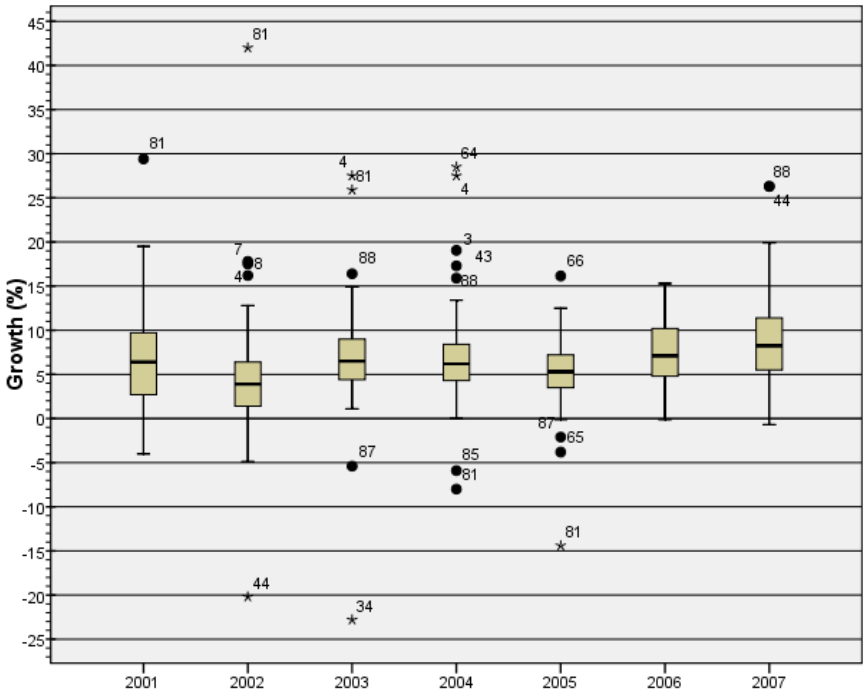
Figures

Figure 1. Oil price and Russia's economic performance



Notes: Prepared by authors using data from Goskomstat (2008) and Energy Information Administration (2009)

Figure 2. Inter-regional disparity in growth rates



Source: Prepared by authors using data from Goskomstat (2008)

Notes: The bottom and top ends of the box and the line in between show the first, third quartiles and the median respectively. Whiskers show the distance from the end of the box to the largest and smallest observed values that are less than 1.5 box lengths from either end of the box. Circles show outliers—cases with values that are between 1.5 and 3 box lengths from either end of the box. Extreme cases with values more than 3 box lengths from either end of the box are not shown.

Table 1. Disparities in Per Capita Revenue of Local Governments within and between Regions, 1999

	Own - source	*Plus assigned*	*Plus regulated*	*Plus grants*	*Plus regional expenditures*
Nominal fiscal resources					
Square Coefficient of Variation (I_2)	1.2382	2.3956	1.9905	1.2762	1.2011
Within regions	0.6408	1.1626	0.7224	0.3100	0.1210
Between regions	0.5974	1.2330	1.2682	0.9662	1.0801
Mean log deviation (I_0)	0.1540	0.1633	0.1553	0.0843	0.1178
Within regions	0.0834	0.0769	0.0677	0.0167	0.0077
Between regions	0.0706	0.0864	0.0876	0.0676	0.1101
Fiscal resources adjusted for the price level					
Square Coefficient of Variation (I_2)	0.8334	1.2863	1.1475	0.6555	0.5999
Within regions	0.5280	0.7350	0.5587	0.2322	0.0891
Between regions	0.3055	0.5513	0.5888	0.4233	0.5108
Mean log deviation (I_0)	0.1341	0.1360	0.1278	0.0590	0.0616
Within regions	0.0834	0.0769	0.0677	0.0167	0.0077
Between regions	0.0507	0.0591	0.0601	0.0423	0.0539

Source: Authors' calculation based on data from the Center for Fiscal Policy, Moscow.
Note: The sample includes 1,953 localities in 70 regions (covering population of 108,399) for which fiscal data are available.

Table 2. Disparities in Per Capita Revenue of Local Governments within and between Regions, 1999

	Own - source	*Plus assigned*	*Plus regulated*	*Plus grants*	*Plus regional expenditures*
Nominal fiscal resources					
Square Coefficient of Variation (I_2)	1.3434	2.2828	2.2732	1.4493	1.3449
Within regions	0.6254	0.9981	0.8139	0.3499	0.1406
Between regions	0.7180	1.2847	1.4593	1.0995	1.2043
Mean log deviation (I_0)	0.1564	0.1638	0.1629	0.0915	0.1004
Within regions	0.0799	0.0756	0.0685	0.0167	0.0078
Between regions	0.0764	0.0881	0.0944	0.0748	0.0926
Fiscal resources adjusted for the price level					
Square Coefficient of Variation (I_2)	0.8459	1.2860	1.3177	0.7469	0.6476
Within regions	0.4849	0.6842	0.6329	0.2610	0.1025
Between regions	0.3610	0.6017	0.6848	0.4859	0.5451
Mean log deviation (I_0)	0.1327	0.1347	0.1296	0.0619	0.0598
Within regions	0.0799	0.0756	0.0685	0.0167	0.0074
Between regions	0.0528	0.0591	0.0611	0.0452	0.0524
Fiscal resources adjusted for the local tax effort and price level					
Square Coefficient of Variation (I_2)	0.9712	1.2132	1.0712	0.6609	0.5895
Within regions	0.5990	0.7078	0.5401	0.2586	0.1085
Between regions	0.3721	0.5054	0.5310	0.4023	0.4810
Mean log deviation (I_0)	0.1702	0.1707	0.1590	0.0706	0.0636
Within regions	0.1105	0.1077	0.1002	0.0276	0.0130
Between regions	0.0597	0.0630	0.0588	0.0430	0.0506

Source: Authors' calculation based on data from the Center for Fiscal Policy, Moscow.
Note: The sample includes 1,602 localities in 59 regions for which statistical data are available to estimate the tax effort.

Table 3. Disparities in Per Capita Revenue of Local Governments within and between Regions, 1999 and 2001

	Own - source	*Plus assigned*	*Plus regulated*	*Plus grants*	*Plus regional expenditures*
Nominal fiscal resources in 1999					
Square Coefficient of Variation (I_2)	1.1480	2.3732	1.8866	1.1544	0.9768
Within regions	0.5752	1.0755	0.6248	0.3117	0.1209
Between regions	0.5727	1.2977	1.2618	0.8427	0.8560
Mean log deviation (I_0)	0.1523	0.1611	0.1513	0.0778	0.1307
Within regions	0.0824	0.0762	0.0666	0.0165	0.0077
Between regions	0.0699	0.0849	0.0847	0.0613	0.1230
Nominal fiscal resources in 2001					
Square Coefficient of Variation (I_2)	3.2092	4.0824	3.0689	1.8948	1.6918
Within regions	1.9364	2.1294	1.4748	0.8582	0.4770
Between regions	1.2728	1.9530	1.5941	1.0366	1.2148
Mean log deviation (I_0)	0.2612	0.2571	0.2182	0.1248	0.1039
Within regions	0.1608	0.1437	0.1207	0.0571	0.0316
Between regions	0.1004	0.1134	0.0975	0.0676	0.0723

Source: Authors' calculation based on data from the Center for Fiscal Policy, Moscow.

Note: The 2001 sample includes 1,688 localities in 62 regions (covering population of 95,358) for which fiscal data are available. The 1999 sample includes 1,693 localities in 62 regions (covering population of 95,141) for which fiscal data are available.

Table 4. OLS regression of regional growth, 2000-04

LHS: Average growth rate 2000-04	I_0 measure	I_2 measure
Inequality in own-source revenue	45.965***	1.316
	(8.662)	(1.028)
Equalization effort	-0.250**	-0.188
	(0.109)	(0.119)
Equalization through centralization	0.031	0.039
	(0.037)	(0.043)
Tax effort	0.951	-5.255
	(2.203)	(3.188)
Local retention of tax revenue	-8.150	-10.892
	(6.499)	(7.251)
Dependence on federal grants	-14.890	-7.806
	(11.294)	(12.271)
Oil extraction	-1.255***	-0.927*
	(0.433)	(0.495)
Oil x tax retention	2.685***	1.856*
	(0.794)	(1.031)
Grants x tax retention	29.885	19.290
	(19.555)	(20.368)
GRP per capita	-0.046	-0.072
	(0.061)	(0.077)
Federal bureaucracy	0.873	0.352
	(0.836)	(1.144)
Regional bureaucracy	-0.009	0.233
	(0.449)	(0.507)
Local bureaucracy	-0.137	0.505
	(0.356)	(0.445)
Judicial bureaucracy	-8.288***	-8.325***
	(2.467)	(2.988)
Constant	13.112**	23.225***
	(5.522)	(6.704)
R-square	0.55	0.38
# of regions	64	64

Note: Robust standard errors are provided in parentheses: * statistically significant at 10 percent; ** statistically significant at 5 percent; *** statistically significant at 1 percent.

Table 5. OLS regression of regional growth, 2002-06

LHS: Average growth rate 2002-06	I_0 measure	I_2 measure
Inequality in own-source revenue	-2.233**	-0.072*
	0.934	0.042
Equalization	-0.259***	-0.249***
	0.067	0.087
Equalization through centralization	0.088***	0.078**
	0.023	0.029
Tax effort	-2.803***	-2.701***
	0.857	0.984
Local retention of tax revenue	-20.530***	-22.253***
	3.946	4.280
Dependence on federal grants	-17.197***	-16.800***
	6.014	6.002
Oil extraction	-1.300*	-1.076
	0.664	0.675
Oil x tax retention	2.042**	1.710*
	0.996	1.012
Grants x tax retention	46.762***	45.102***
	8.783	9.115
GRP per capita	0.093	0.073
	0.057	0.059
Federal bureaucracy	-0.940*	-0.154
	0.526	0.487
Regional bureaucracy	-0.542*	-0.540
	0.271	0.328
Local bureaucracy	0.332	0.437
	0.300	0.337
Judicial bureaucracy	-4.543**	-6.640***
	1.692	1.488
Constant	20.036***	20.898***
	2.850	3.203
R-square	0.61	0.58
# of regions	71	71

Note: Robust standard errors are provided in parentheses: * statistically significant at 10 percent; ** statistically significant at 5 percent; *** statistically significant at 1 percent.

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