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# Fiscal decentralisation and the quality of public services in Russian regions

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## **Summary**

The paper provides empirical analysis of the relationship between fiscal decentralisation and the quality of public services in the Russian regions. The analysis suggests that fiscal decentralisation has no significant effect on the key inputs into secondary education, such as schools, computers, or availability of pre-schooling, but has a significant positive effect on average examination results, controlling for key observable inputs and regional government spending on education. Decentralisation also has a positive impact on the quality of municipal utilities provision. Both effects can be attributed to strengthened fiscal incentives rather than to superior productive efficiency of municipal governments.

Keywords: decentralisation, education, utilities, public services, Russian regions

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## INTRODUCTION

Empirical evidence in support of the theoretical advantages of decentralisation has been generally inconclusive, as highlighted by Treisman (2007). This may be partly explained by the difficulties of measuring the extent of decentralisation or its relevant aspects such as the degree of voter accountability or decision-making autonomy (Treisman, 2002; Stegarescu, 2005). In fact, the correlation between different measures of decentralisation proves to be astonishingly low (Voigt and Blume, 2008).

The inconclusive empirical evidence may also reflect theoretical ambiguities of the impact of decentralisation. There has been growing consensus in the literature that the results of decentralisation depend critically on local conditions, in particular on comparative intensity of distortions in the incentive structure at different tiers of government (Bardhan and Mookherjee, 2005; Blanchard and Shleifer, 2001). The extent of capture at different levels of government, and hence the potential benefits of decentralisation, may accordingly depend on the quality of institutions and a number of other factors, including the extent of political centralisation, that is, presence of strong nationwide parties (Enikolopov and Zhuravskaya, 2007).

Lastly, measuring performance under decentralisation is itself a significant challenge, since the quality of public services tends to be benchmarked through observable input indicators or process-oriented measures, such as pupil enrolment ratios, student-teacher ratios, or teacher absenteeism in education, rather than output indicators (such as quality of instruction), which is often much more difficult to assess.

In light of these complications, more empirical analysis is needed to strengthen the case for further decentralisation. Of particular interest would be a direct comparative study of the quality of public service delivery in more and less decentralised regions, to complement cross-country studies of decentralisation and studies of the impact of country-wide reforms. Cross-country studies, for instance those based on performance in standardised PISA examinations conducted by the Organisation for Economic Co-operation and Development (OECD) Programme for International Student Assessment, face the difficulty of meaningfully comparing outcome or input indicators across countries given vast differences in objectives, priorities, curricula, and sampling. In addition, production functions that transform various inputs in public service provision into outputs may differ substantially across countries complicating estimation and interpretation (see Nabeshima, 2003, on education in south-east Asia). In the case of studies of system-wide reform initiatives, it is often difficult to credibly establish a counterfactual, that is, the quality of public services in the absence of reforms.

Cross-regional studies, by contrast, combine reasonably comparable data on inputs and outcomes with substantial heterogeneity in some institutional arrangements, including the extent of fiscal decentralisation—the role of municipal governments in public service provision relative to that of central regional governments. The latter approach was adopted by Galiani and Schargrodsy (2002) and Barankay and Lockwood (2007), and is followed below.<sup>1</sup>

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<sup>1</sup> This literature, which looks at the benefits of fiscal decentralisation within government, complements a number of studies that examined the merits of decentralisation of spending and management decisions from governments to service providers, such as schools or municipal companies (for example, Crain and Zardkoohi, 1978, Ladd, 1999, Meier and O’Toole, 2003).

This paper looks at the public service provision in Russian regions in the first half of the 2000s. Russian data could be of considerable interest for advancing our understanding of the effects of decentralisation since, on the one hand, Russian regions show a considerable variation in the degree of expenditure decentralisation (Freinkman and Plekhanov, 2009), and they differ considerably in their choices of expenditure and sectoral policies. On the other hand, there is a major cross-regional variation in efficiency of regional public spending in core sectors (Hauner, 2008). Thus, the question is whether there is a link between regional fiscal decentralisation and the quality of public services in the regions. Importantly, regions share common history, common legal framework, and common expected standards of public services such as education, health or municipal utilities, substantially reducing heterogeneity of the sample with respect to factors that cannot be explicitly controlled for.

We consider primarily fiscal aspects of decentralisation, that is, allocation of control over budget revenues and expenditures across government levels. We do not have sufficient information to measure and study the political dimension of decentralisation. Moreover, it is unclear if such variation remains significant in today's Russia.

The paper looks at two different sectors: secondary education and municipal utilities (water, wastewater (sewerage), and district (central) heating). In Russia both sectors are the responsibility of subnational governments, but they are characterised by very different production functions. In particular, education performance is arguably determined by long-term factors in effect over the school cycle (of up to 11 years if primary education is included). In municipal utilities successful restructuring or improved maintenance can be expected to affect performance within months.

The analysis makes a distinction between observable inputs in public service provision and indicators of performance, incorporating both in the following framework: the level of government spending affects the quantity and quality of the main observable inputs in each sector (such as schools, teachers, or computers in education) and then these observable inputs and spending both affect regional performance in the sector. The decentralisation variable can, in principle, influence the relationship between government spending and outcomes either directly or indirectly, through observable inputs, or both.

As a performance indicator in education the analysis uses the first wave of the results of the standardised final examinations in mathematics and language, which were rolled out country-wide from 2003 onwards. These exams results are particularly valuable due to the “surprise” element of exam introduction, which rules out the possibility that spending on education or provision of basic inputs had been affected by examination performance. The performance indicator in the utilities sector is the average number of network breakdowns per unit of network length, which measures quality and reliability of service delivery but, to the best of our knowledge, is not a common determinant of funding allocation in the sector.<sup>2</sup> Importantly, this is a results-based rather than process-based measure of performance.

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<sup>2</sup> In individual cases, utility breakdowns have been used as an argument to seek additional federal funding, for instance by Primorky region during the winter of 2000-01 (Martinez-Vazquez et al., 2006). However, even in these cases utility breakdowns appear to have been at the centre of federal-regional rather than regional-municipal bargaining.

The analysis suggests that fiscal decentralisation has no significant effect on the key inputs into secondary education, such as schools, computers, or availability of pre-schooling, but at the same time has a significant positive effect on average examination results, controlling for the key observable inputs and per capita regional government spending on education. Likewise, the degree of decentralisation appears to have no discernible impact on the quality of inputs into utilities provision, such as depreciation of assets or network coverage, but an increase in the degree of fiscal decentralisation has a significant positive effect on the performance in the sector.

The paper also contrasts two measures of fiscal decentralisation: one based on expenditure shares in particular sectors, and one based on the share of municipal revenues over which municipalities have some control in terms of how these revenues are raised. The fact that only the latter measure appears to have an impact on public service outcomes suggests that improvements in public service delivery associated with fiscal decentralisation in the Russian regions are brought about by improved incentive structure and accountability rather than by gains in productive (allocative) efficiency of public spending.

The rest of the paper is structured as follows. Section I discusses the link between fiscal decentralisation and the quality of public services, with particular reference to decentralisation and provision of education and municipal utilities in the Russian regions. Section II presents the results of a cross-regional empirical study of the determinants of the quality of public services. Concluding remarks follow.

## 1. FISCAL DECENTRALISATION AND THE QUALITY OF PUBLIC SERVICES

### *Fiscal decentralisation and provision of public services*

The impact of decentralisation on the quality of public services depends on a large number of factors, but in general terms decentralised provision of public services could have four main advantages.

First, local governments may have superior knowledge of local preferences and needs and thus can be able to target public spending better (Oates, 1972). Faguet (2004) provides empirical evidence in support of this hypothesis by showing that decentralisation in Bolivia significantly altered public investment spending patterns in a way that is consistent with local governments being more responsive to perceived local needs. If expenditure targeting is the key issue, the relevant measure of decentralisation would be the share of sectoral spending administered "closer to people", for instance at the municipal, sub-municipal, or school level in the case of education spending, as argued by Barankay and Lockwood (2007). Empirical evidence on the effects of decentralised education spending has been mixed, with positive results reported by Barankay and Lockwood (2007) for Switzerland and Skoufias and Shapiro (2006) for Mexico, but negative results obtained by Di Gropello (2002) for Chile, and more broadly for Latin American countries (Glewwe, 2002).

Second, decentralisation may affect public services provision through its impact on incentive structure and accountability of governments and public services providers (World Bank, 2004). Local governments may invest in policies that with time increase their revenue base and the value of their office, but they will lack incentives to do so if all the benefits of growth and development accrue to higher-tier governments, as argued by Weingast (1995) and Qian and Weingast (1997). Hence, if centrally appointed bureaucrats merely administer central funds, they may lack incentives to put effort in improving quality of public services, since they may be unable to derive economic or political benefits from the results of their actions. The measure of fiscal decentralisation best reflecting incentive effects at the local government level is revenue autonomy, or the share of municipal government expenditure financed by own municipal revenue—revenue over which municipalities have some control, and which cannot easily be withheld by the regional authorities.<sup>3</sup>

Third, if local governments are in charge of administering their own tax revenues, they are more likely to be held accountable for their performance by local populations. A shorter distance between decision-makers and taxpayers should by itself increase accountability of government (Seabright, 1996), but in practice this need not always be the case, since local governments may be captured by the local elites and special interests with greater ease than central or regional governments (Bardhan and Mookherjee, 2000, 2005), in which case decentralisation may aggravate rather than solve incentive problems. Lastly, yardstick competition between governments of various jurisdictions may have a further positive influence on performance (Besley and Case, 1995), if local populations compare achievements of their governments with those of governments in other jurisdictions.

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<sup>3</sup> As in Akai and Sakata (2002), own revenue is defined as revenue excluding transfers. It includes fixed shares of federal taxes (for example, personal income tax) assigned to municipalities by law.

For the latter two channels to work, not only should municipal governments have sufficient autonomy of spending, but governments of all levels should also enjoy sufficient political autonomy and be subject to effective political competition. Unfortunately, reliable measures of this aspect of decentralisation are not available for Russian regions. Nonetheless, the analysis will control for administrative decentralisation arrangements, which varied somewhat across regions. In some cases regional governments could exercise more political control over municipalities through an intermediate (district) level of government with region-appointed officials.

Overall, the distinction between the measure of decentralisation based on local share of consolidated regional spending in particular sectors and the measure based on the share of municipal expenditure financed by own revenues can shed some light on whether the origin of performance improvements associated with decentralisation, if any, lies in productive efficiency of lower-level governments or in strengthened incentives for good governance. The two measures prove to be weakly correlated in the case of Russian regions (correlation coefficients between 0 and 0.25) making such distinction meaningful.

### ***Input-based, process-oriented and outcome-based measures of quality of public services***

Decentralisation is not the only feasible way of addressing agency problems in a multi-tier government system, in particular given a number of possible disadvantages of decentralisation, including diseconomies of scale, inter-jurisdictional spillovers, and impediments to macroeconomic policy coordination (Prud'homme, 1995). Moral hazard problems can be alternatively addressed by setting explicit or implicit performance targets for lower-tier units, provided that the chosen performance indicators are reasonably strongly correlated with the unobserved effort of bureaucrats accountable to the central authorities.

In practice, however, it may be difficult to use indicators directly related to the quality of public services provided, both because the quality of services may be difficult to measure and because of strong political resistance on the part of lower-level governments and service providers to switch from process-oriented to result-oriented assessments (as discussed below). Therefore, analysis of public service delivery often focuses on public sector inputs such as availability of schools, teachers, hospital beds, and so on, assuming—plausibly—that better inputs translate into better outputs.

However, the link between inputs and outcomes is often weaker than hoped. For instance, even with the same number of teachers and schools per student education outcomes may differ dramatically. In fact, Fuchs and Wössmann (2007) find that institutional differences explain cross-country variation in education outcomes much better than differences in schooling resources.

At the same time, in order to be able to interpret any observed relationship between decentralisation and public sector performance meaningfully it is essential to control for pecuniary and non-pecuniary inputs in public sector provision, as emphasised by Barankay and Lockwood (2007). In the absence of such controls, any observed dependence between decentralisation and public sector outcomes may be plausibly driven

by higher public sector spending (or other non-pecuniary inputs), which may be correlated with both higher decentralisation and better outcomes.<sup>4</sup>

Hence this paper looks at both the determinants of observable, commonly benchmarked physical inputs in public service provision and the determinants of performance indicators. This approach can determine whether decentralisation arrangements affect inputs or the way in which these inputs are used to produce outputs, or both.

While a large number of studies looked at the determinants of the quality of public services in a decentralised setting, they typically focused either on inputs or on performance indicators, but not both. Galiani and Schargrodsky (2002) found that devolution of secondary education responsibilities from the central to provincial governments in Argentina resulted in better student performance in standardised examinations, although the opposite was true in the case of provinces running large fiscal deficits. Barankay and Lockwood (2007) established that higher decentralisation of education spending in Swiss cantons is associated with higher completion rates in secondary education. Hauner (2008) revealed substantial differences in the efficiency of public service provision in the Russian regions, based on observable input and process-based indicators.

The key contributions of this paper to the voluminous literature on decentralisation and public services provision is to contrast different hypotheses about the nature of the impact of decentralisation on the quality of services by linking them to different measures of decentralisation and to look at both result-based performance indicators and process-based and input indicators, in a setting where only the latter are institutionally benchmarked.

The next subsections briefly discuss decentralisation in Russia with particular reference to education and utilities.

### ***Decentralisation in Russia in the 1990s***

Since the early 1990s Russia has operated as a federal state, in which the governments of 83 regional jurisdictions have had broad powers with respect to their fiscal policies, particularly regarding the level and structure of their spending.<sup>5</sup> The modern system of intergovernmental fiscal relations has its origins in the reforms launched in 1994 based on the 1993 Constitution. The initial rapid decentralisation resulted in a system of relatively powerful but poorly motivated regional governments operating in an unstable and insufficiently transparent institutional environment.

Subnational governments became responsible for over half of the consolidated government spending, and more than 80 per cent of spending on key social services such as education and health care. Regional governments became in charge of important elements of expenditure policies, such as the levels of salaries of civil servants in sectors

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<sup>4</sup> A significant fraction of studies providing evidence of a positive relationship between decentralisation and the quality of public services, including Robalino et al. (2001) and Khalegian (2003), do not control for inputs.

<sup>5</sup> Initially there were 89 regions. Six regions have been merged with their larger neighbours, and the merger of Archangelsk Region and Nenets Autonomous District is currently in progress.

financed from subnational budgets, subsidies to the state-owned enterprises and to households, or the level of social benefits. The organisation of regional fiscal systems and in particular the assignment of expenditure responsibilities to municipal and regional governments were largely determined by regional governments themselves (Freinkman et al., 1999), subject to general federal guidelines that assigned responsibility for housing and utilities subsidies, education, and health care predominantly to municipalities.

At the same time, subnational governments lacked clear incentives to raise efficiency in service delivery. Lack of transparency in distribution of intergovernmental transfers, in particular at the regional level, insufficient clarity of expenditure responsibilities, high incidence of unfunded mandates, and low taxing powers of subnational governments encouraged dedication of efforts to rent seeking and politicised competition for federal transfers rather than to improving public services and promoting investment (Martinez-Vasquez et al., 2006, Polishchuk, 2004, Treisman, 1998). The transfer allocation practices were shown to undermine incentives for fiscal prudence and growth-enhancing policies (Alexeev and Kurlyandskaya, 2003, Desai et al., 2005).

In line with the general decentralisation patterns, Russia embarked on a rapid decentralisation in education, giving regions more responsibilities and more autonomy. This devolution took place against the background of a shrinking fiscal envelope, and thus without transfer of resources commensurate with the new responsibilities of subnational governments. Despite some positive trends, such as increased parental choice and school autonomy, the 1990s saw growing inefficiencies and deterioration in the quality of education services, to a significant extent related to the weak institutional capacity in the regions and poor incentives to implement the necessary reforms (Canning et al., 1999).

The 1995 Federal Law on Local Government spelled out major expenditure responsibilities for education by level of government.<sup>6</sup> Pre-school institutions and primary and secondary schools were assigned to local (municipal) governments. At the same time, the exact extent of decentralisation of education and other expenditure items varied widely across regions, and effective control over the level and composition of education expenditures has been largely retained by the regional governments, with the municipal governments merely acting as executing agents responsible for day-to-day aspects of service delivery. Yet their role in this capacity was significant as witnessed by the fact that by the end of the 1990s fewer than 10 per cent of municipal secondary schools opened a bank account despite the fact that the 1992 Law on Education granted them the status of a legal entity (Bray and Borevskaya, 2001).

Moreover, various federal regulations unnecessarily limited regional freedom to raise efficiency in service delivery and slowed down restructuring, while the federal capacity to monitor the quality of education programmes throughout Russia remained weak. The traditional system of municipal education finance remained largely intact with a focus on supporting the education process, not necessarily on the results.

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<sup>6</sup> Generally, the 1995 law did not provide for a clear allocation of expenditure assignments. While it was less of a problem in general education (where most responsibilities were clearly assigned to the local governments), in other areas, including social assistance, public administration and national economy, regional governments were left with significant unfunded mandates and responsibilities jointly shared with both the federal and municipal governments.

Housing expenditure was a major item of subnational government spending throughout the 1990s due to the national policy of heavily subsidised tariffs on utility and energy services for households. Although the share of this expenditure item had been gradually declining it still accounted on average for about one-sixth of consolidated regional spending in the early 2000s, declining further to one-ninth in 2006. The variation in the share of housing spending in the total regional spending has been remarkably high, reflecting regional differences in urbanisation (urban housing has been subsidised to a greater extent than housing in rural areas); differences in underlying housing costs due to climatic factors; and differences in regional housing policies—the extent to which regional authorities chose to subsidise local utility and housing tariffs.

As in the case of education, the legislation assigned housing and utilities spending predominantly to municipalities, while the decisions on the level of both tariffs and subsidies were made at the regional level (OECD, 2000). This was clearly inconsistent, and became a source of serious tensions between different tiers of government.

### *Decentralisation in Russia in the 2000s*

The second wave of fiscal federalism reforms in Russia undertaken in 1998–2001 was characterised by additional centralisation of tax revenues at the federal level and increased dependence of subnational budgets on federal transfers: the share of federal transfers in the revenues of regional governments increased from about one-quarter to one-third in 2001. At the same time, allocation of federal transfers became much more transparent and predictable.

The third wave of reforms of intergovernmental relations was launched in 2002 on the basis of the new federal government programme adopted in August 2001. The latter significantly strengthened the earlier trend towards fiscal centralisation<sup>7</sup> and complemented it by measures to restore some elements of central political controls (Martinez-Vasquez, Timofeev, and Boex, 2006). On balance, the reforms brought significant improvements with respect to clarity, predictability and realignment of government incentives at different levels. The system that emerged is still far from a proper “market preserving federalism”<sup>8</sup>, but many earlier distortions were reduced and subnational authorities finally faced the incentive framework that could be supportive of improvements in service delivery. The most notable changes included the following.

- Expenditure responsibilities: expenditure responsibilities have been made significantly clearer, and unfunded mandates have been largely eliminated.
- Revenue assignments: a regime of individual tax exemptions for large enterprises has been mostly phased out and special tax preferences for particular regions have been eliminated, while resource rents (taxes on extraction of mineral resources) have been centralised. These changes have made the tax system much more stable, transparent and progressive, with wealthier regions (in particular, regions with highly profitable extractive industries) facing a higher tax burden and a lower retention rate.

<sup>7</sup> The share of subnational expenditures declined from 54 per cent of the consolidated budget spending in 2000–01 to on average 50 per cent in 2002–05, that is, to the level prevailing in the mid 1990s.

<sup>8</sup> In particular, there is still little of subnational government accountability to local voters/taxpayers.

- Transfers: transfer allocation has become predominantly rule-based with at least 70 per cent of all transfers distributed based on transparent formulae. Federal subventions (strictly earmarked transfers) were expanded linking federal funding with subnational service delivery.
- Financial incentives for regions were further strengthened by reforms in budget management (including through the introduction of performance benchmarks and multi-year budgeting) and federal monitoring (introduction of federally set performance benchmarks for the regions, for example, in education and health).

In this new setting subnational authorities are believed to face stronger incentives to improve service delivery, in particular in the core high-visibility sectors, such as education, health and housing.

Simultaneously the government developed a comprehensive reform strategy aimed at improving availability and quality of education services as well as efficiency of their provision (Canning, 2004). Standardised national examinations at the end of secondary school (at the age of 17) were pioneered in 2001 and rolled out across regions starting from 2003, accompanied by a detailed description of federal standards. To improve the relevance and career orientation of education, flexible curricula have been piloted in secondary schools, assisted by the liberalisation of textbook publishing. Local control over funding, at least in some regions, allowed for teacher and parent participation in educational decision-making.

In 2000 expenditure responsibilities in education were further clarified. Financing of maintenance and operational costs in education was left with municipalities, while regional governments were put in charge of financing teachers' salaries (personnel costs). Although formally salaries are recorded as a municipal expenditure item, they are financed by earmarked transfers (subventions) from the regional government. The 2000 clarification expanded the amount of resources available for schools and increased stability of education financing. The 2004 amendments to the law reaffirmed responsibility of the municipal governments for delivery of both pre-school and school education services. The national Education project launched in 2006 provided for incremental federal funding of subnational mandates in the sector.

Education accounted on average for approximately one-quarter of consolidated regional expenditures, with the shares varying between 10 and 35 per cent in individual regions. Relative to GDP, general government expenditure on education in Russia has remained moderate, below levels typically observed in transition economies and countries with similar per capita incomes. Internationally comparable assessments of education quality place Russia substantially below the OECD average (PISA, 2007). In the 2006 reading test of 15 year olds, Russia was ranked 37th out of 56 countries (32nd in mathematics), below many of the transition economies in eastern Europe, hinting at some decline in the relative quality of education since the start of transition. At the same time, cross-country comparisons suggest that efficiency (value-for-money) of education spending in Russia is relatively high compared with other countries, especially when output is proxied by measures such as the adult literacy rate or education coverage, unlike health spending where efficiency in Russia is estimated to be significantly lower (Herrera and Pang, 2006). This may be explained by both relatively low expenditures and by the abovementioned attention to form (enrolment) rather than substance (achievements).

One of the most radical reforms undertaken in Russia in the 2000s was that of the housing and utilities sectors, based on the Housing Code and other core legislation adopted around 2004. The package covered tariff regulation and social benefits, utility privatisations and concessions, and organisation of housing management in apartment blocks, among other issues. At the same time, in line with the federalist spirit of the Russian constitution, the regions were given considerable discretion with respect to the implementation of the new laws, and the actual pace of reforms varied. For instance, while the federal government mandated full cost recovery in housing to be achieved by 2006, in reality the average cost recovery ratio reached only 86 per cent (in Moscow only about 60 per cent), which was nonetheless a major improvement on the 38 per cent ratio recorded in 1997 (Sivaev, 2008).

The new framework also addressed inconsistencies in allocation of expenditure responsibilities across the tiers of government. Municipalities were put in charge of housing privatisation, registration of condominiums, development of utility networks, decisions on their privatisation and concessions, and tariff-setting for water supply and garbage collection. Regional governments' responsibilities included determination and financing of tariff discounts for particular groups of consumers (in addition to those defined federally), social housing subsidies, tariff-setting for electricity and district heating (subject to federal restrictions). The federal governments' responsibilities related to certain categories of benefits and natural gas tariffs.

Table 1 presents the estimates for the level of regional expenditure decentralisation in recent years (2003-07). It shows that on average municipal spending amounted to about half of consolidated subnational expenditures and that the decentralisation ratio varied considerably across sectors. Education is the most decentralised expenditure category with about 75 per cent of all subnational spending executed by municipalities. Housing, culture, and administration represent other examples of highly decentralised items, where municipal expenditures exceed those made by regions.

Relatively high coefficients of variation reflect significant differences in municipal-regional expenditure breakdown across regions. However, in more decentralised sectors (education, housing, and culture) the observed variability is lower (below 30 per cent) reflecting the existence of federal rules and guidelines regulating subnational expenditure sharing.

Table 1 suggests that intergovernmental fiscal reforms of 2005 resulted in considerable centralisation of subnational finance. On the expenditure side such a shift towards centralisation was partially reversed in 2006-07. On the revenue side, however, the reforms brought about a significant permanent loss of municipal fiscal autonomy. The key factor of revenue centralisation was elimination of the earlier requirements that guaranteed municipalities a minimum share in several important subnational taxes. From 2005 onwards, such requirements were abolished with respect to corporate income, personal income,<sup>9</sup> and corporate property taxes. This caused a major reallocation of revenue from these taxes in favour of regional governments.

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<sup>9</sup> In 2006 the minimum requirement for municipal share of personal income tax (PIT) was restored, but at a level which was much lower than that which existed before 2005 (40 per cent instead of 50 per cent).

Table 1. Degree of expenditure and revenue decentralisation by function

(In per cent)

	<i>Municipal share of spending</i>					<i>Coefficient of variation</i>				
	2003	2004	2005	2006	2007	2003	2004	2005	2006	2007
<u>Municipal expenditures in per cent of consolidated regional spending:</u>										
Administration			51.4	53.2	54.4			44.5	29.8	26.0
National economy			12.4	13.1	14.6			69.5	67.1	68.0
Housing and utilities	87.8	87.0	55.7	56.4	54.9	24.9	25.5	28.0	27.0	30.1
Education	80.7	80.3	74.6	75.1	74.8	23.1	24.0	19.6	18.3	19.4
Health and sports	55.3	49.6	39.1	38.0	37.2	35.0	39.2	36.5	32.8	34.8
Social protection	45.8	44.5	38.2	35.6	34.4	57.4	60.7	72.2	79.2	71.0
Law and order			13.7	13.3	12.3			118.8	101.6	105.6
Culture and mass media			55.7	56.4	54.9			28.0	27.0	30.1
Total expenditures	53.8	53.7	49.3	51.6	51.1	26.8	27.8	24.4	24.7	24.4
Own municipal revenue as per cent of mun. spending	55.3	59.0	45.2	40.0	40.2	28.0	33.4	27.9	27.0	23.4

Source: Authors' estimates based on Ministry of Finance data.

Note: Due to the important changes in budget classification undertaken in 2005, expenditure estimates for 2003–04 are not fully comparable with those for later years.

## 2. EMPIRICAL EVIDENCE

### *Basic framework and specifications for education*

The basic framework includes specifications for public sector inputs and public sector performance indicators. The specification for inputs is as follows:

$$INP_{it} = \alpha_1 + \beta_1 EXP_{it} + \gamma_1 DEC_{it} + \lambda X_{it} + \varepsilon_{it} \quad (R1)$$

where  $INP$  are the key physical inputs in region  $i$  in year  $t$ ,  $EXP$  is regional government spending in the relevant sector per user of services,  $DEC$  is a measure of fiscal decentralisation in the region (either sectoral or broadly defined),  $X$  is a set of control variables, and  $\varepsilon$  is the residual.

The basic specification for the performance indicators can be written as:

$$PERF_{it} = \alpha_2 + \beta_2 EXP_{it} + \gamma_2 DEC_{it} + \delta INP_{it} + \mu Z_{it} + \eta_{it} \quad (R2)$$

where  $PERF$  is an indicator of sector performance,  $Z$  is a set of control variables,  $\eta$  is the residual, and other variables are defined as above.

The performance indicator in education is the regional average mark obtained by school graduates in standardised national examinations. The exam scores, taken as averages for mathematics and language, are available for 2004 and 2005 for 73 regions (Amur, Chechnya, Ingushetia, Kemerovo, Orel, Primorky, Stavropol and Ulyanovsk regions did not take part in the test; and the cities of Moscow and St. Petersburg are excluded for the purpose of the analysis). The exam scores range from 0 to 100 and are comparable across years and subjects since the exam marks are calibrated in a way that sets the national

average equal to 50 in each year for each subject. Table 2 presents descriptive statistics for the key variables of interest.

Based on the results of numerous studies of student performance (for example, Card and Krueger, 1992, Hanushek, 1997, 2003, Lee and Barro, 2001, Filmer and Eskeland, 2002, Nabeshima, 2003, Afonso and St. Aubyn, 2006), the observed quality of schooling could be affected by three groups of factors: school resources, organisation of schooling, and student and family characteristics. School resources include classroom size (student-teacher ratio), teacher qualification, training, and experience, length of instruction period, teachers' pay, and so on. The relevant aspects of schooling organisation include the degree of competition across schools, school autonomy, and degree of community participation in school management, among others. Important student-level factors include family income, parents' education and socio-economic background, physical resources available at home (for example, internet), and access to pre-school education.

Table 2. Descriptive statistics for selected variables: education

<i>Variable</i>	<i>Mean</i>	<i>Standard deviation</i>	<i>Median</i>	<i>Min</i>	<i>Max</i>	<i>k of var., %</i>
(In per cent, unless otherwise indicated)						
Incidence of second shift	14.7	6.5	13.9	3.4	32.0	44.3
Computers per 100 pupils	3.0	0.8	2.8	1.5	5.3	25.3
Pre-schooling coverage	59.9	11.7	58.8	26.1	87.7	19.5
Student-to-teacher ratio	12.2	1.6	12.2	8.8	16.4	13.3
Average examination score	50.5	4.6	50.2	33.3	67.2	9.1
Education expenditure per pupil	46 824	43 354	34 133	15 205	316 797	92.6
Education exp. per pupil, PPP-adj.	69 418	34 103	61 383	29 624	240 051	49.1
Education expenditure in % of total	24.9	4.3	24.4	10.6	33.7	17.3
Share of workforce with univ. degree	21.5	4.0	20.7	14.3	35.9	18.4
University students per 10,000 pop.	402.8	122.5	402.0	0.0	740.0	30.4
Own municipal revenue in per cent of municipal expenditure	41.6	11.8	41.3	11.3	75.3	28.4
Education exp. decentralisation	76.0	9.2	77.3	47.7	92.4	12.1
Expenditure decentralisation	50.8	9.0	51.4	26.1	71.7	17.7
Urbanisation	68.7	11.9	69.1	26.0	94.4	17.3
Transfers as a share of expenditure	26.8	19.1	21.3	0.0	80.2	71.1
Investment risk index	1.2	0.4	1.1	0.8	3.8	31.6
Index of democracy, 2004	29.3	6.2	29.0	17.0	45.0	21.0

Sources: See annex.

Note: As of 2005, unless otherwise indicated, based on 73 observations.

The extent to which specific factors are relevant for education outcomes remains hotly debated, with a common agreement only about the importance of parents' education and income (Wössmann and Fuchs, 2007). In particular, the significance of various inputs (including decentralisation) may vary substantially across countries (Nabeshima, 2003),

and while certain reforms (including decentralisation) may improve average results they may also contribute to higher inequality and heterogeneity of outcomes (Glewwe, 2002).

Many of the identified indicators, such as the length of instruction period or average community participation in school affairs, have little or no regional variation within Russia (while parent associations commonly exist they tend to be used as a tool for raising additional funding and have very limited say on issues of school management). Others, however, exhibit substantial regional variation. They include the share of students that have to start classes in the afternoon (“second shift”) due to the lack of school capacity in the area; the availability of computers in secondary schools (measured by the number of machines per 100 pupils); and the average student-to-teacher ratios.<sup>10</sup> In addition, enrolment in voluntary pre-school education is also considered as a physical input, since average enrolment ratios primarily reflect availability and affordability of pre-school education, while many other considerations may, of course, influence individual enrolment choices.

To account for differences in parents’ education and occupation controls also include the share of working population with a university degree (the number of university students in the region per 10,000 population was also used as an alternative proxy). The degree of urbanisation is included to account for differences in the cost and logistics of education provision in the urban and rural areas (for instance, class sizes tend to be smaller in rural schools).

The quality of public services may also depend on the overall quality of regional institutions. To distinguish the role of institutions in general from the impact of decentralisation arrangements specifically, control variables include an index of investment risks compiled annually by the Expert Rating Agency, a sister company of Russian *Expert* magazine, an analytical weekly. The index of investment risk takes into account local legislation, quality of local administration (municipal and regional governments), crime, lack of social cohesion and possibility of social unrest, environmental issues, downside risks to the regional economy, and enforcement of financial contracts. Until recently the index also reflected political risks but this component has been dropped following the abolition of regional governor elections (governors became appointed by the President with the consent of the regional legislature). The values of the index are normalised as multiples of the “average” perceived business risk in Russia. Higher values of index indicate lower quality of regional institutions.

Another region-specific institutional index, compiled by the Moscow Carnegie Center, specifically measures the strength of regional democratic institutions based on expert assessments.<sup>11</sup> Stronger democratic institutions are expected to be associated with higher accountability of governments and may thus contribute to higher quality of public services.

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<sup>10</sup> Data on the latter are available only for 2001–02, however, to the extent that final exam marks reflect quality of education over a number of preceding years, the lagged values available can be viewed as suitable input indicators.

<sup>11</sup> This index primarily reflects the *perception* of the true quality of democratic institutions and is in fact slightly negatively correlated with the index of electoral democracy compiled solely on the basis of the observed electoral data, such as the voter turnout or the number of candidates running.

Lastly, to distinguish between the effects of decentralisation within region and possible effects of federal-regional decentralisation arrangements, controls include a measure of regional dependency on federal transfers (the share of federal transfers in consolidated regional expenditure)<sup>12</sup>. Excessive reliance on external sources of financing may distort regional incentives and lead to inferior public sector outcomes (Desai et al., 2005, Freinkman and Plekhanov, 2009). The distance between Moscow and the regional capital was also included as a proxy for a likely extent of political oversight imposed by the federal authorities (although this variable proved to be highly insignificant).

Furthermore, when assessing the impact of fiscal decentralisation on the provision of physical inputs in education it may be useful to control for the stock of inputs in 1990 (where data are available). For instance, current stocks of school buildings and pre-school education centres depend not only on the efforts to build new schools but also on the level of pre-existing stock.

Regional expenditure on education is expressed in per-student terms and following the standard practice in cross-country studies it is adjusted for regional differentials in the purchasing power of the rouble, using data on the cost of a standard bundle of consumer goods and services in different regions. Share of education expenditures in total regional spending, which may reflect "priority weights" that regions attached to education, can also be included (this measure was robustly insignificant and is not reported).

As discussed above, the preferred broad measure of fiscal decentralisation (corresponding to the incentives hypothesis) is the share of municipal expenditures financed by own municipal revenues. The sectoral decentralisation variable (corresponding to the productive efficiency hypothesis) is the share of municipal spending on education in the consolidated regional education spending. Although all municipal governments in Russia have to be elected by a popular vote (independently from regional authorities), administrative decentralisation arrangements differed substantially across Russian regions due to a broad interpretation of the federal laws on municipal self-governance. Kurlyandskaya and Nikolayenko (2005) classified region-specific arrangements of the time into three main groups. In most cases subnational government consisted of two tiers, regional and municipal, both with independently elected authorities voting on annual budgets. These regions comprise the base group (without a dummy). In nine regions (assigned "type 2" decentralisation dummy) municipal budgets were aggregated and executed at the district level, with district authorities appointed by the regional administration. Under these decentralisation arrangements the regional governments were able to retain more control over municipal policies and spending. In 19 regions the budgets of smaller municipalities were also aggregated at a higher (district) level but the district authorities were elected in the same way as the municipal councils. In this case subnational government effectively comprised three independently elected tiers—regional, district and municipal. "Type 3" represents the most decentralised form of administrative arrangements.

Since the study focuses on cross-regional differences in education performance indicators and their long-run determinants (secondary education outcomes depend on the quality of instruction over several years), equations (R1) and (R2) are estimated using the between

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<sup>12</sup> Retention ratios (the ratios of regional and municipal revenues to all revenues collected in the region) were also used and produced similar results.

panel estimator, which exploits differences in time averages for different cross-sectional units.

While education spending is expected to affect the availability and quality of physical inputs, the observed stocks of inputs in the region may in turn affect education spending, making the expenditure variable endogenous. In particular, lower quality or quantity of inputs (insufficient number of schools, teachers, computers, insufficient provision of pre-schooling) may demand higher spending. Conversely, it is also possible that higher inherited stocks of inputs require higher recurrent spending (for example, undersubscribed rural schools may be bankrolled rather than closed, for political or equity reasons).

To address this potential endogeneity problem, per-student education spending can be instrumented with per capita regional income adjusted for PPP differentials. While per capita government spending on education and per capita regional income are closely correlated, per capita income should not be affected by differences in education inputs, and thus can act as an appropriate instrument.<sup>13</sup>

### ***Results: Education inputs***

Estimation results for the second shift are presented in Table 3 (columns A and B report results using basic specifications with both measures of decentralisation included in turn; in column C both measures of decentralisation are included simultaneously and statistically insignificant variables are dropped; and columns D and E summarise the results obtained using instruments). The results suggest that controlling for the incidence of second shift in 1990 (which is highly significant) improvements in availability of schools are associated with urbanisation and higher spending on education but appear to be unrelated to the degree of fiscal decentralisation proxied by either measure. In some specifications the dummy for type 2 administrative decentralisation is also statistically significant.

Table 4 presents results for other key inputs. Availability of computers (columns A and B) is explained predominantly by higher per student government spending and seems to be unrelated to the degree of fiscal decentralisation.

Factors significantly contributing to higher enrolment in pre-school education (columns C and D), controlling for the enrolment levels in 1990, include higher spending on education, urbanisation, and lower dependence on federal assistance. The measure of decentralisation of education spending is statistically significant at the 10 per cent level in some specifications, but the estimated magnitude of the impact is very small: a 10 percentage point increase in decentralisation of education spending is estimated to increase enrolment rate by only 0.1 per cent.

Smaller average class sizes (lower student-teacher ratios) primarily reflect predominance of rural schools (lower degree of urbanisation, columns E and F). The perceived level of

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<sup>13</sup> This estimation framework implies several important assumptions. The identification assumption with respect to inputs is that differences in per capita income affect provision of education inputs only through their impact on education spending per student. Further identification assumption is that inputs are strictly exogenous with respect education performance (exam scores). Error terms  $\varepsilon$  and  $\eta$  are assumed to be uncorrelated.

democracy is associated with larger class sizes (which could in principle be viewed as more efficient). The measures of fiscal decentralisation are not statistically significant and the magnitude of coefficients is low: a 10 per cent increase in the share of municipal own revenue in total municipal spending is associated with a 0.2 students more per each teacher, or 11 per cent of one standard deviation of the class size variable.

Overall, decentralisation variables do not affect education inputs significantly. Differences in inputs are relatively well explained by differences in the levels of education spending and urbanisation, as well as the initial stocks of inputs in 1990.

Table 3. Determinants of education inputs: second shift

<b>Model</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>
Method	<i>Between</i>	<i>Between</i>	<i>Between</i>	<i>IV</i>	<i>IV</i>
<i>Dependent variable</i>	<i>Second shift</i>				
Second shift in 1990	0.891 (0.080)***	0.884 (0.079)***	0.890 (0.069)***	0.928 (0.091)***	0.897 (0.083)***
Education expenditure per student log, PPP	-2.791 (1.163)**	-2.809 (1.055)**	-2.146 (1.032)**	0.934 (3.441)	-0.495 (2.367)
Urbanisation	-0.205 (0.049)***	-0.207 (0.048)***	-0.120 (0.046)***	-0.197 (0.053)***	-0.206 (0.051)***
Investment risk	0.632 (2.918)	0.653 (2.888)		-2.143 (3.656)	-1.123 (3.400)
Index of democracy	-0.123 (0.080)	-0.126 (0.079)		-0.029 (0.098)	-0.111 (0.083)
Share of regional expenditure financed by federal transfers	-0.040 (0.049)	-0.052 (0.035)		0.036 (0.081)	-0.034 (0.040)
Type 2 administrative decentralisation			2.614 (1.192)**	2.562 (1.470)*	
Type 3 administrative decentralisation			0.033 (0.958)	0.510 (1.103)	
Education expenditure decentralisation		0.035 (0.047)	0.043 (0.047)		0.052 (0.051)
Own municipal revenue in per cent of municipal spending	0.018 (0.067)		0.055 (0.059)	0.107 (0.106)	
Constant	43.217 (15.128)***	42.180 (12.466)***	26.027 (12.170)**	-3.875 (41.819)	17.387 (25.954)
R <sup>2</sup> between	0.74	0.74	0.75	0.71	0.72
Number of regions	73	73	73	73	73
Number of observations	365	365	365	365	365

Source: Authors' calculations.

Note: Robust standard errors in parentheses. Values significant at the 10% level are marked with \*; at the 5% level, with \*\*; at the 1% level, with \*\*\*. Education spending was instrumented with per capita GRP (PPP-adjusted). Based on 2001–05 data.

Table 4. Determinants of other education inputs

<b>Model</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>
Method	<i>Between</i>	<i>IV</i>	<i>Between</i>	<i>Between</i>	<i>IV</i>	<i>IV</i>
<i>Dependent variable</i>	<i>Computers</i>		<i>Pre-schooling</i>		<i>Student-teacher ratio</i>	
Pre-schooling coverage in 1990			0.728 (0.072)***	0.730 (0.073)***		
Education expenditure per student, log, PPP	0.972 (0.175)***	1.467 (0.383)***	0.474 (0.167)***	0.524 (0.152)***	-1.565 (0.929)*	-1.131 (0.826)
Urbanisation	-0.010 (0.007)	-0.010 (0.007)	0.162 (0.066)**	0.159 (0.066)**	0.084 (0.016)***	0.081 (0.016)***
Investment risk	0.301 (0.322)	-0.049 (0.417)	-0.919 (0.569)	-0.879 (0.567)	1.180 (1.057)	1.087 (1.019)
Index of democracy	-0.008 (0.011)	-0.003 (0.014)	0.049 (0.134)	0.042 (0.149)	0.059 (0.032)*	0.069 (0.029)**
Share of regional exp. financed by fed. transfers	-0.006 (0.005)	-0.001 (0.006)	-0.057 (0.018)***	-0.061 (0.018)***	-0.010 (0.019)	0.001 (0.013)
Type 2 administrative decentralisation		0.055 (0.210)		-0.149 (2.457)	-0.263 (0.487)	
Type 3 administrative decentralisation		0.191 (0.150)		0.464 (1.819)	0.030 (0.356)	
Education expenditure decentralisation	-0.007 (0.006)	-0.004 (0.007)	0.013 (0.008)	0.013 (0.008)*		0.006 (0.012)
Own municipal revenue in per cent of mun spending			-0.007 (0.010)		-0.018 (0.020)	
Constant	-6.432 (2.007)***	-11.761 (4.259)***	-5.110 (5.786)	-5.946 (6.497)	20.672 (9.927)**	14.363 (8.361)
R <sup>2</sup> between	0.45	0.39	0.76	0.76	0.51	0.52
Number of regions	73	73	73	73	73	73
Number of observations	219	219	365	365	146	146

Source: Authors' calculations.

Note: Robust standard errors in parentheses. Values significant at the 10% level are marked with \*; at the 5% level, with \*\*; at the 1% level, with \*\*\*. Education spending was instrumented with per capita GRP (PPP-adjusted). Based on data for 2001, 2003, 2005 (computers); 2001–05 (pre-schooling); 2001–02 (student-teacher ratio).

Table 5. Determinants of education performance (exam scores)

Model	A	B	C	D	E	F
Method	<i>Between</i>					
<i>Dependent variable</i>	<i>Average examination score</i>					
Second shift	-0.172 (0.080)**	-0.188 (0.085)**	-0.227 (0.072)***	-0.249 (0.076)***	-0.195 (0.078)***	-0.200 (0.075)***
Computers per student	-0.645 (0.893)	-0.547 (0.951)			-0.674 (0.855)	-0.851 (0.778)
Pre-schooling coverage	0.166 (0.065)**	0.133 (0.068)*			0.164 (0.062)**	0.146 (0.054)***
Student-to-teacher ratio (3-year lag)	-0.373 (0.418)	-0.286 (0.444)			-0.266 (0.400)	-0.335 (0.347)
Share of working population with university degree	0.161 (0.144)	0.139 (0.153)			0.147 (0.141)	0.152 (0.135)
Education expenditure per student, log, PPP	0.879 (0.967)	-0.011 (0.965)	1.259 (0.825)	0.673 (0.825)	1.048 (0.933)	0.941 (0.902)
Urbanisation	-0.019 (0.067)	-0.005 (0.071)				
Investment risk index	-3.271 (2.357)	-3.104 (2.506)	-3.151 (1.822)*	-4.422 (1.824)**	-4.013 (2.268)*	-3.321 (1.817)*
Index of democracy	-0.061 (0.092)	-0.084 (0.097)			0.019 (0.093)	
Share of regional expend. financed by fed. transfers	0.044 (0.050)	-0.029 (0.045)			0.038 (0.047)	
Type 2 administrative decentralisation					3.967 (1.407)***	4.066 (1.271)***
Type 3 administrative decentralisation					1.921 (1.082)*	2.003 (1.041)*
Education expenditure decentralisation		0.014 (0.047)		0.019 (0.046)	0.001 (0.043)	
Own municipal revenue in per cent of mun spending	0.139 (0.050)***		0.090 (0.036)**		0.128 (0.048)***	0.099 (0.036)***
Constant	35.317 (12.829)***	53.109 (12.031)***	39.334 (9.906)***	50.092 (9.903)***	30.598 (12.694)**	35.459 (10.678)***
R <sup>2</sup> between	0.41	0.33	0.32	0.26	0.49	0.48
Number of regions	73	73	73	73	73	73
Number of observations	132	132	132	132	132	132

Source: Authors' calculations.

Note: Robust standard errors in parentheses. Values significant at the 10% level are marked with \*; at the 5% level, with \*\*; at the 1% level, with \*\*\*. Based on average scores for mathematics and language, 2004–05.

### ***Results: Education outcomes***

Estimation results for the average exam scores are presented in Table 5. Columns A and B report results for the basic specifications using both measures of decentralisation. Columns C and D present specifications with fewer explanatory variables, where most insignificant ones are dropped. In Column E both measures of decentralisation and administrative decentralisation dummies are included simultaneously, column F presents an additional robustness check for the specification with municipal own revenues.

With the exception of computers, education inputs have expected signs: lower incidence of second shift, higher pre-schooling coverage, and smaller class sizes are associated with better exam performance although the latter input is not statistically significant. Parents' education also has the expected positive sign but is not statistically significant, which is plausible given that exam scores are averaged across large numbers of students. Notably, while education spending and urbanisation were found to be the key determinants of physical inputs in secondary education, neither factor appears to have further impact on the quality of education once observable physical inputs are controlled for.

By contrast, the broad revenue measure of fiscal decentralisation is robustly positively associated with exam performance: a 10 percentage point increase in the share of municipalities' own revenues is associated with an improvement in exam performance of approximately 30 per cent of one standard deviation. On the other hand, the education-spending-based measure of fiscal decentralisation is not statistically significant and the magnitude of the corresponding coefficient is approximately 10 times smaller. The administrative decentralisation dummies are positive and statistically significant, indicating that regions with two-tier local (district and municipal) governments ("type 2" and "type 3") performed better on average (the difference between the coefficients on the type 2 and type 3 dummies is not statistically significant).

Of the institutional variables, the index of investment risks is statistically significant in some specifications. Lower quality of institutions (reflected in higher perceived investment risks) is associated with poorer performance in education. In quantitative terms, a one standard deviation improvement in the index of business risks is associated with an approximately 35 per cent of one standard deviation improvement in exam performance. Altogether the identified factors explain up to one half of the variation in exam scores.

Overall, the results suggest that while total education spending affects the quality of secondary education through the provision of basic observable inputs, once inputs are in place the perceived quality of institutions has more power in explaining the remaining differences in performance. Decentralisation is one of the relevant institutional aspects, and the findings further indicate that the impact of decentralisation on education outcomes in the Russian regions is likely to rest on improved incentives and accountability rather than better targeting of education expenditure.

### ***Specifications for utilities***

The empirical analysis of the outcomes in the utilities sector follows the same approach based on specifications (R1) and (R2). The chosen performance indicator in the case of utilities is the number of breakdowns per 100 km of network length in water, wastewater and district heating. This measure approximates the quality (reliability) of services

provided rather than the quantity and quality of inputs or adherence to procedures. Table 6 presents descriptive statistics for selected variables highlighting substantial differences in the quality of service delivery between the top and the bottom performers.<sup>14</sup>

It should be noted that while the topic of the determinants of education quality has been intensively studied over the last three decades, that of the quality of utilities is much less researched. This is largely because public provision of housing maintenance and utilities has not been a major issue outside a few transition economies, mostly in the former Soviet Union.

The key physical inputs in the municipal utilities sector include the extent of depreciation (wear-and-tear) of assets and the degree of coverage (average percentage of population with access to central water supply, sewerage system and district heating). Another input measure related to the above two indicators is the share of newly built networks in the total regional network length.

Sector-specific control variables include residential area per capita and the index of cross-subsidisation, calculated as the average of the ratios of industrial to residential tariffs for electricity and district heating. This index can be viewed as a policy-based proxy for regional attitudes to reform in the utilities sector, since during the analysed period the regional governments were in charge of approving electricity and district heating tariffs, as discussed above. The alternative would be to look at the regional cost recovery ratios (the ratios of revenues-to-expenditures of utilities providers). While the latter measure may appear to be more direct, its use is problematic, since first, lower cost recovery may reflect poor efficiency as much as inadequate pricing and poor policies, and second, poor quality of inputs and poor performance (including constant breakdowns) may directly inflate costs.

In addition, average January temperature is included to control for adverse weather conditions that may contribute to a higher incidence of breakdowns. Other control variables and decentralisation variables are defined as in the case of education (except consolidated regional government spending on housing and utilities is expressed in per capita rather than per student terms).

Specifications for inputs (R1) and the performance indicator (R2) are estimated by the between estimator (or by OLS, where only a cross-section of data are available as in the case of asset depreciation). Unfortunately, the available data are not sufficient for meaningful dynamic panel estimation, and fixed effects estimation is problematic because the impact of changes in the degree of fiscal decentralisation is likely to be spread across years rather than fully realised within a given year. As discussed earlier, the quality of utilities inputs and frequency of breakdowns may affect sector spending. For instance, higher incidence of breakdowns may prompt government to authorise additional funds to fix them, and poorer quality of assets may require higher spending on upkeep and modernisation. To deal with the potential endogeneity issue, per capita GRP adjusted for PPP differentials was used as an instrument, similar to the case of education.

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<sup>14</sup> Similar heterogeneity is observed in 2002-04; 2005 data are not available.

Table 6. Descriptive statistics for selected variables: utilities

<i>Variable</i>	<i>Mean</i>	<i>Standard deviation</i>	<i>Median</i>	<i>Min</i>	<i>Max</i>	<i>k of var., %</i>
(In per cent, unless otherwise indicated)						
Housing and utilities exp per cap.	4 075	7 834	1 883	377	53 276	192.2
Hous. and ut. exp. pc, PPP-adj.	4 763	6 208	3 086	674	35 809	130.3
Housing and utilities exp, % of total	11.6	5.1	10.6	3.2	29.1	44.1
Housing and utilities exp decentr.	80.3	16.4	84.5	27.3	99.4	20.4
Water net. breakdowns, per 100	35.6	36.2	27.4	0.7	245.7	101.7
Sewerage network breakdowns	33.2	120.6	9.0	0.0	1 020.9	363.1
District heating breakdowns	21.3	80.4	5.3	0.0	703.9	377.7
Breakdowns overall	27.3	54.0	17.2	0.4	456.9	197.7
Cost recovery ratio, utilities	0.97	0.13	0.98	0.53	1.56	12.9
Ratio of ind. to res. heating tariffs	1.5	0.8	1.2	0.9	5.3	57.2
Ratio of ind. to res. electricity tariffs	1.7	1.4	1.5	0.4	13.7	86.3
Residential area per capita, m <sup>2</sup>	21.5	2.6	21.0	12.9	29.4	12.3
New water networks, % of total	0.8	2.0	0.3	0.0	14.7	250.0
New sewerage netw., % of total	0.3	0.6	0.1	0.0	5.0	240.0
New heating netw., % of total	0.2	0.3	0.0	0.0	2.5	220.0
Access to water network, % pop.	70.9	13.8	72.0	32.7	97.7	19.5
Access to sewer. net., % pop.	66.6	14.2	66.8	27.5	97.6	21.3
Access to distr. heating, % pop.	77.0	13.4	77.7	40.2	100.0	17.5
Depreciation of assets, water	50.5	15.5	52.4	4.1	94.2	30.6
Depreciation of assets, sewerage	39.8	13.7	41.7	9.6	68.4	34.4
Depreciation of assets, heating	39.2	14.6	39.6	4.7	73.4	37.3
Average January temperature, °C	-16.8	7.9	-14.7	-36.8	-4.6	47.0

Sources: See annex.

Note: As of 2006, unless otherwise indicated, based on 79 observations.

### ***Results: Utilities sector inputs***

Estimation results for the key utilities inputs are presented in Table 7. Depreciation of assets appears to be to a significant extent determined by government spending in the sector: doubling per capita spending reduces the depreciation coefficient by around 13 percentage points (columns A and B). More comprehensive network coverage (columns C and D) appears to be facilitated by higher per capita government spending in the sector, higher average January temperatures (more benign weather conditions), and a higher degree of urbanisation (higher density of population substantially reduces the per capita costs of connection).

Neither variables capturing the quality of institutions nor fiscal decentralisation variables appear to have any sizeable impact on the analysed measures of inputs and services, which is similar to the results obtained for inputs in education.

Table 7. Determinants of utilities sector inputs

<b>Model</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
Method	<i>IV</i>		<i>Between IV</i>	
<i>Dependent variable</i>	<i>Depreciation of assets</i>		<i>Network coverage</i>	
Housing and utilities expenditure Per capita, log, PPP	-13.091 (6.671)*	-12.871 (7.156)*	7.023 (4.567)	9.258 (5.372)*
Index of cross-subsidisation (Ratio of industry and residential tariffs)	-0.881 (0.650)	-0.853 (0.661)	1.445 (1.077)	1.415 (1.098)
Residential area per capita	0.674 (0.609)	0.700 (0.797)	-0.608 (0.610)	-0.899 (0.657)
Temperature, January average (Long-term average)	0.039 (0.316)	0.042 (0.334)	0.723 (0.230)***	0.749 (0.240)***
Urbanisation	0.425 (0.265)	0.431 (0.275)	0.821 (0.133)***	0.824 (0.136)***
Investment risk index	6.531 (13.417)	5.567 (13.202)	5.760 (9.020)	3.618 (9.769)
Index of democracy	0.337 (0.291)	0.389 (0.328)	-0.278 (0.218)	-0.206 (0.242)
Share of regional expenditure financed by federal transfers	-0.016 (0.175)	0.001 (0.186)	-0.032 (0.115)	0.062 (0.164)
Type 2 administrative decentralisation		2.301 (6.528)		3.425 (4.423)
Type 3 administrative decentralisation		-0.464 (3.222)		4.130 (2.684)
Housing and utilities expenditure decentralisation		0.016 (0.121)	0.016 (0.108)	0.027 (0.117)
Own municipal revenue in per cent of mun. spending	-0.177 (0.178)	-0.166 (0.200)		0.151 (0.204)
Constant	96.816 (48.072)**	91.284 (53.107)*	-22.402 (27.440)	-45.990 (42.070)
R <sup>2</sup> between	0.15	0.15	0.60	0.62
Number of regions	77	77	79	79
Number of observations	77	77	474	474

Source: Authors' calculations.

Note: Robust standard errors in parentheses. Values significant at the 10% level are marked with \*; at the 5% level, with \*\*; at the 1% level, with \*\*\*. Spending on housing and utilities was instrumented with per capita GRP (PPP-adjusted). Network coverage is the average across utilities (water, wastewater, district heating). Based on data for 2006 (depreciation of assets); 2001–06 (network coverage).

Table 8. Determinants of performance in the utilities sector

Model	A	B	C	D	E	F
Method	<i>Between</i>			<i>IV Between</i>		
<i>Dependent variable</i>	<i>Utilities network breakdowns (av. per 100 km of network), log</i>					
Access to basic utilities (average, in % of pop.)	-0.021 (0.015)	-0.022 (0.016)	-0.003 (0.022)	-0.004 (0.021)	-0.005 (0.021)	-0.008 (0.023)
Depreciation of assets						-0.001 (0.016)
New utilities networks (in % of total network)	-0.009 (0.014)	-0.006 (0.015)	-0.010 (0.016)	-0.017 (0.016)	-0.028 (0.022)	-0.016 (0.017)
Housing and utilities exp. per capita, log, PPP	-0.654 (0.317)**	-0.637 (0.377)*	-1.675 (0.965)*	-1.379 (0.766)*	-2.648 (0.776)**	-1.702 (1.026)*
Index of cross-subsidisation		0.091 (0.142)				0.216 (0.151)
Temperature, January av.	0.063 (0.024)**	0.054 (0.027)**	0.016 (0.048)	0.022 (0.044)	0.010 (0.043)	0.038 (0.048)
Residential area per capita		0.016 (0.068)	0.103 (0.103)	0.053 (0.084)	0.103 (0.090)	0.052 (0.092)
Urbanisation	0.040 (0.019)**	0.037 (0.021)*	0.023 (0.025)	0.035 (0.022)	0.005 (0.028)	0.039 (0.025)
Investment risk index	1.104 (0.988)	1.151 (1.094)	2.138 (1.368)		2.605 (0.932)**	1.586 (1.332)
Index of democracy	0.058 (0.028)**	0.059 (0.030)**	0.045 (0.032)	0.056 (0.029)*	0.047 (0.029)	0.059 (0.033)*
Share of regional exp. financed by fed. transfers		0.013 (0.013)	-0.010 (0.020)			-0.010 (0.020)
Type 2 administrative decentralisation	0.395 (0.465)	0.457 (0.479)	0.138 (0.577)	0.246 (0.518)	0.112 (0.539)	0.230 (0.586)
Type 3 administrative decentralisation	0.216 (0.317)	0.137 (0.338)	-0.101 (0.401)	0.067 (0.379)	-0.099 (0.392)	0.074 (0.395)
Housing and utilities exp. decentralisation	-0.014 (0.015)	-0.009 (0.015)		-0.018 (0.015)	-0.008 (0.015)	0.010 (0.017)
Own municipal revenue in % of mun. spending	-0.028 (0.017)*		-0.029 (0.023)	-0.041 (0.014)**		-0.041 (0.025)*
Constant	6.892 (2.950)**	3.884 (3.011)	10.524 (5.192)*	12.518 (4.480)**	9.009 (4.277)**	12.601 (6.734)*
R <sup>2</sup> between	0.35	0.34	0.27	0.29	0.26	0.26
Number of regions	79	79	79	79	79	77
Number of observations	312	312	312	312	312	308

Source: Authors' calculations.

Note: Robust standard errors in parentheses. Values significant at the 10% level are marked with \*; at the 5% level, with \*\*; at the 1% level, with \*\*\*.

Spending on housing and utilities was instrumented with per capita GRP (PPP-adjusted). Based on data for 2002–04 and 2006. The dependent variable is the average across municipal utilities (water, wastewater and district heating).

***Results: Utilities sector outcomes***

Table 8 presents the results for the quality of services proxied by the number of breakdowns per unit of network length. Columns A and B report the results of the between estimation using both measures of decentralisation. Columns C, D, E present the results of the between IV estimation including measures of decentralisation in turn and simultaneously; additional controls are included in column F.

The share of own revenues in municipal spending is statistically significant at the 10 per cent level (at the 1 per cent level in some specifications), and the corresponding coefficients indicate that a one percentage point increase in the share of municipal own revenue in municipal spending is associated with a 3-4 per cent reduction in the number of breakdowns. This may be attributed to better management and maintenance effort which may reflect better oversight of utilities providers as a result of strengthened fiscal incentives at the municipal level. By contrast, the measure of decentralisation of sectoral spending is not statistically significant and the magnitude of the corresponding coefficient is smaller.

Although warmer winters can be expected to reduce the number of breakdowns they also make breakdowns less socially costly. The data suggest that the latter effect dominates, and network breakdowns are less common in the regions with harsher winters. The coefficient on the index of investment risks is robustly positive and significant in some specifications, indicating that better overall institutions are associated with a lower incidence of breakdowns. Higher government spending in the sector is associated with a lower incidence of breakdowns. Coefficients on urbanisation and index of democracy are also significant in some specifications (in the latter case with a somewhat unexpected, positive, sign).

Overall, the results suggest the level of consolidated regional government spending affects both the provision of observable inputs in the utilities sector and the performance outcomes. As in the case of education, institutional variables or measures of decentralisation do not appear to have much impact on the provision of observable inputs, but once observable inputs are in place, they have substantial power in explaining the remaining differences in performance. As in the case of education, decentralisation is one of the relevant institutional aspects, and the findings further indicate that the impact of decentralisation on the quality of utilities provision in Russian regions is likely to reflect improved incentives and accountability rather than better targeting of expenditure in the sector.

## CONCLUSION

The paper studied the link between fiscal decentralisation and the quality of public services in Russian regions by looking at the determinants of both the inputs into secondary education and municipal utilities (water, wastewater and district heating) and performance-based measures of the quality of education and utilities services.

The analysis suggests that fiscal decentralisation measured by the share of municipal spending financed by own municipal revenue has no significant effect on the key inputs into secondary education or utilities provision (such as schools, computers, or availability of pre-schooling) but at the same time has a significant positive effect on average examination results and on reliability of utilities, controlling for the key observable inputs and per capita regional government spending on education and utilities, respectively.

The analysis also points towards a positive dependence of education outcomes in Russia on the key inputs, in particular adequate school capacity and availability of pre-school education. In the utilities sector the dependence of the incidence of breakdowns on the input-based and process-oriented indicators, such as the extent of depreciation of fixed assets or network coverage, appears to be much weaker.

The fact that fiscal decentralisation has a positive impact on education outcomes but not through typically benchmarked inputs and processes would be consistent with the accountability and incentives argument in favour of decentralisation. In a system with substantially centralised spending and decision-making powers a local bureaucrat, whether centrally appointed or locally nominated, may lack incentives to improve quality of public services and deliver “value for money”. This is in fact a typical agency problem with unobservable effort. A standard solution is to introduce implicit or explicit performance targets, based on centrally observed indicators. Typically, these would be input indicators such as the student-teacher ratio in education or the number of hospital beds per head in health care, in particular in a setting with a long history of a process-oriented rather than result-oriented culture, as is the case in Russia. Municipalities (and regional governments) would then put effort in achieving these targets regardless of peculiarities of decentralisation arrangements in a particular region. Moreover, regional funding may be allocated to municipalities with the view to equalise the quantity and quality of observable inputs across jurisdictions.

Our results suggest that key variables related to both decentralisation and general quality of institutions (index of investment risk) are not significantly related to the availability of major inputs in public service delivery. This is consistent with the view that subnational authorities are accountable for delivering these observable and widely published inputs and thus their delivery is not affected much by the quality of institutions or institutional design—the more money is spent, the more inputs are available.

When it comes to outcomes, however, what seems to matter more are inputs and institutions, while spending less so. This is consistent with the idea that beyond observable inputs the way the money is spent matters more for outcomes than the total amount of spending, especially if outcomes are not credibly monitored (as was the case in Russia until recently).

In the case of education in Russian regions, the standardised examinations were introduced in the first half of the 2000s and their results could not be used as explicit or

implicit targets during the analysed period. The quality of municipal education was not centrally monitored in a systematic way. However, the outcomes of secondary education (beyond the quantity and quality of the basic inputs), which are likely to be more precisely assessed within local communities, remained important to local populations. The same is true with respect to other sectors, including municipal utilities, giving rise to incentives for municipal governments to work towards better public service outcomes if they have adequate autonomy of deciding how to manage and allocate funds contributed by the local taxpayers. This may explain why the revenue measure of fiscal decentralisation was found to affect the quality of education but not the availability of basic education inputs, and why similar results were also obtained for utilities using a result-oriented rather than process-oriented measure of performance.

Overall, the analysis suggests that fiscal decentralisation in the Russian regions (measured by the higher share of revenues with respect to which municipalities have some control over spending) is associated with better public sector outcomes, in areas as diverse as education and utilities. At the same time, no significant association has been found between the sector expenditure decentralisation per se (measured by the share of total sectoral spending administered by municipal authorities) and the quality of public sector inputs or outputs, consistent with the view that what matters for public sector outcomes is the overall incentive structure municipal authorities are facing rather than the way in which a particular expenditure envelope may be split across tiers of government. And the former is influenced largely by revenue autonomy and quality of regional institutions.

This paper is, of course, only one small piece of evidence on a very complex relationship between fiscal decentralisation and the quality of public services, which undoubtedly should be subject to further extensive empirical research.

At the same time, at the minimum the analysis suggests that in a hierarchical system of governance with significant agency problems there is a case for collecting, disseminating, and analysing data on results-based (as opposed to process-based or input-based) indicators of service delivery closely related to agents' efforts. This conclusion is also in line with the findings that the presence of standardised examinations and appropriate benchmarks is associated with better performance in education (Wössmann and Fuchs, 2007).

In Russia, however, only a handful of regions continue to publish comprehensive data on the performance in standardised national examinations, while others, as well as the federal authorities, strongly prefer not to disclose the average score data. Granted, such data are noisy, as highlighted by the fact that only about one-third of the variation in regional performance could be explained by the empirical models of this paper. Furthermore, there is no consistently applied international "best practice" in this respect: while it is common to make school performance league tables widely available in some OECD countries (for example, the UK and US), it is not the case in others (for example, Switzerland). At the same time, even noisy data on result-based indicators may prove invaluable for improving incentives for provision of quality public services across Russian municipalities and making subnational governments more accountable to the taxpayers.

The paper also points to the importance of the revenue dimension of fiscal decentralisation, which has traditionally been paid less attention by the researchers of the Russian fiscal system compared with expenditure decentralisation. The analysis suggests

that revenue decentralisation may have a stronger influence on local incentives. At the same time, recent developments in Russia's intergovernmental fiscal relations show a clear trend towards fiscal centralisation with local revenue autonomy being squeezed. The results of this paper suggest that this trend may not be consistent with the objectives of strengthening local government accountability and improving quality of core municipal services.

## References

- A. Afonso and M. St. Aubyn (2006), "Cross-country efficiency of secondary education provision: a semi-parametric analysis with non-discretionary inputs," *Economic Modelling*, Vol. 23, No 3, pp. 476-91.
- N. Akai and M. Sakata (2002), "Fiscal decentralization contributes to economic growth: evidence from the state-level cross-section data for the United States", *Journal of Urban Economics*, Vol. 52, No 1, pp. 93-108.
- M. Alexeev and G. Kurlyandskaya (2003), "Fiscal federalism and incentives in a Russian region", *Journal of Comparative Economics*, Vol. 31, No 1, pp. 20-33.
- I. Barankay and B. Lockwood (2007), "Decentralization and the productive efficiency of government: theory and evidence from Swiss cantons", *Journal of Public Economics*, Vol. 91, No 5–6, pp. 1197-1218.
- P. Bardhan and D. Mookherjee (2000), "Capture and governance at local and national levels", *American Economic Review*, Vol. 90, No 2, pp. 135-39.
- P. Bardhan and D. Mookherjee (2005), "Decentralizing anti-poverty program delivery in developing countries", *Journal of Public Economics*, Vol. 89, No 4, pp. 675-704.
- T. Besley and A. Case (1995), "Incumbent behavior. Vote-seeking, tax-setting, and yardstick competition", *American Economic Review*, Vol. 85, No 1, pp. 25-45.
- O. Blanchard and A. Shleifer (2001), "Federalism with and without political centralization: China versus Russia", *IMF Staff Papers*, Vol. 48, No 4, pp. 171-79.
- M. Bray and N. Borevskaya (2001), "Financing education in transitional societies: lessons from Russia and China", *Comparative Education*, Vol., No 3, pp. 345-65.
- M. Canning (2004), "The modernization of education in Russia", World Bank, mimeo.
- M. Canning, Mary, P. Moock, and T. Heleniak (1999), "Reforming education in the regions of Russia", World Bank Technical Paper 457.
- D. Card and A. Krueger (1992), "Does school quality matter? Returns to education and the characteristics of public schools in the United States", *Journal of Political Economy*, Vol. 100, No 1, pp. 1-40.
- W. Crain and A. Zardkoohi (1978), "A test of the property-rights theory of the firm: water utilities in the United States," *Journal of Law and Economics*, Vol. 21, No 2, pp. 395-408.
- R. Desai, L. Freinkman and I. Goldberg (2005), "Fiscal federalism in rentier regions: evidence from Russia", *Journal of Comparative Economics*, Vol. 33, No 4, pp. 814-34.
- E. Di Gropello (2002), "An assessment of the impact of decentralization on the quality of education in Chile", *World Bank Economists' Forum*, Vol. 2, pp. 117-54.

- R. Enikolopov and E. Zhuravskaya (2007), "Decentralization and political institutions", *Journal of Public Economics*, Vol. 91, No 11–12, pp. 2261-90.
- J.-P. Faguet (2004), "Does decentralization increase government responsiveness to local needs? Evidence from Bolivia", *Journal of Public Economics*, Vol. 88, No 3-4, pp. 867-93.
- D. Filmer and G. Eskeland (2002), "Autonomy, participation, and learning in Argentine schools: findings and their implications for decentralization", World Bank Policy Research Working Paper 2766.
- L. Freinkman, D. Treisman and S. Titov (1999), "Subnational budgeting in Russia. preempting a potential crisis", World Bank Technical Paper 452.
- L. Freinkman and A. Plekhanov (2009), "Fiscal decentralization in rentier regions: evidence from Russia", *World Development*, Vol. 37, No 2, pp. 503-12.
- T. Fuchs and L. Wössmann (2007), "What accounts for international differences in student performance? A re-examination using PISA data", *Empirical Economics*, Vol. 32, No 2, pp. 433-64.
- S. Galiani and E. Schargrotsky (2002), "Evaluating the impact of school decentralization on education quality", *Economia*, Vol. 2, No 2, pp. 275-314.
- P. Glewwe (2002), "Schools and skills in developing countries: education policies and socioeconomic outcomes", *Journal of Economic Literature*, Vol. 40, No 2, pp. 436-82.
- E. Hanushek (1997), "Assessing the effect of school resources on student performance: an update", *Educational Evaluation and Policy Analysis*, Vol. 19, pp. 141-64.
- E. Hanushek (2003), "The failure of input-based schooling policies", *Economic Journal*, Vol. 113, No 485, pp. F64-98.
- D. Hauner (2008), "Explaining differences in public sector efficiency: evidence from Russia's regions", *World Development*, Vol. 36, No 10, pp. 1745-65.
- S. Herrera and G. Pang (2006), "Efficiency of public spending in developing countries: an efficiency frontier approach", World Bank Policy Research Working Paper 3645.
- P. Khaleghain (2003), "Decentralization and public services: the case of immunization", World Bank Policy Research Working Paper 2989.
- G. Kurlyandskaya and E. Nikolayenko (2005), "Forms of public government decentralization in the Russian Federation and intergovernmental fiscal relations at the subnational level", Center for Fiscal Policy, Moscow, mimeo.
- H. Ladd (1999), "The Dallas school accountability and incentive program: an evaluation of its impacts on student outcomes", *Economics of Education Review*, Vol. 18, No 1, pp. 1-16.

- J.-W. Lee and R. Barro (2001), "Schooling quality in a cross-section of countries", *Economica*, Vol. 68, No 272, pp. 465-88.
- J. Martinez-Vazquez, A. Timofeev, and J. Boex (2006), *Reforming regional-local finance in Russia*. Washington, D.C.: World Bank Institute.
- K. Meier and L. O'Toole (2003), "Public management and educational performance: the impact of managerial networking", *Public Administration Review*, Vol. 63, No 6, pp. 689-99.
- K. Nabeshima (2003), "Raising the quality of secondary education in East Asia", World Bank Policy Research Working Paper 3140.
- W. Oates (1972), *Fiscal federalism*, New York, NY: Harcourt Brace Jovanovich.
- OECD (2000), *OECD Economic Surveys: The Russian Federation*, Paris: OECD.
- OECD (2007), *The Programme for International Student Assessment*, Paris: OECD.
- L. Polishchuk (2004), "Decentralization in Russia: impact on quality of governance", in M. Kimeneyi and P. Meagher, eds., *Devolution and development. Governance prospects in decentralizing states*, NY: Ashgate, pp. 307-44.
- R. Prud'homme (1995) "The dangers of decentralization", *World Bank Research Observer*, Vol. 10, No 2, pp. 201-20.
- Y. Qian and B. Weingast (1997), "Federalism as a commitment to preserving market incentives", *Journal of Economic Perspectives*, Vol. 11, No 4, pp. 83-92.
- D. Robalino, O. Picazo and A. Voetberg (2001), "Does fiscal decentralization improve health outcomes? Evidence from a cross-country analysis", World Bank Policy Research Working Paper 2565.
- P. Seabright (1996), "Accountability and decentralisation in government: an incomplete contracts model", *European Economic Review*, Vol. 40, No 1, pp. 61-89.
- S. Sivaev (2008), "Reforms in the housing and utility sector in 2003-2007: A twisted road to the market", in E.T. Gaidar, ed., *Economy in transition. Essays of economic policy and economic development in post-communist Russia*, Moscow: Delo, pp. 1217-51 (in Russian).
- E. Skoufias and J. Shapiro (2006), "Evaluating the impact of Mexico's quality school program: the pitfalls of using nonexperimental data", World Bank Policy Research Working Paper 4036.
- D. Stegarescu (2005), "Public sector decentralization: measurement concepts and recent international trends", *Fiscal Studies*, Vol. 26, pp. 301-33.
- D. Treisman (1998), "Fiscal redistribution in a fragile federation: Moscow and the regions in 1994", *British Journal of Political Science*, Vol. 28, No 1, pp. 185-200.

- D. Treisman (2002), "Decentralization and the quality of government", University of California Los Angeles, mimeo.
- D. Treisman (2007), *The architecture of government: rethinking political decentralization*. Cambridge, MA: Cambridge University Press.
- S. Voigt and L. Blume (2008), "The economic effects of federalism and decentralization—a cross-country assessment", University of Marburg Working Paper.
- B. Weingast (1995), "The economic role of political institutions: market-preserving federalism and economic growth", *Journal of Law, Economics and Organization*, Vol. 11, No 1, pp. 1-31.
- World Bank (2004), *World Development Report 2004: Making services work for poor people*, Washington, D.C.: World Bank.

## **ANNEX 1. DATA SOURCES**

The data are taken from various official statistical yearbooks, including the Statistical Yearbook of Russia (*Rossiyskiy Statisticheskiy Ezhegodnik*); Regions of Russia (*Regiony Rossii*); Education in Russia (*Obrazovanie v Rossii*); Finance in Russia (*Finansy v Rossii*); and Utilities in Russia (*Zhilichshnoe Khozyaistvo i Bytovoje Obsluzhivanie Naselenia v Rossii*), with the following exceptions:

Fiscal data on regional and municipal budgets: Ministry of Finance, Treasury, Rosstat (Office of Statistics).

Average examination scores: Standardised State Examination support portal ([www.ege.edu.ru](http://www.ege.edu.ru)).

Electricity and district heating tariffs: Ministry of Finance.

Utilities network breakdowns: Ministry of Construction.

Index of investment risks: Expert Rating Agency.

Indices of Regional Democracy and Regional Democratic Elections: Moscow Carnegie Center (available at: [http://atlas.socpol.ru/indexes/index\\_democr.shtml](http://atlas.socpol.ru/indexes/index_democr.shtml)).