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Benchmarking the Efficiency of Public Expenditure in the Russian Federation

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Abstract

This paper benchmarks the efficiency of public expenditure in the social sectors in the Russian Federation relative to other countries and among the country's regions. It finds that there is substantial room for efficiency gains, particularly in health care and social protection, although less so in education. An econometric analysis of efficiency differences between the regions suggests that they are positively related to per capita income and the quality of governance and democratic control, while they are negatively related to the share of federal transfers in the respective region's government revenue and the level of spending relative to gross regional product.

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I. Introduction

1. **The rapid increase in government revenue in the Russian Federation offers a unique opportunity to improve public services if the resources are allocated well**. The analysis in IMF (2006) demonstrated the existence of room for fiscal easing from a long-term sustainability perspective. The authorities plan to direct a large part of the additional resources—in particular those associated with the oil windfall—toward the social sectors. This emphasis is appropriate, as improvements in public health and education services and in social protection can increase welfare and potentially also economic growth. However, higher spending alone will not deliver improvements in outcomes, as ample anecdotic and empirical evidence from other countries suggests.[1] It is essential that large increases in public expenditure be accompanied by an improvement in its efficiency, that is, the effect this expenditure has on the intended policy outcomes. This study aims to contribute preliminary analytical underpinnings to reforms aimed at enhancing expenditure efficiency.

2. **The study examines the efficiency of public spending on health, education, and social protection at the general and local government levels in the Russian Federation.** The focus on these three functional expenditure categories (in line with most of the literature) is due to the availability of data on public sector performance. Substantial conceptual problems notwithstanding (see Section B), internationally comparable measures of the outcomes of public sector activity in these sectors are available, such as the number of hospital beds, university enrollment, or income inequality; no such indicators are available for other key spending areas, particularly administration and capital spending. Efficiency is measured by the ratio of outcome measures to public spending. Obviously, other factors than public spending also influence outcomes. While the most important two factors, the economy's per capita income level and private health and education spending, will be controlled for, the results still must be interpreted with great care.

3. **The results provide preliminary evidence of substantial room for improving public expenditure efficiency**. At the general government level, cross-country comparisons suggest that, while efficiency in education seems to be relatively high, the current outcomes in health and social protection could be produced with only about two-thirds of the present spending. At the local government level, comparing spending and outcomes across regions suggests that, on average, the current outcomes in health, education, and social protection could again be produced with about two-thirds of the present inputs if the less efficient regions would emulate the more efficient ones. An econometric analysis of regional efficiency differences suggests that higher efficiency tends to be associated, in particular, with higher per capita income, a smaller share of federal transfers in local government revenue, better governance, a stronger

[1] For example, Aninat, Bauer, and Cowan (1999) refer to the Chilean experience, where a tripling of real health spending over a few years did not produce any visible or measurable increase in the quantity or quality of services. All cross-country studies cited in this paper show that higher spending often fails to produce better outcomes.

civil society, and less public expenditure. A better understanding of these drivers of efficiency can be useful not only because local governments account for about half of general government spending, but also because the underlying determinants of expenditure efficiency are likely to be similar at the central government level. While these results should be interpreted with caution and seen only as first indications of possible inefficiencies, they suggest several policy implications.

4. **Vigorous reform in the social sectors, particularly of health care financing and the targeting of social assistance, would strengthen efficiency**. The excessively complicated health care financing system could be simplified and made more incentive compatible through single source funding, outcome-based financing, and performance-pay. Ill-targeted housing, utilities, and energy subsidies, as well as social assistance programs, could be subjected to much broader and tighter means testing, which would also free up funds for the truly vulnerable, who currently receive only a very small part of the benefits. In education, relatively favorable efficiency should not conceal the need to improve quality, including through higher pay for teachers. This pay raise, however, could be accompanied by more emphasis on performance and school restructuring. The quality of spending of federal transfers by the regions ought to be monitored more closely.

5. **The paper proceeds as follows:** it discusses methodological issue (Section B); explores the efficiency of public spending on health, education, and social protection in the Russian Federation on the general government level (section C), as well as on the local government level (Section D); and draws conclusions (Section E). Appendix I elaborates on the methodological underpinnings and Appendix II on the results by region.

II. Methodological Issues

6. The efficiency of public spending is the subject of a rapidly growing literature. Tanzi and Schuknecht (1997 and 2000) explore the benefits from public spending in industrial countries. Gupta and Verhoeven (2001) evaluate education spending in Africa. Afonso, Schuknecht, and Tanzi (2005) develop encompassing public sector performance and public sector efficiency indicators and apply them to OECD countries. Afonso, Schuknecht, and Tanzi (2006) examine spending efficiency in the new member states of the European Union. Herrera and Pang (2005) explore the efficiency of public spending in a large set of developing countries. Several country case studies, such as Mattina and Gunnarsson (2006), complement these cross-country papers.

7. **The efficiency of public spending is measured by comparing actual spending with the minimum spending theoretically sufficient to produce the same actual output**. The efficiency of an input-output combination is measured relative to a production possibilities frontier constructed with data envelopment analysis (DEA), a nonparametric method. Given the focus on efficient spending, the input approach is used. In this context, the efficiency scores measure the share of the actual spending sufficient to produce the actual output if a given country's public sector were as efficient as the best; for example, a score of 0.7 implies

potential savings of 30 percent. Note that thus defined efficiency is only an upper bound of the "true" efficiency, because the producers who perform the best may still have room for improvement. DEA has been widely used in efficiency measurement, particularly in the services industries, because it does not require the assumption of a particular functional form, deviations from which are misinterpreted as inefficiency by parametric techniques. However, cautious sample selection is crucial, as DEA interprets random errors as inefficiency and is thus sensitive to outliers; it is also sensitive to the degrees of freedom. See Appendix I for further methodological details.

8. **Inputs are measured by public spending in specific functional areas, while outputs are represented by indicators of the impact of public spending in these areas**. While spending data are relatively harmonized, there are complex issues relating to the taxation of social benefits in some countries or the accounting of the imputed cost of government property. On the output side, relatively consistent cross-country data are available for spending outcomes in education, health, and social protection. Health outcomes are measured by indicators such as infant mortality and the number of hospital beds. Education outcomes are measured by teacher-pupil ratios, tertiary enrollment, and test scores. Data availability is more limited for social protection, where the Gini coefficient of income inequality that is used, is admittedly a relatively weak indicator. Most of these indicators are *proxies*, not actual *measures* of outcomes; for example, teacher-student ratios proxy education outcomes, assuming they are correlated with quantity and quality of teaching. Moreover, while the indicators and resulting efficiency scores, tend to be highly correlated (Herrera and Pang, 2005), indicator selection affects results to some extent. Another limitation is that much of the data are available only at irregular frequencies; we follow Afonso, Schuknecht, and Tanzi (2005) in using the most recent observation, as most series show little yearly variation.

9. **While efficiency scores give useful hints of potential inefficiencies, they must be interpreted with great care and should be combined with qualitative information**. This is because the approach for calculating the scores assumes homogeneity across countries in the production functions. Two of the most obvious violations of this assumption—the Baumol effect (production costs in the public sector tend to rise faster than per capita income) and the heterogeneity in input quality—are here controlled for by using per capita income at purchasing power parities. Another obvious comparability issue—the different amounts of private spending on health and education—is controlled for as far as data availability permits.[2] In any case, no number of controls can substitute for careful interpretation of the DEA results.

10. **For local governments, public sector performance (PSP) and public sector efficiency (PSE) scores can be computed.** The scores computed in this chapter were first proposed by Afonso, Schuknecht, and Tanzi (2005). PSP is defined as the mean of the outcome

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[2] Among several valid approaches to including control variables in DEA—which tend to yield similar results (Worthington and Dollery, 2002)—we choose to use input variables, as this allows direct comparison of the efficiency scores with and without controls.

indicators (by sector or all together), standardized by dividing each observation by the respective indicator's standard deviation and dividing by the mean. PSE is then given by the ratio of PSP to the respective spending in percent of GDP. While these indicators are very concise, there is no doubt that the required weighting of the outcome indicators introduces additional assumptions, in addition to those discussed above. Again see Appendix I for more methodological detail.

III. General Government[3]

11. **Relative to GDP, general government expenditure in the Russian Federation is moderate, particularly on education and social protection**. As Figure 1 shows, total expenditures in percent of GDP are lower than in all transition countries included in the sample, except Kazakhstan. Public expenditure is also moderate compared with the countries of similar income level.[4] With regard to the three social sectors, the Russian Federation spends less on education and social protection than all countries except Kazakhstan; it is more in line with other countries in health, although remaining at the lower end of the distribution.

12. **Also, after accounting for the overall size of government, expenditure on education, health, and social protection is relatively small**. The shares of health and education in total expenditure are smaller than in most other transition countries, and the share of social protection is the third smallest after Kazakhstan and Latvia (Figure 2). In contrast, at about one-fifth, the combined share of defense and public order and safety is larger than in any other of the benchmark countries. Also the economic classification (Figure 3) shows low shares of social benefits relative both to GDP and total expenditure; the wage bill is also moderate.

13. **However, poorly targeted subsidies for housing, utilities, and energy remain unusually large**. The fiscal cost of discounted housing and utilities for "privileged citizens"[5] is more than 2 percent of GDP. Moreover, the additional quasi-fiscal cost borne by the state-owned providers is estimated to amount to 2 percent of GDP (World Bank, 2004). These subsidies are very poorly targeted: "housing privileges" amount to almost six times the spending on targeted social assistance, despite World Bank (2004 and 2005) analysis suggesting that most of these privileges accrue to upper-income households; meanwhile, the means-tested "housing allowances" could be used to take care of vulnerable groups. Moreover, not only are housing subsidies allocated inefficiently, but they also entail little competition,

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[3] The data sources for this section are WHO Statistical Information System (health outcomes and private and public spending); UNESCO Global Education Digest (education outcomes and public spending); IMF Government Finance Statistics (other fiscal data); and IMF World Economic Outlook database (macroeconomic data). For the Russian Federation, data from these sources were in some cases replaced with national statistics.

[4] The share of public expenditure in GDP tends to rise because productivity growth in the public sector is often slower (Baumol effect), and because the demand for public services rises as societies develop (Wagner effect).

[5] As a relic of Soviet times, privileged citizens (civil servants, soldiers, etc.) receive discounted housing.

poor service, and underinvestment in the respective sectors. As a first step to their abolishment, the privileges could be monetized. More progress has already been made in the reform of energy subsidies, where gas and wholesale electricity prices are set to be adjusted gradually to market prices until 2011; however, it remains unclear to what extent electricity prices for households will rise.

14. **In this paper, social expenditure in the Russian Federation is related to outcome indicators and compared with other countries to assess its efficiency**. The choice of the indicators is in line with the literature (see Section B). The sample consists of countries with comparable income levels and transition economies of all income levels. For each sector (health, education, and social protection), DEA is first run with one input (expenditure in percent of GDP) and one output. Inputs and outputs are shown in Figures 4–7, with the DEA scores reported next to the country acronyms. The countries with a score of 1 form the efficient frontier; for the other countries, the scores indicate the spending sufficient to produce the same outcome, relative to the frontier *at the left* of the country. For each sector, DEA is then also run with multiple inputs and outputs, with results reported in Tables 1–3.

15. **For health, the results consistently suggest that it would be possible to produce the same outcomes with only 60–70 percent of current spending**. As Figures 4–5 show, all single-output models find an efficiency level of 0.6, with the exception of "physicians per 1,000 population," where the efficiency level is 0.7.[6] All figures include private health spending to adjust for the considerable differences in health care financing, which are much more pronounced than in the education sector. The multiple-output model in Table 1 confirms these findings: not controlling for income per capita (but for private health spending) yields an efficiency score of 0.65, while controlling for income per capita raises the score to 0.72.

16. **While the country's health problems are only partly related to the health care system, there is still great need for reform**.[7] The current financing is excessively complicated, as the federal and regional medical insurance funds are complemented by federal and regional budget financing. This setup establishes weak budget constraints for the funds and reduces their incentives to monitor providers. Moreover, the budget funding, accounting for about 60 percent, is usually input, as opposed to output based and thus creates incentives for excessive hospital capacity, as opposed to more cost-effective outpatient care. Also, the private and public insurance companies that were intended to create competition rarely fulfill this function, because insurers tend to be chosen by the employer (often with little regard to performance), and providers are usually operated by the municipalities. The insurers bear little risk but create administrative costs of about 3 percent by acting as mere intermediaries.

17. **Health care financing could be simplified and made more incentive-compatible**. The 2005 health care strategy rightly emphasizes genuinely insurance-based and output-based

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[6] In a sample of all developing economies, Herrera and Pang (2005) found for the Russian Federation also efficiency scores of about 0.6 in health, using life expectancy and immunization as outcome indicators.

[7] See Marquez (2005) and OECD (2006) for more detail on problems and reforms in the health care system.

funding, as well as more cost-effective primary care. A pilot project in 20 regions, including single-source funding, outcome-based financing, and performance pay, could be made permanent and universal. Also, the establishment of "autonomous institutions" is intended to provide many medical facilities with global budgets and incentives for better financial management. While insufficient payroll tax revenue and regional income disparities require continued budgetary financing, channeling them through the medical funds would at least streamline the system. The choice among the insurance companies could be given to the employees; the insurers could become actual risk bearers; and they could be limited to supplementary insurance, as is already done in some regions. Co-payments, which could be progressive, would also improve efficiency in some areas, particularly in pharmaceuticals where spending is unusually high. Also, the funds could leverage their market power more to make the pharmaceuticals market more competitive. Finally, more emphasis could be put on combating corruption, including by establishing independent complaints offices.

18. **In education, efficiency appears to be substantially higher than in health, particularly in secondary and tertiary education**. With regard to these latter, the Russian Federation obtains efficiency scores of 1 (Figure 6), because enrollment ratios and literacy rates similar to advanced economies are achieved with relatively little expenditure. However, efficiency is somewhat lower with regard to primary (including preprimary) education and test scores,[8] of 0.7 and 0.8, respectively.[9] This outcome is in line with evidence of overstaffing in (pre-)primary education, mostly because many schools in rural areas are small, and of problems with education quality, which continues to lag most of the advanced economies (World Bank, 2007). Overall, however, the multiple-output model (Table 2) suggests that education spending is relatively efficient, whether controlling for income level or not.

19. **However, the apparently high efficiency of education spending masks quality problems that are insufficiently captured by the efficiency measure used here**. First, teacher qualification and motivation are eroded by salaries that are only half as high as on average as those in advanced economies, when evaluated relative to per capita GDP. Raising salaries relative to the national average is thus certainly justified, but this should be accompanied by more emphasis on performance. Second, general government figures conceal the fact that too few teachers in urban areas are accompanied by too many in rural areas, an interpretation confirmed by substantial inefficiency found at the regional level (see next section); school restructuring should thus be a focal point of reform. Third, tertiary education benefits from substantial private tuition fees, but the resulting quality is questionable, considering that 75 percent of graduates do not find jobs in their field. More autonomy for tertiary education institutions and more incentives for links with the business sector could

[8] Given data availability, many of the benchmark countries in test scores are advanced economies.

[9] In a sample of all developing economies, Herrera and Pang (2005), found for the Russian Federation efficiency scores of about 0.85 for primary school enrollment, about 0.73 for secondary school enrollment, and 0.93 for test scores (including advanced economies).

alleviate this problem. Finally, the gradual introduction of per capita financing ("money follows the student") should significantly raise the efficiency of education spending.

20. **In the area of social protection, results also suggest considerable room for improving efficiency.**[10] The output model (Figure 7) results in an efficiency score of only 0.5. Controlling for per capita income lifts the score to 0.75 (Table 3). Note that income inequality—the outcome measure used—is conceptually problematic: poverty rates would have been a more adequate measure, but limited cross-country data availability prevents its use.

21. **Means testing could improve poor targeting of social protection expenditure**.[11] Spending on social assistance programs targeted to the poor is merely about ½ percent of GDP, while the fiscal cost of various privileges (see above) is much higher. Even the programs aimed at the poor are ill targeted: best targeted are the child allowance and the decentralized social assistance programs, but these still reach only about 30 and 28 percent, respectively, of their beneficiaries from the poorest quintile. About half of the beneficiaries of the targeted social assistance programs come from the upper 60 percent of the income distribution. With the exception of the child allowance, the average benefit received by the richest quintile is larger than the average benefit received by the poorest quintile. The share of social assistance funds captured by the poorest quintile is also smaller than in most other transition economies.

IV. Local Governments

22. **Local governments account for the bulk of social expenditures at the regional level**. Local governments are defined here as the consolidated subfederal governments of each of 79 regions.[12] Inputs are given by the health, education, and social protection expenditure of the consolidated governments in each region (regional and municipal budgetary authorities and extrabudgetary funds). To the extent that outcomes are affected by both federal and local government spending, one requires the assumption that the contribution of federal spending to outcomes is the same in all regions, as data on federal spending per region are not available. However, any bias should be small, as the public expenditure related to the selected outcome indicators is overwhelmingly disbursed by local governments. Local governments account for about 85 percent of health and about 80 percent of social protection expenditure. In education, they account for nearly all preschool and general education spending and about 65 percent of professional education spending. However, while local governments disburse these funds, policies are often set at the federal level.

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[10] Given data availability, many of the benchmark countries are advanced economies.

[11] See World Bank (2004) for more detail.

[12] There are 21 republics, 50 *oblasts*, 6 *krais*, 10 *okrugs*, and the cities of Moscow and St. Petersburg. For simplicity, all of them are here referred to as "regions," including the *okrugs* in superior entities gives *N*=79.

23. **Local government expenditure varies substantially relative to gross regional product (GRP), and it appears to bear a negative relationship to per capita income**. Figure 8 shows that local government spending in most regions varies between about 15–25 percent of GRP, but is substantially higher in several regions. These differences also translate into large variations in social spending. Health expenditure varies mostly between 2 and 4 percent of GRP, but can extend to 15 percent. Education spending varies mostly between 3 and 5 percent of GRP, but can extend to 20 percent; and social protection expenditure varies mostly between 1 and 3 percent of GRP, but can extend up to 9 percent. There is also a negative relationship between the size of local government spending and income level, suggesting that there are no Baumol and Wagner effects (see footnote 13) for Russia' regions; rather, expenditure is similar in nominal terms due to the equalization transfers.

24. **Local government expenditure is evaluated using different measures of performance and efficiency.** Specifically, these are the public sector performance (PSP), public sector efficiency (PSE), and data envelopment analysis (DEA) efficiency scores, respectively, for health, education, and social protection, and for all these three social sectors together. The outcome indicators are similar to those used for general government: hospital beds and physicians relative to population; infant mortality; life expectancy; preschool and professional education coverage; teacher-student ratios in general and professional education; incidence of poverty; and income inequality. The results summarized in this section are based on the data described in Table 4.[13] The complete scores by region are listed in Table A1 in Appendix II.

25. **The most striking finding is that the large variation of expenditures across regions results in very similar outcomes (Figure 9)**. As mentioned before, local government spending in percent of GDP, shown on the *x*-axes in the figure, varies considerably across regions. However, the different spending does not seem to translate into materially different outcomes, as the PSP scores shown on the *y*-axes in the left part of the figure suggest: whether it is health, education, or social protection, outcomes are similar, regardless of the associated level of expenditures. Comparing the actual production sets with those on the frontier to the left indicates visually the large efficiency differences between regions. Therefore, PSE and DEA scores for all three sectors are negatively related to the level of spending, as shown in the right part of the figure.

26. **Statistical measures also underscore the contrast between the small variation in public sector performance and the much larger one in public sector efficiency**. Table 5 summarizes the scores based on several descriptive statistics and the Spearman rank order correlation test. PSP has no meaning as an absolute number, but again it is notable how little PSP varies across regions, with a coefficient of variation of only 0.10–0.17, compared with 0.38–0.42 for PSE. However, minimum and maximum PSP still reveals a remarkably wide range: 0.60–1.30 in health, 0.64–1.24 in education, 0.72–1.65 in social protection, and 0.74–

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[13] All data are from Rosstat (2006), unless otherwise mentioned. As most time series are highly persistent, only the latest observation is used, in most cases for 2004; for series with larger variance, multiple-year averages are used.

1.33 in the social sectors overall; in other words, in each of the three social sectors, public sector performance is about twice as good in the best as in the worst region. The rank correlations reveal that regions that perform better in education also do so in health, with a highly statistically significant correlation of 0.5; between social protection and health and between social protection and education, are weaker than that.

27. **The DEA scores suggest that the average region could produce the same outcomes with only 64 percent of the actual spending.** This result is fairly consistent across sectors, with a mean of about 0.62 in health and social protection and 0.68 in education. This result is similar to the mean of 0.59 that Afonso, Schuknecht, and Tanzi (2006) found for emerging markets, but much worse than the average 0.79 that Afonso, Schuknecht, and Tanzi (2005) found for the OECD. Note again that efficiency is always assessed relative to the best observed practice, which could still be worse than the theoretical optimum. The two types of efficiency scores—PSE and DEA—behave very similarly, with highly significant rank order correlations of 0.54 in health, 0.77 in education, 0.92 in social protection, and 0.82 overall.

28. **Of course, exogenous factors may partly explain the differences in outcomes.** Some possible explanations are examined econometrically below. A better understanding of these drivers of efficiency can be useful not only because local governments account for about half of general government spending, but also because the underlying determinants of efficiency are likely to be similar at the federal level. The possible explanatory factors that are examined are described in Table 4, and their motivation is discussed in Box 1. The factors fall into five broad categories (social and environmental conditions, relationship to the federal government, quality of governance, civil society, and public and private expenditure). Table 6 summarizes the results of three distinct regression approaches for each of the twelve scores.[14] The regressions explain a large part of the variation, with an adjusted R-squared of 0.55–0.80 in eight of the twelve regressions, and still 0.34–0.36 in another three.

[14] Univariate and multivariate regressions are used because both have disadvantages: the former, in which a constant is also included, suffers from omitted-variable bias, the latter from multicollinearity. As a third approach, the multivariate regressions are tested down to the specifications that maximize the adjusted R-squared. To be conservative, conclusions are drawn only if: (i) the coefficients in at least two of the three approaches are statistically significant; and (ii) all of these significant coefficients have the same sign. More detail on methodological issues is can be found in Appendix I. The individual regressions are shown in Appendix II.

Box 1. Explanatory Variables—Motivation and Results

Social and environmental conditions. A higher income per capita (*INCPERCAP*) could, on the one hand, reduce efficiency by raising the relative cost of public services (Baumol, 1967). On the other hand, higher income has consistently been found to be associated with better health and education outcomes (Afonso and St. Aubyn, 2006; Afonso, Schuknecht, and Tanzi 2006; Herrera and Pang, 2005). To the extent that higher *INCPERCAP* reduces poverty and inequality, it would also directly contribute to better social protection outcomes. The evidence here lends more support to the second hypothesis: higher *INCPERCAP* is consistently associated with higher PSE in all three social sectors. In fact, it even explains between one-third and one-half of the variation in the univariate regressions.
A larger fuel industry (*FUEL*) could, on the one hand, affect *PSP* similarly as *INCPERCAP*, but through additional nonlinear effects, as the few regions that pump Russia's fuel exports are unusually wealthy. On the other hand, it could also reduce outcomes at a given income level, as oil windfalls may weaken incentives in the public sector (Desai, Frinkman, and Goldberg, 2005). Alas, *FUEL* does not seem to affect health and education performance, but consistently raises social protection efficiency, suggesting that—everything else equal (particularly income and social protection expenditure)—regions with larger *FUEL* perform better regarding inequality and poverty.

The consumption of alcohol and tobacco (*ALCTOB*) and the share of above-working-age population (*OLD*) are expected to have obvious negative implications for health outcomes. Alas, there is no consistent evidence. However, *OLD* has a consistent positive relationship with education performance and efficiency, suggesting that regions with fewer students are doing better at providing education.

Higher population density (*DENSITY*) and higher winter temperatures (*TEMPJAN*) are expected to improve *PSE* by reducing the cost of services provision through economies of scale and lower transportation and heating costs; moreover, warmer climate could be expected to improve health outcomes. However, the only robust finding here is a positive relationship between temperatures and social protection performance, suggesting that warmer regions do better in inequality and poverty.

Relationship to the federal government. The federal government retains a large degree of control over regional finances in Russia, as the center has a disproportionate sway over expenditure responsibilities and transfer rules. However, equalization has become more rules-based since the late 1990s (Dabla-Norris and Weber, 2001). The attention the federal government is paying to regional developments is thus potentially important to *PSE*. One popular measure of this attention by the center in the Russian context (e.g., Berkowitz and DeJong, 2003) is the distance from Moscow, which indeed has a consistent negative relationship with efficiency in education, social protection, and the social sectors overall.

Moreover, as it has been claimed that the Russian equalization system is largely determined by bargaining (Treisman, 1996) or is influenced by a region's impact on federal elections (Popov, 2004); larger *POPULATION* could increase per capita transfers and thus *PSP*. However, there is no consistent evidence for this variable.

A share of *TRANSFERS* in regional revenues is expected to reduce the incentives of local governments to spend efficiently (Ter-Minassian, 1997): first, the funds are not raised in their own region, and, second, there may even be an incentive to spend more to receive additional transfers. There is indeed strong evidence of such a negative relationship for health and the social sectors overall, but less so for education and social protection. In fact, *TRANSFERS* explains not less than about 60 percent of the variation in *PSE* for all three sectors. However, for social protection performance the relationship is positive; this apparent contradiction may be explained by the fact that social protection expenditure consists mostly of cash benefits that are relatively independent of local government effectiveness, thus allowing federal transfers to directly affect social protection outcomes.

Quality of governance. Lower quality of governance can be expected to reduce the *PSP* and *PSE*. In the absence of more direct measures, two proxies are adopted: investment risk (*RISK*) is measured by a business survey that places a heavy weight on the quality of governance; and the share of the shadow economy (*SHADOW*) has been shown to be correlated with bad governance (Dabla-Norris, Gradstein and Schuknecht, 2005). In fact, it turns out that larger *SHADOW* is consistently associated with lower performance in health, social protection, and the social sectors overall, and also with lower efficiency in social protection. On the latter, *RISK* yields the same result, but it appears to be positively related to health performance and efficiency.

Box 1. Explanatory Variables—Motivation and Results (concluded)

Civil society. Putnam (1993) and Gellner (1994) have argued that the degree of development of civil society influences the effectiveness of the public sector: cooperation between citizens and their formation of nonstate institutions enables them to exert more effective control over politicians and bureaucrats. La Porta and others (1997) empirically confirm such a positive correlation between participation in civic activities and government performance. Unfortunately, such data are unavailable for Russia's regions. However, two of the determinants of the degree of development of the civil society proposed by Putnam are available: citizens with higher education (*ACADEMIC*) are likely to be better informed and more active politically, and urbanism (*URBAN*) may promote civic activity through clustering. Our results support these hypotheses, as *ACADEMIC* and *URBAN* are consistently positively correlated with most *PSP* and *PSE* scores. *URBAN* is a particularly influential variable, explaining about one-third of the variation in many univariate regressions.

Size of public and private expenditure in the relevant sectors. Larger public spending (*EXPHEL*/…) would be obviously expected to improve performance, as well as private health and education spending (*PRIVHEL*/…). Its relationship to efficiency is less clear a priori: it could be positive if increasing economies of scale prevail, or negative if declining marginal returns dominate. Private spending seems to have surprisingly little impact on health and education performance and education efficiency. There is, however, interesting evidence of a negative relationship between private health spending and the efficiency of public health expenditure. This relationship could be interpreted either as evidence that higher private spending allows lower public sector efficiency, or that lower public sector efficiency entails higher private spending (an endogeneity test in Appendix I supports the first hypothesis). On public spending, there is very consistent evidence of a negative relationship between the size of spending and efficiency across all sectors, and evidence of the expected positive relationship to performance only in social protection.

Local Governments—Overview of Regression Results

Dependent variable	Health			Education			Social Protection			Social Sectors		
	PSP	PSE	DEA	PSP	PSE	DEA	PSP	PSE	DEA	PSP	PSE	DEA
INCPERCAP	+	+ + +	+ + +	+ +	+ + +	+ +	–	+	+ +		+ +	+ + +
FUEL					+			+ + +	+ + +		+	
ALCTOB	+			+			–	–				
OLD		+ +	+	+ + +	+ + +	+		+	+	+	+ +	+
DENSITY			–	–								
TEMPJAN						+	+ + +			+		
MOSCOW		–			–	– – –	–	– –	– – –	– –	–	– – –
POPULATION		+		– –	+ +		– +	+	+		+	+ – –
TRANSFERS	–	– – –	– –	–	–		+ + +	–	–		– –	–
RISK	+ +	–	+ +		–	–	+	–	– –		–	–
SHADOW	– –	–		–		–	– –	– –	–	– –		
ACADEMIC	+ +	+ +	+ + +		+			–		+		+
URBAN	+ +	+	+ + +	+ + +	+ +		– – –	+	+ + +		+	+ + +
EXPHEL/EXPEDU/EXPSOC/EXPTOT 1/	– –	– – –		–	– –	– –	+ +	– – –	– – –		– –	–
PRIVHEL/PRIVEDU /n.a./n.a. 1/			– – –			–						

Source: Fund staff calculations.
Notes: Table shows the signs of the coefficients in Tables A2–A4 that are significant at least at the 10 percent level. The entries in each column follow the order of Tables A2–A4: univariate, multivariate, and tested-down regressions.
1/ The first, second, third, and fourth alternatives apply to the regressions for health, education, social protection, and all three social sectors, respectively.

29. **The regressions suggest that PSP and PSE are better in regions that are richer and have better governance and stronger civil societies (Box 1).**[15] Higher income per capita is consistently associated with higher PSE in all three social sectors; in fact, it tends to explain a particularly large share of the variation. Even controlling for this effect, regions with larger fuel sectors perform better regarding inequality. Moreover, better governance tends to improve PSP and PSE. Similarly, regions that have a more developed civil society (as proxied by the share of the urban population and tertiary graduates), which supposedly exerts stronger control on government activities, do better. Higher private health expenditure is associated with lower public expenditure efficiency. In contrast, there is little evidence that the intensity of alcohol consumption, the share of elderly people, climate, or population size and density explain much of the regional differences.

30. **A key finding is that adverse incentives provided by the intergovernmental transfer system seem to contribute to expenditure inefficiency**. There is strong evidence that higher expenditure (relative to GRP) and larger shares of federal transfers in total revenue reduce expenditure efficiency. These points are related because poorer regions not only receive larger transfers but also spend more, as Figure 8 shows. Behind this result, are arguably two factors. One factor is that local governments have little incentive to spend less because they risk losing federal transfers or receive additional expenditure responsibilities (Ter-Minassian, 1997; and Zhuravskaya, 2000). If weak democratic control provides little motivation to deliver more than an absolute minimum of public services, any higher spending will thus necessarily result in lower efficiency. Also, governments in poorer regions appear to expand public employment to extract transfers (Gimpelson and Treisman, 2002). A second factor is that regional expenditures are driven primarily by the availability of revenues, with regions usually spending windfall revenues in booms rather than saving them (Kwon and Spilimbergo, 2005). The resulting expenditure volatility is likely to further reduce efficiency, similar to the effect documented in the context of external aid (Bulir and Hamann, 2005).

31. **While much progress has been made regarding intergovernmental relations, the local governments still need better incentives to improve financial management**. Since 2000, the responsibilities of the various levels of government have been clarified and unfunded mandates reduced. Recently, financial incentives for regions were established to improve financial management (including through performance and multiyear budgeting) and to meet performance criteria set for them by the federal government in education and health. Moreover, regions will be grouped in three tiers according to their dependence on transfers, with varying degrees of federal supervision, and all regions will have municipal governments with their own budgets. However, the deadline for the reforming the relations between regional and municipal governments has slipped to 2009. Moreover, weakening the local government budget constraint

[15] These findings are in line with cross-country studies; e.g., Afonso Schuknecht, and Tanzi (2006) found higher expenditure efficiency to be positively related to income, civil service competence, education level, and property rights.

through frequent changes in tax attributions, as well as ad hoc federal interventions in expenditure responsibilities of lower government levels, is undesirable.

V. Conclusion

32. **The paper has examined the efficiency of social expenditure in the Russian Federation on the general and local government levels**. The findings suggest considerable room for improving efficiency, particularly in health care and social protection, but less so in education. Moreover, an examination of regional efficiency variations raises particular concerns about the efficiency of the spending of federal transfers by the poorer regions.

33. **Besides the more specific policy implications discussed in the paper, implementing performance budgeting and extending more autonomy and accountability to local governments are key**. Renewed efforts will be necessary to implement performance budgeting, which so far has fallen short of expectations: this kind of budgeting applies to only 15 percent of the federal budget—with poor outcomes—and even less progress has been made at the subfederal level. Moreover, local governments need to be granted more sway in policymaking in the domains of their expenditure responsibilities; they also need to be granted more accountability, including harder budget constraints. The National Projects are an example of ad hoc federal intervention that risks creating unfunded mandates and backtracks on prior steps taken toward devolution. Similarly, while shortcomings in financial management at the local government level may warrant more federal supervision, there is a risk that tightening control will in the long run only further weaken incentives for responsible policymaking and financial management. In contrast, the establishment of autonomous institutions with global budgets and incentives for competition both between public service providers and with the private sector could improve efficiency; however, financial risks for the government will have to be closely monitored.

Table 1. General Government—Multiple-Outcome Health Efficiency Model

Country	Income per Capita (U.S. dollars, PPP)	Public Health Expenditure in Percent of GDP	Private Health Expenditure in Percent of GDP	Healthy Life Expectancy at Birth, Females	Infant Mortality Rate, per 1,000 Live Births 1/	Prevalence of Tuberculosis, per 100,000 Populat. 1/	Physicians per 1,000 Population	Age-standardized mortality rates 1/: Non-communicable Diseases	Cardio-Vascular diseases	Cancer	Injuries	Efficiency Score: Controlling for Income per Capita	Not Controlling for Income per Capita
Argentina	14,838	4.3	4.6	68.1	62.5	1,887	3.0	192	471	703	1,917	0.44	0.38
Armenia	4,516	1.2	4.8	62.6	34.5	1,018	3.6	125	201	685	2,573	0.97	0.86
Azerbaijan, Rep. of	5,895	0.9	2.7	58.7	13.3	1,116	3.5	112	163	887	3,423	1.00	1.00
Belarus	8,230	4.9	1.6	64.9	125.0	1,468	4.6	119	169	699	649	1.00	0.71
Bosnia & Herzegovina	6,456	4.8	4.7	66.4	76.9	1,872	1.3	143	203	828	2,342	0.59	0.36
Botswana	12,131	3.3	2.3	35.4	13.3	181	0.4	153	296	808	1,394	0.65	0.59
Brazil	8,917	3.4	4.2	62.4	31.3	1,303	1.2	140	294	705	1,241	0.57	0.45
Bulgaria	10,003	4.1	3.4	67.1	83.3	2,767	3.6	132	180	800	2,369	0.64	0.47
Chile	12,737	3.0	3.1	69.7	125.0	6,325	1.1	221	606	732	1,987	1.00	1.00
China,P.R.: Mainland	8,004	2.0	3.6	65.2	38.5	452	1.1	150	344	675	1,270	0.68	0.62
Colombia	7,646	6.4	1.2	66.3	55.6	1,339	1.4	196	417	855	708	1.00	0.69
Costa Rica	10,747	5.8	1.5	69.3	90.9	6,549	1.3	219	541	803	1,815	1.00	0.69
Croatia	13,062	6.5	1.3	69.3	166.7	1,538	2.4	163	281	598	2,083	0.91	0.66
Czech Republic	19,428	6.8	0.8	70.9	250.0	8,902	3.5	176	317	566	1,996	1.00	1.00
Dominican Republic	8,018	2.3	4.7	61.9	37.0	850	1.9	145	263	762	1,695	0.56	0.50
Estonia	17,802	4.1	1.2	69.0	166.7	2,034	4.5	148	230	667	692	1.00	1.00
Georgia	3,755	1.0	3.0	66.6	24.4	1,120	4.1	134	171	1,094	3,939	1.00	1.00
Hungary	17,821	6.1	2.3	68.2	142.9	3,372	3.3	144	275	498	1,486	0.54	0.48
Iran, I.R. of	8,441	3.1	3.4	59.1	31.3	2,837	0.4	135	215	882	752	0.70	0.55
Kazakhstan	9,134	2.0	1.5	59.3	15.9	624	3.5	95	140	598	627	1.00	1.00
Kyrgyz Republic	2,224	2.2	3.1	58.4	17.2	732	2.5	108	166	941	1,115	1.00	0.65
Latvia	13,875	3.3	3.1	67.5	111.1	1,399	3.0	136	207	640	757	0.61	0.57
Libya	12,146	2.6	1.5	65.0	55.6	5,008	1.3	154	243	1,270	1,833	1.00	1.00
Lithuania	15,443	5.0	1.6	67.7	125.0	1,503	4.0	156	256	621	736	0.73	0.68
Malaysia	11,915	2.2	1.6	64.8	100.0	754	0.7	160	364	721	1,989	1.00	1.00
Mauritius	13,508	2.2	1.5	64.6	83.3	738	1.1	143	230	1,268	2,390	1.00	1.00
Mexico	10,604	2.9	3.3	67.6	43.5	2,312	2.0	199	614	1,136	1,723	0.64	0.57
Poland	13,797	4.5	2.0	68.5	142.9	3,132	2.5	169	308	555	1,878	0.75	0.63
Moldova	2,708	3.9	3.3	62.4	43.5	468	2.6	108	162	859	1,026	1.00	0.47
Romania	9,446	3.8	2.3	65.2	58.8	532	1.9	137	209	708	1,787	0.75	0.56
Russia	**11,904**	**3.3**	**3.4**	**64.1**	**76.9**	**624**	**4.3**	**104**	**145**	**657**	**461**	**0.72**	**0.65**
Slovak Republic	17,239	5.2	0.7	69.4	142.9	4,271	3.2	157	270	589	1,995	1.00	1.00
Slovenia	23,159	6.7	2.1	72.3	250.0	5,945	2.3	199	439	627	1,691	0.60	0.57
South Africa	12,760	3.2	5.2	45.3	18.5	149	0.8	124	244	649	836	0.45	0.41
Tajikistan	1,506	0.9	3.5	56.4	11.0	361	2.0	97	133	1,111	1,570	1.00	0.94
Thailand	8,877	2.0	1.3	62.4	55.6	481	0.4	179	502	774	1,358	1.00	1.00
Serbia and Montenegro	5,713	7.2	2.4	64.9	76.9	2,007	2.1	130	197	673	2,777	1.00	0.45
Macedonia	8,175	6.0	1.1	65.0	76.9	2,972	2.2	134	198	691	1,359	1.00	0.75
Tunisia	8,809	2.5	2.9	63.6	47.6	4,172	1.3	146	240	1,277	1,394	0.98	0.71
Turkey	8,385	5.4	2.2	62.8	35.7	2,231	1.3	132	184	1,057	2,368	0.79	0.52
Turkmenistan	8,663	2.6	1.3	57.2	12.5	1,210	4.2	90	118	1,007	1,348	1.00	1.00
Ukraine	7,816	3.8	1.9	63.6	71.4	663	3.0	112	157	718	743	0.90	0.64
Uruguay	11,378	2.7	7.1	69.4	83.3	3,051	3.7	193	481	587	1,811	0.44	0.44
Uzbekistan	1,983	2.4	3.1	60.9	17.5	640	2.7	111	151	1,351	1,998	1.00	0.63

Sources: WHO, IMF, WEO, database and Fund staff calculations.

1/ Inverted (following Afonso, Schuknecht, and Tanzi, 2005), because better outcomes have to be reflected in higher values.

Table 2. General Government—Multiple-Outcome Education Efficiency Model

						Efficiency Score	
Country	Income per Capita (U.S. dollars, PPP)	Public Expenditure per Student (Primary-Tertiary), Percent of GDP per Capita	Teacher-Pupil Ratio (Primary)	Teacher-Pupil Ratio (Secondary)	Tertiary Graduates in Percent of Tertiary School-Age Population	Controlling for Income per Capita	Not Controlling for Income per Capita
Belarus	8,230	22.2	0.06	0.11	11.8	1.00	1.00
Belize	8,055	15.2	0.04	0.05	0.5	1.00	0.52
Botswana	12,131	7.3	0.04	0.07	0.6	1.00	1.00
Brazil	8,917	13.7	0.05	0.06	3.1	0.95	0.63
Bulgaria	10,003	21.8	0.06	0.08	8.4	0.85	0.62
Chile	12,737	13.9	0.04	0.04	7.9	0.85	0.82
Colombia	7,646	17.5	0.04	0.04	2.0	1.00	0.46
Costa Rica	10,747	19.2	0.04	0.05	6.2	0.76	0.54
Croatia	13,062	25.8	0.06	0.09	5.1	0.68	0.51
Czech Republic	19,428	21.9	0.06	0.08	7.8	0.58	0.55
Estonia	17,802	24.1	0.07	0.10	9.9	0.78	0.78
Hungary	17,821	26.8	0.10	0.10	10.2	1.00	1.00
Iran, I.R. of	8,441	12.5	0.05	0.05	3.2	1.00	0.73
Latvia	13,875	21.5	0.08	0.09	13.6	1.00	1.00
Lithuania	15,443	19.1	0.07	0.09	14.8	1.00	1.00
Macedonia, FYR	8,175	14.2	0.05	0.07	3.1	1.00	0.65
Malaysia	11,915	30.4	0.06	0.06	8.6	0.67	0.42
Mauritius	13,508	18.2	0.04	0.06	4.2	0.67	0.51
Mexico	10,604	18.9	0.04	0.06	3.5	0.77	0.47
Poland	13,797	22.6	0.08	0.07	14.6	1.00	1.00
Romania	9,446	15.5	0.06	0.07	8.9	1.00	0.83
Russia	**11,904**	**14.6**	**0.06**	**0.10**	**13.4**	**1.00**	**1.00**
Slovak Republic	17,239	18.4	0.06	0.08	7.9	0.69	0.67
Slovenia	23,159	26.8	0.07	0.09	10.8	0.61	0.61
South Africa	12,760	17.8	0.03	0.03	2.3	0.68	0.46
Thailand	8,877	15.0	0.05	0.04	8.8	0.96	0.80
Tunisia	8,809	29.8	0.05	0.06	2.8	0.88	0.29
Ukraine	7,816	17.8	0.05	0.08	15.4	1.00	1.00
Uruguay	11,378	8.4	0.05	0.07	2.7	1.00	1.00

Sources: USESCO; IMF, WEO database and Fund staff calculations.

Table 3. General Government—Social Protection Efficiency Model

Country	Per Capita Income (U.S. Dollars, PPP)	Social Protection Spending in Percent of GDP	Gini Coefficient 1/	Efficiency Score: Controlling for Income per Capita	Efficiency Score: Not Controlling for Income per Capita
Austria	34,803	20.3	0.034	0.51	0.50
Bolivia	2,791	5.3	0.017	1.00	0.44
Hong Kong SAR	35,396	2.5	0.022	1.00	1.00
Czech Republic	19,428	12.3	0.025	0.47	0.36
El Salvador	4,620	2.4	0.019	1.00	1.00
Finland	32,822	19.6	0.037	0.62	0.62
Hungary	17,821	12.1	0.037	1.00	1.00
Israel	24,357	12.2	0.026	0.47	0.37
Italy	29,406	16.7	0.028	0.42	0.36
Lithuania	15,443	9.1	0.028	0.77	0.66
Luxembourg	72,855	22.4	0.033	0.40	0.40
Norway	44,342	16.0	0.039	1.00	1.00
Poland	13,797	18.2	0.029	0.86	0.37
Russia	**11,904**	**9.1**	**0.025**	**0.75**	**0.46**
Slovak Republic	17,239	12.7	0.026	0.55	0.37
South Africa	12,760	3.2	0.017	0.73	0.73
Spain	27,542	11.9	0.029	0.62	0.56
Sweden	31,264	22.4	0.040	1.00	1.00
United States	43,236	6.8	0.025	0.62	0.57

Sources: IMF, *Government Finance Statistics,* WEO database, and Fund staff calculations, and World Bank, *World Development Indicators*.
1/ Inverted (following Afonso, Schuknecht, and Tanzi, 2005), because better outcomes have to be reflected in higher values.

Table 4. Local Governments—Data Description

Acronym	Definition	Mean	*StDv*
Outcome indicators:			
HOSPITAL	Number of hospital beds per 10,000 people, end-year, 2004.	121	*25.6*
PHYSICIAN	Number of physicians per 10,000 people, end-year, 2004.	46.4	*11.1*
INFANT	Infant mortality rate (number of deaths within first year of life per 1,000,000 born alive), 2002-03 average.	12,802	*3,402*
LIFE	Life expectancy at birth in years. Females only, because their life expectancy tends to be somewhat less affected by alcoholism that has been identified as a key driver in the increase in mortality in Russia in the 1990s (DaVanzo and Grammich, 2001). 2004.	71.5	*2.7*
PRESCHOOL	Pre-schooling coverage of children in % of children of applicable age, end-year, 2004.	59.5	*13.0*
PROFEDU	Professional education coverage. Students in primary and secondary professional education in % of below-working-age population, end-year, 2004.	17.5	*4.1*
GENTEACH	Teacher-student ratio in general education. Teachers per student in general education schools, beginning of school year, 2003.	0.08	*0.01*
PROFTEACH	Teacher-student ratio in professional education. Teachers per student in primary and secondary public professional education schools, beginning of school year, 2003.	0.06	*0.02*
POVERTY	Percentage of population with per capita income below 3,000 rubles monthly, estimated by adjusting the income brackets by regional price level, 2004.	41.4	*14.1*
INEQUALITY	Gini coefficient, 2003.	0.36	*0.04*
Public expenditure:			
EXPHEL	Public health expenditure. Consolidated regional government expenditure on health in % of gross regional product, 2004.	3.3	*2.0*
EXPEDU	Public education expenditure. Consolidated regional government expenditure on education in % of gross regional product, 2004.	4.9	*2.6*
EXPSOC	Public social protection expenditure. Consolidated regional government expenditure on social policy in % of gross regional product, 2004.	2.0	*1.2*
EXPTOT	=EXPHEL+EXPEDU+EXPSOC	10.1	*5.4*
Other potential correlates:			
INCPERCAP	Income per capita. Gross regional product per capita in rubles, adjusted by dividing by the ratio of the regional to national price level, 2003.	65,245	*36,932*
FUEL	Fuel sector in % of total industrial production, 2003-04 average.	11.0	*17.7*
ALCTOB	Percentage of alcohol and tobacco in household consumption, 2004.	3.1	*0.8*
OLD	Percentage of population older than working age, end-year, 2004.	19.4	*4.5*
DENSITY	Population per square kilometer, end-year, 2004.	36.6	*57.8*
TEMPJAN	Average temperature in January in degrees Celsius.	-10.5	*7.7*
MOSCOW	Distance of main regional city from Moscow in kilometers.	2,367	*2,748*
POPULATION	Population in thousands, end-year, 2004.	1,802	*1,622*
TRANSFERS	Percentage of federal transfers in government revenue, 2000-04 average.	27.7	*20.5*
RISK	Investment risk index, 2006. Scores from 1 (lowest risk) to 4 (highest risk). Source: http://www.raexpert.ru/ratings/regions/2006/.	2.2	*1.1*
SHADOW	Importance of the shadow economy. Percentage of "other income" in household cash income, 2004.	21.1	*8.3*
ACADEMIC	Percentage of employed population with higher professional education degree, 2004.	24.0	*5.3*
URBAN	Percentage of urban population, end-year, 2004.	68.9	*12.7*
PRIVHEL	Household consumption in health in % of gross regional product, 2004.	1.6	*0.7*
PRIVEDU	*Household consumption in education in % of gross regional product, 2004.*	*1.2*	*0.6*

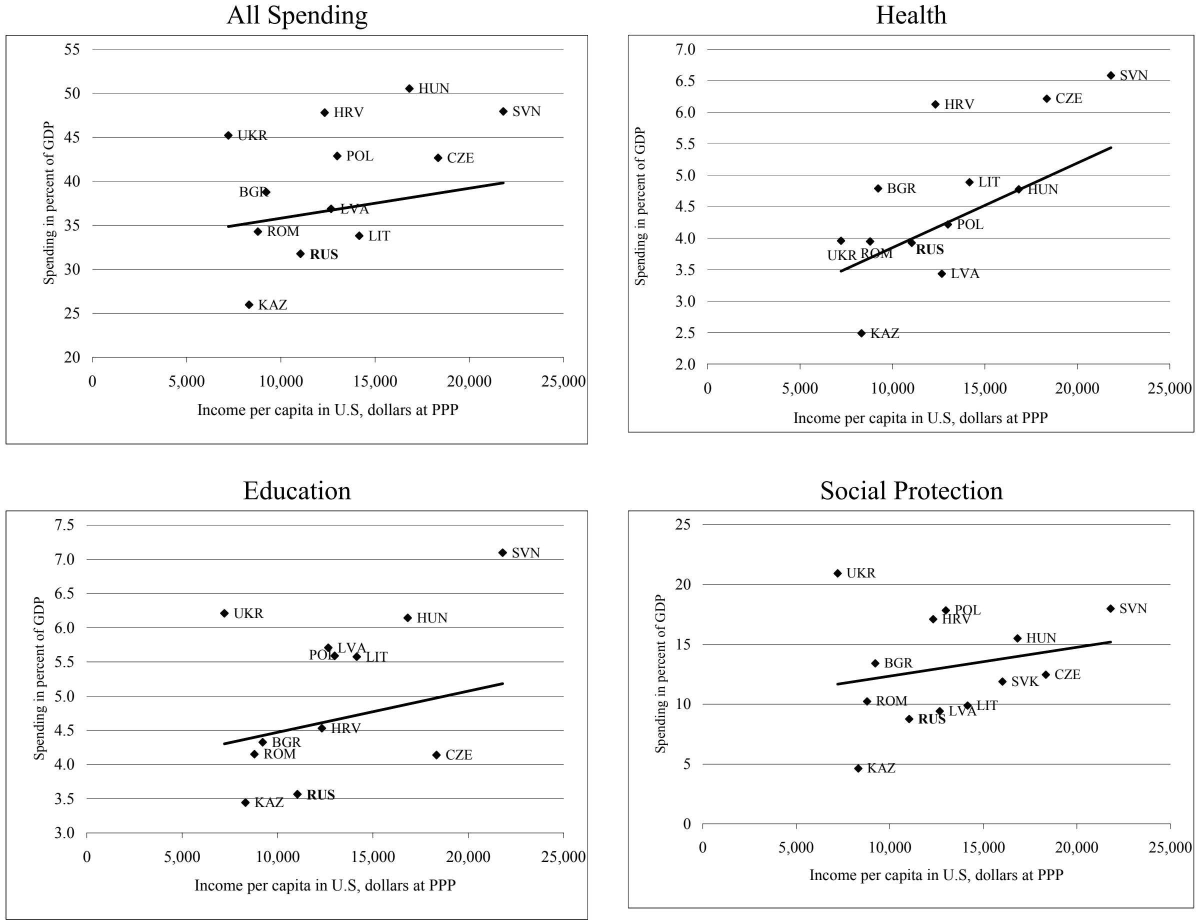
Table 5. Local Governments—Summary of Performance and Efficiency Scores

	Health			Education			Social Protection			Social Sectors		
	PSP	PSE	DEA	PSP	PSE	DEA	PSP	PSE	DEA	PSP	PSE	DEA 2/
Mean 1/	1.00	0.37	0.62	1.00	0.25	0.68	1.00	0.61	0.61	1.00	1.22	0.64
Coefficient of variation	0.10	0.42	0.37	0.11	0.40	0.39	0.17	0.42	0.35	0.10	0.38	0.31
Minimum	0.60	0.04	0.21	0.64	0.05	0.14	0.72	0.08	0.12	0.74	0.19	0.19
1st quartile	1.00	0.37	0.62	1.00	0.25	0.68	1.00	0.61	0.61	1.00	1.22	0.64
Median 1/	0.99	0.35	0.58	1.02	0.24	0.67	0.98	0.60	0.60	1.00	1.20	0.66
3rd quartile	1.00	0.37	0.62	1.00	0.25	0.68	1.00	0.61	0.61	1.00	1.22	0.64
Maximum	1.30	1.09	1.00	1.24	0.67	1.00	1.65	1.46	1.00	1.33	2.61	0.95
Spearman rank order correlation test:												
Health												
PSP		0.36***	0.58***	0.50***	0.35***	0.52***	0.27***	0.31***	0.28***	0.71***	0.36***	0.59***
PSE	0.36***		0.54***	0.41***	0.88***	0.70***	0.48***	0.73***	0.70***	0.53***	0.90***	0.78***
DEA	0.58***	0.54***		0.52***	0.49***	0.61***	0.32***	0.42***	0.39***	0.62***	0.5***	0.80***
Education												
PSP	0.50***	0.41***	0.52***		0.49***	0.69***	0.21*	0.38***	0.46***	0.66***	0.42***	0.69***
PSE	0.35***	0.88***	0.49***	0.49***		0.77***	0.4***	0.72***	0.73***	0.52***	0.89***	0.80***
DEA	0.52***	0.70***	0.61***	0.69***	0.77***		0.34***	0.55***	0.56***	0.64***	0.69***	0.89***
Social Protection												
PSP	0.27***	0.48***	0.32***	0.21*	0.40***	0.34***		0.74***	0.56***	0.77***	0.64***	0.47***
PSE	0.31***	0.73***	0.42***	0.38***	0.72***	0.55***	0.74***		0.92***	0.68***	0.93***	0.73***
DEA	0.28***	0.70***	0.39***	0.46***	0.73***	0.56***	0.56***	0.92***		0.58***	0.88***	0.75***
Social Sectors												
PSP	0.71***	0.53***	0.62***	0.66***	0.52***	0.64***	0.77***	0.68***	0.58***		0.65***	0.75***
PSE	0.36***	0.90***	0.50***	0.42***	0.89***	0.69***	0.64***	0.93***	0.88***	0.65***		0.82***
DEA	0.59***	0.78***	0.80***	0.69***	0.80***	0.89***	0.47***	0.73***	0.75***	0.75***	0.82***	

Source: Fund staff calculations.
Notes: N=79. ***/**/* indicates significance at the 1 percent/5 percent/10 percent levels, respectively.
1/ The means of the PSP indicators have been set to unity.
2/ As DEA suffers from an increasing upward bias as additional outputs are added, the overall score was calculated as the simple average of the three subscores. This also explains why the maximum value is lower than unity, while the maximum must be equal to unity by definition if scores are actually calculated by DEA..

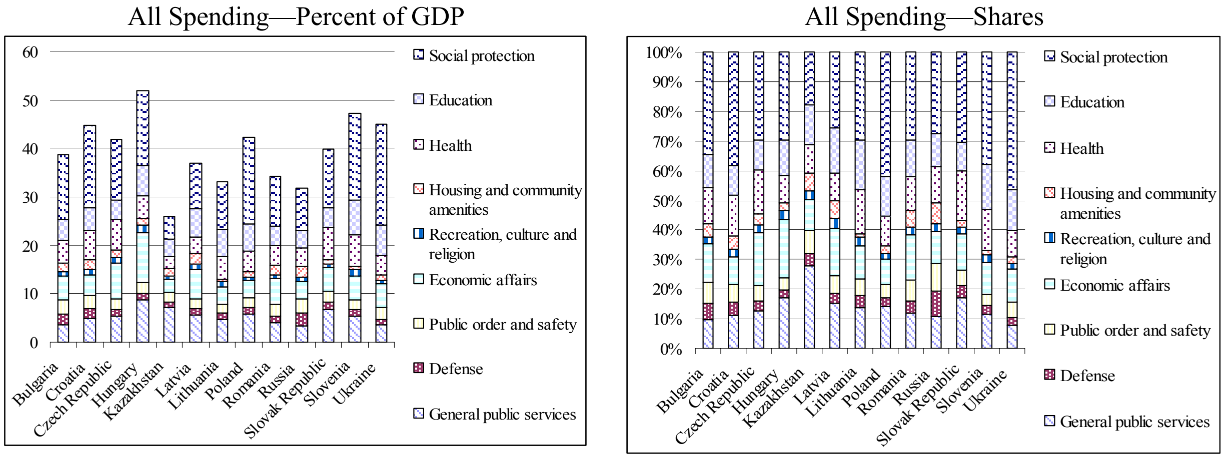
Figure 1. Income Level and General Government Spending

(Selected transition economies; latest available observation)



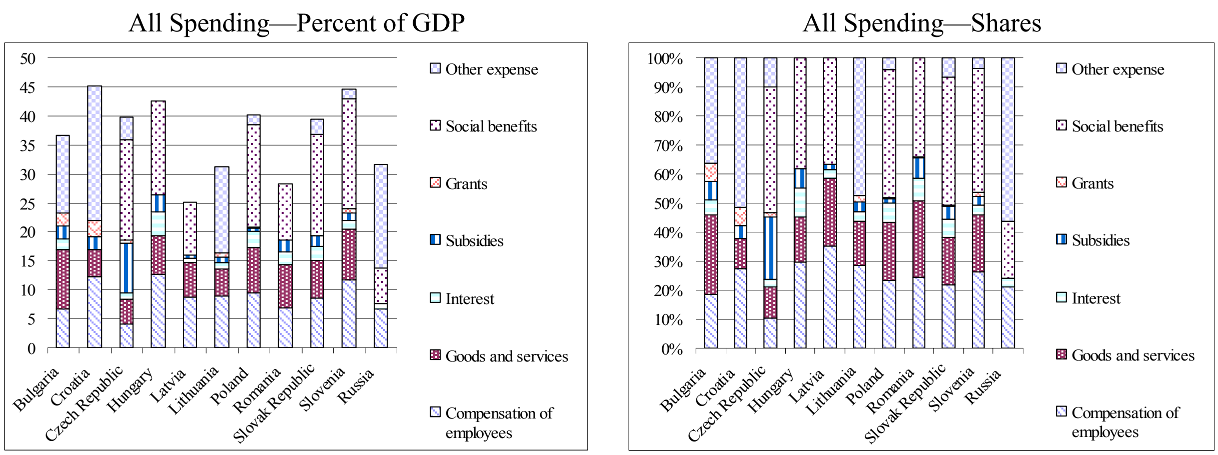
Sources: *IMF Government Finance Statistics*, WEO database, and Fund staff calculations.

Figure 2. Structure of General Government Spending—Functional Classification
(Selected transition economies; latest available observation)



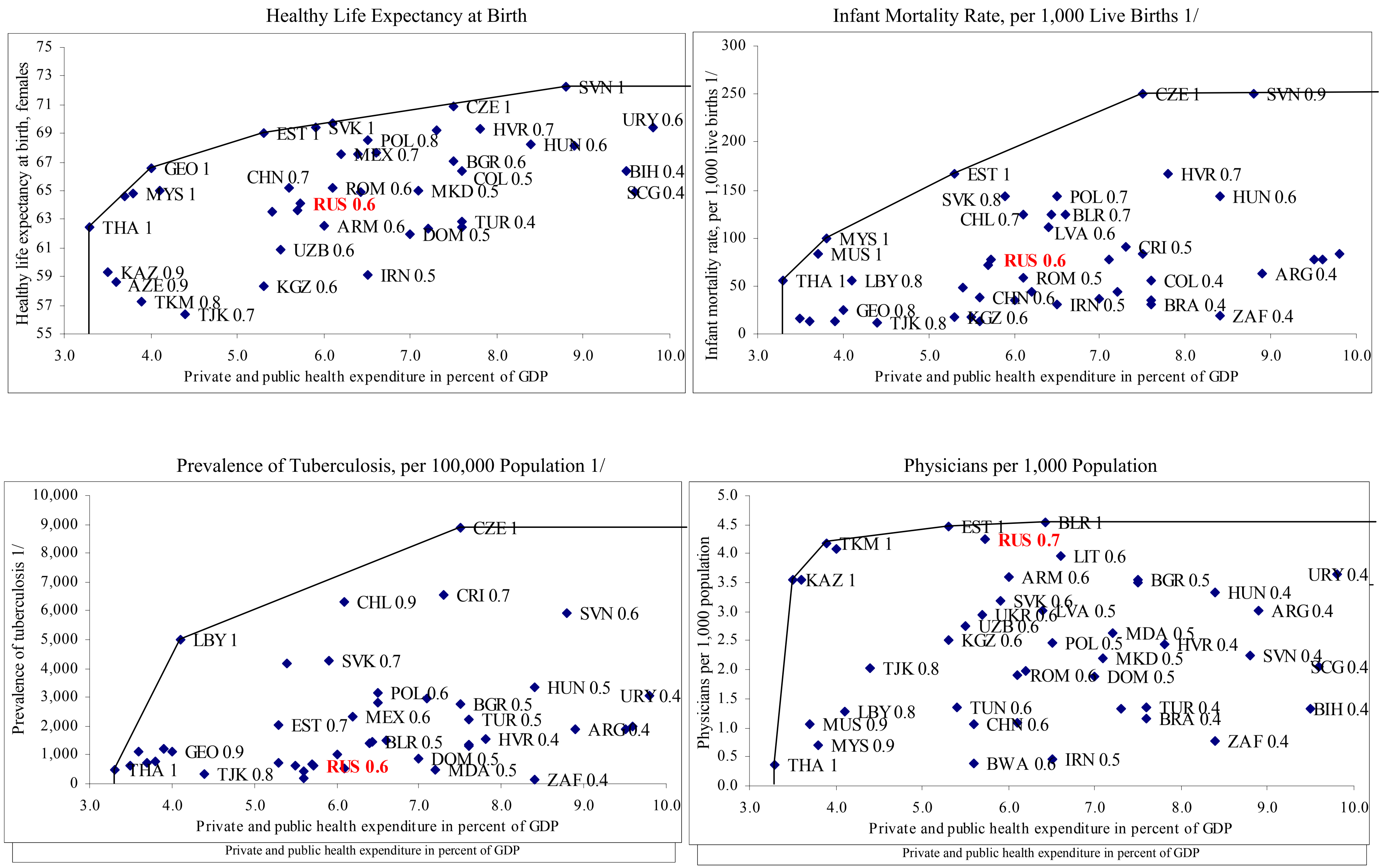
Sources: *IMF Government Finance Statistics*, WEO database, and Fund staff calculations

Figure 3. Structure of General Government Spending—Economic Classification
(Selected transition economies; latest available observation)



Sources: *IMF Government Finance Statistics*, WEO database, and Fund staff calculations.

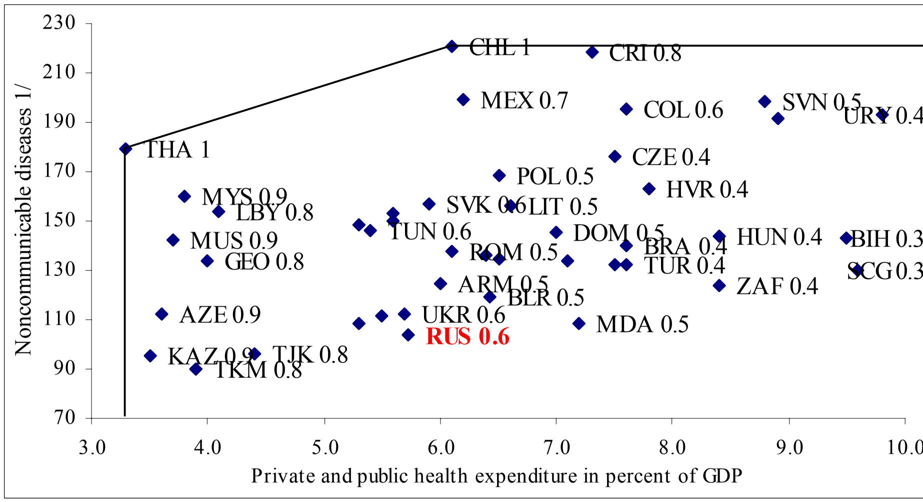
Figure 4. General Government—Efficiency of Private and Public Health Spending (I)



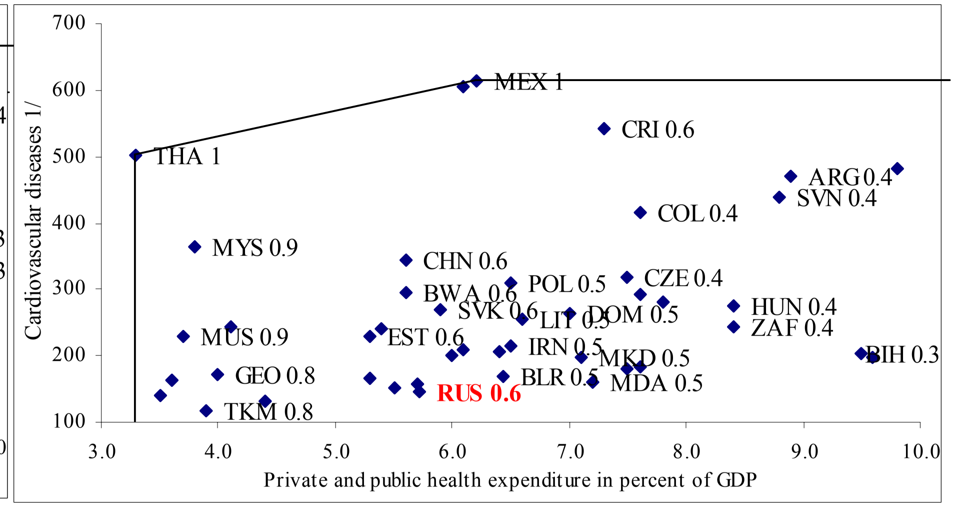
1/ Inverted (following Afonso, Schuknecht, and Tanzi 2005), because better outcomes have to be reflected in higher values.

Figure 5. General Government—Efficiency of Private and Public Health Spending (II)

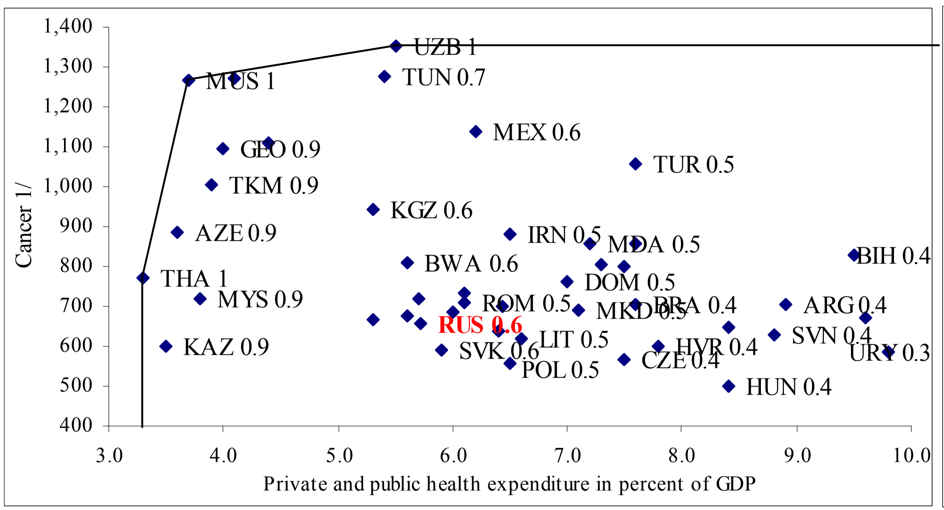
Standardized Mortality Rate Noncommunicable Diseases 1/



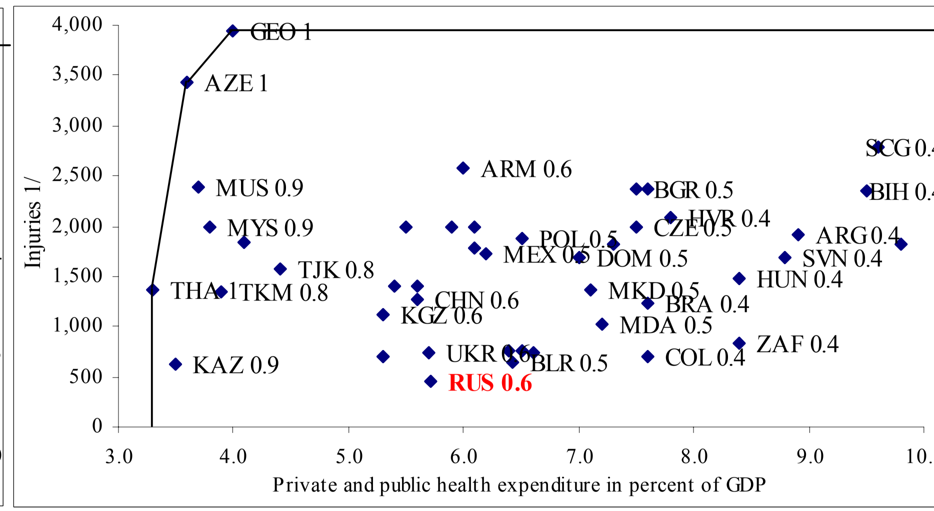
Standardized Mortality Rate—Cardio Vascular Diseases 1/



Standardized Mortality Rate—Cancer 1/

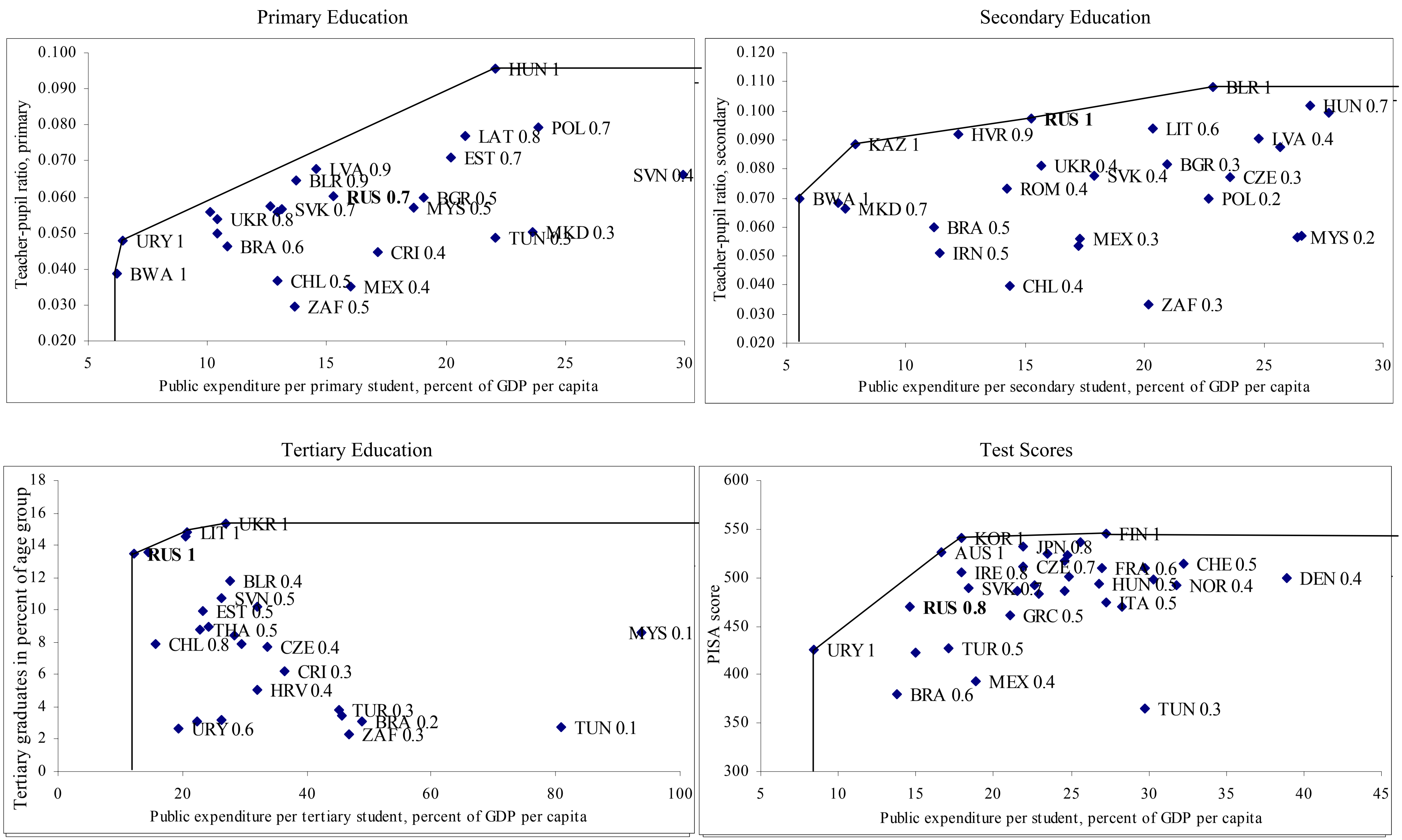


Standardized Mortality—Injuries 1/



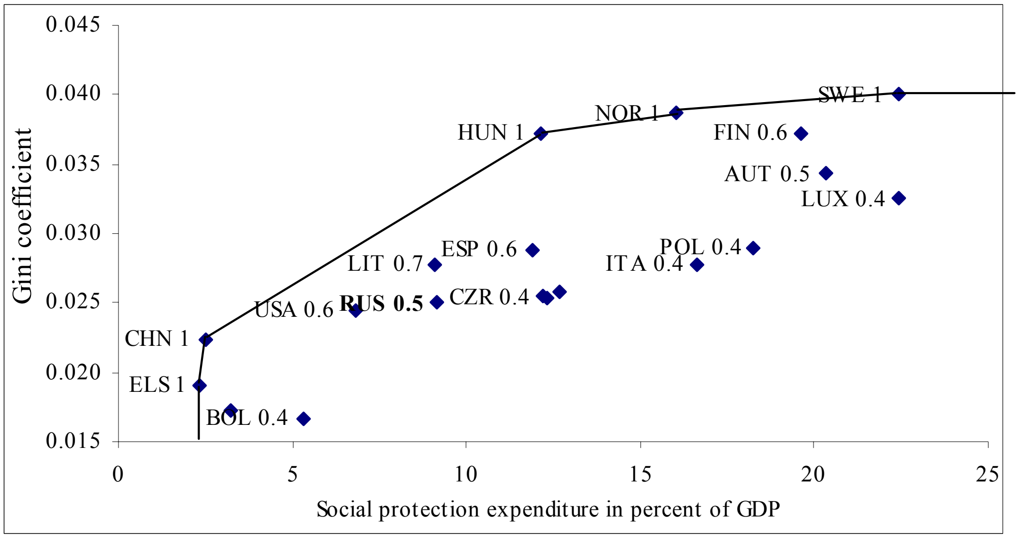
1/ Inverted (following Afonso, Schuknecht, and Tanzi 2005), because better outcomes have to be reflected in higher values.

Figure 6. General Government—Efficiency of Public Education Spending



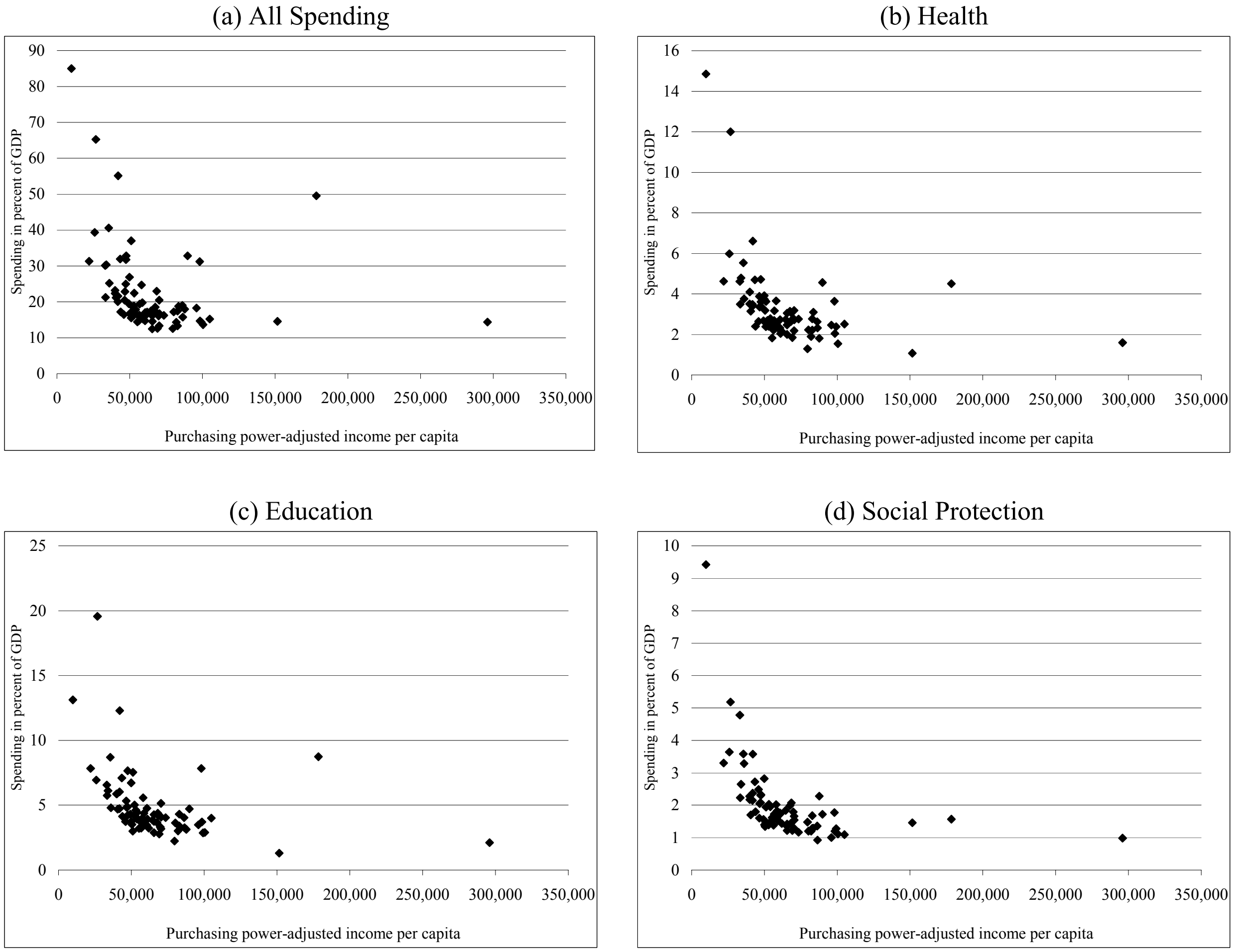
Sources: UNESCO; IMF, WEO database, and Fund staff calculations.

Figure 7. General Government—Efficiency of Social Protection Spending



Sources: IMF, *Government Finance Statistics*, and WEO database, and Fund staff calculations; and World Bank, *World Development Indicators.*

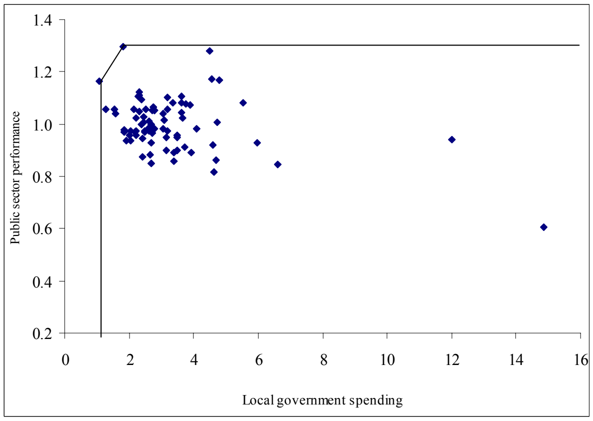
Figure 8. Local Governments—Income Level and Government Spending
(Selected transition economies; latest available observation)



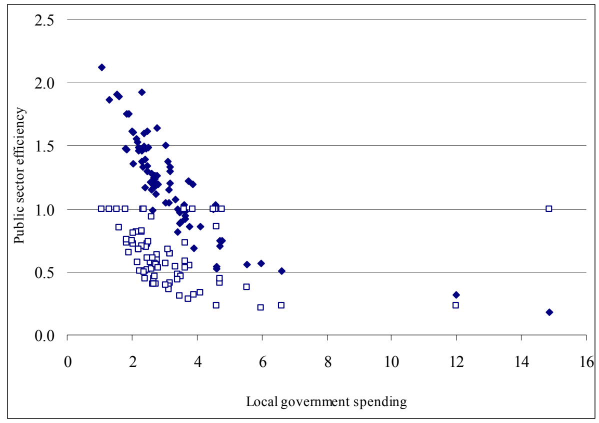
Sources: Rosstat; and Fund staff calculations.

Figure 9. Local Governments—
PSP, PSE, and DEA Scores vs. Spending in Percent of GRP

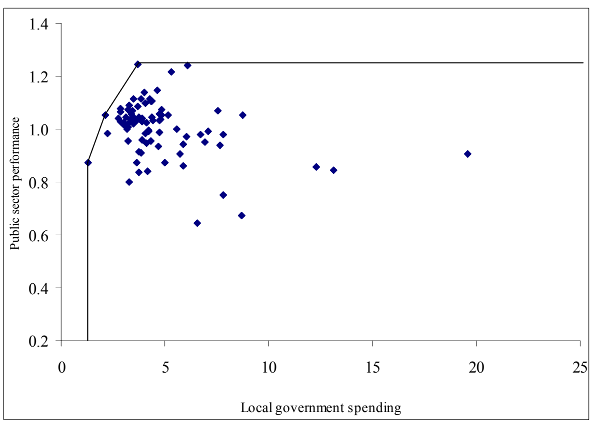
PSP
Health



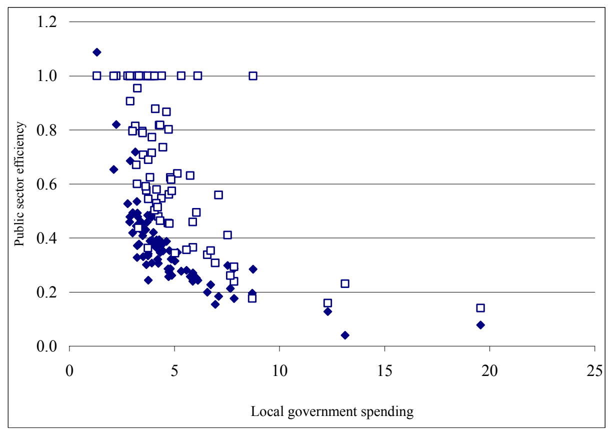
PSE (filled markers) and DEA (empty markers)
Health



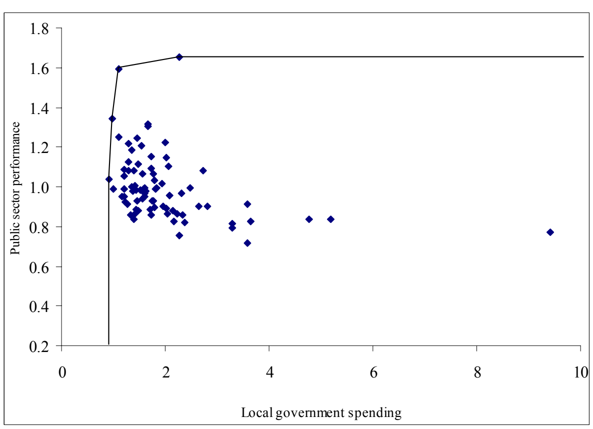
Education



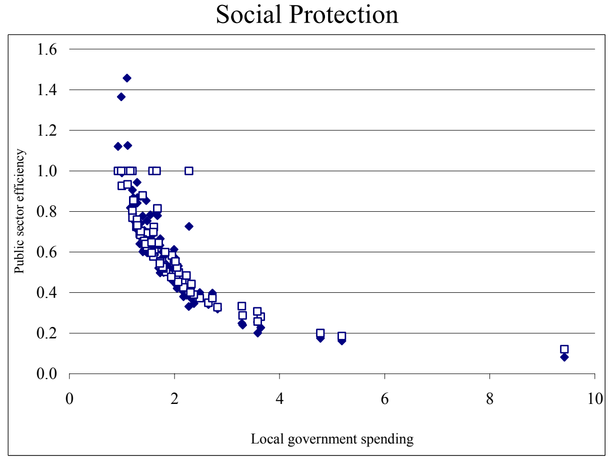
Education



Social Protection



Social Protection



Sources: Rosstat; and Fund staff calculations.

APPENDIX

A. Methodological Details

34. The paper uses three concepts to measure public sector performance and efficiency: public sector performance (PSP), public sector efficiency (PSE) scores, both proposed by Afonso, Schuknecht, and Tanzi (2005; below referred to as "AST"), and data envelopment analysis (DEA) efficiency scores. All these concepts measure performance by outcome indicators that are assumed to be targeted by policy, and efficiency by relating performance to expenditure.

35. Slightly changing the definition in AST, PSP is defined, given country *i* and *j* areas of government performance, as

$$PSP_i = \sum_{j=1}^{n} \omega_j PSP_{ij} \tag{1}$$

where ω_j is a vector of weights determined by the societal welfare function, and PSP_{ij} is a scalar that is a function of socioeconomic indicators. As the welfare function is unobserved, weights have to be assumed; following AST, equal weights are assumed for all *j*. This clearly introduces a strong assumption, but given the typically high correlation between outcome indicators, it turns out—as in AST—that different weights yield very similar results as measured by rank correlations. To aggregate the outcome indicators, the paper follows AST in dividing the outcome indicators by their respective standard deviation and then setting the mean to 1.

36. PSE is then calculated as the ratio of PSP to the respective expenditure EXP_{ij} in percent of GDP, or

$$PSE_i = \sum_{j=1}^{n} \frac{PSP_{ij}}{EXP_{ij}}. \tag{2}$$

37. The DEA efficiency of public spending is measured by comparing actual spending with the minimum spending theoretically sufficient to produce the same actual output.[16] The underlying theory was developed in Debreu (1951), Koopmans (1951), and Farrell (1957), and extended, in particular, by Färe, Grosskopf, and Lovell (1994). To the latter, the reader is referred to for a more extensive treatment of what can only be sketched here.

38. The efficiency concept here is more specifically "technical efficiency," defined as the ability of an entity to produce a given set of outputs with minimal inputs, independent of input prices and under the assumption of variable returns to scale. An example in Figure A1 illustrates this: say, one input *x* is used to produce one output *y*. *CRS* is the production possibilities frontier at constant returns to scale, *VRS* is

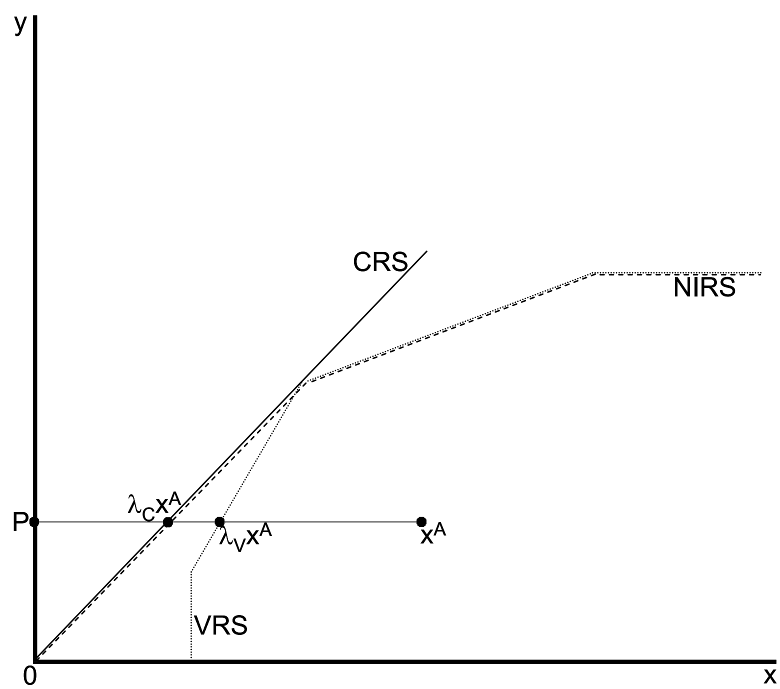
[16] We use this "input approach" as we focus on the level of expenditure; in any case, the alternative output approach tends to yield very similar results as measured by rank correlation. This finding is in line with those in AST; Afonso, Schuknecht, and Tanzi (2006); and Herrera and Pang (2005).

the production possibilities frontier at variable returns to scale, and *NIRS* is the production possibilities frontier at non-increasing returns to scale. Therefore, technical efficiency under variable returns to scale is

$$T_{VRS} = \frac{\overline{P(\lambda_V x^A)}}{\overline{Px^A}} = \lambda_V \,, \tag{3}$$

where λ are the distances shown in Figure 1.

Figure A1. Technical Efficiency



Source: Hauner (2005).

39. To calculate the efficiency scores, an empirical frontier is estimated. An entity is technically efficient if it lies on the frontier, implying a score of 1. Note that efficiency defined as such is in fact only an upper bound of the “true” efficiency because the producers that are relatively the best may themselves have room for improvement. For the entities inside the frontier, efficient production sets are calculated as linear combinations of the production sets of efficient entities with similar output quantities. The scores for the inefficient entities are part of the set [0,1[, where a score of 0.7 implies that the same output could be theoretically produced with only 70 percent of the input.

40. To establish the frontier, the nonparametric DEA approach is used, as it is more adept than parametric approaches at describing frontiers as opposed to central tendencies. Instead of trying to fit a regression plane through the center of the data, DEA constructs a piecewise linear surface that connect the

efficient entities, yielding a convex production possibilities set. DEA has been widely used in efficiency measurement, particularly in services industries, because it does not require the assumption of a particular functional form, deviations from which are misinterpreted as inefficiency by parametric techniques. However, DEA has the disadvantage of interpreting random errors as inefficiency, making it sensitive to outliers, and the results tend to be sensitive to the degrees of freedom. Recently, Simar and Wilson (2007) have proposed two algorithms to resolve some of these problems. However, as their Monte Carlo simulations yield similar results with and without the algorithms with *N*=100, and as Afonso and St. Aubyn (2006) also find "strikingly similar" results with and without them for *N*=25, the traditional approach is retained here, given that we have *N*=79.

41. The computation of the efficiency scores can be briefly sketched as follows. Given an *N x J* input matrix, an *M x J* output matrix, and a scaling vector ϕ, the technical efficiency of unit *j*'s production plan (x^j, y^j) relative to those of the benchmark units $i = 1 \ldots I$ (where $i \neq j$) under variable returns to scale can be calculated as the solution to

$$\begin{aligned}
&\min_{\lambda\phi} \lambda \\
&s.t. y_{jm} \le \sum_i \phi_i y_{im}, m = 1, \ldots, M \\
&\sum_i \phi_i x_{in} \le \lambda x_{jn}, n = 1, \ldots, N \quad . \\
&\phi_i \ge 0 \\
&\sum_i \phi_i = 1.
\end{aligned} \tag{4}$$

When all inputs have been cut by the highest proportion λ possible for all of them at a given output, there could be remaining "slack" in some inputs. To account for the slacks *s*, (4) is changed to

$$\begin{aligned}
&\min_{\lambda\phi} \lambda - \varepsilon\left(\sum_m s_m^+ + \sum_n s_n^-\right) \\
&s.t. y_{jm} = \sum_i \phi_i y_{im} - s_m^+, m = 1, \ldots, M \\
&\sum_i \phi_i x_{in} + s_n^- = \lambda x_{jn}, n = 1, \ldots, N \quad . \\
&\phi_i \ge 0 \\
&\sum_i \phi_i = 1.
\end{aligned} \tag{5}$$

42. In the second stage of analysis, the PSP, PSE, and DEA scores are regressed on a set of potential correlates. The regressions take the form

$$y_i = f\left(z_i\right) + \varepsilon_i, \tag{6}$$

where y_i stands, alternatively, for the PSP, PSE, and DEA scores, z_i is a set of correlates, and ε_i is a continuous i.i.d. random variable uncorrelated with z_i. For the PSP and PSE scores, there is a choice between ordinary least squares OLS and two-stage least squares 2SLS. Given that tests on the OLS results (discussed below) show only very limited instances of endogeneity, OLS is used because it is more efficient. For the DEA scores, most previous studies used Tobit, usually based on the argument that the scores have a probability mass at 1. However, Simar and Wilson (2007) argue that this property is an artifact in finite samples and that it is more appropriate to estimate truncated regressions with maximum likelihood assuming normally distributed error terms, an approach that is adopted here. The standard errors are always corrected for heteroscedasticity.

43. Two robustness checks seem particularly pertinent. First, several correlates might be endogenous. Specifically *ACADEMIC* could be influenced by education sector performance, *EXPHEL/EXPEDU/EXPSOC/EXPTOT* could be endogenous if lower efficiency leads to larger spending, and *PRIVHEL/PRIVEDU* could be endogenous if lower public sector raises private health and education spending. To test the null hypothesis of exogeneity of these variables, we perform a standard augmented regression test[17] on our tested-down regression results but never reject exogeneity at the 10 percent significance level (see bottom line of Table A4). Second, the fact that the PSE ratios have public spending in the denominator may exert a bias when public expenditure is included as a regressor, given that PSP, the numerator of the PSE ratios, varies little. However, excluding public spending from the PSE regressions leaves 14 of the 18 remaining coefficients in the tested-down regressions (which exclude insignificant regressors) in Table A4 unchanged in sign and significance at conventional levels, thus providing little evidence of such a bias. Three of four cases where coefficients are affected concern *OLD*, and the fourth case concerns *ACADEMIC*.

[17] First, the potentially endogenous variables are regressed on a constant and all other explanatory variables. Then, the residuals from these regressions are included as additional regressors in the tested-down regressions. If the coefficient on a residual is significantly different from zero, the null hypothesis of exogeneity is rejected.

B. Background Tables for Local Governments

The background tables in this appendix present the details underlying the discussion in Section D on local governments. Table A1 shows the PSP, PSE, and DEA scores for each region in the health, education, and social protection sectors, as well as the aggregate of the three social sectors. Table A2 shows the univariate regressions underlying the discussion in paragraph 50 and Box 1, while Table A3 shows the corresponding multivariate regressions, and Table A4 the tested-down (that is, excluding the insignificant coefficients from Table A3) multivariate regressions. The variables are presented in Table 4 and Box 1, and the regression methodology is discussed in paragraphs 63–64 in Appendix I.

Table B1. Scores by Region

	Health			Education			Social Protection			Social Sectors		
	PSP	PSE	DEA	PSP	PSE	DEA	PSP	PSE	DEA	PSP	PSE	DEA
Adygeya Republic	0.93	0.15	0.21	0.95	0.14	0.31	0.83	0.23	0.28	0.90	0.52	0.27
Altai Krai	0.98	0.24	0.33	0.86	0.15	0.46	0.83	0.38	0.43	0.89	0.77	0.41
Altai Republic	0.85	0.13	0.23	0.86	0.07	0.16	0.91	0.25	0.31	0.87	0.45	0.23
Amur Oblast	1.02	0.28	0.53	1.00	0.18	0.36	1.15	0.57	0.55	1.06	1.03	0.48
Arkhangel'sk Oblast	1.05	0.38	0.59	1.11	0.26	0.82	1.31	0.78	0.81	1.16	1.42	0.74
Astrakhan Oblast	1.11	0.48	0.70	1.24	0.33	1.00	0.96	0.60	0.58	1.11	1.42	0.76
Bashkortostan Republic	0.96	0.43	0.51	1.03	0.28	0.59	0.95	0.79	0.77	0.98	1.51	0.62
Belgorod Oblast	1.05	0.45	1.00	1.07	0.31	0.80	0.93	0.53	0.56	1.02	1.29	0.78
Bryansk Oblast	0.96	0.27	0.48	1.03	0.22	0.56	0.88	0.41	0.45	0.96	0.90	0.50
Buryat Republic	0.89	0.23	0.31	0.98	0.15	0.35	0.90	0.32	0.33	0.92	0.69	0.33
Chelyabinsk Oblast	0.96	0.48	0.75	1.06	0.37	1.00	1.00	0.74	0.68	1.01	1.59	0.81
Chitinsk Oblast	1.01	0.21	0.41	0.94	0.12	0.26	0.97	0.42	0.40	0.97	0.76	0.36
Chukotsk A. Oblast	1.28	0.28	1.00	1.05	0.12	1.00	1.07	0.68	0.60	1.13	1.09	0.87
Chuvash Republic	1.08	0.32	0.54	1.07	0.22	0.62	0.86	0.42	0.52	1.01	0.97	0.56
Dagestan Republic	0.82	0.18	0.86	0.75	0.10	0.24	0.79	0.24	0.29	0.79	0.51	0.46
Ingush Republic	0.60	0.04	1.00	0.84	0.06	0.23	0.77	0.08	0.12	0.74	0.19	0.45
Irkutsk Oblast	0.99	0.37	0.61	1.11	0.25	1.00	0.98	0.68	0.64	1.02	1.31	0.75
Ivanovo Oblast	1.08	0.29	0.55	1.04	0.22	0.62	0.82	0.25	0.33	0.98	0.75	0.50
Jewish Autonomous O.	0.86	0.18	0.44	0.99	0.14	0.56	1.08	0.40	0.37	0.98	0.72	0.46
Kabardino-Balkar R.	0.90	0.26	0.31	0.90	0.16	0.63	0.86	0.39	0.48	0.89	0.80	0.47
Kaliningrad Oblast	0.88	0.36	0.51	1.02	0.25	0.53	1.08	0.78	0.88	0.99	1.39	0.64
Kalmykiya Republic	1.08	0.20	0.38	0.67	0.08	0.18	0.72	0.20	0.26	0.83	0.47	0.27
Kaluzhska Oblast	0.98	0.38	0.58	1.04	0.24	0.55	0.99	0.54	0.60	1.00	1.16	0.57
Kamchatka Oblast	1.08	0.30	0.73	1.07	0.14	0.41	1.02	0.52	0.48	1.06	0.96	0.54
Karachaev-Circassian R.	0.92	0.20	0.23	0.64	0.10	0.34	0.84	0.18	0.20	0.80	0.47	0.26
Karelian Republic	1.10	0.35	0.64	1.05	0.21	0.64	1.32	0.79	1.00	1.16	1.35	0.76
Kemerovo Oblast	0.97	0.35	0.41	0.99	0.21	0.45	1.15	0.67	0.55	1.04	1.23	0.47
Khabarovsk Krai	0.98	0.32	0.39	0.99	0.24	0.51	1.10	0.53	0.45	1.03	1.09	0.45
Khakasian Republic	0.85	0.32	0.47	0.87	0.17	0.34	1.01	0.71	0.65	0.91	1.20	0.49
Kirov Oblast	1.07	0.28	1.00	1.22	0.23	1.00	0.95	0.59	0.70	1.08	1.10	0.90
Komi Republic	1.06	0.42	0.73	1.14	0.28	1.00	1.60	1.46	1.00	1.26	2.16	0.91
Kostromska Oblast	1.01	0.39	0.94	1.15	0.25	0.87	0.89	0.44	0.49	1.02	1.08	0.76
Krasnodarsk Krai	1.00	0.37	0.44	1.02	0.32	1.00	0.86	0.50	0.54	0.96	1.19	0.66
Krasnoyarsk Krai	0.97	0.37	0.53	0.98	0.24	0.50	1.19	0.87	0.70	1.05	1.49	0.58
Kurgan Oblast	0.86	0.25	0.43	0.97	0.16	0.49	0.82	0.35	0.39	0.88	0.76	0.44
Kursk Oblast	0.98	0.53	0.73	1.01	0.31	1.00	0.98	0.61	0.60	0.99	1.46	0.78
Leningrad Oblast	0.94	0.49	0.66	1.02	0.34	0.80	0.99	0.82	1.00	0.98	1.66	0.82
Lipetsk Oblast	1.09	0.46	1.00	1.08	0.38	1.00	0.91	0.71	0.72	1.03	1.55	0.91
Magadan Oblast	1.17	0.26	1.00	1.06	0.22	0.80	1.09	0.63	0.54	1.11	1.11	0.78
Marii-El Republic	0.95	0.27	0.46	0.94	0.16	0.37	0.75	0.33	0.41	0.88	0.76	0.41
Mordoviya Republic	1.10	0.31	1.00	1.00	0.24	0.48	0.86	0.37	0.44	0.99	0.91	0.64
Moscow	1.16	1.09	1.00	0.87	0.67	1.00	1.25	0.85	0.68	1.09	2.61	0.89
Moscow Oblast	0.95	0.30	0.39	0.87	0.24	0.58	1.22	0.61	0.55	1.01	1.15	0.50
Murmansk Oblast	1.05	0.39	0.57	0.95	0.23	0.88	1.21	0.78	0.65	1.07	1.40	0.70
N. Ossetian-Alaniya R.	1.17	0.24	1.00	1.24	0.20	1.00	0.90	0.34	0.35	1.10	0.79	0.78
Nizhegorod Oblast	0.97	0.53	0.76	1.04	0.37	1.00	1.06	0.87	0.85	1.02	1.77	0.87
Novgorod Oblast	0.97	0.48	0.81	0.96	0.25	1.00	0.93	0.53	0.53	0.96	1.26	0.78
Novosibirsk Oblast	1.06	0.39	0.55	0.91	0.24	0.62	0.99	0.54	0.50	0.99	1.17	0.56
Omsk Oblast	1.05	0.38	0.53	1.04	0.31	1.00	1.03	0.58	0.52	1.04	1.27	0.68
Orenburg Oblast	1.04	0.34	0.57	0.92	0.24	0.55	0.92	0.76	0.85	0.96	1.34	0.66
Orlov Oblast	0.97	0.39	0.61	1.11	0.26	0.82	0.86	0.61	0.65	0.98	1.26	0.69
Penza Oblast	0.90	0.29	0.36	0.94	0.20	0.46	0.88	0.52	0.64	0.91	1.01	0.49
Perm Oblast	1.02	0.46	0.68	1.06	0.31	1.00	1.08	0.84	0.73	1.05	1.61	0.80
Primorye Krai	0.93	0.35	0.40	0.96	0.22	0.46	0.94	0.60	0.65	0.94	1.17	0.50
Pskov Oblast	0.89	0.26	0.48	1.05	0.22	0.57	0.96	0.46	0.50	0.97	0.94	0.52
Rostov Oblast	0.88	0.33	0.41	0.84	0.22	0.36	0.99	0.40	0.37	0.90	0.96	0.38
Ryazan Oblast	1.06	0.49	0.82	1.07	0.33	0.95	0.89	0.62	0.70	1.01	1.44	0.82
Saint Petersburg	1.30	0.72	1.00	1.04	0.33	0.81	1.65	0.73	1.00	1.33	1.78	0.94
Sakha R. (Yakutiya)	1.04	0.29	0.58	0.98	0.12	0.29	1.07	0.60	0.53	1.03	1.01	0.47
Sakhalin Oblast	1.02	0.33	0.68	0.95	0.30	0.60	1.12	0.87	0.73	1.03	1.49	0.67
Samara Oblast	1.06	0.82	1.00	0.98	0.44	1.00	1.12	0.75	0.64	1.05	2.02	0.88
Saratov Oblast	1.00	0.42	0.49	1.02	0.34	0.80	0.93	0.64	0.69	0.98	1.39	0.66
Smolensk Oblast	1.12	0.48	0.82	1.11	0.29	1.00	0.98	0.64	0.64	1.07	1.42	0.82
Stavropol Krai	0.94	0.39	0.45	0.84	0.20	0.58	0.90	0.50	0.53	0.89	1.09	0.52
Sverdlovsk Oblast	0.97	0.44	0.57	1.00	0.31	0.67	1.22	0.94	0.76	1.06	1.70	0.67
Tambov Oblast	0.98	0.39	0.72	1.04	0.26	0.77	0.88	0.60	0.63	0.97	1.25	0.71
Tatarstan Republic	1.01	0.41	0.51	1.05	0.30	0.79	0.99	0.99	0.93	1.01	1.70	0.74
Tomsk Oblast	1.06	0.69	1.00	1.03	0.36	0.91	1.25	1.12	0.93	1.11	2.17	0.95
Tula Oblast	0.98	0.31	0.65	1.03	0.26	0.72	0.99	0.62	0.72	1.00	1.19	0.69
Tver Oblast	1.03	0.42	0.70	1.11	0.32	1.00	0.99	0.62	1.00	1.04	1.37	0.90
Tyumen Oblast	1.04	0.65	0.85	1.05	0.50	1.00	1.34	1.37	1.00	1.15	2.52	0.95
Tyva Republic	0.94	0.08	0.23	0.91	0.05	0.14	0.84	0.16	0.19	0.90	0.29	0.19
Udmurt Republic	1.07	0.39	0.63	1.10	0.27	1.00	0.95	0.82	1.00	1.04	1.47	0.88
Ulyanov Oblast	0.91	0.24	0.29	1.05	0.28	0.69	0.84	0.60	0.66	0.93	1.12	0.55
Vladimir Oblast	0.98	0.35	0.56	1.03	0.23	0.74	0.90	0.46	0.58	0.97	1.05	0.63
Volgograd Oblast	0.97	0.44	0.68	0.80	0.24	0.44	0.98	0.71	0.69	0.92	1.39	0.60
Vologodsk Oblast	0.94	0.46	0.72	1.09	0.29	1.00	1.09	0.91	0.80	1.04	1.66	0.84
Voronezh Oblast	1.06	0.33	0.42	1.02	0.29	0.71	0.86	0.64	0.69	0.98	1.26	0.60
Yaroslavl Oblast	1.11	0.48	0.83	1.09	0.34	1.00	1.04	1.12	1.00	1.08	1.93	0.94

Source: Fund staff calculations.

Table B2. Local Governments—Univariate Regressions of Scores

Dependent Variable	Health			Education			Social Protection			Social Sectors		
	PSP	PSE	DEA	PSP	PSE	DEA	PSP	PSE	DEA	PSP	PSE	DEA
INCPERCAP	1.2E-6**	2.4E-6***	6.0E-6***	7.0E-7**	1.5E-6***	0.00	-1.9E-6***	2.1E-6***	1.2E-6***	0.00	6.0E-6***	6.4E-6***
	(0.04,0.19)	(0.01,0.32)	(0.00,0.19)	(0.06,0.06)	(0.00,0.33)	(0.11,0.37)	(0.01,0.22)	(0.00,0.21)	(0.00,0.50)	(0.96,0.00)	(0.00,0.35)	(0.00,0.49)
FUEL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.6E-3**	0.01*	0.00	5.0E-3*	0.00
	(0.87,0)	(0.21,0.02)	(0.17,0.02)	(0.90,0.00)	(0.15,0.04)	(0.80,0.00)	(0.75,0.00)	(0.04,0.07)	(0.08,0.07)	(0.66,0.00)	(0.07,0.05)	(0.12,0.03)
ALCTOB	4.7E-2**	0.00	0.01	0.03*	0.00	38.75	-0.07***	0.01	0.07	0.00	0.01	0.05
	(0.02,0.13)	(0.84,0.00)	(0.91,0.00)	(0.07,0.05)	(0.85,0.00)	(0.38,0.02)	(0.00,0.14)	(0.65,0.00)	(0.20,0.04)	(0.89,0.00)	(0.83,0.00)	(0.19,0.02)
OLD	0.00	0.01***	0.00	0.01***	0.01***	0.03***	0.00	0.01***	0.02**	2.6E-3*	0.03***	0.02**
	(0.61,0.01)	(0.00,0.13)	(0.79,0.00)	(0.01,0.07)	(0.00,0.20)	(0.00,0.29)	(0.87,0.00)	(0.01,0.11)	(0.03,0.08)	(0.07,0.04)	(0.00,0.17)	(0.03,0.08)
DENSITY	0.00	0.00	0.00	-3.0E-4***	0.00	0.44	0.00	0.00	0.00	0.00	0.00	0.00
	(0.80,0.00)	(0.20,0.12)	(0.57,0.01)	(0.01,0.02)	(0.11,0.14)	(0.54,0.01)	(0.57,0.01)	(0.97,0.00)	(0.90,0.00)	(0.96,0.00)	(0.27,0.06)	(0.51,0.01)
TEMPJAN	0.00	0.00	0.00	0.00	0.00	0.00	0.01***	0.00	0.00	1.6E-3**	0.01	0.00
	(0.27,0.02)	(0.36,0.01)	(0.55,0.01)	(0.50,0.01)	(0.13,0.03)	(0.32,0.02)	(0.00,0.16)	(0.40,0.01)	(0.82,0.00)	(0.05,0.05)	(0.28,0.02)	(0.48,0.01)
MOSCOW	0.00	-1.7E-5***	0.00	0.00	-1.3E-5***	-2.8E-5***	-1.2E-5***	-1.7E-5***	-2.4E-5***	-5.2E-6**	-4.7E-5***	-2.5E-5***
	(0.85,0.00)	(0.00,0.09)	(0.24,0.02)	(0.16,0.01)	(0.00,0.14)	(0.00,0.12)	(0.00,0.05)	(0.00,0.07)	(0.01,0.05)	(0.03,0.06)	(0.00,0.12)	(0.00,0.08)
POPULATION	0.00	5.7E-5***	0.00	0.00	3.7E-5***	0.00	0.00	2.6E-5**	5.3E-5*	0.00	1.2E-4***	3.9E-5*
	(0.37,0.01)	(0.00,0.35)	(0.58,0.01)	(0.16,0.02)	(0.00,0.37)	(0.13,0.04)	(0.19,0.03)	(0.03,0.06)	(0.07,0.08)	(0.25,0.03)	(0.00,0.27)	(0.07,0.05)
TRANSFERS	-2.2E-3***	-0.01***	-0.01**	-1.8E-3***	-3.8E-3***	-0.03	4.3E-3***	-0.01***	-0.01***	0.00	-0.02***	-0.01***
	(0.00,0.19)	(0.00,0.60)	(0.02,0.11)	(0.01,0.12)	(0.00,0.63)	(0.12,0.37)	(0.00,0.34)	(0.00,0.43)	(0.00,0.58)	(0.79,0.00)	(0.00,0.69)	(0.00,0.48)
RISK	0.00	-0.06***	-0.01	-0.02	-0.05***	-0.09***	0.04**	-0.08***	-0.13***	0.00	-0.19***	-0.08***
	(0.72,0.00)	(0.00,0.19)	(0.81,0.00)	(0.15,0.03)	(0.00,0.27)	(0.00,0.21)	(0.04,0.07)	(0.00,0.27)	(0.00,0.30)	(0.44,0.01)	(0.00,0.30)	(0.00,0.14)
SHADOW	-4.2E-3**	0.00	0.00	-4.4E-3***	0.00	-0.01*	0.00	-4.7E-3*	-0.01*	-1.9E-3***	0.00	-0.01
	(0.03,0.12)	(0.89,0.00)	(0.77,0.00)	(0.00,0.11)	(0.96,0.00)	(0.06,0.06)	(0.28,0.03)	(0.06,0.05)	(0.07,0.06)	(0.01,0.07)	(0.58,0.01)	(0.11,0.03)
ACADEMIC	0.00	0.01	0.02**	-4.7E-3**	0.00	0.00	0.00	-0.01*	-0.01	0.00	0.00	0.00
	(0.84,0.00)	(0.44,0.04)	(0.04,0.07)	(0.04,0.05)	(0.69,0.01)	(0.56,0.01)	(0.38,0.03)	(0.09,0.06)	(0.27,0.03)	(0.78,0.00)	(0.98,0.00)	(0.82,0.00)
URBAN	3.8E-3***	0.01***	0.01***	3.4E-3***	4.6E-3***	0.09	-0.01***	4.2E-3**	0.01***	0.00	0.02***	0.01***
	(0.00,0.22)	(0.00,0.34)	(0.01,0.11)	(0.00,0.16)	(0.00,0.35)	(0.60,0.27)	(0.00,0.39)	(0.02,0.10)	(0.00,0.33)	(0.90,0.00)	(0.00,0.29)	(0.00,0.32)
EXPHEL/EXPEDU/	-0.02***	-0.05***	-0.03	-0.01***	-0.03***	-0.25*	0.08***	-0.11***	-0.22***	0.00	-0.05***	-0.03***
EXPSOC/EXPTOT 1/	(0.01,0.17)	(0.00,0.47)	(0.42,0.03)	(0.00,0.11)	(0.00,0.59)	(0.10,0.42)	(0.00,0.37)	(0.00,0.55)	(0.00,0.67)	(0.90,0.00)	(0.00,0.62)	(0.00,0.43)
PRIVHEL/PRIVEDU/	-0.01	0.00	-0.17***	-0.04	-0.03	-0.12**						
n.a./n.a. 1/	(0.51,0.01)	(0.91,0.00)	(0.01,0.11)	(0.12,0.05)	(0.13,0.04)	(0.03,0.10)						

Source: Fund staff calculations.

Notes: *N*=79. All regressions include a constant that is not reported. Heterocesdosticity-robust *P*-values and R^2s in parentheses. ***/**/* indicates significance at the 1 percent/5 percent/10 percent levels, respectively.

1/ The first, second, third, and fourth alternatives apply to the regressions for health, education, social protection, and all three social sectors, respectively.

Table B3. Local Governments—Multivariate Regressions of Scores

Dependent Variable	Health			Education			Social Protection			Social Sectors		
	PSP	PSE	DEA	PSP	PSE	DEA	PSP	PSE	DEA	PSP	PSE	DEA
CONSTANT	0.73***	0.01	-0.75	0.56**	-0.04	-0.58	1.25***	1.03***	0.51	0.85***	1.02***	0.04
	(0.00)	(0.95)	(0.22)	(0.02)	(0.69)	(0.57)	(0.00)	(0.00)	(0.11)	(0.00)	(0.01)	(0.90)
INCPERCAP	0.00	2.1E-6**	4.5E-6*	0.00	2.1E-6***	2.1E-6***	0.00	0.00	2.1E-6**	0.00	4.1E-6***	4.1E-6***
	(0.23)	(0.02)	(0.07)	(0.26)	(0.00)	(0.00)	(0.26)	(0.49)	(0.01)	(0.60)	(0.00)	(0.00)
FUEL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.3E-3**	3.0E-3**	0.00	0.00	0.00
	(0.81)	(0.49)	(0.48)	(0.36)	(0.12)	(0.51)	(0.37)	(0.02)	(0.02)	(0.33)	(0.12)	(0.50)
ALCTOB	0.02	-0.01	-0.01	0.02	-0.01	0.09	-0.01	-0.03	0.00	0.01	-0.03	0.00
	(0.16)	(0.66)	(0.91)	(0.41)	(0.33)	(0.28)	(0.48)	(0.16)	(0.84)	(0.48)	(0.31)	(0.92)
OLD	0.00	0.00	0.02	0.01*	0.01***	0.01	0.00	0.00	0.00	0.00	0.01	0.00
	(0.97)	(0.27)	(0.19)	(0.08)	(0.01)	(0.67)	(0.89)	(0.90)	(0.90)	(0.26)	(0.14)	(0.49)
DENSITY	0.00	0.00	-1.1E-3*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.72)	(0.69)	(0.10)	(0.94)	(0.85)	(0.65)	(1.00)	(0.92)	(0.34)	(0.75)	(0.76)	(0.18)
TEMPJAN	0.00	0.00	0.01	0.00	0.00	0.01*	3.9E-3*	0.00	0.00	0.00	0.00	0.00
	(0.84)	(0.41)	(0.29)	(0.52)	(0.97)	(0.06)	(0.08)	(0.51)	(0.86)	(0.46)	(0.81)	(0.22)
MOSCOW	0.00	0.00	0.00	0.00	0.00	-4.0E-5**	0.00	0.00	-1.9E-5**	-1.0E-5*	0.00	-1.9E-5**
	(0.45)	(0.19)	(0.28)	(0.64)	(0.76)	(0.04)	(0.14)	(0.35)	(0.01)	(0.09)	(0.48)	(0.02)
POPULATION	0.00	0.00	0.00	-3.5E-5**	0.00	0.00	-3.5E-5*	0.00	0.00	0.00	0.00	-3.5E-5**
	(0.74)	(0.43)	(0.28)	(0.03)	(0.30)	(0.37)	(0.08)	(0.85)	(0.21)	(0.72)	(0.45)	(0.02)
TRANSFERS	0.00	-2.2E-3**	0.00	0.00	0.00	0.00	3.1E-3**	0.00	0.00	0.00	-4.9E-3**	0.00
	(0.59)	(0.03)	(0.50)	(0.96)	(0.12)	(0.42)	(0.01)	(0.75)	(0.84)	(0.19)	(0.04)	(0.32)
RISK	0.02**	0.01	0.07**	0.00	0.00	0.01	0.01	-0.01	-0.03**	0.01	-0.01	0.01
	(0.04)	(0.30)	(0.02)	(0.90)	(0.89)	(0.77)	(0.59)	(0.45)	(0.07)	(0.12)	(0.81)	(0.69)
SHADOW	0.00	0.00	0.01	0.00	0.00	0.00	-0.01***	0.00	0.00	-2.8E-3**	0.00	0.00
	(0.12)	(0.31)	(0.15)	(0.84)	(0.45)	(0.56)	(0.00)	(0.20)	(0.91)	(0.01)	(0.95)	(0.41)
ACADEMIC	4.8E-3**	0.01***	0.03***	0.00	0.00	0.01	0.00	0.00	0.00	2.6E-3*	0.01	0.01**
	(0.04)	(0.00)	(0.00)	(0.89)	(0.13)	(0.44)	(0.43)	(0.71)	(0.74)	(0.09)	(0.18)	(0.05)
URBAN	0.00	0.00	0.01**	3.6E-3**	3.6E-3*	0.00	-3.5E-3**	0.00	3.6E-3**	0.00	0.00	4.5E-3***
	(0.11)	(0.26)	(0.05)	(0.02)	(0.09)	(0.42)	(0.01)	(0.18)	(0.04)	(0.57)	(0.99)	(0.00)
EXPHEL/EXPEDU/	-0.01	-0.03***	0.01	0.00	-0.01	-0.06	0.02	-0.11***	-0.10***	0.00	-0.02***	0.00
EXPSOC/EXPTOT 1/	(0.19)	(0.00)	(0.68)	(0.94)	(0.17)	(0.24)	(0.23)	(0.00)	(0.00)	(0.75)	(0.00)	(0.38)
PRIVHEL/PRIVEDU/	0.01	0.00	-0.12**	-0.01	0.01	-0.05						
n.a./n.a. 1/	(0.62)	(0.77)	(0.02)	(0.57)	(0.36)	(0.40)						
Adjusted R^2	0.33	0.76	0.35	0.26	0.80	0.54	0.60	0.65	0.70	0.16	0.79	0.66

Source: Fund staff calculations.

Notes: N=79. Heteroscedosticity-robust P-values in parentheses. ***/**/* indicates significance at the 1 percent/5 percent/10 percent level, respectively.

1/ The first, second, third, and fourth alternatives apply to the regressions for health, education, social protection, and all three social sectors, respectively.

Table B4. Local Governments—Tested-Down Regressions of Scores

Dependent Variable	Health			Education			Social Protection			Social Sectors		
	PSP	PSE	DEA	PSP	PSE	DEA	PSP	PSE	DEA	PSP	PSE	DEA
CONSTANT	0.86***			0.61***		0.54**	1.26***	0.93***	0.64***	1.04***	0.70***	
	(0.00)			(0.00)		(0.03)	(0.00)	(0.00)	(0.0007)	(0.00)	(0.00)	
INCPERCAP		2.1E-6***	2.1E-6*	9.1E-7***	2.1E-6***	1.1E-5***					2.1E-6***	4.8E-6***
		(0.00)	(0.09)	(0.00)	(0.00)	(0.00)					(0.00)	(0.00)
FUEL					7.5E-4**			2.8E-3***	3.9E-3***		3.7E-3***	
					(0.03)			(0.00)	(0.01)		(0.01)	
ALCTOB								-0.03*				
								(0.01)				
OLD		0.01***	0.01***	0.01***	0.01***						0.02***	
		(0.00)	(0.01)	(0.00)	(0.00)						(0.00)	
DENSITY												
TEMPJAN							7.0E-3***					
							(0.00)					
MOSCOW						-5.1E-5***		-1.0E-5***	-1.6E-5***	-1.0E-5***		-3.1E-5***
						(0.01)		(0.01)	(0.00)	(0.00)		(0.00)
POPULATION				-3.1E-5***	1.0E-5***		2.0E-5**					-2.6E-5*
				(0.00)	(0.00)		(0.02)					(0.06)
TRANSFERS		-2.8E-3***	-4.2E-3*				2.6E-3***			-5.5E-3*		
		(0.00)	(0.08)				(0.00)			(0.00)		
RISK	0.02**		0.06*							0.02***		
	(0.03)		(0.07)							(0.01)		
SHADOW	-4.2E-3***	2.9E-3***					-4.9E-3***	-2.3E-3*		-2.5E-3***		
	(0.00)	(0.01)					(0.00)	(0.10)		(0.00)		
ACADEMIC	4.6E-3**	0.01***	0.02***		2.0E-3**						0.01**	
	(0.02)	(0.00)	(0.00)		(0.03)						(0.02)	
URBAN	2.0E-3**			3.1E-3***			-3.8E-3***		3.9E-3*			6.6E-3***
	(0.02)			(0.00)			(0.00)		(0.06)			(0.00)
EXPHEL/EXPEDU/	-0.02***	-0.02***			-0.01***	-0.06**	0.04***	-0.11***	-0.15***		-0.02***	
EXPSOC/EXPTOT 1/	(0.00)	(0.00)			(0.00)	(0.03)	(0.01)	(0.00)	(0.00)		(0.00)	
PRIVHEL/PRIVEDU/			-0.13***									
n.a./n.a. 1/			(0.01)									
Adjusted R^2	0.36	0.77	0.36	0.34	0.80	0.55	0.61	0.68	0.71	0.19	0.80	0.67
Endogeneity test p 2/	0.38	0.35	0.40	n.a.	0.49, 0.31	0.58	0.23	0.61	0.15	n.a.	0.66	n.a.

Notes: N=79. Heteroscedosticity-robust P-values in parentheses. ***/**/* indicates significance at the 1 percent/5 percent/10 percent level, respectively.

1/ The first, second, third, and fourth alternatives apply to the regressions for health, education, social protection, and all three social sectors, respectively.

2/ P-value(s) of coefficients on residuals from auxiliary regressions added to the regressors; when more than one of the potentially endogenous variables is included in a given regression, the p-values are given in the order of appearance of the variables above. See Appendix I for more details.

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