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GeorgiaState University | ANDREW YOUNG SCHOOL OF POLICY STUDIES

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**January 2014**

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# Andrew Young School of Policy Studies

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# Efficiency Cost of Fiscal Equalization:

# The Case of Belarus

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## Introduction

Belarus is the last command economy left standing in Europe. Because it still has an option of a gradual transition ("Chinese style'"), the study of Belarus' case can present insights on the counterfactual to the "shock therapy" approach undertaken by the rest of the Central and Eastern European countries. However, the viability of the existing system hinges on its ability to weather short-term external economic shocks and to adjust to a significant list of medium term structural challenges. Now that more than half of Belarus' consolidated public expenditures, excluding social security, takes place at the subnational levels of government, its ability to adjust largely hinges on the incentives that the system of intergovernmental relations presents to subnational officials. Belarus' experience with the recent recurrent macro-economic turmoil suggests that the incentives embedded in the system of intergovernmental fiscal transfers might hinder its ability to undergo fiscal adjustment and consolidation. Thus, since 2008, Belarus underwent one of the largest contractions in the size of government in the region, with public expenditures contracting by 12.9 percentage points of GDP and finally dropping to 37 percent of GDP at the end of 2011 (Figure 1).

**Figure 1 Belarus Significantly Reduced the Size of the General Government Budget**
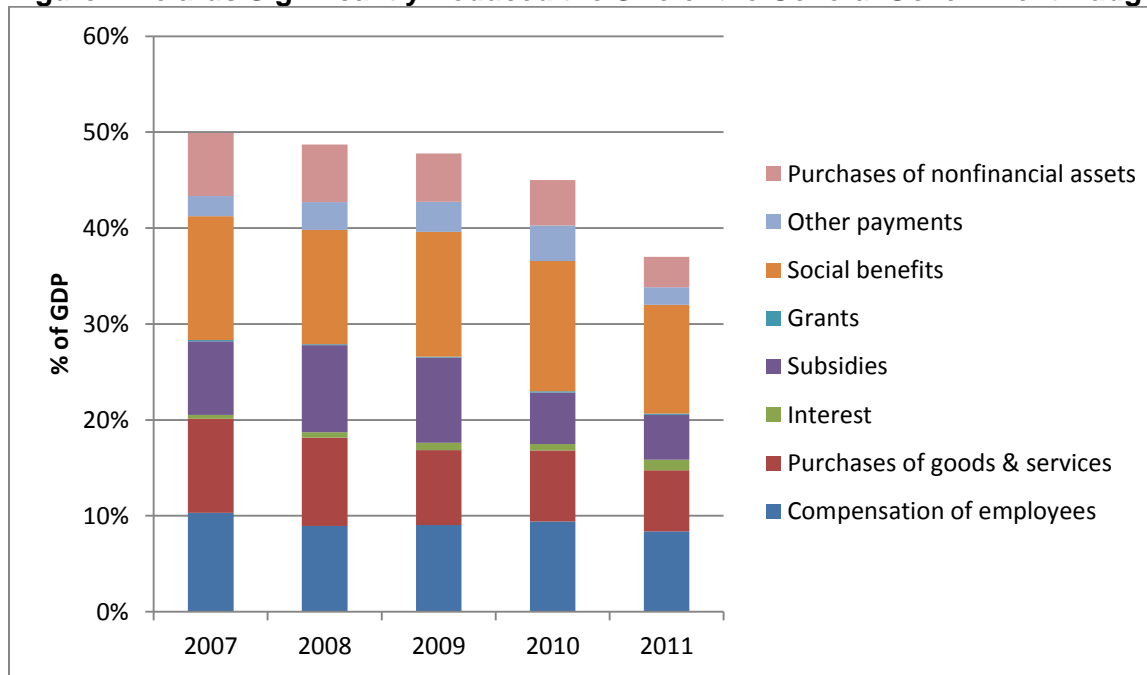


*Source:* World Bank staff estimates, MOF.

An important feature of the process is that a reduction of subsidies from the national budget to enterprises was partially offset by an increase in subsidies from subnational budgets. As a result, today subnational budgets account for two thirds of all subsidies to enterprises, compared to only one third in 2008. In addition, there are signs that the current system of intergovernmental fiscal relations might not provide the correct or even sufficient incentives to improve the efficiency of subnational government service delivery. This lack of efficiency might be interpreted as the necessary price to pay for the almost complete bridging of fiscal disparities among regions. Thus, while in per capita terms the City of Minsk has three times more locally-derived revenues than the poorest region, after the allocation of intergovernmental transfers this gap narrows to only 18 percent. In a similar vein, while sub-region districts (similar to the U.S. counties) have 8 percent lower levels in locally-derived revenues per capita than the cities' average, the districts end up with 40 percent more revenue per capita than the cities after the allocation of grants. As a result, sub-region districts spend more per capita on each function than the city average. Because, outside Minsk City,  two thirds of the population resides in sub-region districts, those higher per capita expenditures add up to a substantial amount of budget funds.
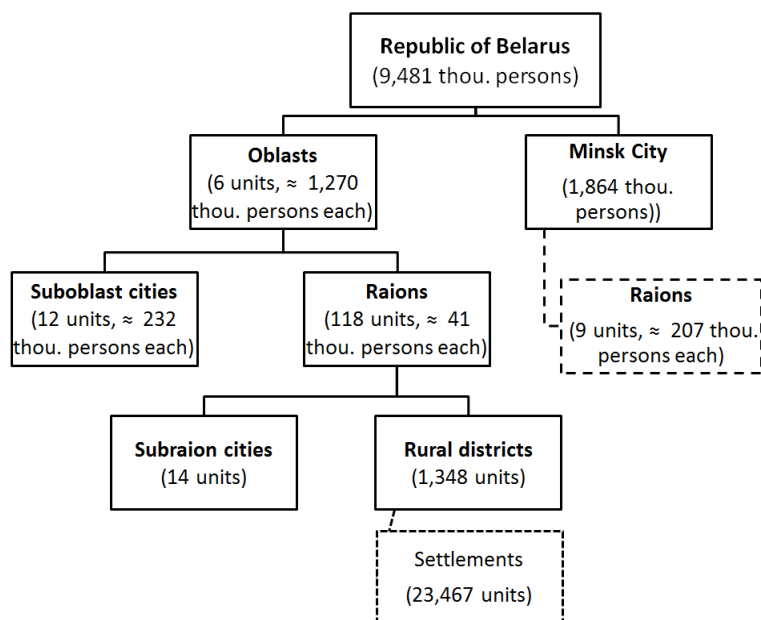
Belarus has made tangible progress in recent years in various aspects of its system of intergovernmental fiscal relations. In particular, by 2005 de facto expenditure responsibilities had been revised with the central government, appropriately, assuming a greater role in economic affairs and social policy. Later, the Ministry of Finance developed a formula-based methodology for the allocation of general-purpose grants, which is yet to be implemented. However, the current systems as it stands falls significantly short of the gains in public sector efficiency that can be realized from a well-structured system of intergovernmental fiscal relations.

In this paper, we analyze how differences in per capita expenditures of different cities and different districts relate to the difference in incentives faced by local officials within the current system of intergovernmental fiscal relations. In particular, we examine the role of a list of potential determinants of per capita expenditures, including reliance on own-source revenues, economies of scale in terms of population and land area, and demographic trends among other factors.

## II. Institutional framework

In Belarus, the territorial division of public administration is comprised of four tiers, including three subnational tiers (Figure 2).

In Belarus, excessive fragmentation would not appear to be a concern except for the lowest tier of government (rural districts, rural settlements and towns of raion's subordination). As we can see in Table 1 the average size of the lowest tier jurisdictions is about 3,600, which is below the threshold of 10,000 for the efficient—or minimum cost—delivery of public services. Although there is information on the population of settlements, it was not possible to establish how these jurisdictions are bundled into political jurisdictions at the bottom tier. We suspect, however, as is the case in other countries, that there is considerable variation in the size of these jurisdictions and so not all of them are likely to have insufficient scale. In the next section, we provide some evidence of economies of scale in the provision of main functions by raion governments.

**Figure 2. Diagram of the tiers of public administration**

```
                    ┌────────────────────────┐
                    │  Republic of Belarus    │
                    │  (9,481 thou. persons)  │
                    └────────────────────────┘
              ┌────────────────────┴──────────────────┐
    ┌──────────────────────┐              ┌──────────────────────┐
    │      Oblasts         │              │     Minsk City       │
    │  (6 units, ≈ 1,270   │              │    (1,864 thou.      │
    │  thou. persons each) │              │     persons))        │
    └──────────────────────┘              └──────────────────────┘
      ┌──────────┴──────────┐                    │
┌──────────────────┐ ┌──────────────────┐   ┌┄┄┄┄┄┄┄┄┄┄┄┄┄┄┄┄┐
│ Suboblast cities │ │     Raions       │   ┆     Raions      ┆
│ (12 units, ≈ 232 │ │ (118 units, ≈ 41 ├┄┄┆ (9 units, ≈ 207  ┆
│thou. persons each)│ │thou. persons each)│   ┆ thou. persons  ┆
└──────────────────┘ └──────────────────┘   ┆    each)        ┆
                ┌──────────┴──────────┐     └┄┄┄┄┄┄┄┄┄┄┄┄┄┄┄┄┘
        ┌──────────────────┐ ┌──────────────────┐
        │  Subraion cities │ │  Rural districts │
        │    (14 units)    │ │   (1,348 units)  │
        └──────────────────┘ └──────────────────┘
                                   ┌┄┄┄┄┄┄┄┄┄┄┄┄┄┄┄┄┐
                                   ┆   Settlements   ┆
                                   ┆ (23,467 units)  ┆
                                   └┄┄┄┄┄┄┄┄┄┄┄┄┄┄┄┄┘
```

*Source:* Prepared by authors based on data from the National Statistical Committee of the Republic of Belarus and World Bank (2009)

**Table 1. Population of subnational jurisdictions, persons, 2011**

|  | Oblasts and the City of Minsk | Top level jurisdictions | | Bottom level jurisdictions |
|---|---|---|---|---|
|  |  | Raions | Suboblast cities |  |
| Number of units | 7 | 118 | 12 | 1,357 |
| Mean | 1,354,456 | 41,003 | 231,559 | 3,566 |
| Min | 1,066,010 | 10,894 | 62,075 | n/a |
| Max | 1,864,090 | 186,325 | 501,312 | n/a |
| Coefficient of Variation | 0.20 | 0.78 | 0.60 | n/a |

Source: National Statistical Committee of the Republic of Belarus and World Bank (2009).

Note: Figures for the top and bottom sub-oblast jurisdictions do not include population of the Minsk City

**Table 2: Government Expenditure as % of GDP, 2007-10**

|  | 2007 | | 2008 | | 2009 | | 2010 | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | CG | LG | CG | LG | CG | LG | CG | LG |
| **Total** | **20.84** | **18.29** | **21.40** | **17.30** | **20.08** | **17.00** | **16.06** | **17.79** |
| General public services | 2.14 | 1.22 | 2.03 | 1.08 | 2.42 | 1.06 | 2.03 | 1.17 |
| Defense | 1.23 | 0.02 | 1.09 | 0.01 | 0.98 | 0.01 | 0.99 | 0.00 |
| Public order and safety | 2.00 | 0.33 | 1.74 | 0.29 | 1.75 | 0.27 | 1.94 | 0.11 |
| National economy | 9.59 | 2.44 | 11.24 | 2.13 | 9.14 | 2.36 | 5.68 | 2.32 |
| Environmental protection | 0.55 | 0.00 | 0.37 | 0.06 | 0.20 | 0.10 | 0.14 | 0.16 |
| Housing and communal services | 0.14 | 3.33 | 0.19 | 3.70 | 0.24 | 3.43 | 0.24 | 3.81 |
| Health | 1.09 | 3.96 | 0.97 | 3.43 | 1.08 | 3.40 | 1.00 | 3.55 |
| Physical culture, sports, culture and media | 0.86 | 1.04 | 0.85 | 1.12 | 0.92 | 1.02 | 0.58 | 1.09 |
| Education | 1.67 | 4.86 | 1.49 | 4.42 | 1.51 | 4.30 | 1.54 | 4.51 |
| Social policy | 1.57 | 1.08 | 1.44 | 1.05 | 1.85 | 1.05 | 1.93 | 1.07 |

*Source*: IMF - Government Finance Statistics

*Note:* CG. Central Government w/o Social Security Funds and transfers to subnational governments

LG. Local Governments

In terms of the overall public sector, until recently, Belarus has had rather large general government expenditures, accounting for 45% of GDP in 2010, out of which 11.2% of GDP by social security funds. This puts Belarus among the high public expenditures or tax revenue ratios to GDP league of countries, many of which have considerable higher per capita income than Belarus.

As the legal framework does not provide a clear assignment of functions, we look at the actual expenditures to gauge the relative roles of different tiers of subnational government. In 2011, subnational budgets in Belarus accounted for 55.4% of general government expenditures excluding social security funds (up from 43.2% in 2009) and 39.3% of general government tax revenues excluding social security funds (up from 35.9% in 2009). The increase in the decentralization ratios have been mostly due to a reduction of central government expenditures on national economy and culture and an across the board increase of subnational expenditures other than on national economy and public order (Table 2). Local government expenditures saw only a one-year dip in 2009, while the central government expenditures (excluding social funds) have been contracting as a percentage of GDP throughout these years. This might indicate that the fiscal consolidation achieved at the national level might be blocked at the subnational level.[1] In particular the share of subnational government in general government outlays on economic affairs increased from 16 percent in 2007 to 35 percent in 2010, mainly as a result of withdrawal of the national government from these activities.

The prevailing legal framework largely delineates responsibilities around the current distribution of "social assets" (or facilities) rather than dividing functions with regard to policy, regulation and financing. With the exception of three functions that are exclusively assigned to the national government (defense, law enforcement and promotion of the national economy) subnational governments carry out important responsibilities in most core government

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[1] For some other countries in the region, it was found that, unless proper incentives are embedded into the system, decentralization can interfere fiscal consolidation, especially elimination of residual subsides associated with price controls (e.g., Timofeev 2001). This is because, in multi-tier governments, subnational levels tend to be more sensitive to "social" and "political" aspects of these reforms due their proximity to the constituency.

functions.[2] However, for many functions, the Budget Code assigns the responsibility for funding service facilities to a certain level of government based on the ownership of these facilities. For example, the Budget Code states that local governments are responsible for maintaining institutions of education, healthcare, social services and others that are *owned by or put under authority* of local governments. As a result, the division of responsibilities for many of the core functions between the levels of government is determined according to the obsolete framework of what is the current distribution of "social assets" (or infrastructure) between the levels of government. Thus, even though the Budget Code may provide clarity about what level is responsible for financing certain facilities, it is less clear what level of government is responsible for promulgating policies and regulations with regard to particular functions and services. In practice, it appears that across most functions, responsibilities are shared between different levels of Government with the central Government exercising important policy and regulatory functions, while subnational governments are responsible for running service delivery facilities

Outside Minsk City, over two-thirds of subnational expenditures takes place at the sub-oblast level (Table 3). In particular, oblast governments proper account for less than a fifth of subnational expenditures on education and housing and utilities. The bulk of the key subnational expenditures takes place at the sub-oblast level.[3] However, oblast governments dominate other categories of expenditures; in particular they account for eighty percent of oblast-local expenditures on the national economy.

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[2] Articles 44-47 of the Budget Code (adopted on July 16, 2008) provide the assignments of expenditure responsibilities among the levels of government. For the oblast level there are only a few exclusive assignments: rescue diving, territorial defense, management of land resources, and inter-city transport. For the city/raion level the exclusive assignments are: city transit, subsidization of fuel wood and coal, subsidization of utilities, public housing and saunas, ambulances, child day centers and foster care.

[3] This is quite typical for the "Russian matryoshka-doll" type of hierarchical structure inherited by many countries in the region from the Soviet past. In that system, all the "outer dolls" are typically quite hollow, mostly playing the liaison role between the center and the bottom tier, with the latter being responsible for the delivery of most public services.

**Table 3: The role of oblast governments, % of oblast-local totals, 2011**

|  | Oblast proper | Sub-oblast cities | Raions |
|---|---|---|---|
| **Population covered** | **100%** | **36%** | **64%** |
| **Total expenditures** | **32%** | **20%** | **47%** |
| Housing and utilities | 17% | 28% | 56% |
| Healthcare | 29% | 28% | 43% |
| Recreation and culture | 40% | 13% | 47% |
| Education | 15% | 23% | 62% |
| Other expenditures | 65% | 8% | 27% |

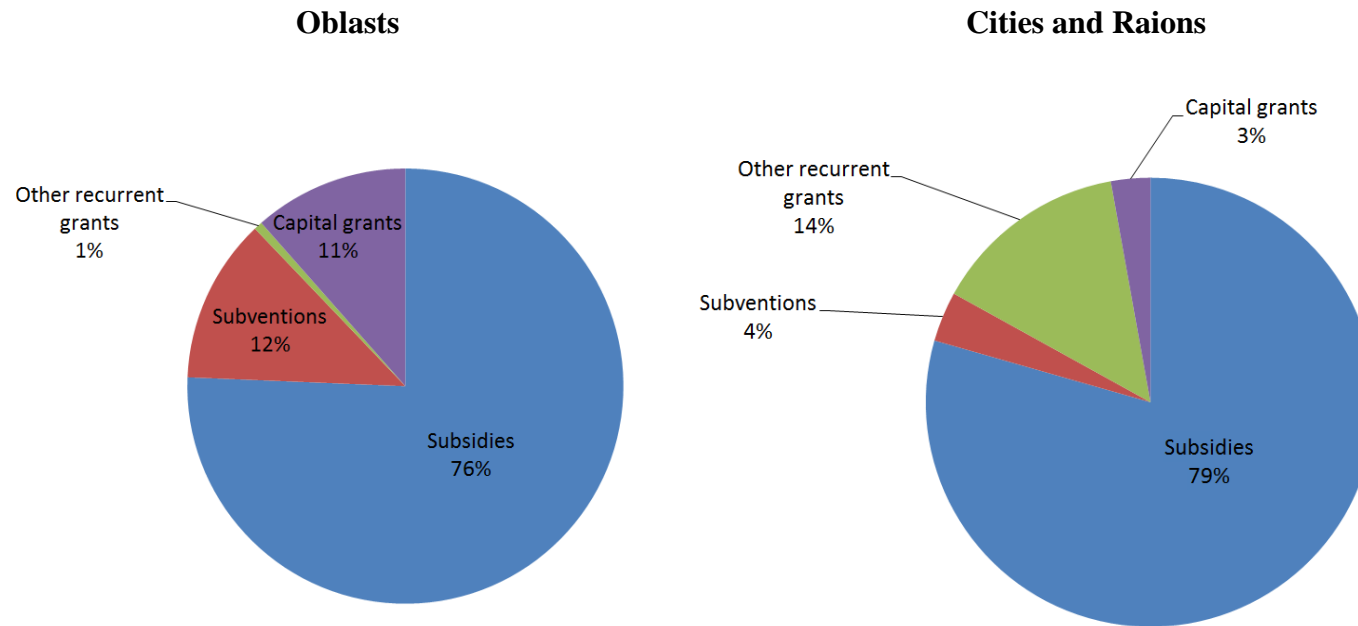*Source:* Prepared by the authors based on Ministry of Finance data

*Note*: These figures do not include Minsk City

Subnational expenditures are predominantly financed by shared revenues from national taxes and other transfers. Shared revenue from national taxes is the largest financing item, contributing roughly 60 percent of sub-national revenues (Figure 3). Transfers from the central government, including both general-purpose and earmarked grants, make up another 35 percent. The remaining 5 percent comes from own-source tax and non-tax revenues.

**Figure 3.  Composition of subnational revenues**
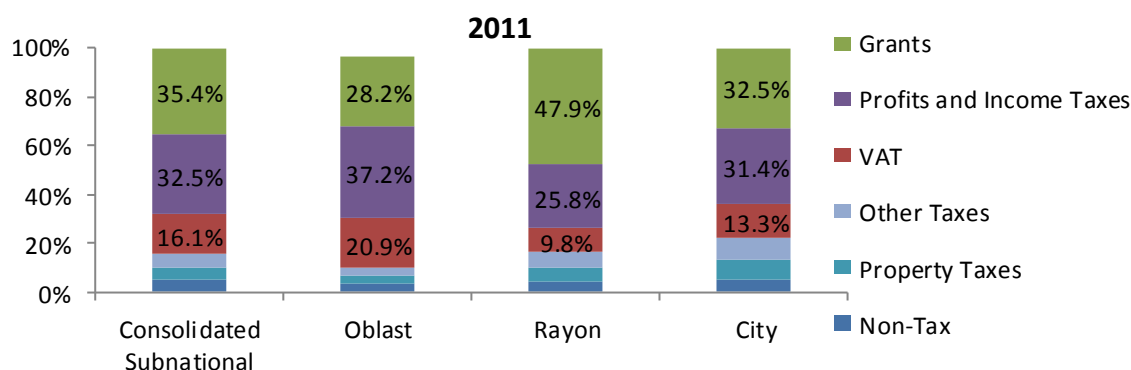


*Note*: Minsk City is included in the consolidated and oblast figures but not in the city and raion figures

As can be seen from Figure 3, intergovernmental transfers, excluding redistribution of the VAT revenue, accounted for about 35% of subnational revenues in 2011 (up from 27% in 2009). The bulk of the national grants to oblasts (over 75 percent) is accounted for by gap-filling subsidies (general purpose transfers) and another 11 percent by capital grants (figure 4). The rest were subventions earmarked for the mitigation of the effects from the Chernobyl accident, support to agriculture, housing vouchers, and so on. In the transfers from oblasts to cities and raions, the largest share is again accounted for by subsidies (79%). The major difference from the composition of national grants is that, in the oblast grant to localities, the shares of capital grants and subventions are much smaller (under 5 percent each), while 14% is accounted for by "other" transfers. This latter category is likely to include ad hoc gap-filling transfers that used to be called "mutual settlements" in the past. This suggests that cities and raions operate under softer budget constraints than oblast governments.

**Figure 4. Composition of intergovernmental revenue,  2011**

**Oblasts**                                    **Cities and Raions**



*Source:* Calculated by the authors based on Ministry of Finance data.

*Note*: Minsk City is included in the oblast figures but not in the city and raion figures

As is evident from Figure 5, transfers from the central government achieve a remarkable degree of equity in fiscal outcomes, with the richest region (Minsk city) spending only 18 percent more per capita than the poorest region (Brest oblast). The lowest variation is observed for education expenditures (coefficient of variation 0.08) and the highest variation is observed for recreation and culture (coefficient of variation 0.28).

**Figure 5. Disparity in fiscal outcomes, per capita expenditures in BYR, 2011**
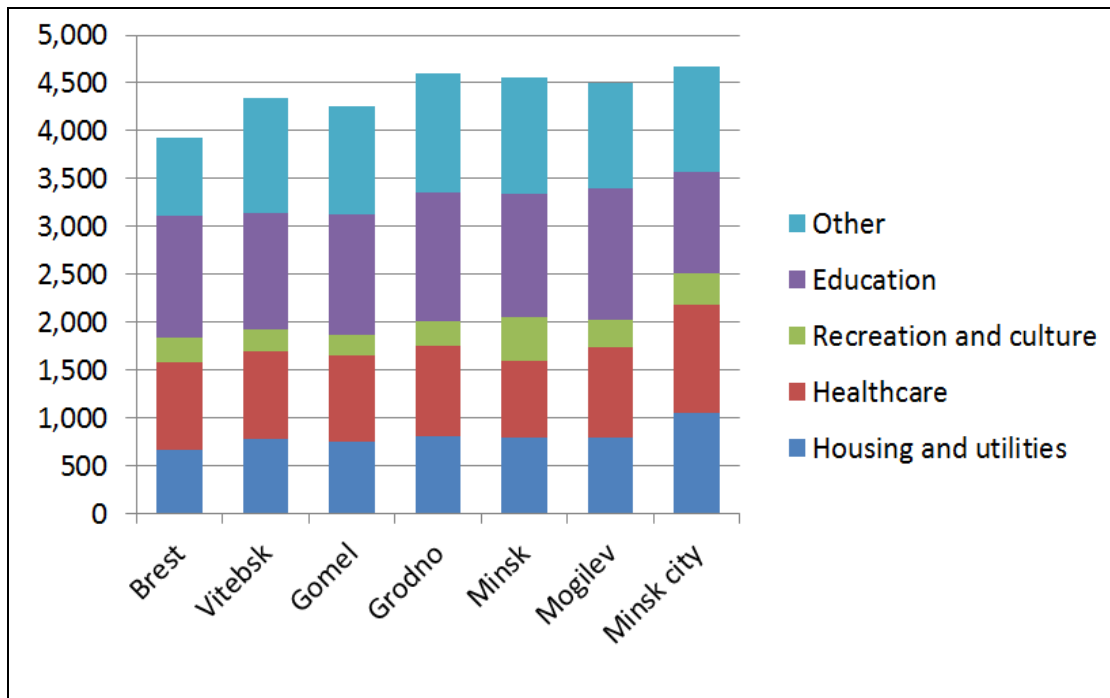


*Source:* Prepared by the authors based on Ministry of Finance data

At the sub-oblast level, fiscal outcomes also appear quite equitable within the both groups of raions and sub-oblast cities (Table 4). Thus, the five-fold difference between the poorest and the richest raions in locally-derived revenues per person is reduced to four-fold after the per capita allocation of the VAT grants and to two-fold after the allocation of subsidies. However, transfers from the oblast budgets seem to over-equalize the difference between these two groups of local governments: cities and raions. While the per capita average of locally-derived revenues in raions is eight percent lower than the city average, raions end up with 40 percent more revenue per capita than the cities after the allocation of grants.

**Table 4. Equalization impact of transfers, by type of LSG, BYR per capita, 2011**

| Type of jurisdictions | Locally derived revenues | plus VAT | plus grants |
|---|---|---|---|
| Raions | | | |
| Average | 1,230 | 1,568 | 3,644 |
| Minimum | 557 | 900 | 2,352 |
| Maximum | 2,998 | 3,243 | 5,441 |
| Coef. of Variation | 0.31 | 0.24 | 0.19 |
| | | | |
| Sub-oblast cities | | | |
| Average | 1,329 | 1,679 | 2,572 |
| Minimum | 762 | 1,175 | 2,080 |
| Maximum | 1,768 | 2,218 | 3,153 |
| Coef. of Variation | 0.25 | 0.19 | 0.12 |

*Source:* Prepared by the authors based on Ministry of Finance data

*Note*: These figures do not include Minsk City

In addition to gap-filling transfers, incentives to rationalize expenditures are further affected by subnational governments' access to explicit and implicit borrowing. Subnational liabilities have increased rapidly over the past few years, although exposure varies across localities. Sub-national liabilities, including both explicit debt and contingent liabilities, peaked at close to 14 percent of GDP in 2010 (Figure 6). High inflation in 2010/11 brought down the debt stock to 10 percent of GDP by the end of 2011—still about double its 2007 level. As of 2011, three oblasts – Grodno, Mogilev and Brest – and 17 raions exceed the statutory limit

recently set in the Budget Code for debt and guaranteed debt (which should not exceed 80 percent of pre-subventions revenue).

**Figure 6. Many subnational governments exceed debt limits**
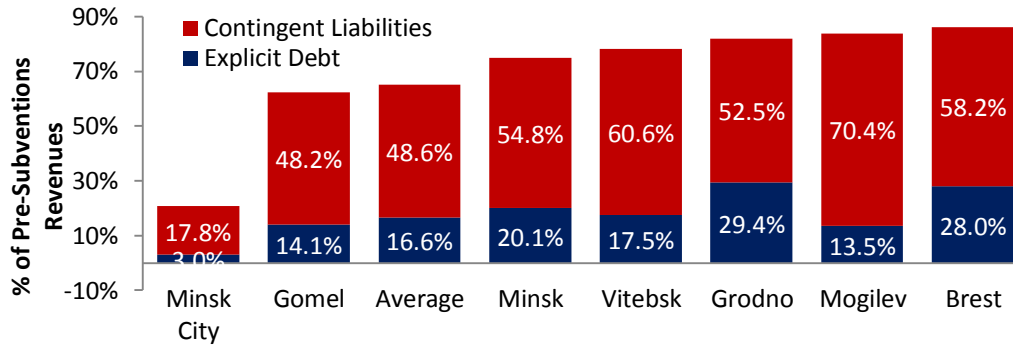


Several other institutional issues are relevant to an overall assessment of expenditure efficiency at the subnational level. First, the delineation of authority between the tiers of government is rather murky. This is because two parallel hierarchical structures of subnational government are superimposed over the four tiers of territorial division: 1) the system of self-local government; 2) the system of local government. The system of self-local government, comprised of local councils and neighborhood associations, is to "*autonomously* manage local affairs based on the national interests." The system of local government, comprised of local executive bodies, is to "manage local affairs based on the national interests." These two parallel systems are interlinked via numerous channels of vertical and horizontal subordination, resembling the system of dual subordination that was characteristic for countries like the Soviet Union and Egypt. Thus higher-level councils can annul acts of lower level councils while higher-level executives can annul resolutions of lower level executives. Local councils affirm appointments by the President of executive heads at the same level of government. The Council Chair at the primary (bottom) tier also serves as the executive head at that tier. On the issues of local affairs, local executives report to the corresponding local councils. On the issues of national affairs, local executives report to the President and higher-level executives. Local line departments report to both the corresponding local executive head and higher-level sectoral heads. Local executive heads have to obtain no objection from a higher-level line-department in order to appoint the local sectoral head. At the same time local executive heads are asked for no objection to the appointment of heads of territorial branches of national agencies (tax service,

police, military recruitment centers, etc.) and state-owned enterprises. Under these arrangements, subnational budgets are drafted by the centrally appointed executives and then adopted by locally-elected councils.

In addition, during the budget planning process, the allocation of transfers still remains primarily based on negotiations over the justifiable expenditures and expected revenues. Currently, the higher level government makes its own estimates for the revenues and expenditures of constituent jurisdictions. The top-down estimates of core ("protected") expenditure are based on the actual staff and enrollments reported by each local government in the past. Non-core expenditures are projected incrementally based on the past expenditures. This undermines incentives for local governments to save by having a more efficient use of resources. According to subnational government officials, this system does not discourage reallocating resources in the course of the fiscal year as long as the savings are utilized within the same fiscal year. The top-down expenditure estimates ("control figures") will not be cut next year as long as, for every redundant position eliminated in one institution, a new position is created in another institution so that the total number of reported staff does not fall at the end of the year. This might hold in a static environment. However, quite clearly, if different categories of expenditures (e.g. "protected" versus "unprotected") are expanded and sequestered to different extents, this can provide disincentives to reallocate resources from inefficient "protected" items to "unprotected" items, which can be cut in the future.

### *Parsing out expenditure disparities: objective expenditure needs versus inefficiency*

While the gap-filling allocation of intergovernmental grants results in almost complete bridging of disparities in per capita expenditures among regions, at the sub-regional level it results in over-equalization. Thus, per capita spending in raions is on average about 38 percent above per capita spending in cities (Figure 7). While there can be objectively higher per capita costs in rural areas due to lower population density and lack of economies of scale, high expenditures could be also due to the lack of spending adjustment to demographic changes, resulting in an oversized and underutilized rural service infrastructure.

**Figure 7 Some are more equal than others**
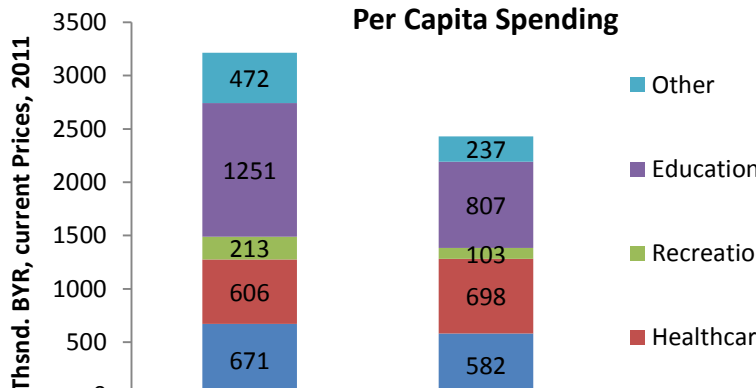


Note: These figures do not include Minsk City

According to Table 5 the disparity in per capita spending on various functions is smaller among the cities and among the raions than between the averages of these two groups. The smallest disparity is observed in education, where the average variation among the cities is only six percent of the mean and 16 percent for the variation among raions. At the same time, the raion average in education is 64 percent higher than the city average. Scatterplots in Figure 8, suggest the presence of economies of scale in the main functions of raion governments, although this is somewhat less pronounced for housing and utilities. Lower per capita expenditures by cities on some functions can also be due to the fact that oblast-government service facilities, like vocational schools, are primarily located in cities and thus might cover some of the service needs of urban residents that would need to be covered by raion governments in rural areas.

**Table 5. Disparities in per capita expenditures, by type of LSG, BYR per capita, 2011**

| Type of jurisdictions | Total | Housing and utilities | Healthcare | Recreation and culture | Education | Other |
|---|---|---|---|---|---|---|
| | | | Raions | | | |
| Average | 3,451 | 690 | 626 | 246 | 1,359 | 530 |
| Minimum | 2,214 | 314 | 0 | 87 | 845 | 243 |
| Maximum | 5,177 | 1,321 | 956 | 588 | 2,218 | 1,142 |
| Coef. of Variation | 0.18 | 0.36 | 0.34 | 0.32 | 0.16 | 0.36 |
| | | | Sub-oblast cities | | | |
| Average | 2,500 | 576 | 752 | 110 | 829 | 234 |
| Minimum | 2,105 | 311 | 535 | 46 | 740 | 178 |
| Maximum | 3,101 | 894 | 1,071 | 170 | 906 | 279 |
| Coef. of Variation | 0.12 | 0.27 | 0.25 | 0.35 | 0.06 | 0.14 |

*Source:* Prepared by the authors based on Ministry of Finance data
Note: These figures do not include Minsk City

**Figure 8. Economies of scale in raion expenditures, BYR per capita 2011**
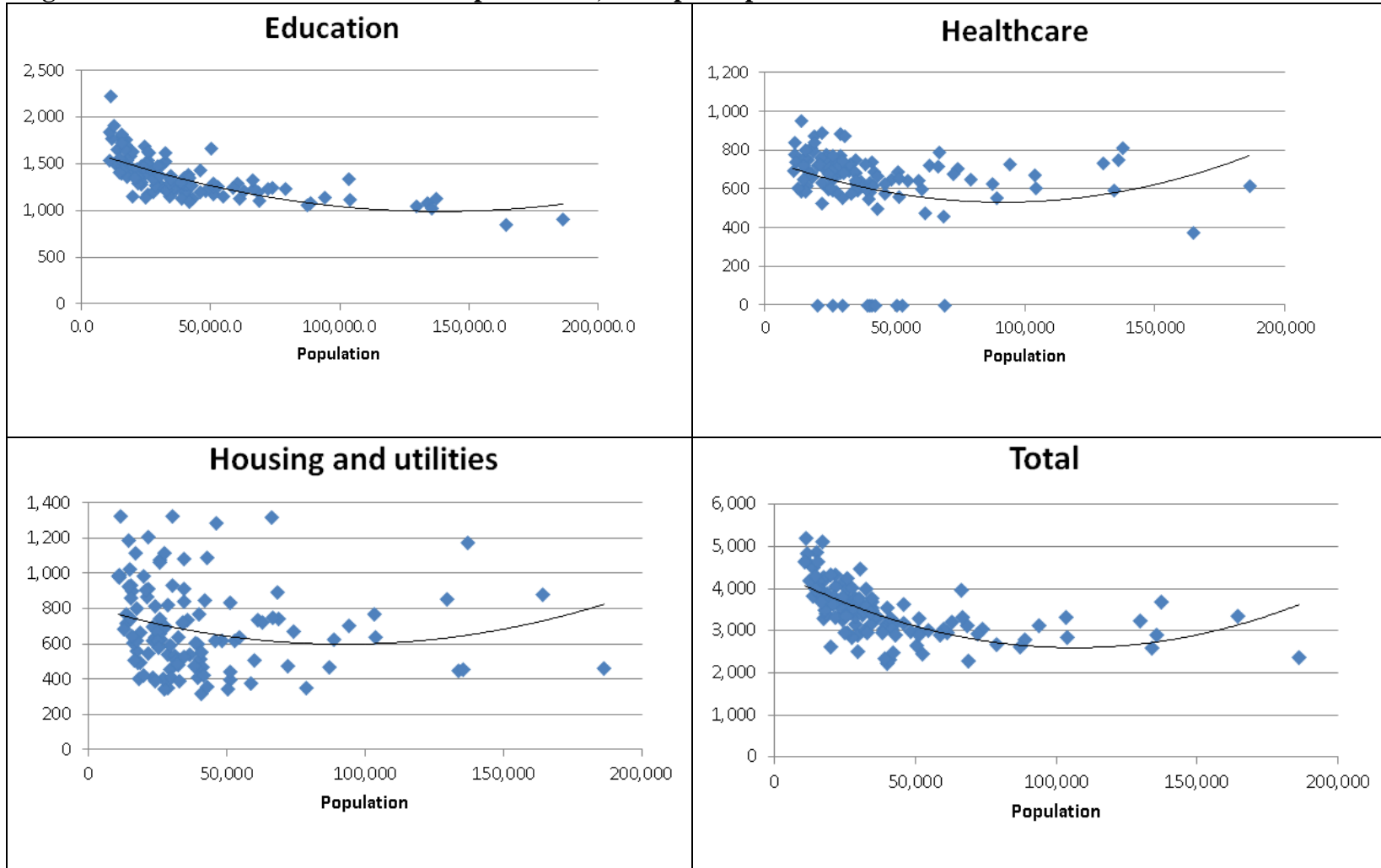


*Source:* Prepared by the authors based on Ministry of Finance data.
Note: These figures do not include Minsk City

One can argue that, to eliminate the disincentives of gap-filling transfers, every oblast should introduce a formula-driven system of equalization grants to municipalities. To assist oblast governments in developing such a formula for allocating grants to cities and raions, the Ministry of Finance could perform statistical estimations of elasticities of per client costs with respect to various cost factors on the sample pooling together cities and raions from all oblasts. The resulting estimates could be provided to the oblast governments as part of the budget circular along with other budget parameters serving as inputs to their budget planning process. We illustrate this approach by providing our estimates for the elasiticity of raion expenditures on main functions (Table 6). Thus, in the last column, the estimated coefficients quantify the exact impact of economies of scale on per capita spending in different sectors. Thus, according to the estimated elasticity of education costs, doubling the population while keeping constant its demographic structure appears to reduce per capita costs of education by 13 percent. In other words, when population increases by 100 percent, total costs increase only by 74 percent.

**Table 6. Elasticity of per capita expenditures of raions on main functions**

| Cost factor | Share of population above 55yo | Share of school-age population | Share of pre-school population | Land area per person | Population scale |
|---|---|---|---|---|---|
| Total expenditures | -0.38 | Statistically insignificant | Statistically insignificant | -0.03 | -0.21 |
| Housing and utilities | -1.30 | -1.23 | Statistically insignificant | -0.16 | -0.38 |
| Healthcare | -6.65 | 15.26 | -11.62 | -2.51 | -1.71 |
| Recreation and culture | Statistically insignificant | Statistically insignificant | Statistically insignificant | 0.11 | -0.24 |
| Education | Statistically insignificant | 0.50 | -0.18 | 0.04 | -0.13 |
| Other | Statistically insignificant | -0.70 | Statistically insignificant | 0.15 | -0.30 |

Because this kind of analysis is based on statistical averaging, it assumes that the identified general pattern reflects the objective impact of socio-economic characteristics on unit costs while all subjective and idiosyncratic factors represent deviations from this general pattern and are captured in the residuals of the regression equation so that on average positive deviations are offset by negative deviations. However, such an assumption of symmetric deviations does not agree well with the fact that, at the lower bound, costs are bound by the efficiency frontier while nothing but the total resource envelope constrains costs from above. Second, the statistical pattern revealed by actual expenditures does not necessarily reflect objective expenditure needs. Thus, higher per capita expenses in densely populated areas can reflect not only higher costs for equal level of per capita services but also higher levels of funding and spending—that is, more and/or better quality services— per capita (Table 6). Thus, lower per capita expenditures on healthcare and communal amenities in low density districts are more likely to reflect historic under-provision of these services in rural areas.

All of the aforementioned concerns can be empirically addressed by cost frontier modeling. Traditionally, expenditure needs have been estimated by passing the cost function through the middle of a cloud of historical expenditure data.[4] This is generally consistent with the earlier studies of production and cost functions in the private sector activities, looking at average or "best-practice" technologies. Fortunately, this approach allows one to consistently estimate cost elasticities (i.e., substitution and economies of scale) but not the constant term.[5] This is because the main difference from the efficiency frontier method is in the assumptions about the distribution of the deviations. But the ordinary least squares (OLS) method is robust to

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[4] Thus, the Representative Expenditure System (RES) proposed for the United States by Robert Rafuse, then Deputy Assistant Secretary of the Treasury for Intergovernmental Fiscal Relations, utilized the estimation of a translog cost function performed by Ladd and Yinger (1989) for a sample 86 largest cities.

[5] This is because the constant term captures the shift of the sample average from the efficiency frontier. Therefore, despite displacement of the constant term, the OLS estimation allows comparing the degree of slack/inefficiency between local governments but not relative to the ideal cost frontier. However, because OLS is robust to non-normality only asymptotically, it will have finite sample bias when the number of local governments is not large enough. In Belarus, with its 118 districts, finite sample bias is less of a concern.

nonnormality of that distribution when the sample is large enough (Greene 2008, p. 104). However, under the stochastic frontier approach these elasticities can be estimated more efficiently (i.e. with smaller margins of error) as the maximum likelihood (ML) estimator takes into account additional information about the shape of the distribution of the deviations. Not only would this allow for a more accurate estimation of contributions of different local characteristics to the expenditure needs, it would also prevent discarding some cost factors as statistically insignificant due to larger standard errors (i.e. smaller significance levels) produced by OLS.

On the other hand, an advantage of the OLS approach is that it is easier to be comprehended by policy practitioners and to be sold to their constituents as fair and objective.  Another issue related to simplicity is the choice of the functional form: Cobb-Douglas versus translog. While the efficiency frontier studies have been increasingly dominated by a more flexible translog form, expenditure needs studies have been mostly using the Cobb-Douglas specification.

Finally, in addition to differences in the costs of inputs, such as wages and the price of utilities, the efficiency frontier modeling also allows to control for other objective factors leading to disparities in expenditures needs. Unfortunately, reliance on sophisticated econometric techniques in pursuit of objectivity does not eliminate the need for a judgment call as to what factors represent objective needs as opposed to unfair historic patterns. This point is well articulated by Greene (2008, p. 156) in his thorough survey of the frontier estimation literature:

*Little is changed in the model by adding exogenous shifts, environmental variables, technical change, and so on to the production, cost, or distance functions ...; however, it must be noted that there is a potential identification issue. The model is obviously indistinguishable from an otherwise "pure" model in which [these factors are part of the inefficiency component]. It is up to the model builder to resolve at the outset whether the exogenous factors are part of the technology heterogeneity or whether they are part of the inefficiency distribution.*

The efficiency frontier approach allows to model heterogeneity as shifts, as parameter variation (through an interactive term) in the cost function as well as shifts and heteroscedasticity of the distribution of the inefficiency term. Even if some of the observable characteristics can be deemed to belong to the inefficiency term rather than being objective cost factors, they should still be included in the estimation of the cost frontier. Not accounting for these "unjustified" patterns in historical spending will produce biased cost elasticities similar to the omission variable bias in linear regression models (Wang and Schmidt 2002). Thus, for example we need

to include the share of urban population to account for better availability of public services in cities. However, if we deem this historical pattern unjustified or unfair, we will not adjust cost norms for this factor and will only make adjustments for estimated elasitities of costs with respect to those factors that we deem objective.

**Table 7. Translog cost function for raion education expenditures, 2011**

| Variable | OLS | Exponential | Half-Normal |
|---|---|---|---|
| *Cost frontier variables* | | | |
| School-age population | 0.6315*** | 0.6777*** | 0.6523*** |
|  | (0.0666) | (0.0418) | (0.0437) |
| Average math score | 0.0247 | -0.0335 | -0.0620 |
|  | (0.1028) | (0.0932) | (0.1015) |
| Average Russian score | 0.0075 | 0.0238 | 0.0510 |
|  | (0.1117) | (0.0896) | (0.0923) |
| Average wages | 14.3893*** | 13.2443** | 13.8208** |
|  | (4.2167) | (5.9220) | (6.2031) |
| Squared average wages | -1.1284*** | -1.2358*** | -1.2169*** |
|  | (0.2852) | (0.4600) | (0.4746) |
| Land area | -3.0332 | -5.5569** | -4.7906* |
|  | (2.0049) | (2.3474) | (2.5037) |
| Land area * Average wages | 0.4136 | 0.7640** | 0.6610* |
|  | (0.2750) | (0.3207) | (0.3417) |
| Constant | -33.6307 | -19.7250 | -24.9534 |
|  | (19.0428) | (21.9488) | (23.6179) |
| *Inefficiency variables* | | | |
| Number of schools in 2005 | 0.2922*** | 0.1841*** | 0.2003*** |
|  | (0.1112) | (0.0473) | (0.0473) |
| Share of locally-derived revenues | -0.1143** | -0.0716* | -0.0796* |
|  | (0.0565)* | (0.0429) | (0.0471) |
| $R^2$ | 0.94 | | |

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

To illustrate the consequences of these methodological choices, we focus on raion expenditures in one sector: education. Here we can control for the service outcome level by using raion averages of standardized test scores for Math and the Russian language.[6] First, we estimate a more flexible translog form of the cost function using OLS and two different versions of the efficiency frontier (exponential and half-normal). While initially we tried a full translog specification, in the final specification we only include those quadratic and interaction terms that were found statistically significant.

In the translog specification, education costs have 65 percent elasticity with respect to school-age population (Table 7). At the same time a quadratic term for school-age population turned out statistically insignificant. This suggests a constant scale elasticity of costs of about 0.65. Test scores do not appear to have a statistically significant relationship to education expenditures.  This is consistent with qualitative findings of the World Bank's (2013) Public Expenditure Review. That report finds that higher costs are associated with fewer students per teacher (on average, less than ten students in rural areas); but that does not translate into better education outcomes.  The statistically significant coefficient on the interaction between the land area and the wage level suggests that land area affects the marginal cost with respect to wages as opposed to shifting the entire cost function. Thus, while in an average raion the elasticity of costs with respect to land area is only 0.0002, it is 0.3 in raions with the highest wages and -0.08 in raions with the lowest wages. Also, the statistically significant coefficient on the quadratic wage term, suggest a decreasing marginal cost with respect to wages. Thus, while in an average raion the elasticity of costs with respect to wages is 0.9, it is 1.14 in the raion with the lowest wages and -0.58 in the raion with the highest wages.

Finally, to explain deviations from the efficiency frontier, we include two additional covariates. The 2005 number of schools captures underutilization of inherited infrastructure. As expected, this variable is associated with higher costs for the same values of other covariates, like school-age population. The share of locally derived revenues (own and shared at source)

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[6] Belarus uses centralized entrance examination for admission to universities, which provides a consistent measure of student performance across schools. In 2006 MoE introduced a 100-point scale for evaluating the educational level, which is used for initial testing of all those entering institutions of higher education. This information helps evaluate the quality of secondary education. Prior to this, university entry examination varied significantly across universities and even within a university.

captures the reliance of local government on hard (non-negotiable) revenues and the link to their activities promoting local economic growth. This variable is associated with lower costs for the same values of other covariates.

Remarkably, the OLS estimates are quite close to those obtain through the frontier estimation modeling. The main difference concerns the impact of land area, which is within the 10-percent significance level in the efficiency frontier models but has only 14 percent significance for the OLS estimates.

**Table 8. Cobb-Douglas cost function for raion education expenditures, 2011**

| Variable | OLS | Exponential | Half-Normal |
|---|---|---|---|
| *Cost frontier variables* | | | |
| School-age population | 0.6237*** | 0.6626*** | 0.6367*** |
| | (0.0666) | (0.0433) | (0.0477) |
| Average math score | 0.0460 | -0.0073 | -0.0265 |
| | (0.1050) | (0.0981) | (0.1030) |
| Average Russian score | -0.0216 | 0.0090 | 0.0301 |
| | (0.1127) | (0.0962) | (0.0980) |
| Average wages | 0.5287** | 0.6014*** | 0.7162*** |
| | (0.2347) | (0.1551) | (0.1677) |
| Land area | -0.0166 | 0.0347 | 0.0428 |
| | (0.0535) | (0.0370) | (0.0399) |
| Constant | 7.5698*** | 6.6348*** | 5.8152*** |
| | (1.6372) | (1.2416) | (1.3442) |
| *Inefficiency variables* | | | |
| Number of schools in 2005 | 0.3003*** | 0.2083*** | 0.2269*** |
| | (0.1153) | (0.0492) | (0.0477) |
| Share of locally-derived revenues | -0.0635 | -0.0573 | -0.0672 |
| | (0.0534) | (0.0444) | (0.0482) |
| $R^2$ | 0.94 | | |

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

Table 8 suggest that a more consequential methodological choice concerns the functional form of the cost function (translog versus Cobb-Douglas) rather than allowing for one-sided efficiency deviations in the error term. Thus, under the Cobb-Douglas specification, land area

does not have any statistical significance while under the translog specification its impact is statistically significant but varies with the wage level.

*Conclusions*

Belarus has made good progress in recent years in reforming and updating its system of intergovernmental fiscal relations. However, as also identified in this paper, there are a number of areas that could benefit from further reform and allow Belarus to realize the gains in public sector efficiency that can be derived from a well-structured system of intergovernmental fiscal relations.

Despite recent efforts to adopt a formula-based approach, the system of grants has continued to work in a discretionary manner, pretty much along the traditional lines of negotiating a "gap filling" transfer for each local government that closes the gap between a jurisdiction's negotiated level of "expenditure needs" and its actual local revenues. This practice has continued to detract from the transparency and objectivity of the system of transfers. It should be emphasized that the problem does not necessarily lie in the amount of actual transfers, which appear to be quite effective in narrowing fiscal disparities, but rather in the manner in which these amounts are determined and adjusted. Admittedly, the lack of adequate data, as well as macroeconomic and overall budget balance conditions may demand sporadic adjustments to the level of funding and the distribution formula. Nevertheless, the entire process of allocation—that is, the determination of the overall pool of funds and how the funds will be apportioned—should rest much more on transparent rules and objective data. In addition to the ad hoc determination of the amount of general purpose grants and the retention rates for national tax revenues, budget constraints are further softened by the practice of unplanned "other" transfers allocated in the course of the fiscal year by oblast governments to cities and raions. In 2011, these "other" recurrent transfers accounted for about 14 percent of all intergovernmental grants to both raions and sub-oblast cities.

The Ministry of Finance has developed a formula-based methodology for the allocation of general-purpose grants that represents a great advance in terms of transparency and predictability. However, this new approach is yet to be implemented. Operationalizing this reform and extending a similar approach to the oblast-raion level should be a policy priority for the Ministry of Finance.

The methodology recently developed by the Ministry of Finance provides a sound template for regional systems of equalization transfers. To assist oblast governments in using the new formula for allocating grants to cities and raions, the Ministry of Finance could perform statistical estimations of elasticities of per client costs with respect to various cost factors on the sample pooling together cities and raions from all oblasts. In this paper, we discuss methodological aspects of such estimation in terms of the functional specification for the cost function and econometric treatment of deviations of historical expenditures from the "ideal" cost level.

Performing estimations on a larger sample would ensure the accuracy of the estimates. The resulting estimates could be provided to the oblast governments as part of the budget circular along with other budget parameters serving as inputs to their budget planning process. Furthermore, in the calculations of adjustment coefficients for their cities and raions, oblast level officials might be more comfortable with applying the provided values of elasticities to the percentage differences in various factors rather than performing the actual estimation of elasticities. The Ministry of Finance could also develop and make available to oblast governments a simple spreadsheet tool that would facilitate the application of the adopted methodology (or facilitate the evaluation of the proposed methodology at the stage of soliciting feedback from the stakeholders).

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