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Cross-Regional Differences in Meeting the Challenge of Teacher Salary Increase

This paper presents an overview of studies on the correlations of teacher pay to regional economics and to regional factors affecting the size of teacher salaries. It describes the basic pay indicators for teachers in the regions: absolute salary, teacher pay level as compared to the average regional salary, and ratio of salary to the cost of a fixed set of goods and services and to the per capita gross regional product. Based on calculations that used open government databases, a classification of regions by teacher pay level was developed. Regions of the country turned out to belong to seven different clusters. Recommendations on teacher remuneration were developed for each of these clusters and common risks and challenges were identified.

Russian Federation [RF] presidential decree of 7 May 2012 set the goal of raising the average salaries of teachers at general education institutions to the average salary in the corresponding

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region. RF regions differ in terms of economic, cultural, and social conditions, and also by level of fiscal capacity. In order to develop federal policies on teacher pay, types of regions must be identified based on the conditions that are present in these regions for solving this task. To create a typology of this nature, we must first look at the ratio of teacher salaries to the average regional salary, and then we must also place this salary in the context of other important socioeconomic factors.

This work involved the following tasks:

- analyzing studies on the correlation of teacher pay to the characteristics of the economic situation in the region;
- setting indicators for absolute and relative teacher pay levels;
- identifying clusters of regions by absolute and relative teacher pay levels; and
- determining government policies for each cluster.

1. The Correlation between Teacher Pay and Regional Economies

1.1. Influence of teacher salary on the condition of the regional education system

An analysis of the scholarly literature shows that teacher pay is the most important factor influencing the development of a regional education system. Raising salaries helps attract more talented and qualified candidates to the profession [30; 35; 36; 39]. In Russia, the inter-industry mobility of teachers is very low and it is extremely rare for teachers to move into another profession. In terms of mobility within the profession, studies show that a teacher's wish to move from one school to another is motivated by the expected difference in income between current and future places of work [6]. The higher the salary, the lower the number of teachers who leave their jobs to work in other sectors of the economy during their professional lives [34; 37; 38; 41; 42; 45–50].

Pay boost also helps bring younger teachers into the profession [1], but it may lead to an increase in the number of teachers of retirement age, since many teachers who would have otherwise

retired remain in their jobs provided that they have a higher salary. In some regions of Russia, high salary does more to keep teachers of retirement age in the system than it does to attract younger teachers [4].

Teacher pay that is not competitive in the economy of a given region may impel teachers to look for side jobs or participate in corrupt schemes [12]. However, an increase in pay in the public sector does not guarantee a reduction in corruption per se. Corruption can only be reduced through the combination of a pay raise (or a relative increase in pay) with an array of other measures, including punishment for corrupt actions, changes in society's perception of fair and unfair pay, and the introduction of a social guarantee system [27].

Finally, teacher pay influences the quality of education. For example, there was found to be a connection between the number of points countries received in the TIMSS (Trends in International Mathematics and Science Study) study and pay for elementary school teachers [26].

1.2. Regional factors affecting the size of teacher pay

The level of teacher pay is influenced by a number of regional factors, the most fundamental of which is natural conditions. In a harsh climate, the share of budgetary expenses unrelated to salaries increases. This means that teacher pay in these regions will be lower than in regions with favorable climates, even when the volume of expenditures from the regional budget on education is the same [13].

Average wages in a region's economy and the amount of budgetary and extrabudgetary resources a school may receive and direct toward financing salaries depend on the region's economic potential [4; 18]. The volume of a region's tax resources is often viewed as an indicator of that region's economic potential [8; 13; 18]. Another important indicator is the income level of the region's population, which shows how developed the given territory is in economic terms and the potential volume of resources that a school may attract through the provision of extrabudgetary services [4]. However, when the income level of the population in a given constituent Russia's entity is high, it

becomes more difficult to raise teacher pay because this requires mobilization of a larger amount of financial resources.

The extra-budgetary revenue that a school receives helps to increase the labor compensation fund for teachers. When determining the target indicator “average teacher salary in relation to the average salary for the region,” both the budgetary and extrabudgetary components of a teacher’s income are taken into account. A number of studies have shown that the attractiveness of the public sector stems from non-cash forms of teacher income [Gimpel’son, 2011; 12]. Potential teachers consider the total potential income that can be made in the teaching profession when they are weighing their options and deciding if they want to work in schools or outside of the education system. Income from tutoring and additional employment outside of schools (not including work in other schools) amounted to 110 percent of teacher income at their main places of work in 2006 and to 60 percent in 2012 [14; 21; 23]. Thus, the percentage of teacher income made outside of schools is dropping, even though it remains significant. It is possible that it is specifically increases in teacher pay that have enabled teachers to forego alternative types of employment.

The relative size of the public sector has influence over the parameters of the regional labor market. The public sector drags down salaries in the private sector because it acts as a kind of “grounding anchor” for salaries in the overall economy. Lowering labor compensation in the public sector supports growth in the total demand for labor and stimulates expansion of the low-paying job segment in both the public and private sectors. The higher the share of the public sector in a given region, the more clearly its monopsony (the presence of a single or dominant consumer on the market) manifests itself and the greater its downward pressure on wages in the private sector [12]. Subsidized regions have less opportunity for developing alternative employment sectors apart from budgetary branches, including the branch of education [12; 13].

Every new class of teachers increases the labor supply for the educational services sector. This has a negative effect on the rate of teacher salaries [12].

The more competition there is between schools for teachers and the greater demand there is for teachers in other sectors, the higher their pay [8; 12; 18]. Landon and Baird used the number of schools as a way to measure competition at the local level. We believe that it is also important to take into account competition from private schools, the budgetary funding of which is set forth in the provisions of Federal Law of 29 December 2012 No. 273-FZ “On Education in the Russian Federation.”

A high unemployment level, which causes fear of losing a job and not being able to find another one, forces teachers to make concessions to their employers and has a downward effect on labor compensation [10]. An artificially low unemployment level is characteristic of the Russian labor market because it has a large number of unproductive, low-paying jobs. As a consequence, the influence of unemployment on the level of teacher pay in Russia is less significant than in Western countries, where the chance of job loss is much higher.

The union movement also has a profound effect on wage formation, and its activities have a positive influence on teacher pay levels [18]. In our opinion, this factor is probably not too meaningful in Russia, since unions do not play an important role in determining teacher pay.

The formation of a teacher’s human capital should give this teacher a higher value as a candidate on the labor market [7]. At the same time, though, a number of studies have shown that the benefit from education in Russia’s public sector is close to zero, if not negative [Gimpel’son, 2011]. The high level of qualification that teachers have provides them with a chance to choose other professions on the labor market [OECD, 2003],

Another factor is that teachers all over the globe are predominately female. Empirical studies give convincing evidence that a woman’s choice of the teaching profession complements her gender’s inherent focus on family roles and responsibilities over professional careers [12]. Thus, with all other things being equal, the predominately female nature of the profession automatically makes teacher pay lower than in other branches of the economy.

Type of administrative management may also influence the level of teacher pay. Funds for increasing teacher pay are allocated at all levels of management (federal, regional, municipal, institutional). Thus, the arrangement of cooperation between various levels of management is important. Federal funding is a major source of budgetary revenue for subsidized regions [13]. The strength of a region's bargaining position to receive budgetary transfers [12] may help expand available resources for increasing teacher pay.

Teacher pay level also depends on the priority given to education as opposed to other spending areas (healthcare, culture, law-enforcement, etc.) in the region's budget [13].

Fixing teacher pay at a level that is not lower than the average salary for the economy to calculate norms for per capita financing of general education may influence the level of take-home pay [19]. In order to increase the statistically registered salary, education management agencies and schools could make changes to staff schedules and workloads or redistribute staff functions [12].

Increasing the share of teacher pay expenses in the school budget may lead to decreased spending on material and technical support for the academic process, which would have a negative effect on learning technologies [13; 25] and would essentially transform the education system into a system of social protection for adults [12].

To raise average teacher salaries, education management agencies and schools could decrease the share of incentive payments, since their introduction during the implementation of new labor compensation standards required an increase in labor compensation funds for teachers in order to differentiate pay levels [1; 28].

The independence of local budgets makes it difficult to apply administrative levers to increase teacher pay [13].

The shift to autonomous status should have raised the levels of independence for educational institutions [2; 3; 24], including in the formation of labor compensation systems.

With the development of state-public management in education, administrative interference should be reduced at all

levels of the education system. Studies on the participation of various stakeholders in developing the labor compensation system for participants in the education process and the distribution of the incentive portion of the labor compensation fund established that in a number of cases the opinions of workers, teachers, and other interested parties were significant in setting parameters for labor compensation [6]. An analysis of the way management boards participate in distributing the incentive portion of the labor compensation fund shows that members of the public usually trust school administrations in issues of education content, quality assessment, etc. Public managers themselves admit that this behavior can be partly explained by their insufficient competence in these areas [17].

2. Indicators for Teacher Pay Levels in Regions

Absolute salary is an important financial characteristic that may be used, for example, to set the amount of additional expenditures needed to finance salaries in regions. However, the absolute value of wages does not allow for any judgment to be made on the actual economic situation of teachers. There are two options for calculating this indicator: the size of the salary in current year prices may be used to make a cross-regional comparison within the limits of one year; or the size of the salary in fixed prices may be used to analyze changes in salary.

Teacher pay relative to average pay in a given region shows how competitive that pay is in comparison to other job positions. Pay rate is not the most important factor for teachers in choosing a place to work [22; 23]. However, World Bank reports [51; 52] citing certain studies [31; 33; 53] note that people who choose the profession of teacher feel that their salaries are fairly important in comparison with other specialists with a higher education. The principle of tying, through the law, pay level in public organizations to similar pay levels in the private sector is known as the “prevailing wage” [11; 12]. It is in effect in many developed countries. The United States, for example, has a federal law that sets the size of wages for workers employed by

government agencies or paid from budgetary funds [29]. While the average salary of teachers cannot be called too high in countries that have attained high indicators in the education sphere, it is still at the same level as wages for other civil servants [32; 40; 44]. If we compare it not with the average salary for a country, but with the average salary for specialists with a higher education, then we will find that only Spain has above-average teacher pay.

Wages relative to the cost of a basket of consumer goods is an indicator of the purchasing power of teacher pay that makes it possible to tie compensation for their labor to the cost of living in a specific region. The consumer basket cost can vary by Russia's region by a factor of three, so this indicator is very important as a characteristic of the real income of teachers in RF regions.

Wages relative to per capita gross regional product [4] makes it possible to evaluate the per-capita share of the cost of goods and services produced in the region that goes toward teacher pay, i.e. to show how high labor compensation is for teachers in relation to the region's economic potential. The possibilities for using this indicator are limited due to the fact that calculations lag by one to two years, so it is not suitable for up-to-date computations.

3. Development of a Typology for RF Regions based on TeacherPay

Information for calculations was taken from open government databases:

- (1) data from the federal statistical survey on labor compensation for specific categories of workers as of year-end 2013 (source: Rosstat¹);
- (2) information on average pay for a given region as of year-end 2013 (source: Rosstat);
- (3) consumer basket cost as of year-end 2013 (source: Rosstat);
- (4) gross regional product (GRP) per capita (source: Ministry of Finance). GRP values for 2013 have not been calculated

yet, so this study uses Ministry of Finance information on GRP for constituent entities of the RF from 2012. Indicators were recalculated with account for regional inflation levels based on Rosstat data.

The values of input variables, expressed in various units of measurement, were standardized in order to reduce them to a comparable form: the data were modified so that the average value of each variable was zero and the standard deviation was equal to one.

Regions were grouped following the method of hierarchical clustering analysis. Euclidean distance (the geometric distance between two points in 3D) was selected as the metric for calculating the distance between two points.

Ward's method was used as the algorithm to merge points in a cluster. This method is structured in such a way that it minimizes the total within-cluster variance. At the initial step, when all clusters are singletons, the sum of squared deviations is equal to 0. Under Ward's method, groups or points for which the sum of squared deviations results in a minimal increase are merged. Clusters created using this method are approximately equal in size. [16].

Seven clusters were identified using this method. The distance within these clusters is at a level of six scaled units out of a possible 25, that is, the dispersal of values is four times less than the distance between the two points furthest from one another. [Figure 1](#) shows a dendrogram of the step-by-step merging of points into clusters. It indicates the threshold that we selected for identifying clusters. [Figure 2](#) gives a 3D positioning of regions merged into clusters for the indicators being examined. [Figure 3](#) gives an idea of the average value of variables (the ratio of average teacher pay to average pay for the region, the ratio of teacher pay to consumer basket cost, and the ratio of annual teacher pay to per capita GRP) by cluster.

Regional Cluster no. 1—Above-Average Performers

This group includes twenty regions: Arkhangelsk, Belgorod, Orenburg, Samara, Novgorod, Sverdlovsk, Leningrad, Kaluga, Kemerovo, Irkutsk, Omsk, Lipetsk, Tomsk, Nizhegorod, and

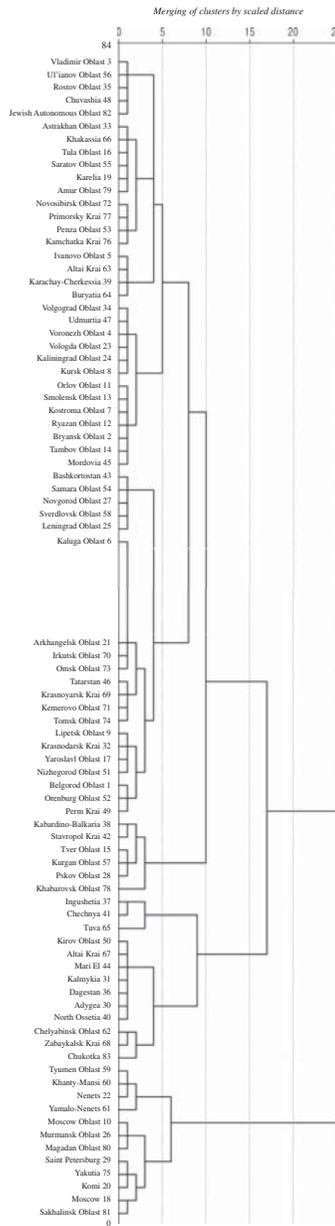


Figure 1. Dendrogram using Ward's Method

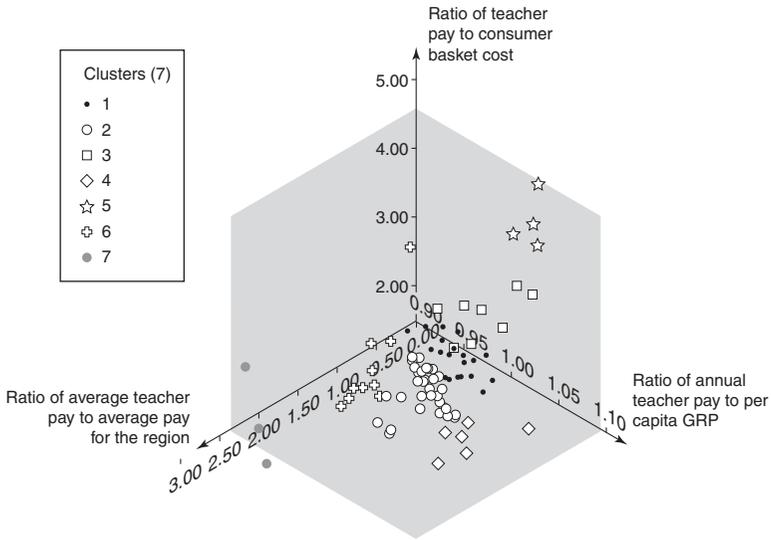


Figure 2. 3D Scatter Plot of Regional Positioning

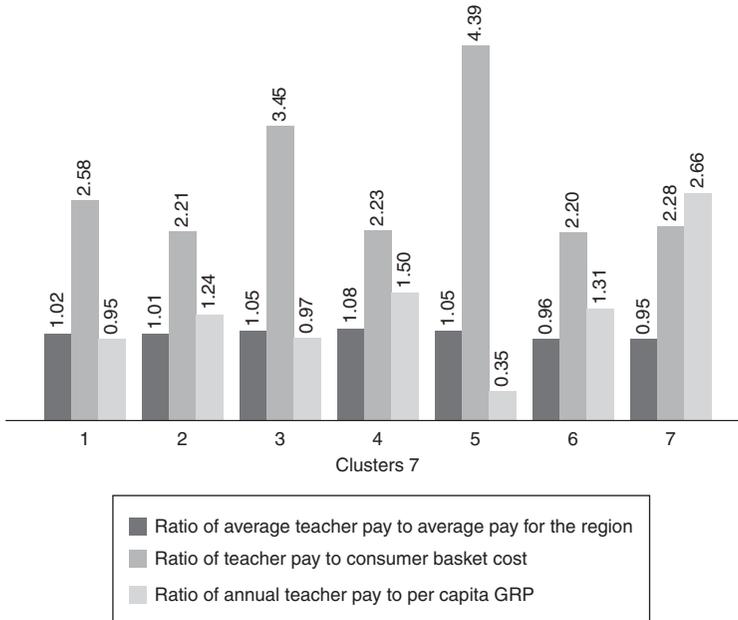


Figure 3. Average Value of Variables by Cluster

Yaroslavl oblasts; Perm, Krasnodar, and Krasnoyiarsk krais; and the republics of Bashkortostan and Tatarstan.

A low share of teacher pay in the per capita GRP (0.95) is characteristic for this group, but there are sufficient allocated resources to ensure teacher pay at the average level of the region (102 percent). The cost of living in these regions is relatively high, so only 2.58 baskets of consumer goods can be bought on teacher pay.

Recommendations are following: to maintain pay at the current level using the region's financial resources and a relatively small transfer from the federal budget.

Regional cluster no. 2—average performers

This group includes thirty-two regions: Astrakhan, Amur, Briansk, Vladimir, Volgograd, Vologda, Voronezh, Ivanovo, Kaliningrad, Kostroma, Kursk, Novosibirsk, Orlov, Penza, Rostov, Ryazan, Saratov, Smolensk, Tambov, Tula, and Ulyanovsk oblasts; the republics of Altai, Buryatia, Karelia, Karachai-Cherkessia, Mordovia, Udmurtia, Chuvashia, and Khakassia; Primorsky and Kamchatka krais; and the Jewish Autonomous Republic.

In this group, teacher pay is close to the average for the region (101 percent), however, this group is characterized by low purchasing power (2.21 baskets of consumer goods). Per capita GRP is at an average level—1.24.

Recommendations: to maintain teacher pay at the current level using transfers from the federal budget.

Regional cluster no. 3—growing consumers

This cluster includes eight regions: Moscow and Saint Petersburg; Moscow, Murmansk, Magadan, and Sakhalin oblasts; and the republics of Komi and Yakutia.

This cluster is characterized by the high purchasing power of teacher pay, which can be used to buy 3.45 baskets of consumer goods. Moreover, teacher pay exceeds average regional pay (105 percent). With fairly high levels of development, the economies of these regions make it possible to maintain the labor

compensation fund for teachers, since the ratio of teacher pay to per capita GRP is already 0.97.

Recommendations: to maintain the current level of teacher pay using the regions' own funds.

Regional cluster no. 4—out in front

This cluster includes six regions: Tver, Pskov, and Kurgan oblasts; the Republic of Kabardino-Balkaria; and Stavropol and Khabarovsk kraises.

Teacher pay in these regions far exceeds average pay (108 percent). However, the high value of the ratio of annual teacher pay to per capita GRP (1.50) shows that these regions do not have reserves of their own resources. The cost of living in these regions is fairly low, so the purchasing power of a teacher's salary is average (2.23).

Recommendations: to lower teacher pay to the target level—100 percent of the regional average.

Regional cluster no. 5—leaders

This group includes four regions: Tyumen oblast; and Khanty-Mansi, Yamalo-Nenets, and Nenets autonomous okrugs. These are the leading regions in the country for hydrocarbon production.

These regions have been able to maintain teacher pay at an above-average level (105 percent) and ensure very high purchasing power (4.39) in spite of the high cost of living in these extremely adverse natural conditions, even given the very low value of the ratio of annual teacher pay to per capita GRP (0.35).

Recommendations: there is a large reserve of regional resources to maintain teacher pay at this level and raise it without help from the federal center.

Regional cluster no. 6—lagging behind

This cluster includes ten regions: Kirov and Chelyabinsk oblasts; the republics of Adygea, Kalmykia, Dagestan, North Ossetia, and Mari El; Altai and Zabaikal kraises; and Chukotka Autonomous Okrug.

Teacher pay in these regions lags behind average pay in these regions (96 percent). Therefore, purchasing power is also the lowest (it can be used to buy only 2.20 baskets of consumer goods). The burden on the economy is at an average level due to low teacher pay, which comprises 1.31 per capita GRP.

Recommendations: relatively modest resources that can be obtained from the federal budget are needed to raise teacher pay level to the average regional level. An additional risk is that purchasing power will not increase significantly even by doing this.

Regional cluster no. 7—subsidized

This cluster merges three regions: the Republic of Ingushetia, the Republic of Chechnia, and the Tuva Republic.

Teacher pay in these regions is below average (95 percent). However, the purchasing power of this pay is average (2.66) due to the low cost of living. The very high ratio of annual teacher pay to per capita GRP (2.66) shows that these regions do not have reserves of their own resources to maintain teacher pay at the target level.

Recommendations: to increase teacher pay to 100 percent of average pay using transfers from the federal budget. Here the risk is that the public sector will put too much pressure on the labor market. Education is one of the most stable and high-paying sectors of the economy in these regions. The private sector may experience difficulties hiring workers, since companies will have to pay their workers no less than the salary teachers are paid. Therefore, large-scale stimulation of manufacturing branches must be carried out in parallel.

Conclusions

Alongside the indicator of teacher pay level relative to average regional pay level, which is used as a target indicator in government programs, the additional indicators of ratio of teacher pay to the cost of a basket of consumer goods and to the volume of per capita gross regional product must be examined to obtain a more complete picture of the economic situation teachers face in

a specific region and to account for cross-regional differences when solving the task of raising teacher pay.

The recommendations developed for each of the clusters makes it possible to increase the effectiveness of measures aimed at implementing education policy tasks by varying the extent of federal support.

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Note

1. http://www.gks.ru/free_doc/new_site/population/trud/itog_monitor/zarplata.html.

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