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Are Interregional Wage Differentials in Russia Compensative? [1,2]

Aleksey Oshchepkov [3]

Abstract

Interregional differentials in nominal wages in the Russian Federation are huge compared to other countries. Using the NOBUS micro-data and a methodology based on the estimation of the wage equation augmented by aggregate regional characteristics, we show that these differentials have a compensative nature. Russian workers receive wage compensations for living in regions with a higher price level and worse non-pecuniary characteristics, such as a relatively low life expectancy, a high level of air pollution, poor medical services and a colder climate. After adjusting for these regional characteristics, the relative ranking of regions in terms of average wages changes considerably. Moreover, regional nominal wages become positively correlated with interregional migration flows.

According to our estimates, half of the interregional wage variation between workers with similar productive characteristics should be considered to be compensative. These results support the view that the best policy reaction to the current high interregional wage differentials should be the removal of migration barriers and a reduction in migration costs. In general, our results show that wage compensations for regional disamenities along with differences in employment composition are able to account for about three fourths of the observed interregional variation in wages.

JEL Codes: J3, J6, P2, R1, R2

Keywords: compensating differentials, regional wages, wage equation, interregional migration, transition, Russia

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1. Introduction

Interregional wage differentials exist in large and small countries. The price of labor cannot be the same throughout a country because the national labor market and the territory of the country are not homogenous. Regional labor markets demand workers with certain skills and evaluate similar workers differently. Moreover, market economies tend to generate compensating wage differentials in the labor market, and there is compensation in terms of wages for higher living costs and worse living conditions. The theory of compensating differences is able to explain most of territory wage differentials in the USA[4]. Empirical evidence suggests that compensating interregional wage differentials also exist in the EU[5]. However, there have been almost no studies into whether or not regional wage differences are compensative in transition economies.

Russia presents an excellent case for conducting an analysis of interregional wage differentials. Firstly, Russia is a very large country, where environmental conditions and living costs vary significantly across regions. A system of wage supplements targeted to attract people to regions with worse living conditions existed even under a planned economy, and thus the compensating principle is not entirely new for Russia. Secondly, two explicit trends in internal migration have been observed during transition: migration from the eastern to the western part of the country, the so called "western drift", and migration out of the Russian North. The main reasons for these migration flows were price liberalization and the drastic weakening of regional employment and equalizing policies. As a result, the population faced rising real living costs that were not compensated by income growth, in addition to a worsening of living conditions.[6] At the same time, the internal migration in Russia, in spite of being low by international standards, can be explained by "classical" factors (e.g., differences in opportunities on regional labor markets, living costs, regional amenities and disamenities).[7] Finally, unconditional interregional wage differentials are huge and persistent in the country. They contribute significantly to the total wage inequality and generate interregional income variation, but an explanation for this phenomenon is still lacking.

The goal of this paper is to contribute to the understanding of interregional wage differentiation. We apply the theory of compensating differences to wage differentials across Russian regions. Using a methodology based on the econometric estimation of a Mincer-type wage equation augmented with regional characteristics, we control for differences in worker

[4] Roback (1982), Robak (1988), Beeson (199), Dumond et al., (1999)
[5] Furdato (1996)
[6] Heleniak (1999), Mkrtchian (2003, 2005), Ryasancev (2005), Karachurina (2007)
[7] Andrienko and Guriev (2004), Gerber (2006)

and job characteristics and analyze the wage differentials between similar workers. The first step is to examine the influence of regional characteristics on individual wages. The second step is to estimate the extent to which the observed wage differentiation across regions compensates for various regional factors.

The literature concerning interregional wage differentials in Russia is rather limited; we found only two papers that considered compensative interregional wage differentials in the country (Berger et al.(2003), Bignebat (2005)). Our work has several important advantages. Firstly, we used the NOBUS database instead of the RLMS database (see the *Data* section); this allowed us to control for differences in regional employment composition much better (to achieve true "similarity" of workers). Moreover, our research does not suffer from the sample-size problem, when samples for local labor markets are comprised of only a few dozen observations. Secondly, most international studies, not only studies on Russia that aim to explain territorial wage differentials, do not go beyond establishing the statistically significant influence of regional amenities on individual wages. This is a fundamental step towards the explanation of interregional wage differentials through the compensative theory, but it does not suffice for making the conclusion that the theory is able to explain the differentials. In our study, in addition to examining wage compensations for regional amenities and disamenities, we also analyze differentials in regional wages adjusted for significant regional factors and make an attempt to estimate the explanative power of the theory of compensative differences. Thirdly, in our theoretical and empirical analysis we explicitly consider migration costs. The failure to take positive migration costs into account leads to biased estimates for compensations and relative regional wages. Fourthly, existing studies on Russia and most international studies neglect the problem of endogenous regional characteristics. We avoid this problem using unique Russian circumstances (see the *Methodology* section), and the results indicate that ignoring this problem may lead to spurious findings of statistical significance of some regional characteristics. Fifthly, we take into account the problem of the instability of estimates of regional level variables when interpreting results (see the *Methodology* section). Finally, we apply the theory of compensative differences to a later period of transition, when the Russian economy and labor market have had more time to adjust to market forces.

The paper is organized as follows. The second section considers the dynamics of interregional wage differentials in Russia and their magnitude in comparison with other countries. The third section is theoretical; it discusses the principal assumptions, predictions and problems of applying the theory of compensative differences. A brief overview of the

empirical literature will be presented in the fourth section. The methodology and data used in our study are described in the fifth section. Empirical findings are discussed in the sixth section. The conclusion and directions for future research will be given in the last section.

2. The magnitude of interregional wage differentials in Russia

The dynamics of wage differentials between Russian regions is presented in Diagram A.1 (see the Appendix). Macroeconomic shocks during the transformation period (price and trade liberalization, weakening of regional employment and equalizing policies, etc.) influenced regions differently. As a result, regional disparities in wages sharply increased in the beginning of the 1990s. They peaked in 1995 and remained persistently high afterwards. At the same time, they visibly exceed interregional wage differentials in other countries. Table A.1 (see the Appendix) shows that even in such large countries as the USA and Canada, the magnitude of territorial wage differences is much lower than in Russia.[8]

Another way to evaluate the magnitude of interregional wage differentials is to estimate their contribution to the total wage inequality. Following the methodology suggested by the OECD and using the NOBUS dataset (a description of this dataset is given in the *Data* section) we estimated and compared the contributions of four factors (gender, education, industry and region) to the variance of average hourly earnings. The decomposition was based on the econometric estimation of an equation in which the dependent variable was the hourly average wage in a group of employees. These groups are formed as the intersections of the four characteristics given above. The results of our estimations for Russia as well as the results of estimations for some OECD countries provided by OECD are presented in Table 1 (see below).[9]

[8] Certainly, the magnitude of differentiation indicators depends on the country's particular administrative division.

[9] Employment Outlook. P.: OECD. 2000.

Table 1. Decomposition of variance of average hourly earnings in Russia and some OECD countries.

Country	period	number of regions	region	gender and age	education	industry	R^2	number of observations [b)]
Austria	1994	3	0,03	0,2	0,36	0,11	0,91	160
Belgium	1995	3	0,03	0,15	0,45	0,15	0,93	156
Canada	1997-1998	10	0,05	0,27	0,12	0,28	0,93	1563
France	1994	8	0,12	0,13	0,25	0,03	0,72	440
Greece	1995	4	0,03	0,27	0,21	0,27	0,9	165
Italy	1995	11	0,04	0,1	0,31	0,24	0,89	512
Japan[(a)]	1995	47	0,12	0,47	-	0,04	0,69	4245
Netherlands	1995	4	0,06	-	0,71	0,05	0,95	71
Portugal	1997	5	0,06	0,1	0,29	0,23	0,95	270
Spain	1995	7	0,08	0,17	0,34	0,15	0,91	374
UK	1995	11	0,12	0,14	0,17	0,1	0,72	573
USA [(a)]	average 1994-1998	51	0,06	0,12	0,31	0,22	0,84	4735
Russia [(c)]	**2003**	**7**	**0,32**	**0,15**	**0,25**	**0,20**	**0,80**	**126**

Source: Employment Outlook. P.: OECD. 2000.

Comments: 1) a) Age dummies were included; b) one observation corresponds to the average wage in a group of workers that have the same four characteristics; c) our estimations. For Russia, workers were divided into 126 groups using 7 Federal districts, 2 gender groups, 3 educational attainment levels (primary vocational, uncompleted higher education and completed higher education) and 3 sectors of the economy (primary, secondary and tertiary); 2) The share of variance associated with each group of dummy variables corresponds to the reduction in the residual term of the regression due to adding the variable after all other variables have been taken into account. In this procedure, the results are not sensitive to the order in which the variables are added, but the shares of variance do not necessarily sum up to the value of R^2.

The regional factor has the largest impact on the variation of hourly wages in Russia. In contrast to Russia, this factor is far from being the most important in OECD countries. In countries such as France, Japan and Great Britain, where the impact of the regional factor is the largest according to OECD, the impact of this factor is about 3 times lower than in Russia.[10] At the same time, the impacts of the other factors in Russia are comparable to that in other countries.

In conclusion, we note that interregional wage differentiation in Russia stands out in comparison with the differentiation that exists in other countries. High interregional wage differentials may cause regional well-being disparities and social tensions, and may be an indication of the inefficient use of human capital. Moreover, these differentials may have a significant impact on the overall wage inequality. Some studies on the wage inequality in Russia show that the effect of the regional factor into the wage inequality is the largest in comparison with other factors such as differences across workers in human capital

[10] It should be noted that because of technical limitations, we distinguished only 7 regions (7 Federal Districts) for estimation. If a more detailed division (for example, into 79 regions) is used, then one would expect that the contribution of the regional factor would rise.

characteristics (education, tenure, age) and occupations.[11] Therefore, the phenomenon of interregional wage differentials in Russia requires an explanation.

3. Compensative wage differences between regional labor markets: theoretical background

The textbook neoclassical model assumes that, under conditions of absolute interregional mobility of goods, some interregional equilibrium can be achieved, in which prices for the same goods are equal across a country.[12] Producers tend to sell their goods at the regional markets where the prices are higher. This decreases the prices at those markets and leads to the equalization of prices across regional markets in the long run. If one considers labor as a commodity and wage as the price for this commodity, then it is expected that the rule "the same wage for the same labor" will hold in equilibrium.

While interregional wage differentials could be regarded as price differentials (see, for example, Jonson (1974)), it is not correct to regard labor as a commodity. Unlike goods, whose "migration decision" is made by sellers, workers consider other things besides relative regional wages when making their migration decisions. The reasonable assumption originating from the famous work of Harris and Todaro (1970) is that employees compare expected, rather than relative, wages. The regional unemployment rate presents a natural measure for the probability of not having a job in a region. In interregional equilibrium, when workers do not have any reason to migrate, expected wages should be equal across regions. This theory suggests a positive relation between regional wages and unemployment that was confirmed by empirical studies (Hall et al., (1972), Ali (1978), Topel (1986)).[13]

A further elaboration of the basic model is associated with the fact that (rational) workers compare not the expected (nominal) wages, but rather the amounts of goods and services that can be purchased for these wages. It is more correct therefore to consider not wage differences per se, but rather differences in the purchasing power of wages, especially when inflation is not uniform across regions. More recent theoretical work and empirical research clearly conclude that not only pecuniary regional characteristics (i.e., living costs), but non-pecuniary ones as well are of importance in making migration decisions (see Knapp and Graves (1989), Greenwood et al., (1991b)), and also Greenwood et al., (1991a)). Workers may prefer moving from a region with higher (expected) wages to a region with lower wages,

[11] See Lukyanova (2007)
[12] The notion of absolute mobility includes zero transportation costs. We will return to this strong assumption later in the paper.
[13] The wage curve assumes the opposite relation between individual wages and unemployment, see Blanchflower and Oswald (1994, 2005)

if they are subjected to worse living conditions in the former region, where there was, for example, a worse (colder) climate or a higher level of (water and/or air) pollution.

Roback (1982) in her seminal paper formulated the general prediction of the neoclassical theory with respect to interregional wage differentials as follows: workers with similar characteristics should attain the same level of utility across regions. Utility functions of employees include not only wages, but also living costs and various regional amenities and disamenities. Workers will prefer staying in a region with worse living conditions, if the corresponding loss in the level of utility is compensated by higher wages. In this case the interregional wage differentials between similar workers are considered to be compensative, and this gives an example of more general compensative mechanisms taking place in the labor market (Rosen (1986)).

After reviewing how the theory of compensative differences explains interregional wage differentials, three important accompanying questions should be mentioned.

Firstly, compensation for worse living conditions may take place not only in terms of wages, but also in terms of land (housing) prices. It should be expected, *ceteris paribus*, that housing prices will be higher in regions with a more attractive environment and lower in regions with a less attractive environment. This implies that lower housing prices compensate for poorer living conditions. According to Graves (1983), housing (land) price is the best candidate to reflect the attractiveness of a region for living, because it already captures the effects of various regional characteristics.

Secondly, considering wage differentials to be compensative makes it possible to evaluate different non-pecuniary regional characteristics in monetary terms and construct the so-called quality of life indexes (QLI). The principle of constructing "prices" for different regional characteristics is the same as the principle of constructing prices not for goods themselves, but for their different characteristics (Rosen (1974)). These "prices" are not observed, but can be evaluated indirectly. After moving from one region to another, a worker begins consuming some new regional amenity or the volume of consumption of an old amenity (which already existed in the original region) changes. At the same time his or her wage also changes and this change constitutes the worker's evaluation of the regional amenity. In practice, monetary estimates of non-pecuniary regional characteristics may be obtained from the estimation of the wage equation augmented with variables representing these amenities under the assumption of interregional migration equilibrium (Roback (1982), Blomquist et al., (1988)).

Thirdly, the compensative nature of interregional wage differentials should be viewed not only from the labor supply perspective, but also from that of labor demand. Firms should be able to pay compensations for worse living conditions. While in the public sector the remuneration of workers may automatically include regional supplements, in the private sector higher wages mean higher costs and under the conditions of perfect competition directly lead to exclusion from the market. This implies that either the assumption of perfect competition does not hold, or certain regions have characteristics that allow firms to lower production costs. The effects of these so-called productive amenities were modeled by Roback (1982) and more explicitly presented in the paper by Beeson and Eberts (1989).[14]

Summarizing the discussion presented above, we may conclude that interregional wage differentials between similar workers are compensative under the assumptions of perfect competition and absolute labor mobility. However, the theory of compensative differences may face a number of difficulties in its empirical implementation.

Lack of micro data and failure to take into account significant characteristics of workers. Aggregate regional data cannot be used to verify the predictions of the neoclassical theory of compensating differences. An aggregate regional wage is an average across various types of labor (with different levels of accumulated human capital, various occupations and industries). A wage gap between two regions may be caused by differences in the regional composition of employment. At the same time, differences in wages of workers with the same characteristics may be hidden behind the equality of average regional wage levels (Duranton and Monastiriotis (2002)). Therefore, in order to be able to compare wages of "similar" workers, one needs micro-data that would be representative at the regional level to control for the different composition of employment across regions.

It should be mentioned that micro-data as such is not a panacea for the problem of comparing "non-similar" workers. By definition, there is no survey that would identify *all* the worker and job characteristics that are important for determining wages. Consequently, the difficulty of considering "really equal" labor is a difficulty in the empirical implementation of the theory of compensating differences. This problem lead to wrong conclusions in a number of papers, for example, Gallaway (1963), Sahling и Smith (1983) and Krumm (1984).

Regional characteristics. The necessity of accounting for regional living costs and amenities raises several questions in testing the predictions of the neoclassical theory:

[14] The concentration of highly productive employees may also explain why firms operate in regions with a relatively high wage level. In this paper, we control for the regional employment composition, and therefore this possibility is accounted for.

1) Some workers may have stronger preferences than others for certain regional characteristics. Let us assume, for example, that the number of sunny days per year is an important regional amenity for one group of workers, but not so important for another group. Then the first group of workers, *ceteris paribus*, will accept lower wages for living in a sunny area than the second group. However, we are able to observe and estimate only the average level of compensation for both groups, hence interregional wage differentials for the workers from the first group will be underestimated, and for the workers from the second group these differentials will be overestimated (Roback (1982, 1988)).

2) There is no theory that would predict which regional characteristics are included in the utility functions of workers, i.e., which regional amenities and disamenities must be compensated (Roback (1982)). Moreover, even if it is known that certain regional characteristics are important for workers, it may be difficult to specify them. Failure to account for such regional characteristics leads to the overstatement of interregional wage differentials.

3) Most regional characteristics, both pecuniary and non-pecuniary, may be correlated with each other, creating econometric problems in regression analysis (Roback (1982, 1989), Dumond et al., (1999)).

4) Laysperes price indexes for a common set of goods and services are usually used in order to control for interregional differences in living costs. However, the optimal consumption structure may differ across regions, and so differences in regional price levels may either overestimate or underestimate the differences in the levels of utility that were brought about by these price differentials.

The influence of shocks and positive migration costs. At any given moment, the interregional wage structure may reflect not only regional endowments in amenities and disamenities, but also the influence of regional shocks. Shocks may arise on the side of labor demand, e.g., by a rise in the price for goods of regional specialization. Such a positive shock would lead to a growth in labor demand and push up the regional equilibrium wage. Shocks may arise on the side of labor supply, such as the demographic shock that arises when a relatively large demographic cohort enters the regional labor market. Such negative shocks lead to a growth in the regional labor supply and a reduction in wages.

The effects of shocks complicate the testing of the theory of compensating differences. If the adjustment to shocks is prolonged and regional wages are subjected to shocks, then monetary evaluations of regional disamenities (compensations in terms of wages) are biased. For example, if an observed wage level in regions with more favorable living conditions is

lower (higher) than the equilibrium wage level, then the monetary prices for non-pecuniary amenities will be overestimated (underestimated) in those regions (Greenwood et al., (1991a)). It is noteworthy that a negative correlation between the level of regional attractiveness for residency and the regional wage level may not even exist, if the "splashes" of regional wages are not controlled for. This may be the case when, for instance, a positive shock occurs in a region with relatively favorable living conditions.

The analysis becomes more complicated because of the fact that different shocks exert a prolonged influence on the size and structure of interregional disparities. According to the estimations by Blanchard and Katz (1992), the effect of a shock on wage structure across American states disappears only in 7-10 years. Such a speed of adjustment is high compared to regions in the EU (Bentivogli и Pagano (1999)). Therefore, regional wages may be under the influence of long-standing shocks, and controlling for shocks only at the moment of analysis may not be sufficient. The important question arises: how should one account for biases in the estimates for compensations in the presence of regional shocks?

In order to answer this question, it is necessary to understand the reason why various shocks exert a prolonged influence on regional labor markets. This reason lies in the failure of the assumption of absolute labor mobility. Indeed, if there is absolute labor mobility, then an immediate inflow or outflow of workers results after a negative (positive) regional shock and the interregional wage structure is restored. However, an immediate movement between regions is not possible. One can list a variety of factors that hamper migration. First of all, there is incomplete information. Movement to a new place of residence requires information about the employment opportunities and the possibilities of renting or buying a home. Secondly, there is underdevelopment of the housing market. This includes a lack of acceptable options for accommodation, an underdeveloped mortgage system and the relatively high transaction costs of the real estate market. Thirdly, there are liquidity constraints: in addition to housing costs, migration implies the costs of moving and a need to have funds to live before settling in. Fourthly, there are family, social and cultural ties (see Mincer (1978)). Fifthly, labor migration to other regions often leads to the depreciation of human and social capital, reducing the potential benefits from migration. Sixthly, there may be administrative barriers to migration.

All these factors generate positive migration costs. And it is the magnitude of these costs that determines how the interregional wage structure adjusts to regional shocks. If the movement costs are low, then workers are more mobile and the adjustment to shocks is faster and more complete. If the movement costs are high, workers are less mobile and the influence

of a shock is more persistent. In the extreme case, when the costs are prohibitive and migration does not take place, the effects of regional shocks on regional wages are not mitigated at all.

These arguments bring us to the following: *because of the effects of various shocks and given positive migration costs, interregional wage differentials reflect not only regional endowments in amenities and disamenities, but also the magnitude of migration costs.* This has several implications, which are very important for empirical analysis.

Firstly, if positive migration costs are not taken into account, as in the case when shocks are not included in an econometric model, the estimates for compensations in terms of wages for regional amenities and disamenities may be biased. The estimates may be under- or overestimated depending on in what region (with more favorable or less favorable conditions, respectively) a "splash" in wages has occurred. Moving towards absolute labor mobility through the removal of barriers to migration and the reduction of migration costs may lead either to a rise or fall in interregional differentials in (nominal) wages. It should also be noted that a negative correlation between regional "favorableness" and regional wages might not be observed at all without controlling for migration costs.

Secondly, the factors hampering migration affect different groups of employees in different ways. Consequently, migration costs vary with certain worker characteristics. For instance, many theoretical and empirical studies indicate that employees with a higher level of human capital and younger employees have a higher propensity to migrate (see, for example Goldfarb и Yezer (1976), Topel (1986), Dickie M. и Gerking S. (1998)).[15] If so, then more mobile workers, *ceteris paribus*, will receive larger wage compensations because they can choose a better combination of pecuniary and non-pecuniary regional characteristics (a bundle of goods comprising wages and amenities) than workers, who are less mobile. In addition, the wages of those workers who face higher migration costs are more affected by regional shocks (Topel (1986)).

Thirdly, the level of migration costs differs across regions. The costs of both migration in a region and migration out of a region increase because of the underdevelopment of the regional housing market, the remoteness of the region or the presence of administrative barriers. A high level of migration costs in a region implies a weak adjustment of wages in this region to shocks originating both from this region and from other regions. Therefore, a wage level in regions with high migration costs will not be similar to the wage levels in regions with similar living conditions but low migration costs.

[15] A possible explanation for this fact is that such employees face a smaller depreciation of accumulated human capital. At the same time younger employees are on average less constrained by family and social ties.

Summary. The theoretical discussion presented above suggests some recommendations for testing the ability of the theory of compensative differences to explain interregional wage differentials. Firstly, it is necessary to control for differences in employment composition across regional labor markets. Secondly, one should consider as large a set of regional characteristics as possible. Thirdly, one should control for the impacts of shocks on the interregional wage structure. Fourthly, one should take into account positive migration costs, which differ across regions. Failure to take significant regional amenities, the effects of shocks and the presence of migration costs into account may lead to biases in the estimates for wage compensations, and may even be the cause for detecting a positive relationship between regional "favorableness" for residency and regional wages (which would contradict the theory). Fifthly, as a consequence of the heterogeneity of workers, both in migration costs and preferences, one should examine regional wage differentials among groups of workers that are as homogeneous as possible.

Overview of the empirical literature. Roback (1982, 1988) shows that in the USA the non-pecuniary characteristics of cities have a significant influence on the wages of workers. Workers receive compensation in terms of wage for such disamenites as a high crime rate, a high level of dustiness, a large number of cloudy days per year and a high precipitation rate. Including city characteristics in the wage equation substantially decreases the significance of the coefficients of dummies for North-American macro-regions, and most of these coefficients become insignificant. It suggests that a relatively high average wage in the northern part of the USA contains a substantial compensative component. Moreover, the explanatory power of the theory of compensating differences rises if interstate wage differentials within more homogenous groups of workers are considered. Using a similar methodology, but a different dataset Dumond et al. (1999) show that wage differentials across American macro-regions fall significantly after controlling for differences in living costs and some non-pecuniary factors (crime rate, air humidity, precipitation rate, and quality indices for health and education systems). Beeson and Eberts (1989) argue that it is important to consider not only consumption amenities, but also productive regional and city amenities. According to their estimations, productive amenities are able to explain even a higher share of the variation in regional wage premiums than consumption amenities. Beeson (1991) shows that even territory differentials in returns to education can be explained through the compensating approach (but not through the differences in the structure of regional labor demand), if the intensity of worker preferences with respect to regional characteristics is associated with their education level.

Furdato (1996) verifies the predictions of the theory of compensating differences for four European countries, Great Britain, Germany, Italy and Spain. In spite of the fact that interregional differentials in real wages in all four countries are higher than in nominal wages[16], the author finds that regional characteristics have a statistically significant impact on individual wages, though the signs of the coefficients for some climate characteristics may differ across countries. [17,18]

For Russia, by using the RLMS data and estimating the augmented wage equation, Berger et al., (2003) show that regional[19] and city[20] characteristics have a significant impact on individual wages as predicted by the compensating theory. Bignebat (2005) also used the RLMS data and arrived at similar results.[21] Both studies conclude that interregional wage differentials in Russia have a substantial compensative component.

In conclusion, we note that the theory of compensative differences is generally confirmed in practice. From the methodological point of view, all studies tested a wide set of regional characteristics and used micro-data to control for interregional differences in employment composition. At the same time, these studies contain several methodological drawbacks. Usually, they ignore the "welfare effect" (the endogeneity of some of the regional characteristics used) and the existence of positive migration costs. Another shortcoming is in neglecting the problem of instability of the coefficients for regional characteristics. The authors usually stop searching for an appropriate specification and start to interpret their findings when a joint significance of the regional coefficients is found. However, exclusion of a single regional variable from the specification may considerably alter the estimates and thus change the interpretation of the results. In addition, the heterogeneity of workers was taken into account only in two studies and only one study included variables to control for region-specific shocks. In our study, we attempt to overcome all these methodological difficulties.

4. Methodology and data

[16] Housing prices were used here as a proxy for living costs, and in order to account for differences in living costs a method of full correction was used (see the "Regional living costs" section).
[17] The author suggests the following explanation: The type of climate in Italy and Spain differs from the type of climate in Great Britain, and therefore the temperature and the number of sunny hours per day in the former countries are more likely disamenities, while they are amenities in Great Britain
[18] The results received for Germany suggest that there is compensation for such regional characteristics as the proximity to natural parks, the number of sunny hours per day and the level of pollution.
[19] The number of days when the air temperature is below zero, the precipitation rate, the sickness rate, the conflict index.
[20] The air and water pollution level, the number of telephones per person, the number of doctors per person, commitment time, the crime rate, a dummy for regional capital.
[21] In this study, panel data were used that allowed to control for non-observable individual characteristics.

The methodology is based on the estimation of the wage equation augmented with regional characteristics:

$$Ln(W_{i,j}) = A + B*X_{i,j} + C*RC_j + D*S_j + E*MC_j + e_{i,j} \quad (1)$$

where $W_{i,j}$ is the wage of worker *i* from region *j*; X is the set of worker and job characteristics that reflect the regional employment composition; RC is the set of regional characteristics (amenities, disamenities and living costs), for which workers demand compensation in terms of wages; S is the set of variables that controls for the influence of shocks on the interregional wage structure; MC are the variables that control for the presence of positive migration costs; A is the global constant; B, C, D and E are the matrices of coefficients that are to be estimated; e is an error term, reflecting the influence of unobservable factors on individual wages.

It is expected that the set of coefficients (C) will be significant. In other words, it is expected that regional characteristics (RC) will influence individual wages, if one considers similar workers (X), controls for the influence of regionally specific shocks (S) and accounts for positive migration costs (MC). The theory of compensating differences predicts that the coefficients for regional amenities will be negative, while the coefficients for disamenities and productive amenities will be positive.[22]

In estimating equation (1), one should take into account regional clusterisation. The wages of workers from one region may be correlated, and the estimates for dispersion of regional coefficients may vary considerably. Moulton (1990) shows that the existing correlation of errors within regions leads to the underestimation of the standard errors of the coefficients for regional characteristics and may produce spurious findings of statistical significance. This implies using a robust estimation technique. However, in order to adjust interregional wage differentials for different factors (see below), the sample should be representative for regional distribution of respondents. Since this is not the case, we apply survey regression techniques. Estimates obtained by using this technique are analogous to those that can be obtained by using robust estimation, if the latter account for the regional clusterisation of errors and additionally use population weights.

Adjustment of interregional wage differentials. In order to see how the adjustment for regional employment composition and regional characteristics influence the scale of interregional wage differentials we follow the methodology introduced by Dumond et al.,

[22] Productive regional amenities are amenities that allow firms to decrease costs, see Roback (1982), Beeson and Eberts (1989)

(1994). We estimate separately three equations: the first one contains only with (X), the second one contains (X) and (RC), and the third one is the full specification (1), including controls for shocks (S) and migration costs (MC). After the estimation of each of these specifications we calculate two measures of interregional wage differentials: the weighted standard deviation (WSD) and the weighted mean standard deviation (WMAD).[23] The calculation of these measures is based on residuals: for every specification for each region we calculate the mean residual, which reflects the deviation of the mean regional wage from the national average. It is expected that adjusting the interregional wage differentials for different regional employment compositions and different endowments in amenities and disamenities will considerably decrease the scale of interregional wage differentials.[24]

Data. A micro-database is needed for this study, one which would be representative both at the national and regional levels. Russian LFS does not contain information about wages, and the widely used Russian Longitudinal Monitoring Survey (RLMS) is not regionally representative. The only appropriate database is the NOBUS. This household survey was conducted in the spring of 2003. The advantages of this dataset are its large sample and its regional covering. The dataset contains information on more than 45 000 households and is representative for the whole country and its 46 regions.[25]

The monthly average wage on a worker's main job is used as a measure of individual wage. 98% of all observations were collected in May 2003; therefore we do not deflate wages. Observations from the lowest and highest 0.1% of the wage distribution were treated as outliers and excluded from the sample. Only a minority of workers had wage arrears at the moment of survey, and these wage arrears were not concentrated in any group of workers based on industry or skill. Therefore, we do not adjust wages for nonpayment as was commonly done in studies on Russia in the 1990s. Descriptive statistics for the NOBUS sample are presented in Table A.2 in the Appendix. Characteristics listed there constitute the set (X) of worker and job characteristics. The inclusion of this set of individual characteristics in the equation allows us to control for interregional differences in the employment composition. Regional average wages are presented in Table A.3 (in the Appendix) in descending order. Nominal wages are highest in the cities of Moscow and Saint Petersburg

[23] A similar methodology was used earlier by Krueger and Summers (1988)

[24] It should be noted that it is impossible to adjust interregional wage differentials for regional characteristics with the use of regional dummy variables because of the problem of total multicollinearity. Papers that used regional dummies adjusted only for the regional employment structure (see, for example, Haisken-DeNew and Schwarze (1997), Azzoni and Servo (2002), Garcia and Molina (2002), Viera et al., (2005))

[25] More information about this database is available on the site of World Bank: Russian Federation/Special Projects

and their surroundings, and in the Northern and North-Eastern regions of the country. Among the outsiders are the regions of the Southern and Central Federal Districts.

In addition to micro data we use aggregated regional characteristics, which are published by Goskomstat (now Rosstat). We match these characteristics with the NOBUS database. As there is no theory that predicts which regional characteristics are compensative in terms of wages, the choice of regional characteristics is determined by the previous papers on Russia and other countries, and also, of course, by the availability of regional data. The list of selected characteristics contains living costs (regional price index and average prices for 1 square meter of living space), the expected lifetime, the average temperature in January, the crime rate, the air pollution level, medical staff per 10 000, the number of buses, the density of asphalt roads, the number of telephones per person, the regional unemployment level. The descriptive statistics for all regional characteristics used in the study are presented in Table A.4 in the Appendix.

Two variables of the set (S) were constructed using official Rosstat data on GDP and GRPs. The first variable is the deviation of the GRP growth rate in 2002 from the regional growth trend. The regional growth trend is presented as the average growth rate for the period 2000-2005. If this variable is more (less) than one, then a positive (negative) shock in the region has occurred. The second variable is the average deviation of GRP growth rates from the GDP growth rate for the period 1999-2003. This variable reflects interregional differences in the speed of adjustment to the 1998 macro-shock. Additionally, we construct a variable reflecting the proximity of a region to the military conflict in the republic of Chechnya. This variable is a dummy and equals one if a region borders Chechnya.[26]

In implementing our methodology, we have to take into account several difficulties.

Instability of the estimates of the C-coefficients. The asymptotic properties of the C-coefficients are determined not by the number of individual observations, but by the number of observations on the regional level, which is equal to 79 in our sample. Under such circumstances, the problem of the multicollinearity of regional characteristics becomes more acute. It implies that the significance of the C-coefficients is very sensitive to the specification of equation (1), and this may significantly affect the interpretation of the estimated coefficients. In this study we take this problem into account and interpret only those dependencies that are robust in all specifications.

Endogeneity of regional characteristics. Not only Russian studies on interregional wage differentials, but international studies as well suffer from the problem of endogeneity. One

[26] Only three regions, the Republics of Dagestan and Ingushetiya and the Stavropol Region, border Chechnya.

can expect that in rich and developed regions the wage level is higher and the regional infrastructure is better than in poorer regions. This may lead to biases in estimation. It is difficult to avoid this problem, because, on the one hand, the characteristics of the infrastructure must be included in the equation, but, on the other hand, it is hard to find any auxiliary (instrumental) variables that reflect interregional differences in infrastructure and, at the same time, are not correlated with the level of regional development. However, unique Russian conditions allow us to solve this problem: under a planned economy the level of development of the regional infrastructure in Russia was determined centrally and exogenously with respect to regional economic development. Taking into account the high correlation between the indicators of regional infrastructure development in 1990 and 2003, one can use the indicators of 1990 as convenient instruments for the indicators of 2003.[27] In this study we instrument for the four regional indicators by using their 1990 values (see *Data* section and Table A.5 in the Appendix).

Regional living costs. The theory predicts that higher regional living costs have to be compensated through a mechanism that is similar to that of worse living conditions. However, it is not clear how one should take regional living costs into account when estimating the wage equation.

Firstly, regional differences in living conditions may account for a significant part of the interregional variation in living costs, including housing (or land) prices. Many papers show that including living costs into the wage equation together with non-pecuniary regional characteristics increases the interregional variation in wages[28]. This can be viewed as an argument to not include living costs in the wage equation. In this paper we take into account this possible "cumulative" effect. We include two measures of regional living costs: the regional price index and the average price for 1 square meter of housing.[29]

Secondly, along with the option of including or not including measures of living costs in the equation, one can use a full adjustment of wages for living costs, i.e. divide individual wages by the corresponding regional price level before estimating the augmented wage equation. However, Dumond et al. (1999) show that the inclusion of the regional price levels

[27] The same method was used in the paper by Muravyev (2006)
[28] Furdato (1996), Robak (1988), Dumond et al., (1999)
[29] In most papers, in order to account for the differences in living costs between territories, either housing prices were used, or they were included in the price index and determined most of its interregional variation. The price index in Russia does not include housing prices, and this is why we include housing prices along with the price index in the equation. The price index is calculated by Rosstat and recommended for interregional comparisons. It presents a price for a fixed set (same for all regions) of goods and services and contains such goods as gasoline, clothing and food.

in the left-hand side of the wage equation is a preferable way of considering regional living costs, and we follow their recommendations.

Migration costs. As mentioned above, there is a long list of factors that may hamper interregional labor mobility. Unfortunately, many of these factors are difficult to formalize in order to use them in an empirical analysis. Moreover, the size of migration costs depends on the characteristics of both origin and destination regions, but micro-data for this does not exist in Russia. In addition, currently there are no studies that offer estimates for the costs of migration between Russian regions.

In this study we use the geographical distance from the capitals of the regions to Moscow as a proxy-variable for the level of positive migration costs. Here we implicitly assume that for migrants from every region, Moscow is the region of destination. Such an assumption is not far from reality, because Moscow (along with the Moscow region) is the principal region that attracts migrants in Russia.[30] It is also assumed that differences in geographical distance reflect differences in transportation costs, thereby accounting for migration costs induced by such factors as the need to pay to move. It should be clear that accounting for migration costs in this way fails to take into consideration the costs of migration induced by many other factors. Nevertheless, it allows us to obtain results, which conform to the theory of compensative differences (see the section *Results and Discussion*).

Heterogeneity of workers. The method used in this study assumes that including the set of worker and job characteristics (X) in the wage equation allows us to consider interregional wage differentials across similar workers. However, the heterogeneity of workers can influence estimates not only through different worker (and job) characteristics. Firstly, different types of workers may have different preferences with respect to regional characteristics. Secondly, workers may have different propensities to migrate. In both cases the level of compensation for the same regional characteristics will not be equal across workers.

Therefore, we estimate equation (1) both for the total sample of workers and also for several sub-samples. We distinguish two groups of workers by age (15-29 and 30-72), and two groups by whether or not there are children in a household. These groups differ significantly in their levels of mobility. According to Rosstat, both men and woman at the age of 15-29 are much more mobile than others.[31] For the purposes of our analysis it is not

[30] According to Rosstat, during the period from 2000 to 2005 the net migration coefficient was the highest in Moscow and the Moscow region (if data on the Republic of Ingushetia are not considered). In 2002, Moscow and the Moscow region had a positive exchange of migrants with 47 regions; the Tumenskaya Region had the next largest positive migration balance, with 7 regions.

[31] Rosstat, "Demographic yearbook"

important what the second group of less mobile workers is, so we compare results for young workers with the results for all other samples without distinguishing more detailed age groups. The presence of children in the household, in its turn, sharply reduces mobility. We use also the intersections of these groups, assuming that young people with children will be the less mobile group, and young people without children will be the most mobile one. It might be expected that more mobile groups of workers will receive on average a higher level of wage compensation, because they are able to choose from a wider set of "wage – amenity" pairs. However, it should be noted that the preferences of workers might differ.

5. Results and discussion

The estimation results of the wage equation generally support the findings of other papers on Russia.[32] Firstly, wages grow with the level of education. Individuals with higher education receive about 30% more than individuals with primary education. Secondly, there is a positive diminishing return to age. Thirdly, there are significant wage premiums in the extracting industry, energy, transport and communications. Employees in the public sector (education and health) and agriculture receive lower wages. Fourthly, there is a clear wage hierarchy in occupations. Finally, the level of urbanization, *ceteris paribus*, positively affects individual wages.[33]

However, the main interest of our study lies in the analysis of the influence of regional characteristics on individual wages. The estimation results are shown in Table A.5 in the Appendix. The six columns of the Table present results for six specifications of the wage equation. Specifications 1 and 2 are the same, including all regional characteristics and estimated by simple OLS (using population weights); the first one, however, was estimated without taking regional clusterisation into account. Controlling for regional clusterisation increases standard errors of the coefficients for regional characteristics, and some of them even become insignificant. This result conforms to our expectations: ignoring clusterisation leads to the underestimation of the standard errors of the coefficients.[34]

In Specification 3, the four infrastructure variables were instrumented by their 1990 values. The significance of all instrumented variables decreases, and two of them (medical staff per person and availability of buses in a region) become insignificant even at the 10% significance level. This finding indicates that the significance of these regional characteristics in Specification 2 may be explained by the "welfare effect", i.e., by their endogeneity with

[32] See, for example, Denisova and Karceva (2005), Oshchepkov (2006)
[33] Some explanations for this phenomenon can be found, for example, in the paper by Glaeser and Mare (2001)
[34] See Moulton (1990)

respect to the regional wage level. Specification 3 also shows that variables controlling regional shocks do not influence individual wages. Specification 4 confirms that excluding the two shock variables from the equation does not alter the estimated coefficients of the regional characteristics. We conclude that the estimates of coefficients of the regional characteristics are not biased with respect to regional shocks, and therefore the shock variables are excluded from further analysis.

It is noteworthy to discuss the effects of the inclusion of distance from a region to Moscow (a variable reflecting migration costs) in the equation. A comparison of columns 4 (containing the distance) and 6 (without this variable) shows that accounting for positive migration costs changes the estimates of the coefficients of the regional characteristics. The coefficient of life expectancy increases, in other words, compensation in terms of wages for living in a region with a low life expectancy rises. This completely satisfies the predictions of the theory of compensative differences. Indeed, Moscow in our case is the center of attraction of migrants and, at the same time, it is a region with a high level of life expectancy (in 2003, Moscow was third in this characteristic after the Republics of Ingushetia and Dagestan). A decrease in migration costs would lead to a growth of migration to Moscow, a decrease in wages in Moscow and an increase in wages in the regions of out-migration, where the life expectancy is low. Therefore, the wage compensation for living in regions with a low life expectancy grows.

The decrease in the coefficient of the regional price index after including distances from regional capitals to Moscow in the wage equation can be explained in a similar fashion. Moscow in this characteristic (price level) is already a relatively "not favorable" region (in 2003 the price levels in only two Northern regions, the Chukotka Autonomous Region and the Sakhalin Region, were higher than in Moscow). A reduction in migration costs would lead to the strengthening of the migration to Moscow, a decrease in the wages in Moscow and the increase of wages in the regions of out-migration. However, the price level in most of these regions is lower than in Moscow, and therefore the wage compensation for regional price levels would come down. (The reduction in the coefficient of regional housing prices after the inclusion of migration costs in the wage equation can be explained analogously.)

Specification 4 could be chosen as the basis for interpreting the coefficients. The regional clusterisation, "welfare effect" and positive migration costs were considered in this specification. Moreover, all regional characteristics are jointly significant at the 1% level of significance. However, the problem of the instability of the regional coefficients has still not been considered. This problem, as discussed above in the methodology section, is caused by

both technical and theoretical reasons. On one hand, some regional characteristics are correlated (see Table A6 in the Appendix). On the other hand, regional characteristics considered by workers in their utility functions may substitute each other. For instance, a worker may prefer to live in a region with a higher crime level, but with a lower level of air pollution. These factors, given the small number of degrees of freedom (equal to the number of regions), result in a high sensitivity of the estimates of the regional coefficients to the specification form. Further analysis confirms that the exclusion of some regional variables alters not only the magnitude, but also the significance of the estimates for the remaining variables.

The process of selecting a stable specification is presented in Table A7 (see the Appendix). Specification 4 was chosen as the starting point. First, we excluded the most insignificant regional characteristic (availability of buses) from the equation. This leads to changes in the size of the coefficients of some regional characteristics, a reduction in the significance of the number of telephones and the statistical insignificance of the regional unemployment level. Next, following the same principle of excluding the most insignificant regional variable, we successively exclude the dummy variable that reflects the proximity of a region to Chechnya (see Specification 7), the density of roads (see Specification 8), the unemployment level (see Specification 9), and the price for 1 square meter of housing (see Specification 10). Specification 11 contains only significant regional characteristics, and the further exclusion of variables does not alter the significance of the remaining variables.[35] Specification 11 additionally includes the variable "distance to Moscow." Comparison of the estimates in specifications 11 and 12 shows that inclusion of migration costs affects the estimates of regional characteristics (above all, life expectancy and the regional price index) holds valid. Thus we chose specification 11 as the final specification for interpreting the coefficients and the further calculation of adjusted interregional wage differentials.

Our results show that Russian workers receive compensation in terms of wages for living in regions with a relatively high level of prices. The estimated coefficient of the regional price index does not significantly differ from one. This means that workers receive a 10% wage compensation for living in a region where the price level is 10% higher than the average price level. Dumon et al. (1994) obtained an estimate for the coefficient of the regional price level significantly lower than one (0.457) for the USA, and Roback (1988)

[35] It should be noted that the estimation sample increases if specification 11 is used. The reason is that information on housing prices was not available for 2003 for the Chukotka Autonomous Region, and therefore observations from this region were dropped during estimations of specifications containing this variable.

received an estimate close to one (0.972).[36] Such discrepancies in the estimates may be explained by whether or not housing prices are included in the regional price index. In our study and in the study of J. Roback, unlike the study of J. Dumond et al., the price index does not contain housing prices.

Russian workers also receive compensation in terms of wages for living in regions with a relatively low expected lifetime. They receive 2,75% wage compensation for living in a region where the expected lifetime is 1% lower than on average in the country (1% of the average expected lifetime of 64 years amounts to about 7.5 months).[37] Such regional characteristics as the average temperature in January, the level of air pollution, the number of medical stuff per person, and the number of telephones per person also have an influence on individual wages that is predicted by the theory of compensative differences. The last characteristic may be viewed as a productive regional amenity. Its positive influence may be explained by noting that the number of telephones decreases the costs of regional enterprises.

The only variable with a sign that is counter to theoretical expectations, is the crime level. The coefficient of this variable remains negative and statistically significant in all specifications. The negative relation holds even if we replace this variable by one that reflects a similar regional characteristic, e.g. the share of crimes in a region that was committed by juveniles. Perhaps the crime level should also be placed among productive regional amenities.

The results of our estimations generally agree with the results of previous studies on Russia. Berger et al. (2003) found that characteristics of cities such as the number of telephones per person, medical staff per person, the crime level, and the number of days per year when the temperature is below zero have a significant influence on individual wages. At the same time, the effect of air pollution was insignificant and the influence of the crime level was negative in this study. Bignebat (2005) found that the regional price level, the air pollution level and regional number of hospital beds (as an analog of our variable, medical staff per person) have the influence on individual wages that is predicted by the theory of compensative differences. However, the average temperature in January was insignificant. It should be emphasized that it is hard to draw any robust conclusions from the comparisons of results of our study and previous studies. Unlike our study, they used RLMS micro-data and their methodology was quite different from ours. Nevertheless, it should be mentioned that

[36] Dumond et al. Op. cit. 1999; Roback Op. cit. 1988

[37] We note that high life expectancy in Russia's southern regions might be a consequence of a high proportion of people with specific religious, cultural and ethnic traditions. Therefore, it could be difficult to receive this amenity by moving to these regions. However, firstly, living in a neighborhood where people live longer might be a self-dependent amenity for migrants (for instance, from the point of view of gaining experience). Secondly, a high life expectancy is not possible without favorable natural and environmental conditions.

our analysis has a number of advantages, because it is based on NOBUS micro-data that is more suitable for considering regional labor markets, and also uses a more correct methodology.

What regional characteristic has a stronger influence on individual wages? In other words, for what regional characteristic do workers receive a higher compensation in terms of wages? In order to answer this question it is necessary to take into account not only the magnitude of the obtained coefficients, but also the variations of the corresponding regional characteristics. Thus, according to our calculations, the regional price index has the largest effect on individual wages: workers receive about 25% wage compensation for one standard deviation in this characteristic. The next characteristics are medical staff (per 10 000 citizens) and life expectancy: both about 14% of wage, followed by the number of telephones (per 1000 citizens) (about 12% wage compensation), the average temperature in January and the crime level (about 8% wage compensation), and the level of air pollution (about 1% wage compensation for one standard deviation).

One more interesting empirical result should be noted. Accounting for positive migration costs increases the constant term of the equation in all estimated specification; in other words, the average wage level of the reference group of workers increases. This suggests that the reduction of migration costs may lead to a more effective distribution of labor force across the regions, and therefore increase the wage level in the country as a whole.

Compensations and different types of workers

The estimation results for our final specification (Specification 11) for different groups of workers are presented in Table A8 (see the Appendix). The magnitude of wage compensation for the regional price level is a little lower for younger workers than for older ones. A similar result was presented in the studies of Dumond et al. (1999) for the USA and Lukyanova (2007) for Russia, but it was not discussed in those papers. In our work we suggest the following interpretation. If the level of worker mobility grows, then workers would migrate to Moscow (or the Moscow region). This would lower wages in Moscow and push up the wages in the regions of out-migration, and therefore lower the wage compensation for regional prices, because price levels in regions of out-migration are less than in Moscow. Such a finding is completely consistent with our previous results of including a proxy variable for migration costs in the regression: controlling for migration costs leads to a decrease in the size of the coefficient for the regional price index. At the same time, as Table A8 shows, compensation for living in regions with a low life expectancy is

higher for younger workers than for older ones. This finding is also consistent with our previous results and has the same interpretation: out-migration from regions with a low life expectancy will raise the wage compensation for this characteristic.

Then, we use another criteria for propensity to migrate (the dummy for the presence of children in the household) and this again confirms our findings. More mobile workers who do not have children receive a higher wage compensation for living in regions with a relatively low life expectancy than less mobile workers with children. The difference is much larger if we compare the most mobile (young workers without children) and the least mobile (young workers with children). Therefore, we conclude that the results we obtained for different groups of workers agree with the results obtained for the whole sample of workers.

Adjustment of interregional wage differentials

The results of adjusting the interregional wage differentials for differences in the regional employment composition and significant regional characteristics are shown in Table A.9 (see the Appendix). They are presented in deviations of average regional wages from the national average, which are evaluated in log-points. We refer to them below as to regional wage premiums. The adjustment was curried out on the basis of Specification 11. The regions where the NOBUS sample is representative are shaded gray. Two measures of regional wage dispersion, WASD and WMAD, for each specification are presented at the bottom of Table A.9.

We emphasize three general findings. The first one is that a broadening of the set of factors smoothes interregional differentials, and as a result both WASD and WMAD decline by about 70%. Therefore, our analysis offers two explanations for the interregional variation in wages. The first one refers to cross-regional differences in composition of the employment. The second relies on the theory of compensating differences. Unfortunately, it is hard to compare the effects of each of these explanations into interregional wage differentiation. Their relative impacts depend on sequence in which the corresponding factors are introduced in the regression.

The second general finding is that the geography of regional wage premiums totally changes after adjusting for different employment compositions and significant regional characteristics. Adjusting for employment structure considerably decreases the high wage premiums in the largest Russian cities, Moscow and Saint Petersburg, where both highly paid jobs and workers with a high level of human capital are concentrated. In contrast, wage premiums in traditionally low-paid regions of the Russian South (for example, the Republics

of Dagestan and Adygeya) increase. Further adjustment for significant regional characteristics (from Specification 11) improves the situation in the southern regions of Russia. A relatively high life expectancy, low prices, and low levels of air pollution characterize these regions. The relative favorableness of these regions compensates for the lower (nominal) wages. Quite to the contrary, adjusting for regional characteristics lowers the wage premiums in the northern regions (for example, in the Murmansk and Sakhalin Regions, and in the Republic of Sakha (Yakutiya), where the price level is high and the life expectancy is low.

Adjusting for living costs and regional disamenities leads to a negative (!) wage premium in Moscow. The high level of prices and air pollution contribute to this result, but it goes contrary to the fact that Moscow is a center of attraction for migrants. It may be the case that some regional characteristics were neglected in our analysis. Moscow is the capital of the country, where the headquarters of leading Russian enterprises, the central offices of many foreign companies, and the federal bodies of executive power and legislature are located. Another possible factor is the agglomeration effects of a large city (higher productivity, lower transaction costs, economy of scale, etc.), which allow firms to pay higher wages.

The third finding is that regional wage premiums are closely associated with migration costs. On one hand, after taking these costs into account, regional premiums rise in most of the northeastern regions of the country (for example, in the Sakhalin, Kamchatka and Khabarovsk Regions), where migration costs are high because of their remoteness from Moscow. On the other hand, regional wage premiums come down in most of the regions of the Central Federal District (for instance, in the Bryansk, Ivanovo, and Lipetsk Regions), where the costs are low. This suggests that a reduction in moving costs will stimulate the migration flow from the northeastern regions to western regions, raising the wages in the regions of origin and decreasing the wages in the regions of destination. This means that workers living in the northern regions are under-compensated for unfavorable regional characteristics, and one of the ways to increase their wage compensation is by reducing migration costs.

It may be expected that the adjustment presented above does not take into account many regional characteristics that are valuable for workers. Some limitations are also imposed by the fact that the NOBUS sample is not representative for about 30 Russian regions; this also adversely affects the calculation of adjusted wage premiums for regions where the NOBUS sample is representative. Therefore, it is clearly not correct to interpret the obtained estimates as recommendations for choosing a region, where people live relatively “well”. Nevertheless, we argue that it is not correct to draw conclusions on the well-being of people living in

different regions by comparing nominal or even real regional wages. Many other regional characteristics need to be taken into account.

Regional wage premiums and net migration

It is natural to test the credibility of our results by establishing the correspondence between them and interregional migration flows.[38] The correlation between the coefficients of net in-migration and unconditional (observed) wage premiums turned out to be negative (see Table A.10 in the Appendix), i.e., the lower the wage premium in a region, the higher the migration rate to this region. The correlation remains negative, and its significance even rises, after adjusting for regional differences in employment composition. However, further adjustment of regional wage premiums for valuable regional characteristics makes the correlation positive. In other words, the sign of the correlation changes from the counterintuitive to what is theoretically predicted after adjustments. This suggests that migrants making decisions on where to move consider not only (nominal) regional wages, but also other regional characteristics. This completely satisfies the predictions of the theory of compensating differences.

6. Conclusion

Large interregional wage differentials have emerged in the Russian Federation since the beginning of the 1990s. However, no explanation for this phenomenon has been suggested. Using a methodology based on the estimation of the wage equation augmented by regional characteristics, we find two possible explanations. First, interregional wage differentials are associated with different compositions of employment in Russian regions. Second, workers are compensated for higher living costs and worse living conditions. Regional amenities influence individual wages as predicted by the theory of compensating differences. Russian workers receive wage compensations for living in regions with a higher price level and worse non-pecuniary characteristics, such as a relatively low life expectancy, a high level of pollution, poor medical services and a colder climate. According to our estimates, different employment compositions and wage compensation for regional disamenities account for about three fourths of the observed variation in regional wages.

Our results argue that the concept of compensative differences is appropriate for explaining interregional wage differences in Russia. According to our estimates, half of the interregional wage variation between workers with similar productive characteristics should

[38] Data on migration is taken from the statistical yearbooks “Regioni Rossii” published by Rosstat

be considered as compensative. Such conclusions are relatively new for transition economies. While the theory of compensative differences works well for mature market economies, there is almost no such evidence for transition countries. In our view, Russian specifics are associated with the historical fact that the same regions are characterized by unfavorable living conditions and a high concentration of enterprises with a high level of profitability (above all, enterprises belonging to the exporting industries). Consequently, on one hand, there is a need for compensation, and on the other hand, there are the resources to pay it. Therefore, interregional wage differentials in Russia have a compensative character in spite of high migration costs.

Our analysis suggests some policy implications. Firstly, we confirm a well-known view that the diversification of regional economies would lead to an increase in regional wages. Secondly, policies aimed at reducing interregional migration costs would contribute to the growth in the level of wage compensations for workers living in regions with relatively unfavorable living conditions. Welfare growth could be achieved in this case even in spite of a possible rise in the interregional differentials in nominal wages. Thirdly, our results argue that it is not correct to make conclusions about the well-being of regional populations by comparing regional (nominal) wages. A relatively low (high) level of wages in a region may be compensated by a higher (lower) price level or by better (worse) non-pecuniary living conditions. Generally, our results support the view that the best policy reaction to the observed high level of interregional wage differentials should be the removal of migration barriers and a reduction in migration costs.

At the same time, our results indicate that the search for other explanations for the phenomenon of interregional wage differentials in Russia should be continued. In the framework of the theory of compensative differences, a broader set of regional characteristics, which are potentially important for workers and influence migration decisions, should be considered. One should also pay more attention to productive regional amenities that allow firms to pay wage compensations, i.e., pay higher wages. Furthermore, a series of studies on Russia indicate that theories other than the neoclassical theory of compensative differences may contribute to the understanding of the phenomenon of interregional wage differentiation. Wage formation mechanisms may substantially differ across regional markets.[39] This does not contradict the compensative character of regional wage differentials, but suggests considering other explanatory factors.

[39] See Kapelushnikov (2003), Kondratieva (2003), Shahnovich (2003)

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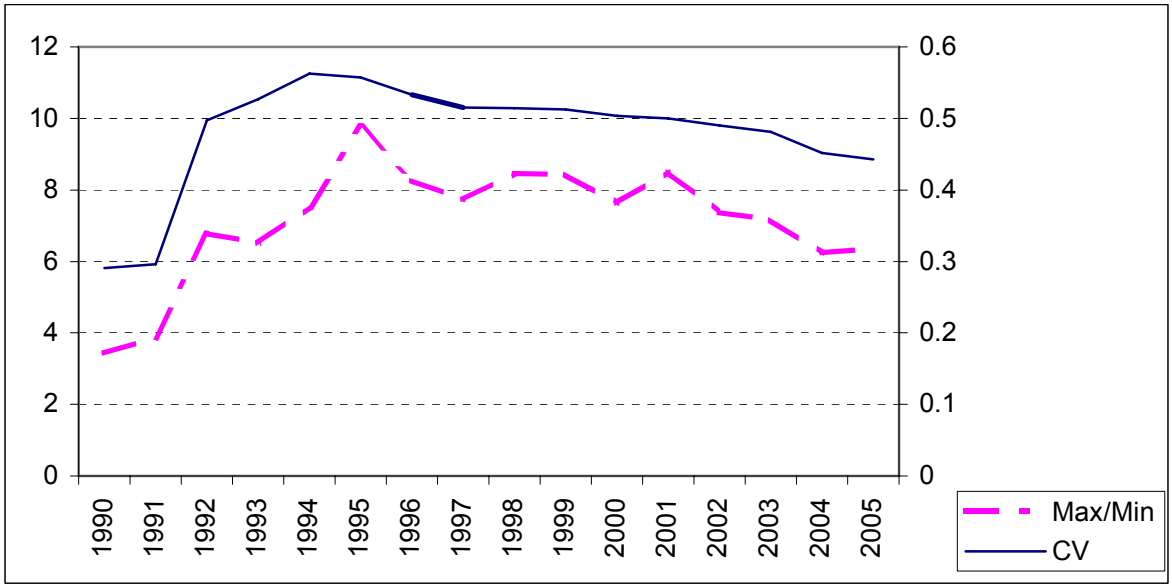
Appendix

Diagram A.1. Dynamics of interregional wage differentials in Russia



The left axis gives the ratio of maximum average wage across regions to the minimum average wage; the right axis gives the coefficient of variation of average regional wages.

Table A.1. Interregional wage differences in Russia and other countries

Country	Number of regions	Period	Max/Min	Coefficient of variation
Australia	8	1996-2001	1,28	0,083
Germany	16	2003	1,56	0,147
Canada	11	2001	2	-
USA	53	1998-2002	2,19	-
France	26	2002	1,57	0,087
Belarus	7	I quarter of 2005	1,47	0,152
Ukraine	27	2002-2004	2,71	0,255
Russia	**79**	**2000-2005**	**7,38**	**0,485**

Table A.2. Description of the NOBUS sample

	%
Gender	
Male	47,4
Female	52,6
Education	
No primary and primary	0,9
Primary general	7,0
Secondary	20,3
Primary vocational (with complete secondary)	8,4
Primary vocational (without complete secondary)	3,9
Secondary vocational	34,3
Higher (not completed)	3,6
Higher and post-graduate education	21,7
Occupations	
Management	2,6
Leading specialists	14,4
Specialists	20,0
Clerks	5,7
Workers in facilities	14,2
Qualified workers in agriculture	4,1
Qualified workers	16,3
Operatives and other	6,7
Non-qualified workers	14,3
Military forces	1,8
Settlement	
1 mln. and more	10,8
500−999,9 thousands	9,1
250−499,9 thousands	14,4
100−249,9 thousands	11,1
50−99,9 thousands	7,3
20−49,9 thousands	9,5
5 - 20 thousands	14,0
village	24,0
Industry	
Agriculture, hunting, forestry	8,6
Fishing	0,9
Extracting industry	2,7
Manufacturing	14,9
Energy, gas and water supply	3,8
Construction	6,8
Trade	11,6
Hotels and restaurants	1,2
Transport, communications and storage facilities	9,5
Financial services	1,2
Realtors and other commercial services	1,2
Government + military forces	9,0
Education	11,7
Health and social programs	8,6
Municipal and social services	7,7
Others	0,8
Tenure	
Less than 1 year	13,4
1-3 years	19,5
3-5 years	12,7
5-10 years	17,0
More than 10 years	37,5
Age (years)	39,9
Wage (roubles, after taxation)	3502,3
Working hours (weekly)	41,0
N	46680

Table A.3. Mean regional wages (in rubles,.NOBUS, May 2003 г.)

Region	N. of observations	Mean	Median	Standard deviation
Chukotka Autonomous Region	127	8448,72	8000	5441,38
Tumen Region	1102	7635,51	6000	8270,02
Kamchatka Region	1037	6349,84	5000	4389,24
Moscow	1133	6008,53	5000	3545,30
Republic of Sakha (Yakutia)	1072	5927,86	5000	5783,43
Murmansk Region	1133	5586,88	4500	3942,26
Moscow Region	448	5486,22	4700	4200,67
Saint Petersburg	1142	5437,61	5000	2480,21
Sakhalin Region	972	5171,91	4500	3547,45
Republic of Karelia	106	4993,11	4600	2901,29
Krasnoyarsk Region	982	4959,49	3500	4929,41
Khabarov Region	968	4763,04	4000	3118,32
Irkutsk Region	219	4740,62	3500	6556,77
Magadan Region	104	4737,82	4400	2707,50
Leningrad Region	181	4646,85	4000	2784,41
Republic of Komi	988	4539,24	3500	4142,82
Primorsk Region	893	4090,71	3500	3082,43
Arhangelsk Region	976	3848,91	3000	2648,08
Tomsk Region	130	3785,85	3000	3297,25
Sverdlov Region	958	3713,86	3000	2620,28
Amur Region	917	3705,28	3000	2837,62
Kaliningrad Region	124	3659,82	3000	2886,67
Samara Region	894	3578,15	3000	2552,69
Kemerov Region	843	3523,60	3000	2446,73
Republic of Altai	97	3510,29	3000	2014,38
Chitinskaya Region	866	3466,63	2700	3010,37
Bashkortostan republic	965	3383,01	2500	6840,43
Chelyabinskaya Region	950	3381,46	3000	2521,14
Novosibirskaya Region	935	3252,95	3000	2311,43
Yaroslavskaya Region	1036	3224,56	3000	2214,09
Republic of Buryatia	865	3217,75	2800	2355,64
Vologda Region	180	3060,48	2600	2118,24
Ryazan Region	125	3041,58	2500	1997,18
Republic of Ingushetia	50	3022,10	2700	1715,39
Republic of Tyva	67	3009,03	2500	2238,48
Perm Region	251	3003,75	2800	1821,35
Tver Region	917	2942,99	2500	2043,36
Kaluga Region	175	2877,25	2500	1633,37
Republic of Tatarstan	1098	2868,35	2500	2239,31
Krasnodar Region	845	2815,54	2200	2834,38
Novgorod Region	898	2807,93	2500	1749,44
Republic of Khakassia	90	2803,14	2350	2148,03
Omsk Region	786	2785,46	2000	2941,79
Lipetsk Region	834	2700,76	2200	2014,97
Vladimir Region	154	2690,96	2500	2006,95
Nizhegorodskaya Region	882	2652,62	2200	2143,74
Kostroma Region	834	2645,71	2100	2513,38
Jewish Autonomous Region	81	2640,09	2400	1841,16
Republic of Udmurtia	1108	2639,55	2300	1925,67
Ulyanovsk Region	128	2620,36	2100	2018,81
Kirov Region	935	2602,65	2000	3646,14
Tula Region	140	2571,63	2490	1363,26
Volgograd Region	845	2567,41	2100	1820,69

Orenburg Region	158	2555,74	2000	1794,88
Rostov Region	822	2548,08	2000	1907,81
Voronezh Region	770	2543,70	2033,5	1968,27
Astrahan Region	860	2529,53	2000	2038,17
Kurgan Region	762	2498,23	2000	1953,03
Smolensk Region	137	2470,58	2000	1463,61
Pskov Region	746	2382,55	2000	1627,78
Ivanovo Region	849	2374,38	2000	1566,05
Republic of North Ossetia	104	2348,00	2150	1169,94
Belgorod Region	134	2280,86	1925	1749,92
Orlov Region	854	2266,71	2000	1515,80
BryanskRegion	786	2249,68	2000	1503,52
Republic of Karachaevo-Cherkessia	91	2231,19	2000	1424,74
Saratov Region	149	2218,70	1860	1778,05
Republic of Chuvashia	170	2212,48	1800	1619,32
Penza Region	129	2208,80	1700	1943,47
Tambov Region	681	2200,68	2000	1485,29
Republic of Adigeya	724	2190,62	1900	1426,97
Altai Region	166	2166,25	2000	1307,62
Republic of Kabardino-Balkarskaya.	721	2121,52	1900	1245,62
Republic of Mordovia	798	2068,04	1700	1720,24
Stavropol Region	151	2043,01	2000	1086,69
KurskRegion	117	2027,56	1800	1215,57
Republic of Mari-El	115	2014,91	1600	1496,37
Republic of Dagestan	653	1907,19	1700	1276,33
Republic of Kalmikia	105	1785,46	1600	970,94
Total	46338	3559,15	2800	3462,72

Comments: 1) nominal wages after taxation (the tax rate is 13% and the same for all regions); 2) Regions where the NOBUS sample is representative are shaded gray.

Table A.4. Regional characteristics used in analysis (2003)

Characteristics of the set (RC)	Mean	Median	Minimum	Maximum	Country mean
Regional price index (rubles)	3570,6	3291,4	2877,7 Tambov Region	7962,3 Chukotka Autonomous Region	3577
Life expectancy (years)	64,3	64,0	54,3 Republic of Tyva	75,1 Republic of Ingushetia	65,07
Price for 1 square meter of housing on the secondary market (rubles)	10131,8	9720,5	3696 Republic of Karachaevo-Cherkessia	31804 Moscow	12785
Average temperature in January (^{0}C)	-11,39	-10,7	-34,9 Republic of Sakha (Yakutia)	2,6 Krasnodar Region	-11,39
Crime rate (per 100 000 citizens)	1901,0	1897,0	326 Republic of Ingushetia	3232 Jewish Autonomous Region	1907
Air pollution (tons per 1 sq. km)	3,63	1,1	0,04 Republic of Sakha (Yakutia)	88,18 Moscow	1,16
Medical staff (per 10 000 citizens)	165,6	163,6	64,2 Republic of Ingushetia	316.3 Chukotka Autonomous Region	159.6
Buses (per 100 000 citizens)	62,6	64,0	10 Sakhalin Region	119 Magadan Region	64
Road density (km per 1000 sq. km)	116,45	119	0,8 Chukotka Autonomous Region	352 Moscow Region	32
Stationary telephones (per 1000 citizens)	225,6	230,6	47 Republic of Ingushetia	348.2 Saint-Petersburg	240
Regional unemployment level (%)	10	9,1	1,3 Moscow	53,1 Republic of Ingushetia	8,6
Characteristics of the set (S)					
Deviation of the GRP growth rate in 2002 from the regional growth trend (Shock-1)	0,95	0,95	0,56 Republic of Ingushetia	1,12 Primorsk Region	0,92
Average deviation of GRP growth rates from the GDP growth rate (Shock-2)	0,96	0,96	0,82 Republic of Kalmykia	1,08 Jewish Autonomous Region	1
Characteristics of the set (MC)					
Distance from the regional capital to Moscow (km)	1790,6	1087,7	0 Moscow	6784,92 Kamchatka Region	-

TableA.5. Influence of regional characteristics on individual wages

	Specifications					
	1	2	3	4	5	6
Price index (ln)	1,005**	1,005**	1,009**	1,054**	1,054**	1,064**
Life expectancy (ln)	-2,630**	-2,630**	-3,284**	-3,433**	-2,826**	-2,936**
Price for 1 square meter of housing (ln)	0,120**	0,120**	0,110*	0,108*	0,141**	0,142**
Average temperature in January (^{0}C)	-0,015**	-0,015**	-0,013**	-0,013**	-0,015**	-0,015**
Crime rate (per 1000 citizens)	-0,011**	-0,011**	-0,012**	-0,012**	-0,011**	-0,011**
Air pollution (thousand tons per 1 sq. km)	0,098**	0,098**	0,125**	0,117**	0,103**	0,099**
Medical staff (per 10 000 citizens) [a]	-0,003**	-0,003**	-0,005	-0,006*	-0,003**	-0,003**
Buses (per 100 000 citizens) [a]	0,002**	0,002**	0,001	0,001	0,002**	0,002
Road density (km per 1 sq. km) [a]	0,095	0,095	0,423	0,455	0,592	0,638*
Stationary telephones (per 1000 citizens) [a]	0,002**	0,002**	0,003	0,003**	0,002**	0,002
Regional unemployment level (ln)	0,161**	0,161**	0,101	0,091	0,140**	0,135
Proximity to conflicts [b] (dummy)	0,183**	0,183	0,116	0,111	0,205	0,213*
Distance from the regional capital to Moscow (km)	-0,027**	-0,027	-0,015	-0,015		
Shock-1	0,239**	0,239	0,291		0,225	
Shock-2	0,276**	0,276	-0,038		0,139	
Constant	1,819**	6,446**	9,744**	10,400**	6,608**	7,357**
R-squared	0,513	0,518	0,513	0,512	0,517	0,517
N. of observations	46213	46213	46213	46213	46213	46213

Comments: 1) ** coefficient is significant at the 1% level**;** * coefficient is significant at the 5% level.
2) a - these variables were instrumented by their own values for 1990.
3) b - this variable equals 1 for the Republics of Dagestan and Ingushetia and for the Stavropol Region, its value for the other regions are 0.

Table A.6. Correlations of regional characteristics

	1	2	3	4	5	6	7	8	9	10	11	12
(1) Price index (ln)	1	-0.32*	0.19	-0.53*	0.30*	0.16	0.53*	-0.07	-0.43*	0.39*	-0.23*	0.25*
(2) Life expectancy (ln)		1	0.17	0.64*	-0.66*	0.12	-0.15	0.29*	0.49*	0.13	0.14	-0.27*
(3) Price for 1 square meter of housing (ln)			1	0.00	0.05	0.38*	0.09	-0.11	0.12	0.09	-0.53*	-0.38*
(4) Average temperature in January				1	-0.58*	-0.05	-0.21*	0.16	0.69*	0.08	0.08	-0.42*
(5) Crime rate					1	0.15	0.19*	-0.19*	-0.55*	-0.12	-0.15	0.30*
(6) Air pollution						1	0.00	0.30*	-0.19*	-0.12	-0.14	0.02
(7) Medical staff							1	0.06	-0.13	0.59*	-0.35*	-0.05
(8) Buses								1	0.09	0.01	-0.05	-0.01
(9) Road density									1	0.20*	-0.23*	-0.65*
(10) Stationary telephones										1	-0.40*	-0.33*
(11) Regional unemployment level (ln)											1	0.55*
(12) Distance from the regional capital to Moscow												1

Comment: * coefficient is significant at the 5% level.

Table A.7. Excluding insignificant regional variables

	Specifications						
	4	7	8	9	10	11	12
Price index (ln)	1,054**	1,056**	1,066**	1,059**	1,063**	1,090**	1,171**
Life expectancy (ln)	-3,433**	-3,266**	-3,188**	-3,094**	-2,997**	-2,753**	-2,712**
Price for 1 square meter of housing (ln)	0,108*	0,096*	0,107**	0,106**	0,086		
Average temperature in January (^{0}C)	-0,013**	-0,013**	-0,013**	-0,011**	-0,011**	-0,011**	-0,009**
Crime rate (per 1000 citizens)	-0,012**	-0,013**	-0,013**	-0,014**	-0,014**	-0,013**	-0,013**
Air pollution (thousand tons per 1 sq. km)	0,085**	0,121**	0,119**	0,108**	0,108**	0,114**	0,110**
Medical staff (per 10 000 citizens) [a]	-0,006*	-0,005*	-0,005*	-0,006*	-0,006*	-0,006*	-0,008*
Buses (per 100 000 citizens) [a]	0,001						
Road density (km per 1 sq. km) [a]	0,455	0,472	0,464				
Stationary telephones (per 1000 citizens) [a]	0,003**	0,002*	0,002*	0,002*	0,002*	0,002*	0,003**
Regional unemployment level (ln)	0,091*	0,082	0,090*	0,071			
Proximity to conflicts* (dummy)	0,111	0,088					
Distance from the regional capital to Moscow (km)	-0,015	-0,013	-0,014	-0,024	-0,014	-0,019	
Constant	10,400**	9,878**	9,370**	9,291**	9,243**	8,799**	7,915**
R-squared	0,512	0,512	0,512	0,512	0,511	0,511	0,510
N. of observations	46213	46213	46213	46213	46213	46340	46340

Comments: 1) ** coefficient is significant at the 1% level; * coefficient is significant at the 5% level;
2) a – these variables were instrumented by their own values for 1990;
3) * This variable equals 1 for the Republics of Dagestan and Ingushetia and for the Stavropol Region, its value for the other regions are 0.

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Table A.8. Estimation of final specification (11) for subgroups of workers

	Age				Children				15-29			
	15-29		30-72		yes		no		No children		children	
Control for migration costs	yes	no	yes	no	yes	no	yes	no	yes	no	yes	no
Price index (ln)	1,067**	1,143**	1,096**	1,173**	1,090**	1,138**	1,092**	1,196**	1,081**	1,205**	1,048**	1,057**
Life expectancy (ln)	-2,775**	-2,727**	-2,698**	-2,660**	-2,340**	-2,361**	-2,963**	-2,889**	-3,312**	-3,232**	-1,819**	-1,838**
Average temperature in January (^{0}C)	-0,012**	-0,010**	-0,011**	-0,009**	-0,009**	-0,007**	-0,013**	-0,011**	-0,015**	-0,012**	-0,011**	-0,009**
Crime rate (per 1000 citizens)	-0,013**	-0,014**	-0,013**	-0,013**	-0,009**	-0,010**	-0,016**	-0,016**	-0,017**	-0,017**	-0,008**	-0,008**
Air pollution (thousand tons per 1 sq. km)	0,102**	0,096**	0,118**	0,115**	0,106**	0,105**	0,119**	0,114**	0,106**	0,100**	0,095**	0,095**
Medical staff (per 10 000 citizens) [a]	-0,005	-0,007	-0,006**	-0,008	-0,003	-0,004	-0,008**	-0,010**	-0,007**	-0,008	-0,001	-0,002
Stationary telephones (per 1000 citizens) [a]	0,002	0,003**	0,003**	0,003**	0,002	0,003**	0,003**	0,004**	0,002	0,003**	0,001	0,002**
Constant	8,800**	7,855**	8,294**	7,476**	6,711**	6,289**	9,899**	8,726**	10,756**	9,348**	4,541**	4,350**
R-squared	0,479	0,476	0,523	0,522	0,516	0.514	0,511	0,509	0,472	0,469	0,505	0,504
N. of observations	11002	11002	35338	35338	21254	21254	25086	25086	5773	5773	5229	5229

Comments: 1) ** coefficient is significant at the 1% level; the other coefficients are insignificant at the 5% level;
2) a - these variables were instrumented by their own values for 1990

Table A.9. Adjustment of interregional wage differentials

	% of regional employment compared to national employment	Unadjusted deviations	Deviations adjusted for differences in employment composition (X)	Deviations adjusted for differences in employment composition (X) and significant regional characteristics (RC) (on the basis of Specification 12)	Deviations adjusted for differences in employment composition (X) and significant regional characteristics (RC) + migration costs (on the basis of Specification 11)
Belgorod Region	0,882	-0,428	-0,184	0,092	0,104
Bryansk Region	0,853	-0,412	-0,274	-0,086	-0,094
Vladimir Region	1,229	-0,151	-0,103	0,078	0,051
Voronezh Region	1,455	-0,312	-0,191	-0,039	-0,036
Ivanovo Region	0,855	-0,345	-0,209	-0,036	-0,075
Kaluga Region	0,907	-0,129	-0,064	-0,113	-0,099
Kostroma Region	0,522	-0,272	-0,109	0,034	-0,002
Kursk Region	0,877	-0,488	-0,227	-0,165	-0,156
Lipetsk Region	0,794	-0,207	-0,101	0,022	0,009
Moscow Region	5,109	0,482	0,398	0,238	0,168
Orlov Region	0,583	-0,385	-0,207	0,028	0,023
Ryazan Region	0,745	-0,083	-0,020	0,049	0,026
Smolensk Region	0,836	-0,243	-0,118	0,042	0,031
Tambov Region	0,684	-0,404	-0,264	-0,079	-0,077
Tver Region	1,172	-0,162	-0,026	0,025	-0,011
Tula Region	1,212	-0,218	-0,154	-0,150	-0,163
Yaroslavl Region	1,075	-0,041	-0,003	0,167	0,135
Moscow	7,662	0,638	0,201	-0,065	-0,093
Republic of Karelia	0,620	0,423	0,386	0,355	0,328
Republic of Komi	0,800	0,271	0,310	0,089	0,075
Arhangelsk Region	1,068	0,090	0,196	0,036	0,022
Vologda Region	1,006	-0,092	0,131	0,128	0,109
Kaliningrad Region	0,717	0,005	0,082	0,168	0,179
Leningrad Region	1,356	0,329	0,383	0,211	0,234
Murmansk Region	0,846	0,477	0,494	0,057	0,077
Novgorod Region	0,526	-0,155	-0,040	0,012	-0,007
Pskov Region	0,488	-0,345	-0,195	-0,108	-0,096
Saint - Petersburg	4,308	0,564	0,146	0,122	0,182
Republic of Adigeya	0,233	-0,382	-0,243	-0,024	0,044
Republic of Dagestan	0,809	-0,550	-0,383	0,064	0,088
Republic of Ingushetia	0,103	-0,008	0,065	0,342	0,413
Republic of Kabardino-Balkarskaya.	0,338	-0,415	-0,289	0,094	0,117
Republic of Kalmykia	0,175	-0,677	-0,312	-0,023	0,018
Republic of Karachaevo-Cherkessia	0,229	-0,389	-0,279	-0,100	-0,017
Republic of North Ossetia	0,414	-0,299	-0,246	0,201	0,220
Krasnodars Region	3,106	-0,254	-0,090	-0,035	-0,007
Stavropol Region	1,517	-0,472	-0,250	-0,153	-0,097

Astrahan Region	0,646	-0,325	-0,217	0,247	0,238
VolgogradRegion	1,653	-0,299	-0,235	-0,037	-0,034
Rostov Region	2,603	-0,315	-0,215	-0,034	-0,013
Republic of Bashkortostan	2,647	-0,140	-0,128	0,032	0,035
Republic of Mari-El	0,495	-0,554	-0,289	-0,080	-0,087
Republic of Mordovia	0,554	-0,512	-0,345	-0,090	-0,103
Republic of Tatarstan	2,730	-0,184	-0,209	0,177	0,154
Republic of Udmurtia	1,218	-0,256	-0,143	-0,014	-0,022
Republic of Chuvashia	1,053	-0,582	-0,433	-0,166	-0,171
Kirov Region	1,116	-0,325	-0,141	-0,051	-0,062
Nizhegorodskaya Region	2,558	-0,257	-0,285	-0,239	-0,239
Orenburg Region	1,507	-0,479	-0,301	-0,189	-0,188
Penza Region	0,784	-0,498	-0,322	-0,154	-0,159
Perm Region	2,191	-0,078	-0,070	-0,003	-0,009
Samara Region	2,199	0,019	-0,100	-0,020	-0,020
Saratov Region	1,713	-0,464	-0,425	-0,271	-0,279
Ulyanovsk Region	0,858	-0,266	-0,254	-0,112	-0,123
Kurgan Region	0,653	-0,363	-0,170	0,040	0,043
Sverdlov Region	3,267	0,065	0,030	0,016	0,015
Tumena Region	2,402	0,659	0,627	0,107	0,114
Chelyabinsk Region	2,596	-0,016	-0,099	-0,024	-0,023
Republic of Altai	0,130	0,017	0,167	0,075	0,098
Republic of Buryatia	0,601	-0,083	0,059	-0,025	-0,028
Republic of Tyva	0,109	-0,317	-0,028	-0,378	-0,389
Republic of Khakassia	0,376	-0,200	-0,063	-0,152	-0,111
Altai Region	1,566	-0,431	-0,211	-0,016	0,005
Krasnoyarsk Region	2,175	0,210	0,296	-0,130	-0,122
Irkutsk Region	1,953	0,238	0,279	0,109	0,116
Kemerov Region	1,846	0,038	-0,002	-0,149	-0,145
Novosibirsk Region	1,845	-0,057	-0,168	-0,013	0,012
Omsk Region	1,181	-0,305	-0,335	0,055	0,041
Tomsk Region	0,840	-0,009	0,080	0,058	0,064
Chitin Region	0,719	-0,045	0,115	-0,089	-0,093
Republic of Saha (Yakutia)	0,655	0,547	0,624	-0,024	-0,010
Primorski Region	1,499	0,164	0,206	-0,108	-0,062
Khabarovsk Region	1,143	0,349	0,332	0,019	0,046
Amur Region	0,679	0,020	0,146	-0,190	-0,181
Kamchatka Region	0,298	0,629	0,631	0,293	0,359
Magadan Region	0,182	0,355	0,430	-0,003	0,048
Sakhalin Region	0,443	0,410	0,447	0,008	0,076
Jewish Autonomous Region	0,142	-0,258	0,071	-0,190	-0,138
Chukotka Autonomous Region	0,063	0,933	1,176	-0,243	-0,110
WSD		0,371	0,258	0,126	0,123
WMAD		0,310	0,216	0,098	0,095

Comment: Regions where the NOBUS sample is representative are marked by gray.

Table A.10. Correlations between wage premiums and net migration coefficients

Wage premiums	2000	2001	2002	2003	2004	2005
Unadjusted	-0,111	-0,205	-0,242*	-0,276*	-0,159	-0,070
Adjusted for employment composition	-0,173	-0,391*	-0,411*	-0,419*	-0,301*	-0,215*
Adjusted for employment composition and significant regional characteristics (Specification 11)	0,355*	0,162	0,221*	0,148	0,141	0,117

Comments: 1) net migration coefficient is the difference between inflows and outflows divided by the average regional population. 2) * Coefficient is significant at the 5% level**.**