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***ESTIMATIONS OF THE IMPACT OF SOME VARIABLES ON THE LABOR DEMAND
AND LABOR SUPPLY IN THE SUBJECTS OF THE RUSSIAN FEDERATION¹***

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Heterogeneity of socio-economic development of the Russia's regions explains the choice of the research question about studying the differences in the functioning of the regional labor markets in Russia. The elasticities of employment in the regions measured by the value of the gross regional product are more variable than in the whole country. Considering that the low elasticity of employment has traditionally been considered as the main functional feature of the Russian labor market model it shows the peculiarities of the regional labor markets. The goal of this empirical study is to provide the regression analysis in order to identify the influence of the different variables on the number of employees and the number of the labor force in the regions of Russia. The estimations are based on the macro data on regional development, officially published by the Federal State Statistics Service (Rosstat). The choice of variables is based on the analysis of the theory, the approaches used by other authors and the analysis of some indicators of regional economic development. Our results have showed that the labor demand, measured by the number of employees, is affected by the factors that determine the structure of the regional economy. At the same time the labor supply that was estimated by the number of regional labor force depends on the demographic factors. The article explains the impact of the factors on the number of employees and the labor force in the regions. Also there are some conclusions about the functioning of the regional labor markets in Russia that could be explained by the factors with the highest impact.

Keywords: employment, labor force, regional labor markets.

Heterogeneity of the regional economic development becomes the initial ground for the empirical research of the regional labor markets in Russia. Some research results show that the difference in economic development between Russian regions is higher than between the regions in developed and developing countries. Moreover, this difference is as significant as between some of those countries [13; p. 1]. Convergence based on the social and economic development indicators between Russian regions does not provide clear results, which proves that there may be no convergence at all. (Guriev, Vakulenko, 2012 [5], Lehmann, Silvagni, 2013 [10], Oshchepkov, Kholodilin, Siliverstovs, 2009 [13; p. 16]).

It is officially recognized that it is necessary to regulate labor force migration within labor markets of the subjects of the Russian Federation that have different levels and rates of social and economic development and, therefore, different need in labor force [16]. This is the matter of the RF Government Order № 663-p issued on April 24, 2014, which approves the 2014-2018 plan of actions to increase mobility of Russian citizens. [12]. The Russian deputy labor and social minister Alexei Vovchenko says that the reason for this Order lies in low level of labor mobility of the population within Russian regions (it was 2.4 million people in 2013) as well as in preferred labor flows to Moscow, the Moscow region and St

Petersburg [17]. Low migration level of the Russian population is stressed in many empirical studies, e.g. Commander, Nikoloski, Plekhanov (2011) [1; p. 3]. The gap between the highest and lowest wages was 4.7 times in 2012 [14], this fact could have led to the expectations that active migration of employees from 'poor' regions to 'rich' ones would feature 2013 but the above given figures do not prove it.

In addition, it should be noted that the main peculiarity of the Russian labor market is that the gross domestic product (GDP) does not affect much the number of employees (Kapeliushnikov, 2009) [8], whereas the employment elasticity is more variable in the subjects of the Russian Federation (Giltman, Votyakova, 2014) [2]. Thus, regional labor markets seem to be quite reserved socio-economic systems, which function locally. This fact again highlights the importance of the research into specific factors influencing labor demand and supply in the subjects of the Russian Federation. The research hypothesis is that if the regional markets operate independently then the labor demand and the labor supply in the Russian regions depend on the factors relevant to the regional economy. A statistical indicator for labor demand is a number of employees, for labor supply – a number of labor force. (Kapeliushnikov, Oshchepkov, 2014) [7; p. 75]. So, the empirical research objective is to prove the

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impact of certain variables on the number of employees and labor force in Russian regions.

In theory, regional employment is affected by three factors: labor demand, labor supply and institutional factors (Gimpelson, Zudina, 2011). Labor demand is the level of regional economic development and economic structure, labor supply is population aging, urbanization rate and education level [4; p. 30-31]. Following some other researches (as in Gimpelson, Zhikhareva, Kapeliushnikov, 2014 [3; p. 31], Kobzar, 2009 [9; p. 26], Lehmann, Silvagni, 2013 [10; p. 27]) the model includes the GRP per capita logarithm ($\log\text{GRPPC}$) to measure the development of the regional economy. It is assumed that the GRP per capita shows the total population number being an important factor for regional difference. Lehmann and Silvagni (2013) [10; p. 10] showed that the highest GRP per capita is produced in scarcely populated areas (excluding Moscow), so it can be expected that the GRP per capita will have negative impact on the number of employees in the region, proving this peculiarity.

The number of small businesses per 10,000 people (b) is used to measure the structure of the regional economy because, firstly, they tend to operate in the sphere of service and commerce, and thus reflect the regional economic structure (40 % of small businesses were engaged in these spheres [14]). Secondly, they are usually privately-owned. Thirdly, they reflect indirectly regional entrepreneurial climate. And finally, they show readiness for economy deformatization as stated in one of the definitions of the informal sector of the economy. (Gimpelson, Zudina, 2011) [4; p. 8]. Moreover, to measure the employment structure against the forms of ownership, the model includes the employment rate in state-owned corporations (emstate) because the public sector is slow in its reaction to economic changes and 'conserves' employment [15; p. 2853]. To measure the employment against types of economic activities, the model includes the employment rate in manufacturing (manuf) because this sector is presented in all the regional economies.

Institutional factors influence greatly the Russian labor market (Kapeliushnikov, 2011) [6]. While most labor market institutions are created on the state level, they function differently in different regions, say Gimpelson and Zudina (2011) [4; p. 33]. As soon as Russian regions have been given right to regulate their minimum wages since 2007, the model

includes the Kaitz index (Kaitz) (the ratio of the minimum wage to the average wage for a certain period), as *proxy* for the regional institutional component. Thus, the following equation is estimated to study the factors influencing labor demand (1):

$$\log\text{Employees} = \beta_1 + \beta_2 * \log\text{GRPPC} + \beta_3 * b + \beta_4 * \text{manuf} + \beta_5 * \text{emstate} + \beta_6 * \text{Kaitz} + \varepsilon_i \quad (1),$$

with $\log\text{Employees}$ – logarithm on the number of employees in the subjects of the RF¹,

ε_i – error term.

To specify the regression equation for regional labor force estimation, the model includes the regional population density (popden), the average age of labor force, years (age); the rate of highly-educated and professionally trained labor force, % (edu); the male and female co-relation (2012 annual estimates), women per 1,000 men (gender); the urban population rate showing the number of city dwellers against the total population number, % (city). We assume that the regional average wages ($\log\text{Wages}$) can influence to the decisions about the participation in the labor force. The following equation is estimated (2).

$$\log\text{LF} = \beta_1 + \beta_2 * \text{age} + \beta_3 * \text{edu} + \beta_4 * \text{gender} + \beta_5 * \text{city} + \beta_6 * \log\text{Wages} + \beta_7 * \text{popden} + \varepsilon_i \quad (2),$$

with $\log\text{LF}$ – logarithm on the number of labor force in the subjects of the RF²,

ε_i – error term.

The Ordinary Least Squares in the econometric package Gretl is used to estimate the equations. The model is efficient in all the formal tests (heteroscedasticity, normal distribution, multicollinearity, RESET). The data for this research are taken from the Rosstat catalogues "Russia's Regions. Socio-economic Indicators" [14] and "Household Survey on Employment" (HSOE) [11]. The former provides data up to the year of 2012 that is why that year is chosen for the research. The catalogue for regional data is chosen due to some differences in methods of employment estimation. For instance, it provides the data on employment in different branches of industry, number of employees in companies and corporations with various types of ownership. This is critical for the research. The HSOE catalogue provides more information on labor force structure. The estimation results for the equation are given in table below.

¹ According to the Rosstat methods, "annual average number of employees is formed once a year and is based on primary employment data when the labor force balance is drawn on the basis of organizational data and employment surveys together with the data held by the government agencies. The annual average of employees includes foreigners who live or stay in the Russian Federation". [14]

² According to the Rosstat methods, labor force is defined as people of a certain age to estimate the labor force (15-72 year olds), employed or unemployed during a period (a week) under study [11].

**Estimation results of the number of employees and the labor force regressions
(the subjects of the Russian Federation, 2012)**

Regressor	Regressand: number of employees (logarithm)		Regressand: regional labor force (logarithm)
	(1)	(2)	(3)
const	13.64*** (4.01)	8.8*** (0.38)	25.21** (10.51)
logGRPPC	-0.3 (0.28)		
b	0.004** (0.002)	0.003** (0.001)	
emstate	-0.1*** (0.01)	-0.09*** (0.01)	
manuf	-0.01 (0.02)		
Kaitz	-3.06 (2.24)		
age			-0.35** (0.14)
edu			0.04* (0.02)
logWages			-1.25* (0.74)
popden			0.0003* (0.0001)
gender			0.002 (0.003)
city			0.04*** (0.01)
Standard regression error	0.68	0.68	0.76
R ²	0.548	0.534	0.425
Number of observations	83	83	83

*** 1% significance level, ** 5% significance level, * 10% significance level

Table results show that some variables are insignificant for the employees estimation, so the omit variables test using two-sided p-value at 0.05 level helps to exclude redundant variables (according to the formal features). It results in estimations given in column 2 of table. In 2012 the labor demand difference between the subjects of the Russian Federation was caused by the factors characterizing the regional economic structure, such as the number of small businesses per 10,000 people and the employment rate in state-owned corporations. If there was 1 small business difference in the number of small businesses per 10,000 people in the region, the regional employment rate was 3 % higher than in the other regions. The employment rate in state-owned corporations, on the contrary, influenced negatively: 1% increase of this indicator meant 9% decrease of the regional employment rate compared to the other regions. These results can be explained by the following: scarcely populated areas could have a higher employment rate in state-owned corporations because the number of employees in state-owned corporations and population of the regions are not proportional. In the opposite the number of small businesses is lower at the scarcely populated areas because due to the geographical position the big companies are concentrated in that kind of territories (the Urals,

Siberia and the Far East) (Commander, Nikoloski, Plekhanov, 2011 [1]). The rest of the indicators prove to be insignificant. For instance, the GRP per capita difference does not influence much the difference in the regional employment rate, although this variable is negative according to our expectations. If the GRP value influenced the regional employment rate within one year, we would observe massive labor force migration from low-income regions to higher-income regions. So, insignificance of this variable is proved and can be explained. The Kaitz index shows no specific influence on the employment rate either. Still it does not mean that institutional factors do not influence labor demand as soon as the Kaitz index characterizes only one institution – the minimum wages which is considered insignificant for the employment rate (as in Kobsar, 2009) [9; p. 27]). Similarly, the employment rate in manufacturing proves to be insignificant, which can be explained by a slight difference of this value among the regions. Its median value was 14.4, minimum – 1.2, maximum – 27 in 2012. In comparison, the employment rate in the extractive industry had the median value of 0.81, minimum – 0.02 and maximum – 22. Anyway, the structural factor includes the number of small businesses per 10,000 people, which is significant.

According to our estimations, labor supply mostly depends on the demographic factors that can be explained by low migration rate in Russia (Commander, Nikoloski, Plekhanov, 2011 [1; p. 3]), [17]. The labor force average age and education rate as well as the regional population density and urbanization rate have the biggest influence on the labor force. The influence by education and urbanization rates is quite evident. As for the influence by population age and density, it can be explained by the fact that the more densely populated is the region, the older is the labor force because more people stay employed after they are retired. This situation is typical for the regions with higher population density: in 2012, the labor force age in the Central Federal District was 40.7 years, in the Siberian Federal District – 39.4 years but the population density was 60 people per km² and 4 people per km² respectively [14], [11]. So the age variable is negative because most people live in densely populated areas. The wages variable is also negative due to the similar reason of heterogeneous distribution of population and well-paid jobs within the country. This sides with Lehmann and Silvagni's conclusions (2013), that emphasize the extractive industry contribution to the regional heterogeneity. [10; p. 37] The results of the research prove that in 2012 more densely populated areas (with higher labor force rate) had a lower level of average wages.

Thus, the research shows that the factors defining the economic structure impact the number of employment (labor demand), and the demographic factors impact the labor force (labor supply). As soon as these factors are time resistant and regionally bound the research results support our hypothesis and we can make a conclusion that the functioning of the regional labor markets are relatively autonomous. It is also implied by the low level of interregional migration rate. The regression analysis proves that younger age and higher education rate of the labor force, higher population density and urbanization rate influence the labor force positively. In this situation the number of employees is higher in the regions with well-developed spheres of service and commerce (proven by the significant number of small businesses per 10,000 people) and with the lower employment rate in state-owned corporations. Therefore, the equilibrium in the regional labor markets is reached through the regional demographic factors, on the one hand, and the factors defining the regional economy, on the other. The real evaluation of the factors mentioned above will determine the conjuncture and the most probable ways of its development for the regional labor markets.

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