

Contribution of Between- and Within-groups Differences to the Interregional Differentiation of Youth Unemployment in Russia

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Abstract. Significant interregional differences in unemployment rates are the main feature of the Russian labour market. Therefore the analysis of the youth labour market based only on the Russian averages conceals the acuteness of the problem hiding an almost tenfold gap in unemployment rates between regions. When the interregional differentiation of the youth labour market is excessive the common economic space disintegrates and the efficiency of the universal instruments and methods of the labour market regulation decreases. It should be noted that in Russia the interregional differences in youth unemployment rates are stable over time. The paper presents the results of modeling the degree and the dynamics of the interregional differences in the youth unemployment rates in Russia. We decompose the interregional differentiation of the youth unemployment rate into “within-groups” differences and “between-groups” differences. We analyze the dynamics of the within- and between-groups differences in the rates of youth unemployment and estimate their contribution to changes in the interregional differentiation of youth unemployment. Additionally we estimate the degree and the dynamics of the interregional differences of the youth labour market in Russia in the time of crisis. The results of the analysis show the reduction in the interregional differences in unemployment rates between 2005 and 2008, while in 2009-2013 the interregional differentiation of the youth labour market increased. The statistical database for this study was the Rosstat data posted on the official website of the Federal State Statistics Service. We found that the socio-economic effects of youth unemployment, as well as the behavioral response to economic shocks in the age groups of 15-19 and 20-29 years were significantly different. Additionally the study contributes to the evaluation of the impact of changing economic conditions on the interregional differentiation of the youth labour market.

Keywords: *Russian regions, labour market, youth unemployment, modeling, interregional differences, within-groups, between-groups.*

JEL classification indices: C30, J64

1. INTRODUCTION¹

There are many research papers written on the subject of the interregional and cross-country differentiation of the labour market (Blanchard and Wolfers, 2000; Elhorst, 2003; Huber, 2007; Overman and Puga, 2002 etc.) A number of authors look at the issues of the youth labour market in particular (Clark and Summers, 1982; Green et al, 2001; Kolev and Saget, 2005). The researchers of the European labour markets pay special attention to both the high rate of youth unemployment exceeding the rates for adult unemployment and the significant cross-country differences (Mareilly et al, 2012). The Russian labour market is similar in a way that the youth unemployment rate is much higher than the overall unemployment rate. The interregional differences in the rate of youth unemployment being affected by the business cycle change in the periods of economic crisis and depression. A number of studies analyzed the impact of the financial crisis on the rate of unemployment and regional differences in general and youth unemployment (Choudhry et al, 2012; O'Higgins, 2012; Mareilly et al, 2012). Many papers are devoted to the study of factors explaining cross-country differences in the rate of unemployment (Blanchard and Wolfers, 2000). However, much less research is focused on assessing regional disparities in youth unemployment.

Significant interregional differences in unemployment rates are the main feature of the Russian labour market. Therefore the analysis of the youth labour market based only on the Russian averages conceals the acuteness of the problem hiding an almost tenfold gap in unemployment rates between regions. When the interregional differentiation of the youth labour market is excessive the common economic space disintegrates and the efficiency of the universal instruments and methods of the labour market regulation decreases. The regions with persistently high unemployment rates experience greater difficulties in terms of youth employment compared to other Russian regions. The average rate of unemployment in Russia, which is relatively low (5.6% in 2015 and 5.4% in 2016), is formed by prosperous regions, such as Moscow, St.-Petersburg, Leningrad Oblast, Moscow Oblast and other.

It should be noted that in Russia the interregional differences in youth unemployment rates are stable over time. It is consistent with the findings of the researchers indicating the stability of the interregional and cross-country differences in European countries (Marelli et al., 2012). Regional labour markets respond to negative macroeconomic changes differently,

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and therefore the rise in unemployment is not the same across regions. Interregional differences generate different degrees of tension on the labour market and give rise to differentiation in terms of income and living standard. Young people living in different regions of Russia have different employment opportunities. The purpose of the study is to conduct statistical analysis and to perform a quantitative assessment of the degree and the dynamics of the interregional differences in the youth unemployment rates in Russia between 2005 and 2013. The main tasks of the study are the following:

- evaluate the interregional differentiation of the Russian labour market by unemployment rate;
- analyze the current state and the dynamics of interregional differences in youth unemployment rate in 2005-2013;
- decompose the interregional differences in youth unemployment into “within - and between-groups” components;
- analyze the “within-groups differences” and “between-groups differences” in the rate of youth unemployment.

The research methodology is based on the econometric evaluation of the model that disaggregates the interregional differences in unemployment rate into “within -and between-groups” differences. The Federal Districts of Russia are used as groups of regions. This approach gives the notion of the contributions of the within -and between-groups differences to the interregional variation in unemployment rate. The issue discussed in this paper is topical and of practical significance. The paper is organized as follows. The research methodology, the database and the set of variables are described in Section 2. In Section 3 we analyze the contribution of the within -and between-groups differentiation of the youth labour market to changes in the total variance of Russian regions in terms of youth unemployment rate. In Conclusion we present our findings and recommendations resulting from the study.

2. METHODOLOGY AND DATA

2.1. Methodology

One of the tasks at this stage of our study is to analyze the contribution of the between-groups and within-groups regional differentiation of the youth labour market by unemployment rate to changes in the overall inequality of Russian regions. Following Doran [Doran et al. 2013], who presents some examples (samples) of modeling between-groups and

within-groups regional inequality on the labour market we made statistical estimations for the regions of Russia. We disaggregated the overall interregional differentiation of the rate of youth unemployment for each year and period of time into “between-groups” differences and “within-group” differences components. In order to assess the contribution of the between- and within-groups differences to the change in the overall dynamics of the interregional differences in youth unemployment in Russia we used the widely used formula [Elbers et al, 2008]. Adapted to the objectives of the study, the formula decomposing regional differences is as follows:

$$GE(0) = \underbrace{\sum_j w_j \cdot GE(0)_j}_{\text{inequality-within}} + \underbrace{\left(- \sum_j w_j \log \left(\frac{y_j}{y} \right) \right)}_{\text{inequality-between}} = \underbrace{L_W + L_B}_{\text{inequality-overall}} \quad (1)$$

where $GE(0)_j$ – is Theil index for the regions of each of the j -Federal District, is calculated as follows:

$$GE(0)_j = \frac{1}{n_j} \sum_{i=1}^n \log \left(\frac{y_j}{y_{ij}} \right) \quad (2)$$

where: y_{ij} – unemployment rate in i -region of the j -Federal District; y_j – average unemployment rates in Federal Districts; y – average unemployment rate in Russia; n_j – number of regions in j -Federal District; w_j – the share of the Federal District in the overall structure of regions; L_W – within - group differentiation of the rate of youth unemployment; L_B – between-group differentiation of the rate of youth unemployment.

Using this formula (1,2), the change in inequality can be decomposed into changes typical of the within- and between-groups variance. According to Bourguignon [Bourguignon 1979], the Theil index can be decomposed using both T- and L-measures. However, some authors [Akita et al. 1999; Bellù et al, 2006] argue that T-measure is “weakly” additively decomposable, i.e. the elimination of the between –group component affects the value of the within-group component, since the weights in the index change.

We will therefore proceed by decomposing L-measure that is “strictly” additively decomposable, which means that if we eliminate the between-group component this will not affect the value of the within-group one since the number of the regions used as weights does not change. If we bear in mind that all the 77 Russian regions included in the sample are included in the Federal Districts that form j groups, then L-measure is decomposed into components that reflect the differences between the Federal Districts (groups of regions) and the differences existing within each of the groups (within the Federal Districts) [Shorrocks

1980; Goerlich 2001]. The inequality within groups is the sum of $GE(0)_j$ of each of the Federal Districts (j), weighted by their share in the overall structure of the regions w_j , and the inequality between groups is the ratio of the average youth unemployment rate in group y_j to the average youth unemployment rate m in the country.

2.2.Date Base and Sample selection

We have formed a sample consisting of 77 regions of Russia out of 83 subjects of Russia Federation as of January 2014. The Nenets, Chukchi, Yamalo-Nenets and Khanti-Mansi Autonomous Districts were not included in the analysis because of the low number of the unemployed. The Chechen Republic and Republic of Ingushetia were not included, because of the lack of data on some age categories for certain periods. The data we used is for 2005-2013. Our information base is the results of the sample surveys on employment of population (labour force surveys), which are held in all regions of Russia, according to the methodology of the International Labour Organization (ILO). In Russia, the official sources of information about the situation on the labour market and the rate and duration of unemployment are the results of sample surveys and data from regional and federal employment services. Sample surveys provide information about the overall unemployment, and the State Employment services – about the registered one.

Figures from the sample surveys are several times higher than the ones from the registered labour market. This brings about difficulties with comparability of the data obtained from different sources. The paper is based on the data on overall unemployment obtained from the sample surveys conducted according to the ILO methodology. According to the international standards, unemployed are considered those who meet the following three criteria during the reference period: have no job (gainful occupation), are looking for a job (apply to public or commercial employment services, place advertisements in the press, appeal to the management of companies (employers), attempt to set up their own businesses), are ready to start working.

Annual surveys allow to identify the total number of the unemployed (estimated), the rate of unemployment (as a percentage of the economically active population) and the duration of unemployment both in Russia and in each subject of the Federation. In our study we use the database that includes labour market indicators in the regions of Russia (2005-2013). Information about the regional employment and unemployment indicators is published

in statistical brochures such as “The Regions of Russia”, “Labour and Employment in Russia” and “Russia in Figures”. Data on the age structure of unemployment is generated by the Federal State Statistics Service (Rosstat) on the basis of sample surveys on employment. Within the studied period 2005-2013 the survey altered its periodicity: up to 2009 it was conducted on a quarterly basis and then switched to a monthly basis as of the second week of the month [Surveys 2014]. The information about the age indicators of unemployment in Russian regions which we use in this study is based on statistics from Rosstat’s sample surveys. The representative database by regions dates back to 2005.

The initial statistics is the following: the structure of the economically active, economically inactive, employed and unemployed population by age, % of the total [Economically Active Population of Russia 2013; Surveys on Employment of Population 2014]; the number of the permanent population by age on January 1 of each year [The Regions of Russia 2013; The Number of Population of the Russian Federation by Cities, Towns and Districts 2013]; the rates of unemployment, economic activity and employment for the total population [Labour and Employment in Russia 2013].

The calculated statistical indicators are the following: age-specific coefficients of employment of the economically active population for the young people aged 15-19 and 20-29 years and for the entire economically active population aged 15-72 years, annual data for 2005-2013. To make an empirical analysis of the interregional differences of the youth labour market in Russia we can use different measuring instruments, including the decile ratio, the Gini coefficient, the Theil index etc. Among the main requirements for the distribution analysis the most important one is the statistical testability put forward by F. Cowell [Cowell 2009].

Statistical testability means that one and the same statistical indicator should be comparable when comparing for the significance of changes over time and at different filling of the totality. The peculiarity of the interregional studies is that when analyzing the age parameters of unemployment the Theil index must be presented in a weighted form, i.e. the one that is used for grouped data. In view of this, in order to ensure that the results are independent from the regional differences in the age structure of the unemployed, we calculate each coefficient of unemployment as the number of unemployed of the certain age in the total number of economically active population aged 15-72 years.

This data serves the basis for decomposing the Theil index into the within - group and the between-group components. The overall interregional differentiation of the youth labour market is disaggregated into two components: (1) the “within – group”, within the Federal

Districts and (2) the “between-group”, between the Federal Districts differentiation. Then we assess the contribution of each of the components to the strengthening or weakening of the interregional differentiation of the youth unemployment rate.

2.3. Interregional differences of the youth labour market: Evidence from Russia

The Russian labour market is not homogenous, representing a diversity of regional segments. In this section we will discuss the degree and dynamics of the interregional differentiation of the Russian labour market in terms of unemployment rates in the period between 2005 and 2013.

Table1. - Indicators of the interregional differentiation of the Russian labour market by unemployment rate

Year	Unemployment rate, %		Degree of between-region differences			
	Maximum	Minimum	Coefficient of variation, %	Max/min	Decileratio	Gini coeff.
2005	22,1	3,8	45,3	5,79	2,22	0,46
2006	22,1	4,0	51,3	5,47	2,82	0,38
2007	20,2	3,6	53,0	5,58	2,90	0,43
2008	18,6	3,3	44,1	5,71	2,37	0,44
2009	21,4	2,8	30,5	7,63	1,99	0,38
2010	21,7	2,8	33,5	7,87	1,86	0,42
2011	17,3	2,5	33,7	7,05	2,02	0,41
2012	18,4	2,5	40,3	7,27	2,32	0,48
2013	19,3	2,6	41,3	7,51	2,09	0,42

The dynamics of the decile ratio in *Table 1* characterizes the convergence of extreme-unemployment-rate regions from 2.90 (2007) to 1.99 (2009) and 1.86 (2010) and restoration of the parity in the future. Unemployment itself is on the rise in these years, and the extreme (maximum-minimum) values diverge.

The theoretical assumption of absolute labour mobility, which implies the labour market quickly adapts to the new environment, does not hold in reality in Russia. This is one of the causes for the interregional differences of the labour market to be that persistent. There are many reasons for that, and one of them is that moving to other regions of RF is too costly because of the lack of affordable housing, the insufficiency of savings young people usually experience and the need to find a new job. Another reason is that in ethnic republics it may seem important for young people to preserve their culture, traditions and language. So, when making a decision to move to other regions people usually consider the entire range of factors,

as it is always mentioned in the literature. Many authors note that such decisions depend not only on the availability (lack) of vacant jobs, but also on non-monetary factors and characteristics of the region [Brown, 1997]. The aforementioned indicators of inequality are shown in *Figure 1*. We can see that the dynamics of the decile ratio is different for the two groups of the unemployed youth, which means that there is a gap in the causes of the regional differences: the group of the 20-29-aged is affected by the business cycle, while the younger group is not.

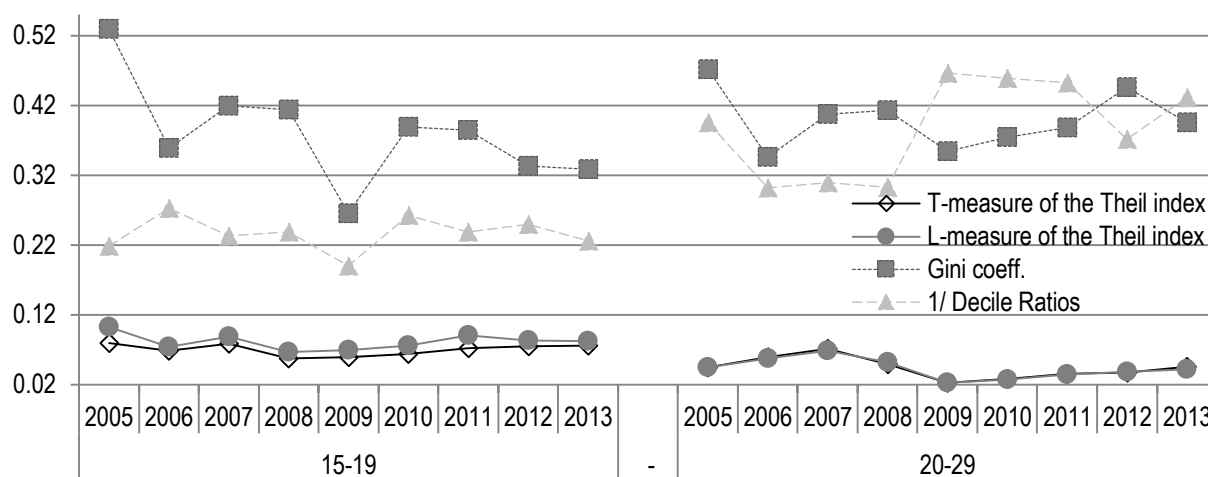


Fig.1. Dynamics of indicators of inequality in terms of youth unemployment for the people aged 15-19 and 20-29 years in Russian regions

We can see that the economic situation does affect the interregional inequality and dynamics of the Gini coefficient – there is a fall in 2009 resulting from the economic crisis. In 2008-2009, Gini coefficient calculated for youth unemployment (15-19 years old) fell sharply from 0.42 to 0.28. The Gini coefficient calculated for general unemployment fell from 0.44 (2008) to 0.41 (2011). The changes in the degree of regional disparities in the unemployment rate of young people in two age groups (15-19 and 20-29) are different. However since then, the interregional differentiation of the unemployment rate for the two groups of young people evolves in different directions.

The decrease in the interregional differentiation by the rate of unemployment for the group aged 15-19 years from 0.39 (2010) to 0.33 (2013) signifies the prolonged pressure of the crisis, while the increase for the group aged 20-29 years from 0.35 (2008) to 0.40 (2013) – faster recovery of the labour market. The relative position of the Federal Districts of Russia by the level of unemployment is presented in *Table 2*. At present there are eight Federal Districts in Russia: Central (CFD), Northwest (NWFD), Southern (SNFD), North-Caucasian (NCFD), Volga (VFD), Ural (UFD), Siberian (SFD) and Far East (FEFD). Each of them

includes regions of different types (Oblasts, Republics, Autonomous Districts and etc.). Member regions in a number of Federal Districts differ considerably in terms of unemployment. In 2013 the lowest unemployment, meeting the ILO criteria, was in the Central Federal District (4.4%), and the highest – in the North-Caucasian Federal District (9.1%). In the Siberian (8.8%), Southern (7.8%), Far East (6.3%) and Ural (6.0%) Federal Districts the unemployment rate is higher than the Russian average.

Table 2. - The average rate and the variation of unemployment by the Federal Districts of Russia

Federal District	Unemployment rate, %									Coefficient of variation, %								
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2005	2006	2007	2008	2009	2010	2011	2012	2013
FEFD	8,1	7,4	6,9	7,9	8,6	8,1	7,1	6,5	6,3	17	26	25	17	14	18	22	25	27
VFD	7,7	6,8	6,3	6,6	8,8	7,8	6,8	5,5	5,1	22	24	29	27	21	20	22	17	17
NWFD	6,8	5,9	5,1	6,2	8,3	7,6	6,8	5,5	5,8	37	45	43	30	29	33	36	38	33
NCFD	14,7	15,8	14,5	12,9	11,8	10,9	9,5	8,5	9,1	49	43	41	32	20	28	27	27	25
SFD	10,8	10,0	8,7	9,9	11,6	10,2	9,4	8,7	8,7	36	38	37	39	31	39	33	41	44
UFD	7,6	7,8	5,5	6,3	9,1	8,7	7,4	6,5	6,0	36	39	44	36	31	27	24	23	19
CFD	6,0	5,4	4,5	5,2	7,6	6,5	5,6	4,4	4,4	34	42	44	34	29	29	26	28	22
SNFD	11,0	10,4	8,8	8,3	10,0	9,1	8,6	7,8	7,8	40	38	36	46	34	32	34	36	31

We can see from *Table 2*, where annual average rates of total unemployment by Federal Districts are presented, that the interregional differences exist both between the Federal Districts and within them, i.e. between the regions (the coefficient of variation). The spread between the Federal Districts by the average rate of unemployment among the population aged 15-72 years would remain insignificant, at a relatively low level between 2005 and 2013, with a noticeable increase of the rate in 2008-2009. The interregional spread within the Federal Districts shrinks (with the exception of the Far East and Siberian Federal Districts), which is especially noticeable in the time of crisis in 2008-2010. The greatest positive change is observed in the Central and North-Caucasian Federal Districts. The interregional differences are much higher within two Federal Districts – Siberian and Northwest, which implies that the regional labour markets belonging to these Federal Districts are highly heterogeneous.

3. ANALIZING THE BETWEEN- AND WITHIN-GROUPS REGIONAL DIFFERENCES IN THE RATE OF YOUTH UNEMPLOYMENT

3.1. Interregional differences in youth unemployment rates in 2005-2013

We have calculated the degree and dynamics of the interregional differentiation of the youth labour market by the unemployment rate, using the Theil index as a measure of interregional differentiation (2005- 2013). The focus was made on two groups of young people – aged 15-19 and 20-29 years – against the economically active population as a whole (15-72 years). The results of our calculations are presented in *Table 3*.

Table 3.-Spatial differentiation of Russian regions by the rate of youth unemployment, T- and L-measures of the Theil index

Year	L-measure of the Theil index			T-measure of the Theil index		
	15-19	20-29	Total 15-72	15-19	20-29	Total 15-72
2005	0,080	0,044	0,039	0,103	0,044	0,041
2006	0,068	0,060	0,049	0,074	0,058	0,048
2007	0,079	0,071	0,053	0,088	0,068	0,054
2008	0,058	0,050	0,039	0,066	0,052	0,041
2009	0,059	0,023	0,019	0,070	0,023	0,020
2010	0,064	0,028	0,023	0,076	0,028	0,024
2011	0,072	0,035	0,024	0,090	0,034	0,026
2012	0,075	0,037	0,032	0,084	0,038	0,036
2013	0,076	0,046	0,032	0,082	0,041	0,032

As shown in *Table 3*, the interregional differences of the youth labour market are, first, considerable, second, the indicators of the interregional differentiation are variable over time, and third, the interregional contrasts on the labour market are strongly affected by the economic conditions and stages of the business cycle. As a result of the global economic crisis the labour market conditions in a number of regions has deteriorated, especially for the younger groups of people. With respect to the overall rate of unemployment in 2008 it grew by 15% compared to the previous year, and in 2009 it reached 134% of the 2008 rate. From then on unemployment would decrease at an average annual rate of 10-12% until 2013, having dropped from 9.2 to 6.2 (number of unemployed) per 100 of the economically active population.

Judging by the average unemployment rate, the regions that are more successful in overcoming economic shocks enjoy a better situation on the youth labour market. This is especially noticeable if we look at the difference in the unemployment rates for the people aged 15-19 years in 2008-2009 that reached 6.7% (the difference between 29.4% and 22.7%). For the more representative group of the population (20-29 years of age) the impact of the crisis manifested itself in that the regions with a stable, not worsening position of the employed youth do not differ from the rest of the subjects of Russia in terms of youth unemployment. Consequently, the demand on the youth labour market is stable, and the

unemployed youth becomes economically inactive (not in the labor force) under the influence of general economic conditions. Regional labour markets differently react to changes in the socio-economic conditions, which causes stratification of the regions by the rate of unemployment. How the young people adapt to economic shocks depends on the age: the age group of 20-29 years demonstrates greater stability, when the regional structural changes lead to a strong convergence of the regional unemployment rates in 2009-2012. The increase in unemployment among the 15-19-aged since 2008 led to the reduction in regional variation only for 2 years, until 2009, inclusive, and the regional inequality was more than two times higher than for the other age groups of unemployed. The interregional differences in the rate of unemployment among the economically active population (labor force) were the highest in the pre-crisis period, but the consequences of the economic shocks caused a twofold reduction in the regional inequality.

For an in-depth analysis of the trends of the interregional differentiation of the youth labour market we can use L-measure of the Theil index (*Table 3*). Comparing its values with T-measure of the Theil index we see [Kuduel et al. 2002] that the interregional differentiation by the level of youth unemployment is different for our two age groups. For the unemployed aged 15-19 years the values of T-measure exceed that of L-measure, which means that the regions with high rates of youth unemployment contribute more to the general unevenness of the national labour markets. On the contrary, for the people of 20-29 years of age the disadvantaged regions are in the minority. If we look at the economically active population (labor force) as a whole (15-72 years of age), we can see that the interregional differences grew between 2005 and 2007 and also between 2009 and 2012, and were the lowest in 2009. In general, they were relatively low in 2009-2013, but at the same time growing in that period. It can also be seen that the interregional differentiation strongly depends on the business cycle, decreasing in the time of crisis and recession and increasing in the time of recovery growth.

3.2. Within –groups regional differences in youth unemployment rates

Analyzing youth unemployment we see that the within - groups differences changes grew considerably in 2005-2007 and decreased in 2008-2009. At the same time, the inequality of regions within the Districts is different, as well as its trends. For instance, the Federal Districts, with the exception of the Ural, Central and Southern ones, experienced the lowest differentiation in terms of unemployment among the people aged 20-29 years in 2009. The

within-groups inequality in general (L_W) declined by 2013 for both of the groups of young people, and only in the North-Caucasian Federal District the regional inequality would grow for both the 15-19 and 20-29 age groups. A key feature of the changes that took place in recent years is the post-crisis growth of the within-groups differences on the youth labour market, which, never the less, have not yet reached the parameters of 2007. To get to know in which regions the between-regional differentiation is higher we decompose the Theil index by the Federal Districts (*Table 4*).

**Table 4.- The within-group component of inequality and its dynamics
(based on L-measure of the Theil index)**

District	15-19									20-29				
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2005	2008	2009	2012	2013
FEFD	0,021	0,021	0,024	0,047	0,040	0,026	0,028	0,069	0,027	0,013	0,006	0,004	0,021	0,034
VFD	0,144	0,075	0,078	0,037	0,064	0,050	0,063	0,055	0,085	0,010	0,018	0,008	0,008	0,009
NWFD	0,140	0,080	0,095	0,062	0,074	0,068	0,081	0,081	0,085	0,035	0,030	0,013	0,053	0,029
NCFD	0,096	0,086	0,079	0,194	0,100	0,136	0,099	0,148	0,188	0,088	0,022	0,018	0,024	0,051
SFD	0,032	0,045	0,132	0,058	0,046	0,056	0,043	0,091	0,038	0,021	0,033	0,017	0,030	0,042
UFD	0,012	0,011	0,048	0,030	0,005	0,008	0,008	0,011	0,032	0,021	0,029	0,011	0,010	0,002
CFD	0,076	0,086	0,072	0,053	0,085	0,088	0,095	0,062	0,047	0,034	0,041	0,022	0,016	0,006
SNFD	0,062	0,021	0,014	0,032	0,062	0,047	0,189	0,026	0,030	0,021	0,023	0,011	0,012	0,015
L_W	0,081	0,061	0,075	0,058	0,064	0,063	0,075	0,069	0,062	0,027	0,027	0,014	0,022	0,021

According to *Table 4*, the most heterogenous is the North-Caucasian Federal District, and for the younger age group the regional inequality has never stabilized after 2008, demonstrating a noticeable increase in 2012-2013. Comparing the data with that on the overall unemployment (*Table 2*), we can conclude that the reduction of the regional variation is caused by the convergence of the parameters of unemployment among the working-age population, which makes the fluctuations on the youth labour markets fade away. This means that the situation with youth unemployment in the regions of the District is unfavorable, when the young people shift from the status of the unemployed to the status of the economically inactive (not in the labour force), i.e. the employment opportunities are limited. Particularly indicative, when the groups are compared, is the dynamics of L_W for the unemployed youth aged 20-29 years: in the NCFD the inequality decreased during the crisis (2008-2010) and this trend remained until 2012. In the Siberian FD the inequality among its regions would grow after the crisis, getting back to the pre-crisis rates of differentiation and reflecting their different approaches to finding ways of economic development. In the Ural and Central Federal Districts the inequality for the young people aged 20-29 years sharply decreased after 2008, leading to homogeneity of the labour market conditions. In the Volga and Southern Federal Districts there are no any significant differences in the rates of unemployment among

the youth aged 20-29 years. Comparing the within –groups differences in youth unemployment rates we may conclude that the impact of the economic shocks is different in terms of both the severity of their consequences and their duration. It is worth noting that in most Federal Districts the inequality would decrease against the backdrop of increasing youth unemployment and grow when it was on the decline. Economically this means that the ways of development of the selected regions are specific. Increase or decrease in the within-groups and between-groups differentiation by unemployment rate in Russia is a manifestation of changing economic conditions. Between 2005 and 2013 any increase or decrease in the within- and between-group differences in the rate of youth unemployment was a result of changes in the economic situation and behavioral responses of the regional labour markets to shocks and recovery growth. If we speak of the Federal Districts, the within-group interregional differences account for most of the overall differentiation of Russian regions by unemployment rate. In the next Section we will take a closer look at the betwin-group components of the youth unemployment inequality in Russia.

3.3. Between-groups differences in unemployment rates

Comparing the indicators of the interregional differences, shown in *Table 4* and *Figure2*, we can easily see that the within-groups differentiation of the regional labour markets in terms of unemployment accounts for more than three fourths of the overall interregional differences in unemployment.

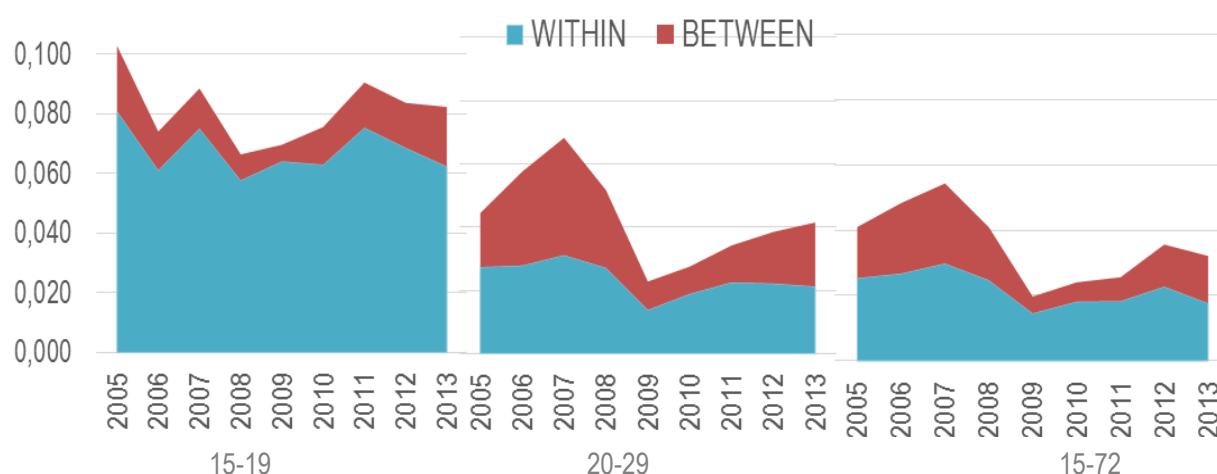


Fig.2 Within- and between-group differences components of L-measure of the Theil index in youth and overall unemployment rate (15-72 years)

As shown in Fig 2, within-groups differences in unemployment rates of young people aged 15-19 fell from 0.08 (2005) to 0.062 (2013). Between-groups differences varied slightly from 0.022 (2005) to 0.02 (2013), but during the crisis fell to 0.01 (2008). Interregional differentiation in the unemployment rate of young people aged 20-29 years declined sharply during the economic crisis. In 2009, within-groups inequality was 0.012, and between-groups - 0,009. By 2013, both components of interregional differentiation increased $L_W = 0,021$; $L_B = 0,020$. The components of regional disparities in the unemployment rate of the economically active population (15-72 years) were changing in a similar way as it were for young people aged 20-29. It should be noted that the contribution of within-groups differences in the level of interregional differentiation of the youth unemployment rate is much higher than between-groups of the Russian regions.

The influence of the 15-19 age group on the geographical distribution of unemployment is maximum. Taking into account the fact that we brought the indicators of unemployment by age to comparability, comparing the charts we see that this age group shows the greatest within-groups differences. Consequently, this group is highly internally heterogeneous, and the reduction of inequality in 2008 and 2013 is insignificant. The between-groups differences component of inequality is relatively low, but after the decrease in 2008-2009 it is on the rise. This hints that unemployment among the young people aged 15-19 years has irremovable geographical differences, and that the behavior of the young unemployed is quite specific. Therefore, regulation of the youth labour market in order to reduce unemployment and increase employment should be based not only on general employment programs, but also on specific measures that take into account the specific features of the regional labour markets. We also assessed the influence of the 20-29 age group on the geographical distribution of unemployment and found that this age group has the proportions of the within - and between - group regional inequality that are close to the overall unemployment. In the Federal Districts the internal heterogeneity is low and only slightly higher than the between-group indicators of inequality. The differences between the regions of one Federal District would increase in the time of economic growth and decrease in the time of crisis. This trend is also very pronounced for the degree of inequality between the Federal Districts.

The results show that the between-groups differences in the rate of overall unemployment for the Federal Districts slightly increased after the crisis of 2008-2009, but this process is partially offset by the effects produced by the within-groups interregional differences. For youth unemployment in the 15-19 and 20-29 age groups the within-groups

differences were steadily decreasing since 2011, which affected the dynamics of the overall unemployment differences. The multidirectional dynamics of the within- and between-groups inequality is mutually offset and affects the stabilization of the overall inequality. The interregional differences in the rate of overall and youth unemployment tend to increase during the ascending wave of the business cycle and decrease in the period of economic crisis. The influence is produced not only by changes in the parameters of youth unemployment, but also by changes in the relative size of the age groups (15-19 and 20-29 years of age). The within-groups of regional differentiation is also involved in explaining the overall interregional differences (compositional effect). The effects of time and the effects of age are interconnected and very difficult to separate from each other.

Our analysis of the dynamics of the interregional unemployment differences of the youth labour market shows that, firstly, the interregional variation is considerable, secondly, the interregional differentiation of the labour market is persistent, and thirdly, the interregional differences depend on the stages of the business cycle. After 2009 the ratio between the maximum and the minimum values of the unemployment rate on the regional labour markets would exceed 7 times, and the gap between some individual Federal Districts could reach two times. The coefficient of variation of the regional values of the youth unemployment rate was also high and depended on the economic conditions.

We also conducted an analysis of correlation between the unemployment rate of young people (15-29 years) and adults (30-59 years). In addition, we evaluated the relation of interregional differentiation in youth and adult unemployment. Youth unemployment and unemployment of the adult population are components of the overall unemployment rate. The calculation results showed that the pair correlation between the unemployment rate and the youth population aged 30-59 years is 0.859, it is significant by Student's test. This strong correlation is not unique to the Russian regions. For example, in EU countries the correlation between youth and adult unemployment is higher than 0.8 (Blanchflower et al., 1998; O'Higgins, 1997; Knipprath et al., 2014). Interregional differences between youth and adult unemployment in Russia (2005-2013) accounted for 14.1%. The unemployment rate of young people aged 15-29 was 11.7%, and the adult population (30-59 years) - 6.1%. Thus, the rate of youth unemployment is on average 5.6% higher than the adult. It should be noted that the percentage of unexplained variance is quite large. Not only general but also specific measures of social policy are required to reduce the rate of youth unemployment. Pair correlation between the Gini coefficients for the Russian regions on youth and adult unemployment is linear and is 0.755. It is significant by Student's test at the level of $p = 0,019$. This implies that

policies aimed at reducing interregional disparities in the rate of youth unemployment will affect the alignment of the regions in terms of general and adult unemployment. Our analysis made it possible to understand the behavioral responses to the economic crisis of the two different age groups (15-19 and 20-29 years of age) on the labour market. Furthermore, it became clear for which age groups the negative impact of the economic shock was the strongest, and which of them benefited from the recovery growth in the following years. We also considered the nature of the change in the interregional differences in the period of economic recession and in the time of recovery growth.

4. CONCLUSION

We have assessed the changes in the within- and between-groups (Federal Districts) interregional differences and estimated their contribution to the change in the interregional differentiation of the rate of youth unemployment (15-19 and 20-29 years of age). The results showed that the level of interregional differentiation in youth unemployment is high, stable and depends on the stage of the business cycle. According to our data for the period 2005-2008 the interregional unemployment differences decreased, while between 2009 and 2013 the interregional differentiation of the youth labour market increased.

We found that the socio-economic effects of youth unemployment and the specific features of behavioral responses to economic shocks are different for the two age groups (15-19 and 20-29 years of age). An additional contribution of our study is that we assessed the impact of changing economic conditions on the degree of interregional unemployment differentiation of the youth labour market.

Our findings show that the interregional differences decreased in 2005-2009 and increased in 2010-2013. The results show that the reduction of the spatial differentiation of the rate of youth and overall unemployment between 2005 and 2009 and the growth of the interregional differences between 2010 and 2013 were to a considerable extent due to the rise of the within-groups differences, which indicates that the regional labour markets were highly heterogeneous. During the period under study (2005-2013) the between-groups differences in the rate of youth unemployment changed.

These between-groups changes are quantitatively important in analyzing the interregional youth unemployment differences, but they are not critical and produce no dominating effects on the interregional structure of youth unemployment. In future the interregional differences in the rate of youth unemployment may change depending on the

relative demand for youth labour in different subjects of the Russian Federation. Increase in the relative demand for labour in the regions of Russia and formation of a system of continuing vocational education would help reduce the rate of youth unemployment.

Our analysis provides reasonable arguments in favor of using this model to describe the interregional differences in the rate of youth unemployment on the Russian labour market. The heterogeneous responses of the regions to shocks and the existence of multiple behavioral patterns prove that the youth employment policies should be regionally differentiated.

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