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Youth Unemployment in Russian Regions and Assessment of the Economic Loss

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Abstract

Background/Objectives: The objective of this study is to quantify the economic loss from underproduction in the regions of Russia caused by cyclical youth unemployment. We decomposed the youth unemployment into its natural rate and its cyclical component and made experimental calculations of the economic loss caused by cyclical youth unemployment. **Methods/Statistical Analysis:** We used the approach to analyzing and quantifying the economic loss from high youth unemployment that considers the economic loss as underproduction of gross value added with taking into account the age of the unemployed. Using the statistics posted on the official website of the Federal State Statistics Service, we calculated the rates of regional labor productivity. **Findings**: The approach we used enabled us to specify the methodology of calculating the economic loss and make more precise the labor productivity parameters, which allows differentiate the economic loss according to the age groups. Having made our calculations, we quantified the economic loss from cyclical unemployment among different age groups. We found that the loss is higher in the time of economic crisis and lower in the time of recovery growth. We also found that the greatest production growth potential due to the employment of young people belongs to the regions with high rates of labor productivity and high fractions of youth in the population. **Applications/Improvements:** The approach we presented in this study enabled us to specify the methodology for calculating the economic loss and make the labor productivity parameters more detailed, which in turn, allows differentiate the economic loss by age groups. This offers the opportunity to forecast the economic loss from youth unemployment by individual age groups on the basis of the existing dynamics. We found that the loss is greater in the time of economic crisis and smaller in the time of recovery growth.

Keywords: Cyclical Unemployment, Economic Loss, Natural Unemployment Rate. Statistic Measurement, Youth Unemployment

1. Introduction

According to Rosstat, the number of the unemployed in Russia in March 2016 constituted 4567 thousand people, including 21.6% of the unemployed in the age of 15-25 years. Irrespective of the age, sex, nationality and residence, youth unemployment always causes damage to the society generating both economic and social loss. Unemployment decreases the standard and quality of life, causes the loss of qualification, and in the case of a long search of job, the loss of confidence in the future, it makes the society more criminalized and causes the social tension in the country to grow. As a result of underuse of resources, the economic growth slows down. The crisis of 1998 affected the Russian labor market so that the unemployment rate was the highest (12.6% in 1999) and the number of the unemployed grew up to 9094 thousand people[1]. In the time of the global financial crisis of 2008-2009, the number of the unemployed constituted 6284 thousand people or 8.3% (2009). Today Russia is under-

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going economic recession and production decline, when the rise in unemployment is inevitable, especially among the young people. Already now the Russian economy is suffering from the economic loss caused by the unjustifiably high youth unemployment[2].

Taking into account all kinds of damage caused to a country or a region is impossible, so we can only consider those kinds of damage, which can be quantified. The statistical measurement of the economic loss to the society from youth unemployment, in the absence of the necessary technique, is an extremely complicated, but burning problem. Unfortunately, the value equivalent of the economic loss caused by youth unemployment is not calculated. The calculations of different authors, both foreign and Russian, are based on estimating the gap between the actual and the potential gross regional product.

We aim at making a value assessment of the economic loss from cyclical unemployment, including youth unemployment, in the regions of Russia. We can achieve this and make an empirical analysis of the economic loss from the underuse of unemployed young people by fulfilling the following tasks:

- Measure the natural unemployment rate and identify the cyclical component of unemployment for each age group in 77 regions of Russia.
- Differentiate labor productivity by age groups, for which the actual labor productivity for each age interval is corrected according to the special coefficients[3,4].
- Estimate the potential labor productivity for the number of the unemployed belonging to the cyclical component of unemployment based on the actual employment rate and the gross regional product Gross Regional Products (GRP).
- Measure the potential Gross Domestic Product (GDP) as a sum total of potential GRP and GRP-adjusted incremented net taxes on products and imports.
- Assess the gaps between the potential and the actual GRP for Russian regions. Analyze the contribution of individual regions to the loss of the potential GDP in absolute and relative terms per 1 person of resident population.

Following who established a quantitative relationship between cyclical unemployment, on the one hand, and the gap between the potential and the actual gross domestic product, we made calculations for the regions of Russia[5]. Assessing the conjuncture gap between the actual and the potential GDP, we based ourselves on the works.

The paper is organized as follows. In the introduction we set the objectives and main tasks. The second section discusses the research methods and approaches to the problem presented in the literature, and describes the database and the variables that will be used. The third section contains the results of our empirical study of the economic loss from the underproduction resulting from cyclical unemployment. We calculated the value of the economic loss from underproduction for different age groups and different regions of Russia. Finally, we summarize the results of our empirical study of the economic loss from cyclical unemployment and discuss the areas of further research.

2. Materials and Methods

2.1 Methodology of Calculating the Economic Loss from Unemployment

Empirical studies of the interrelationship between the conjuncture gap between the actual and the potential GDP, on the one hand, and the scope of cyclical unemployment, on the other hand, are presented in the works. The Okun's law, reflecting the decreasing dependence of output on the norm of unemployment, stipulates that when cyclical unemployment increases by 1%, the actual GDP falls short of the potential one by the value g (Okun's parameter).

The conjuncture gap between the actual and the potential GDP was assessed. The difference between the potential GDP and the actual GDP or actual output is the output gap or the GDP gap. When the growth of aggregate demand is outpacing the growth of aggregate supply, there may be inflation, and in this case the positive GDP gap is called an inflationary gap. A recessionary gap is a negative GDP gap accompanying a production and employment decline[6].

Today the actual rate of unemployment in the regions of Russia is higher than the natural one, which indicates the existence of cyclical unemployment, which is determined by fluctuations of the economic conjuncture. To assess the rate of cyclical unemployment we

need to calculate the difference between the actual and the natural unemployment rates. The existence of cyclical unemployment means underutilization of resources, including labor. Any production decline and economic recession are accompanied by a decrease in employment and increase in unemployment, as well as in the number of economically inactive population. In this situation the actual GDP is lower than the potential GDP, and the greater this gap, the higher the cyclical unemployment. In the Western literature the methodology of calculating the economic loss from unemployment is based on comparing the actual and the potential GRP, which enables to assess the scope of underproduction. According to the proposed approach, the economic loss from unemployment for the reported year is calculated as the volume of underproduction. This approach implies that the annual estimation of the value added not produced due to unemployment should be considered the value equivalent of the economic loss. Basing ourselves on the main provisions of this methodology, we made calculations of the economic loss from unemployment in the regions of Russia. Using the statistics for the 2005-2013 periods posted on the official website. we examined the economic loss caused by youth unemployment. In order to estimate the economic loss from unemployment correctly we fulfilled the following tasks: assessed the labor productivity age differences, identified the regional rate and considered the dynamics of labor productivity, structured the unemployment according to age groups, calculated the economic loss from cyclical unemployment in the manufacturing sector by age groups, and identified the contribution of youth unemployment to the total economic loss. In addition to that, we analyzed the changes in the volume of the economic loss in different years.

Comparing the actual youth unemployment in Russian regions and its deviation from the natural rate, it seems reasonable to think of the degree of underuse of the economic activeness potential, which leads us to the need to assess the gap between the actual and the potential GDP and the contribution of individual regions to this gap. The potential economic loss from underproduction differentiates the actually produced GRP from the maximum one, which is possible under the existing infrastructure constraints, production capacities and personnel capabilities.

2.2 Differentiation of Labor Productivity by Age Groups

A single methodology of measuring labor productivity age differences does not exist yet. In the second half of the 20th century, a Hungarian researcher employing his own method of Economic Age Pyramids (EAP) that represent a distribution of the volumes of production and consumption by different population age groups, calculated the relative indicators of the public labor productivity and average per capita consumption (in relation to the averages of the respective indicators) for each five-year age interval[7]. Followed in the second half performed sample surveys for Latvia and Russia, respectively to prove that in general the Valkovics scales for labor productivity are constant in time and space. In addition to the age grading, the Valkovics scale is differentiated by gender[8]. Therefore, to fit the existing unemployment groupings, we average the gender rates of labor productivity and enlarge the five-year age groups to 10-year intervals Table 1.

Table 1. Coefficients of labor productivity by age groups

Age	15-19	20-29	30-39	40-49	50-59	60-72
Coefficient	0.7750	0.9975	1.0825	1.0525	0.9625	0.6900

We will use this scale to differentiate labor productivity in Russian regions by the age groups between 2005 and 2013. Having made our calculations, we derived labor productivity for each region, age group and year.

The system of indicators we use in our calculations includes the following:

- Labor productivity, including that adjusted by the ages and regions;
- Total number of the unemployed, as well as that according to the natural and the cyclical factors of unemployment;
- Number of the potentially employed by the age and region;
- Coefficients of the actual, natural and cyclical unemployment among the economically active population by the regions and age groups;
- Losses from the underproduction of GRP differentiated by periods;
- Sum total of the potential gross value added for 77 regions of Russia;
- Actual Gross Value Added (GVA) for 77 and 84 regions and actual GDP.

3. Results and Discussion

3.1 Decomposing the Actual Rate of Unemployment into the Non-Accelerating Inflation Rate of Unemployment (NAIRU) and the Cyclical Component

Decomposing the Actual Rate of Unemployment into

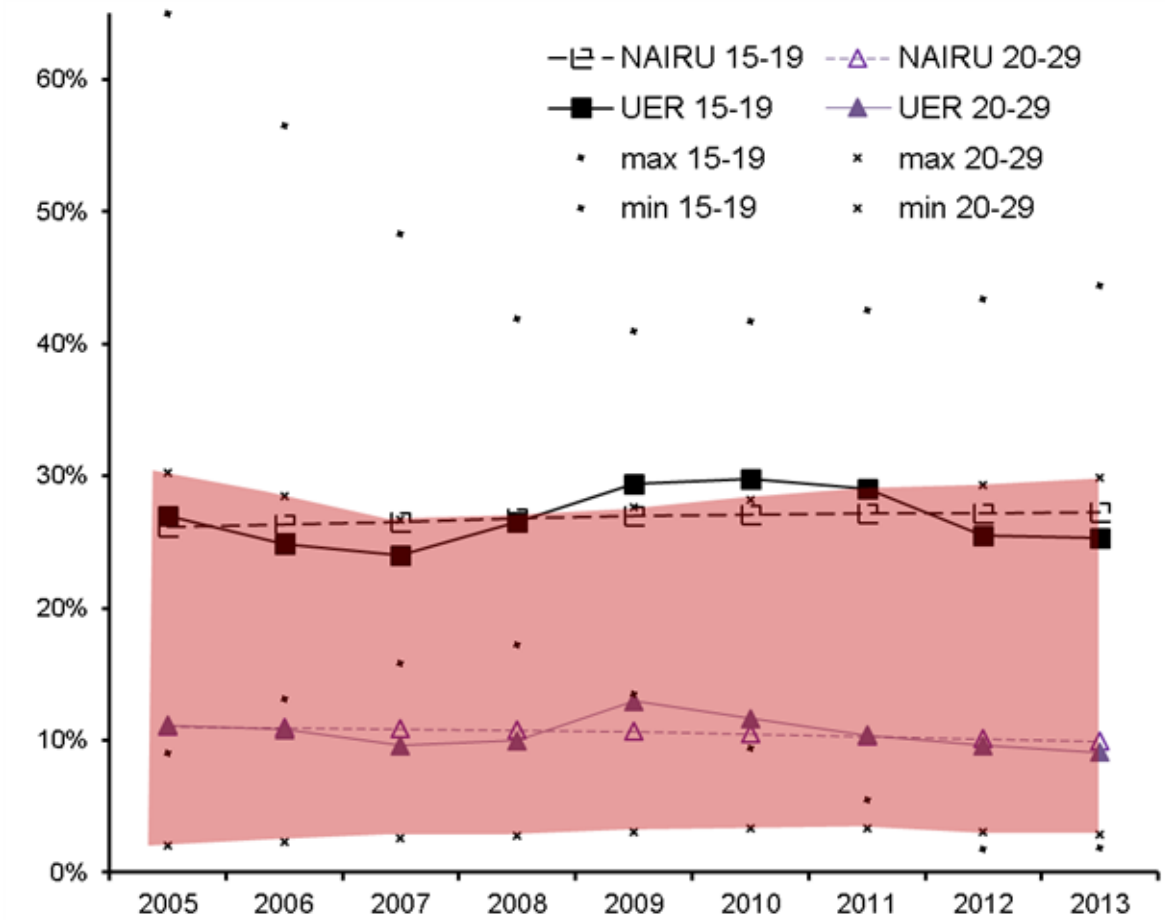

Figure 1. The average Russian natural (NAIRU) and actual (UER) youth unemployment rates between 2005 and 2013 (the regional NAIRU extremes are also shown)

Table 2. Economic loss from underproduction due to cyclical unemployment, 2005-2013, million RUR

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total for 77 regions	90086.5	82364.8	31661.3	90072.6	552819.4	320838.8	156719.7	48492.1	73231.4
Maximum*	5982.6	19737.0	4500.4	11943.2	100516.8	33690.2	13741.0	9385.7	13479.5
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	7.5	0.0	0.0
Average	1170.0	1069.7	411.2	1169.8	7179.5	4166.7	2035.3	629.8	951.1

* the maximum value that occurs among the 77 regions of Russia

the Non-Accelerating Inflation Rate of Unemployment (NAIRU) and the Cyclical Component

The actual rate of unemployment is known to include cyclical, structural and frictional unemployment. Structural and frictional unemployment form the natural unemployment rate, while cyclical unemployment depends on the economic conjuncture. The Non-Accelerating Inflation Rate of Unemployment (NAIRU) can only be estimated if the trend does not correlate with the rate of inflation. Within the framework of one-dimensional methods the unemployment rate is decomposed into a determined trend and a random component[9]. The trend is interpreted as the "equilibrium unemployment rate", and the random component – as the "cyclical" unemployment curve[10]. Using the regional statistics for 2005-2013 and the Hodrick-Prescott filter[11] we derived the annual values for the NAIRU and cyclical unemployment for each age category of the unemployed. The results of measuring the natural (NAIRU) and the actual youth unemployment by age groups for the period under study (2005-2013) are shown in Figure 1.

The natural rate of unemployment for the 15-19-age group tends to increase (line NAIRU 15-19). At the same time, the regional maximums (line max 15-19) and minimums (line min 15-19) in the crisis time of 2008-2009 tend to draw near to the natural Russian average rate. After the crisis, the situation with youth unemployment in the leading regions would improve at a higher pace. This is demonstrated by the horizontally tilting max 15-19 line and the strongly declining min 15-19 curve. For the young people aged 20-29 years the natural rate of unemployment tends to decrease, while the extremes are stable over time.

3.2 Results of Experimental Calculations of the Economic Loss

Basing ourselves on the actual employment rate and the actual GRP, we calculated the amount of gross value added not produced because the actual unemployment rate were exceeding the natural rate due to cyclical unemployment. Having summed up the amounts of gross value added lost as a result of cyclical unemployment in each region and for each age group we derived the scope of the economic loss. The results of our calculations are presented in Tables 2 and 3.

The potential of the unemployed that could have caused the amount of gross value added to augment is quite high and reaches its peak in the post-crisis years. It ranges from 0.5% in 2005 to 1.7% of the Russian GDP in 2009.

The actual maximums and minimums of the economic loss shown in Table 2 make us understand that the regional differences in unemployment and the loss it generates as a result of the underuse of the labor potential of the unemployed are quite high. To illustrate this, the underproduction due to the underuse of the labor poten-

Table 3. Economic loss from underproduction due to cyclical unemployment by age groups, million RUR

Age groups	15-19	20-29	30-39	40-49	50-59	60-72	Fraction of youth, % of the loss
Total for 77 regions	95759.2	440617.7	342178.5	288777.1	233732.0	45222.0	37.1%
Maximum	9244.6	49225.6	52625.9	35363.3	22672.3	2955.1	34.0%
Minimum	69.5	372.1	196.8	227.8	150.0	5.5	43.2%
Average	1243.6	5722.3	4443.9	3750.4	3035.5	587.3	37.1%

tial of the unemployed constituted 100.517 billion RUR in Moscow (2009), 27.100 billion RUR in St.-Petersburg, and 26.200 billion RUR in the Republic of Tatarstan. It is natural to suppose that the regional differentiation in terms of the unused labor potential is caused, among other, by the heterogeneity of the age composition of cyclical unemployment. Thus, according to Table 3, the greatest absolute economic loss between 2005 and 2013 is caused by the increase in unemployment among the young people aged 20-29 years and among the most able-bodied part of the population – those aged 30-39 years.

The last column of Table 3 reveals the contribution of youth unemployment to the unused labor potential. The results show that the abstract region formed accord-

Table 4. Contribution of individual regions of Russia to the economic loss from cyclical unemployment, 2005-2013

Region	Economic loss, million RUR	Contribution to the total national loss, cumulative, %	Economic loss per resident, thousand RUR
Moscow	170993.9	12.07	2.08
Tyumen Oblast	110099.4	19.44	4.62
Krasnoyarsk Krai	51483.8	23.00	2.56
Moscow Oblast	50518.1	26.49	1.02
Sverdlovsk Oblast	47827.6	29.80	1.57
The Republic of Tatarstan	43445.9	32.80	1.65
The Republic of Bashkortostan	40133.7	35.57	1.44
St.-Petersburg	40041.4	38.34	1.15

Nizhniy Novgorod Oblast	34399.4	40.72	1.46
Chelyabinsk Oblast	32434.0	42.96	1.32
Krasnodar Krai	32295.0	45.20	0.89
Perm Krai	30388.3	47.30	1.63
Sakhalin Oblast	29949.2	49.37	8.15
Irkutsk Oblast	28631.4	51.35	1.68
Samara Oblast	28525.2	53.32	1.24
Kemerovo Oblast	28434.1	55.29	1.46
The Republic of Komi	21693.3	56.79	3.28
Rostov Oblast	21395.6	58.27	0.71
The Republic of Dagestan	20877.7	59.71	1.16
Novosibirsk Oblast	20656.0	61.14	1.09
Volgograd Oblast	20022.6	62.52	1.09
Primorsky Krai	19434.6	63.87	1.36
Khabarovsk Oblast	19063.1	65.18	1.94
Orenburg Oblast	18441.6	66.46	1.29
Leningrad Oblast	18028.2	67.71	1.48
Kaliningrad Oblast	17419.5	68.91	2.60
The Republic of Saha	17272.3	70.10	2.66
Altai Krai	17127.4	71.29	1.00
Omsk Oblast	16494.5	72.43	1.18
Arkhangelsk Oblast	16425.4	73.56	1.87
Voronezh Oblast	16414.3	74.70	1.00
Saratov Oblast	15084.0	75.74	0.83
Yaroslavl Oblast	14265.8	76.73	1.57
Udmurt Republic	13749.3	77.68	1.29
Trans-Baikal Krai	13166.4	78.59	1.73
Vologda Oblast	13002.6	79.49	1.54

ing to the empirical maximums of age unemployment (the "Maximum" line) has a low fraction of youth. At the same time, the "best" abstract region (the "Minimum" line), on the contrary, demonstrates the highest contribution of youth unemployment. The descriptive statistics of the economic loss resulting from the growth of cyclical unemployment by years and age groups itself provides no opportunity of making an address analysis of the problem regions, so further we will present the top regions with the highest economic loss from underproduction.

We will also group the regions in descending order of the contribution of the unemployed youth to the underproduction and analyze the dynamics of the production loss from the macroeconomic shocks caused by the global financial crisis of 2008-2009.

3.3 Analyzing the Contribution of Individual Regions to the National Economic Loss

Let us make a Pareto analysis[12] of the role of individual regions in the economic loss of the total GRP for 77 regions of Russia for the entire 2005-2013 period. The accumulated results in 80% of the total loss are achieved when ranking the regions at the level of the 36th region. Thus, 80% of the under produced total GRP of the country is caused by cyclical unemployment in half of the regions of Russia. Consequently, some individual regions demonstrate a high concentration of the unemployed. These regions are shown in Table 4.

Table 5. Regions in descending order of the contribution of the unemployed youth to the economic loss from the underproduction of GRP

Region	Economic loss, million RUR	Loss from cyclical youth unemployment, %	Region	Economic loss, million RUR	Loss from cyclical youth unemployment, %
Tomsk Oblast	7567.9	58.7	Stavropol Krai	4481.8	41.9
Moscow Oblast	24252.4	48.0	St.-Petersburg	16619.3	41.5
Vologda Oblast	6136.9	47.2	Samara Oblast	11732.0	41.1
The Republic of Altai	699.4	45.2	Arkhangelsk Oblast	6732.6	41.0
The Republic of Dagestan	9348.8	44.8	Sakhalin Oblast	12244.7	40.9
Tver Oblast	3670.5	44.3	Tyumen Oblast	44559.0	40.5
Smolensk Oblast	3147.8	43.7	Perm Krai	12137.8	39.9
Kirov Oblast	4204.9	42.7	Nizhniy Novgorod Oblast	13727.4	39.9
Trans-Baikal Krai	5618.1	42.7	The Republic of Komi	8605.2	39.7
Irkutsk Oblast	12070.6	42.2	Udmurt Republic	5296.2	38.5

To make our findings comparable for the territories different in size, in Table 4 we present the economic loss per capita population of the respective territory. Twenty regions with the highest contribution of youth unemployment to the underproduction of the regional GRP are shown in Table 5. It also contains the values of the potential contribution of the unemployed to the GRP of these regions.

The results show that the greatest potential for growth in production due to youth employment is in two types of regions: firstly, these are the regions with high rates of labor productivity and economic development, and secondly, - the regions where the population is young.

According to the methodology of the System of National Accounts[13], the sum total of the regional GRP in Russia is not equal to the national GDP. First, the federal level of accounting includes all taxes, related to the taxation of products and imports, as well as similar subsidies. Second, the calculation of collective government services, particularly allocations for security, law enforcement, and two branches of the government is only made on the national level. Using the actual annual rates, we derived the fraction of net taxes on products and imports of the GDP. Then we compared the actual GDP in basic prices and the GRP of all regions of the country in basic prices to find out the fraction and value of the collective services. The total amount of the GRP in basic prices we calculated for the 77 Russian regions that form the core data set of our study. The results of the calculations are shown in Table 6.

The net taxes on products and the federal component are calculated and respectively derived as the difference between the taxes and the subsidies and the difference between the GDP in basic prices and the GRP of all the regions.

The contribution of the GRP of our 77 Russian regions to the total GRP is more than 99%, so we can generalize our findings to the entire country. In Table 6 the GDP gap is given as an absolute and relative evaluation of the differences between the actual and the potential GDP, if cyclical unemployment no longer existed in the regions of Russia.

Table 6. Gross domestic product and gross regional product for 77 regions of Russia, billion RUR

	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Total GRP in basic prices for 77 regions	17991.7	22435.2	27878.1	33792.8	31878.9	37558.2	45234.0	49730.5	53780.2
GDP in market prices	21609.8	26917.2	33247.5	41276.8	38807.2	46308.5	55967.2	62147.0	66193.7[1]
Net taxes on products (NTP)	3092.1	3939.9	4763.0	6094.2	4975.9	6268.5	8248.3	9201.6	9278.4
Federal component (collective services)	483.3	485.2	520.5	1273.9	1824.1	2352.3	2326.6	3025.4	2844.9
Potential amount of NTP	3108	3954	4768	6110	5062	6322	8277	9211	9291
Potential GDP	21716	27014	33285	41383	39449	46684	56153	62205	66280
GDP gap, %	-0.49	-0.36	-0.11	-0.26	-1.63	-0.80	-0.33	-0.09	-0.13
Gap, billion RUR	-106	-97	-37	-107	-641	-375	-186	-58	-86

Table 7. Gap between the actual and the potential gross value added, Russian regions, %

Age group of unemployed	2005	2006	2007	2008	2009	2010	2011	2012	2013
15-72 years, including	-0.50	-0.37	-0.11	-0.27	-1.73	-0.85	-0.35	-0.10	-0.15
15-19	-13.8	-3.5	-3.8	-5.4	-7.6	-7.0	-6.4	-2.6	-2.5
20-29	-0.9	-0.7	-0.4	-0.4	-2.8	-1.5	-0.5	-0.2	-0.2
30-39	-1.0	-0.6	-0.2	-0.4	-1.8	-0.9	-0.4	-0.2	-0.2
40-49	-0.5	-0.4	-0.2	-0.5	-1.5	-0.8	-0.3	-0.1	-0.2
50-59	-1.3	-0.3	-0.2	-0.6	-1.6	-1.0	-0.6	-0.2	-0.2
60-72	-1.7	-0.5	-0.4	-1.0	-1.5	-1.0	-0.8	-0.3	-0.7

Evaluation of the conjuncture gap between the actual and the potential GDP, we believe, should take into account the age structure. The age differences in the factors causing gaps between the actual and the potential gross value added created by the actual and the potential workers are presented in Table 7.

The average size of the gap is determined as the weighted arithmetic mean with taking into account the different number of the potentially employed in the different age groups. Young people have the greatest potential throughout the 2005-2013 periods. The Figures in Table 7 show the extent to which the value added created in the regions by the people belonging to this or that age group can be augmented. All the age groups demonstrate a sharp decrease in cyclical unemployment in 2005 and an equally noticeable jump in 2009-2010. The former is likely to be caused by the NAIRU smoothing technique, when the trend is based on the extreme periods, and the latter is a result of the economic shocks accompanying the global financial crisis[14].

4. Conclusion

Using the proposed approach, we made a value estimation of the economic loss from cyclical unemployment in the regions of Russia with taking into account the age. We also took into account the fact that labor productivity differs depending on a number of factors, including the age. The complemented methodology of valuation of the economic loss from unemployment with taking into account the age presented in this study is universal and designed to evaluate the loss for different age cohorts.

The approach we presented in this study enabled us to specify the methodology for calculating the economic loss and make the labor productivity parameters more detailed, which in turn, allows differentiate the economic loss by age groups. This offers the opportunity to forecast the economic loss from youth unemployment by individual age groups on the basis of the existing dynamics. We found that the loss is greater in the time of economic crisis and smaller in the time of recovery growth.

*Rosstat estimation on 31.12.2015. URL: http://www.gks.ru/free_doc/new_site/vvp/comment.htm

Making a systemic evaluation of the benefits from increasing the rate of youth employment is an urgent task. The potential economic benefits from increasing the employment rate, improving labor productivity in the age groups with a potential for this, and achieving the unemployment rate close to the natural one, should be quantified. The results show that the greatest potential for growth in production due to youth employment is in two types of regions: firstly, these are the regions with high rates of labor productivity, and secondly, - the regions with high fractions of youth in the population.

It should be noted, however, that in this study we ignored the effect of reduced consumption due to the lack of job among the different population strata and age groups. Like economic inactivity, unemployment causes the consumption among the population (and its different social groups) to fall. We think that this effect should be taken into account when estimating the economic consequences of unemployment. Our further research will focus on evaluating the economic loss from youth unemployment with taking into account both the "underproduction" and the "under -consumption" in the regions of Russia. This approach will allow find out the contribution of cyclical youth unemployment to the total economic loss.

In addition to that, it is projected that our future studies will embrace not only the unemployed, but also the economically inactive young people, who do not enter the labor market to find a job. Statistical measurement of the economic loss carried out with taking into account the peculiarities of the age structure of the unemployed in the region gives an indication of both the possible economic consequences and the appropriate public policy measures.

Calculations of the loss from youth unemployment reflecting the peculiarities of the territories can be used to develop specific policy measures and select target programs of youth employment in the regions of Russia.

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