

## Macroeconomic Assessment of the State of Labor Markets in the European Part of the Russian Arctic After 2013

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**Abstract**—The article is devoted to the analysis of the dynamics of labor markets in the regions of the European part of the Russian Arctic based on the indicators of the balance of labor resources after 2013. It is shown that the trends in these regions are much more unfavorable compared to the country as a whole. A significant reduction in the size of labor markets is expected, which will slow down the socio-economic development of these territories.

**Keywords:** European part of the Arctic, balance of labor resources, employment, labor market, scenarios

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In modern conditions of acute conflict between Western countries and Russia, the composition and distribution of labor resources are an important factor that can ensure both success in confrontation with more powerful economies and a strategic failure in the country's development. The issue of availability of labor resources in the medium and long term for Russia is especially relevant, because for a long time there has been a low birth rate, rapid population aging, mass external migration and significant interregional differentiation in most socioeconomic indicators. Special attention should be paid to the regional level, since the development of the Russian economy is largely determined by the ability of the regions to realize their economic potential, and interregional economic relations are the basis of the country's internal integration [1].

One of the most important macroregions, the importance of which in economic and geopolitical terms is increasing today, is the Arctic. Its development is a comprehensive national project aimed at reindustrialization of the country [2]. In recent years, interest in the Arctic has increased significantly [3–6], including in the aspect of demography [7, 8]. This interest took shape in the form of the implementation of large-scale infrastructure projects aimed at the industrial development of the macroregion: the Northern latitudinal route, the Northern Sea Route, floating nuclear thermal power plants, a low-power nuclear power plant, and others. Despite some adjustments related to the events in Ukraine and the subsequent imposition of sanctions against Russia, they have every chance of being fully implemented. However, the effect of the development of the Arctic may be insignificant if its economy is not provided with

resources (including human resources) of the required volume, quality and within the prescribed time frame. In this regard, the analysis of the dynamics of the number and structure of labor resources in the Arctic regions of Russia is relevant.

Our task is to show the changes that have taken place since 2013 and present macroeconomic forecasts for the dynamics of regional labor markets in the near future, taking into account the events of recent years, while maintaining the logic of presentation of previous articles. The sources of formation and directions of use of labor resources in the Arkhangelsk and Murmansk oblasts, the Republics of Karelia, Komi and Nenets Autonomous Okrug are considered, and their prospective dynamics are also assessed.

### *The main sources of the formation of labor resources.*

The number of labor resources in the Russian Federation in 2020 remained virtually unchanged compared to 2000 (+74 thousand people). In the Arctic regions over the same period, it decreased by 874.7 thousand people, (15.3%), and since 2013 the decline amounted to 328 thousand people. As a result, the share of the Arctic regions in the total labor force decreased from 6.4 to 5.5%. The Asian part retained its share, while the share of the European part decreased from 3.1 to 2.2%. In the European part, over a twenty-year period, the number of labor resources decreased by 30% (829.4 thousand people), while in the Asian part, only by 1.5% (45.3 thousand people). Since 2013, the decline has been 12.5% (276.1 thousand people) and 2.1% (64 thousand people), respectively.

The Nenets Autonomous Okrug is the only region of the European part of the Arctic, which experienced growth, but an increase of 4.3 thousand people (14%)

**Table 1.** Dynamics of the number of labor resources in the regions of the European part of the Russian Arctic

Index	2014	2015	2016	2017	2018	2019	2020
RF, thousand people	92021.4	92706.1	91 161.1	89967.5	89670.8	90 184.9	89 105.8
European part of the Arctic, thousand people	2159.5	2121.1	2055.4	1992.0	1961.9	1958.5	1933.0
% to RF	2.3	2.3	2.3	2.2	2.2	2.2	2.2
Rep. Karelia, thousand people	375.1	367.3	357.5	348.3	341.2	340.6	337.6
% to the European part	17.4	17.3	17.4	17.5	17.4	17.4	17.5
Rep. Komi, thousand people	550.9	542.9	523.2	507.3	499.8	494.5	481.0
% to the European part	25.5	25.6	25.5	25.5	25.5	25.2	24.9
Arkhangelsk oblast, thousand people	686.6	669.8	645.1	619.6	610.4	607.2	601.2
% to the European part	31.8	31.6	31.4	31.1	31.1	31.0	31.1
Nenets Autonomous Okrug, thousand people	37.2	37.2	37.2	36.4	35.3	34.7	34.6
% to the European part	1.7	1.8	1.8	1.8	1.8	1.8	1.8
Murmansk oblast, thousand people	509.7	503.9	492.6	480.4	475.2	481.5	478.6
% to the European part	23.6	23.8	24.0	24.1	24.2	24.6	24.8

did not affect the situation as a whole, since the contribution of this region to the balance is small.

The largest losses occurred in the Arkhangelsk oblast and the Komi Republic, where more than half of the labor force lived. In them, the reduction was 29.9% (256.1 thousand people) and 34% (247.4 thousand people). The Murmansk oblast and the Republic of Karelia are characterized by a similar loss: 28.9% (194.9 thousand people) and 28.6% (135.4 thousand people). The shares of regions in the total labor force fluctuated slightly, but remained stable.

If we restrict ourselves to the period from 2013 (see Table 1), negative trends will become more noticeable, as there is not a single region in which the labor force has increased. In the Nenets Autonomous Okrug, there was a decrease of 6.2% (2.3 thousand people). The Arkhangelsk oblast and the Komi Republic remained leaders in terms of decline: 14.4% (100.9 thousand people) and 15.2% (86.2 thousand people). The Murmansk oblast and the Republic of Karelia occupied an intermediate position, but in the first case the decline was less, amounting to 8.3% (43.5 thousand people) against 11.4% (43.1 thousand people) in the second.

In the balance of labor resources by sources of formation, the able-bodied population of working age is about 90% of the total labor force (Table 2) and has a stable share: after 2013, its fluctuations amounted to approximately 1.5%. Before 2018, it was reduced by about 50–60 thousand people per year or 2–3% of the

total labor force. In 2018–2019, against the background of an increase in the share of this category in the overall balance of labor resources for the entire European Arctic, the decrease in absolute numbers was less than 0.3%.

In the Arkhangelsk oblast, the Republics of Karelia and Komi, the share of the able-bodied population of working age after 2013 amounted to 90–93% of the total labor force and increased by 2–5 percent compared to 2000. In the Murmansk oblast, it was somewhat lower, 89–91%, and was more stable. The lowest share was in the Nenets Autonomous Okrug (72–80%) and tended to a strong decrease compared to 2000, when it was 89%.

The above means that it is not possible to replace the recorded decline in the working-age population with other sources, the number of which is also declining. Changing the boundaries of working age does not solve the main problem of population decline, and the difficult natural and climatic conditions and the underdevelopment of social infrastructure make this region less attractive for permanent residence. Temporary labor migration can only partially solve the problem, since this way of developing territories has many negative consequences.

By 2013, the number of the working population older than working age had increased by 1.5 times compared to 2000, from about 100 to 160 thousand people. The maximum (177.5 thousand people) was noted in 2015. Its subsequent decrease is likely due to

**Table 2.** Change in the number of elements of the balance of labor resources by sources of formation in the regions of the European part of the Arctic relative to 2013, thousand people

Index	2014	2015	2016	2017	2018	2019	2020
The number of labor resources	-49.7	-87.9	-153.6	-217.1	-247.1	-250.6	-276.1
Working-age population of working age	-50.6	-100.6	-162.8	-228.5	-257.7	-256.8	-261.3
Foreign labor migrants	-1.3	-2.3	-5.4	0.8	0.6	2.3	2.9
Persons over working age and adolescents employed in the economy including:	2.5	15.1	14.8	10.8	10.2	4.0	-17.5
persons older than working age	2.3	15.3	14.6	10.9	10.4	4.4	-17.0
teenagers	0.2	-0.2	0.2	-0.1	-0.2	-0.4	-0.5

both the change in the boundaries of the retirement age and the more active retirement of older age groups from the labor force compared to the country as a whole.

After 2013, in the structure of labor resources by sources of formation, the share of the working population older than working age increased, amounting to 7.3–8.8% compared to 3.7% in 2000. In the regions of the European Arctic, it became higher compared to country as a whole by 0.5–1 pp, although in 2000 it was about 1.5 pp below. The decline in its share from 8.5 to 7.5% in 2020 was well above the national average of 0.4 pp, suggesting a greater impact from the pandemic.

The dynamics of the number of workers older than working age in the regions of the European part of the Arctic were heterogeneous. The smallest fluctuations (less than 1 pp) were noted in the Murmansk oblast. In the Komi Republic, the changes were greater (up to 2 pp) and their direction was constantly changing. The dynamics in the Republic of Karelia corresponded to the dynamics in the European part (an increase until 2015 and then a decrease) and were characterized by fluctuations of up to 2.3%. The dynamics were similar in the Nenets Autonomous Okrug. The Arkhangelsk oblast occupied an intermediate position—fluctuations did not exceed 1.7%. In terms of the share of this source in the regional balance of labor resources, the Nenets Autonomous Okrug stands out noticeably, where it increased from 3.3% in 2000 (the lowest among all regions of the European Arctic), to 15.2% in 2016–2019, where values exceeded 20% (in 2016, the maximum was 24.9%). In other regions, the growth was 2–2.5 times, but the share of this source did not exceed 9%.

Foreign labor migrants, as a source of labor force formation in the European part of the Arctic, did not make a significant contribution to the overall balance, and their share in the balance was lower than in the country as a whole (1.0–1.2 and 3.0–3.7%, respectively). In 2013–2018, the number of migrants increased to 20–22 thousand people compared to five thousand people in 2000. In 2020, there were

24.4 thousand people, which was caused by the attraction of migrants to the Murmansk oblast. The lowest (0.4–0.7%) share of migrants was in the Arkhangelsk oblast. In the Nenets Autonomous Okrug, there was a decrease from rather high values in 2013 (4.3%) to an average level in 2020 (1.1%).

The Murmansk oblast attracted more migrants than any other region under consideration, and the gap between it and the rest of the regions has been widening since 2018. The share of foreign labor migrants in this region in the balance increased from 1.0 to 2.6%, and in the Republics of Karelia and Komi it was about 1%.

Working teenagers, as a source of labor force formation, had a share in the balance of less than 0.2%, and the number of employed did not exceed 1.7 thousand people. Its contribution was extremely small even in the Nenets Autonomous Okrug, where in 2013–2017, the share did not exceed 0.5%.

The European part of the Arctic is characterized by a positive balance of internal labor migration, which means that the macroregion is attractive for work. However, the significance of this source is somewhat less in comparison with foreign labor migrants. The number of migrants was 12–22 thousand people, and their share was 0.6–1.1% of all labor resources. Since 2013, the balance of migration in the Republic of Karelia has been negative (the decline was 1–5 thousand people, or 0.3–1.3% of all labor resources). The outflow increased until 2017, after which it slowed down, but did not stop. The second region with a decline in labor resources due to internal labor migration is the Arkhangelsk oblast, where it began in 2015. In it, fluctuations ranged from +4 to -4 thousand people per year, but the period of decline was longer and more intense. The Nenets Autonomous Okrug, on the contrary, attracted labor migrants (primarily from the neighboring Arkhangelsk oblast). The balance was positive throughout the entire period, and in the second half the intensity was higher (3–4 thousand people, or 8–11% of the labor force). The balance of migration in the Komi Republic was 8–13 thousand people (six thousand people in 2020). Its contribution

**Table 3.** Change in the number of elements of the distribution part of the balance of labor resources in the regions of the European part of the Arctic relative to 2013, thousand people

Index	2014	2015	2016	2017	2018	2019	2020
The number of labor resources	-49.7	-87.9	-153.6	-217.1	-247.1	-250.6	-276.1
Average annual number of people employed in the economy	-30.4	-62.0	-131.1	-167.2	-190.7	-223.8	-274.5
Students of working age who are studying part-time	-8.3	-8.3	-10.3	-6.8	-4.5	-5.3	-5.3
Working-age population of working age, not employed in the economy and not studying in the education system	-7.1	-22.8	-25.3	-38.4	-40.9	4.8	9.5
Unemployed ILO	-4.1	4.8	12.9	-4.9	-11.2	-26.5	-5.9

to the regional balance increased from 1.3 to 2.6%, but its share in the overall balance in the European part of the Arctic decreased. In the Murmansk oblast, the balance was positive and increased, and the share of internal labor migrants in the balance of labor resources increased from 0.4 to 2.6%. At the end of the period, it provided 50–80% of the total increase in the balance.

**The main directions of the use of labor resources.** The dynamics of indicators reflecting the elements of the distribution part of the balance of labor resources in the European part of the Arctic also indicates negative trends (Table 3). Against the background of a decrease in the number of labor resources, the average annual number of people employed in the economy in 2020 compared to 2013 decreased by 15.6% and amounted to 1489.3 thousand people. At the same time, even taking into account the sharp decrease in the number of employed in 2020 by 1514.2 thousand people, which is associated with the pandemic, the country has seen an increase by 1649.3 thousand people over the entire period (2.4%). This multidirectional trend persists if we compare 2000 and 2013: in the European part of the Arctic, the decline was 66.6 thousand people, and the country as a whole showed an increase of 3384.4 thousand people. The decline was the largest in 2016, which can be explained by sanctions pressure on the Russian economy. For the country as a whole, from 2000 to 2013, the share of this source of labor resources use increased slightly (up to 73.5%), but after 2016 it was 78–80%. In the European part of the Arctic, by 2013, its share increased from 66.3 to 79–80% and only in the last two years has decreased to 77.0–78.5%. By regions, the values fluctuated at the level of 78–82%. The exceptions were the Murmansk oblast with a decrease to 73% and the Nenets Autonomous Okrug, where it was 89–90%, despite the initial average level for the macroregion.

The largest decline was recorded in the Arkhangelsk and Murmansk oblasts, where more than half of the total employed population worked. It amounted to 17.6% (99.5 thousand people) and 16.8% (70.5 thousand people), respectively. The Nenets Autonomous Okrug, probably due to close ties with the Arkhangelsk oblast, showed the smallest decrease, 6.3% or 2.1 thousand people. The Republics of Karelia and

Komi had similar results, but the difference in population led to the fact that in the first case the reduction was 40.6 thousand people (13.5%), and in the second, 61.8 thousand people (13.9%).

It should be noted that the share of the number of people employed in the European part of the Arctic in the total number of people employed in Russia is also decreasing. In 2000, it was 2.1%, and in 2013, 1.9%, and subsequently decreased continuously, which means a decrease in the size of the labor market and a decrease in the attractiveness of the macroregion as a place of employment.

The least visible sources of labor resources use are students of working age who are studying out of work. Since 2000, the share of this group has decreased by 67.0 thousand people, and amounted to 131.5 thousand people, which led to a reduction in the balance of its share in the European part of the Arctic by 1.0–1.5 pp. Since 2016, in the country as a whole, due to the demographic wave, there has been an increase in the number and share of this group in the entire population, however, in the European part of the Arctic, against the background of an increase in the share from 6.0 to 6.5%, there was a decrease by 5.3 thousand people. Interregional differences in the share of students were small, but in the Murmansk oblast and the Nenets Autonomous District the values were lower by 2.0–2.5 pp.

Against the background of growth in the country as a whole from 11.1 to 15.4%, the proportion of the non-working population of working age (military personnel, housewives, Russian citizens working abroad, etc.) in the European part of the Arctic decreased in the balance by 2013 from 16.7 to 8.1%. Absolute figures showed even more noticeable dynamics: an increase of 4405.2 thousand people (up to 14250.8 thousand people) in the first case and a decrease by 282.3 thousand people (up to 179.7 thousand people) in the second. Since 2013, the share of this source has been gradually decreasing, reaching the level of 7.1% in 2018. In 2019–2020, due to the pandemic, it increased by 2.7 pp, and the number of this group is up to 189.2 thousand people, which is higher than the level of 2013. Murmansk oblasts is the only region in which the share of the nonworking population has increased

**Table 4.** Deviation of real indicators from estimates in 2020, pp

Index	Republic of Karelia		Komi Republic		Arkhangelsk oblast		Nenets Autonomous District		Murmansk oblast	
	1	2	1	2	1	2	1	2	1	2
Human Resources	-8.6	-5.2	-5.6	-3.5	-9.5	-7.0	-17.3	-16.8	-1.6	1.1
Average annual number of people employed in the economy	-13.7	-10.9	-6.3	-7.0	-15.6	-14.4	-10.7	-11.3	-13.1	-12.4
Students of working age who are studying part-time	6.6	23.5	5.8	18.9	11.3	23.1	39.4	47.5	-0.5	11.3
Unemployed ILO	23.9	7.9	16.1	4.4	36.5	26.5	39.6	33.7	34.6	17.7
Foreign labor migrants	-13.7	-5.4	-15.8	-5.7	34.4	-19.5	-97.1	-84.4	162.0	118.5

(from 8.2 to 15.6%). The lowest (0.5–2.5%) it was in the Nenets Autonomous Okrug, which is associated with regional characteristics. Other regions showed similar dynamics and fluctuated around average values.

The number of unemployed according to the ILO methodology and the unemployment rate are important indicators that are quite sensitive to crisis phenomena in the economy. In the European part of the Arctic, their share in the balance repeated the all-Russian dynamics, but exceeded the national average by 1.0–2.5 pp. By 2013, the number of unemployed decreased from 271.5 thousand people to 134.2 thousand people (from 9.8 to 6.1%) in 2013. Its further dynamics were multidirectional. The local maximum (147.1 thousand people) was reached in 2016, which is associated with the introduction of the first package of sanctions against Russia. In 2020, the number of unemployed was lower than in 2013 (128.3 thousand people), but their share increased to 6.6% due to the general reduction in labor resources. The number of unemployed increased only in the Nenets Autonomous Okrug, where their share was the lowest throughout the entire period. It was also below the average in the Arkhangelsk oblast, where the largest number of unemployed people lived in absolute terms, while in the Republic of Karelia, the share exceeded the average.

**Estimation of prospective dynamics and structure of the main indicators of regional balances of labor resources.** Assuming the persistence of the main trends formed over sufficiently long periods of time, it is possible to make prospective estimates of the dynamics of changes in the main parameters of the balance of labor resources. Such work has already been carried out by us [9, 10].

In this article, inertial estimates are based on the average version of the forecast of the population of the Russian Federation, which was prepared by Rosstat for the period up to 2035. Four base periods are considered: 2000–2020, 2005–2020, 2010–2020 and 2015–2020. The work differs from our previous works on the Arctic, in which the number of intervals was less and short time intervals were not used [11, 12].

Table 4 shows how many percentage points the ratio of the real indicators of 2020 to 2013 deviates compared to the estimates for two calculation options from [12]: 1998–2013 (option 1) and 2002–2013 (option 2).

The estimate was made for 2020, but the pandemic intervened in the labor market that year, so the ratio of 2019 to 2013 is also considered. However, the differences are not significant.

The best estimate was given to the size of the largest group, the labor force, for which the difference between 2020 and 2019 is less than 1 pp. Therefore, the trends taken into account are stable and suitable for further analysis. Estimates for the average annual number of employed people turned out to be worse. The difference compared to 2019 is noticeable, however, in 2020 the deviations did not exceed 15 pp for all regions, with the exception of the Arkhangelsk oblast.

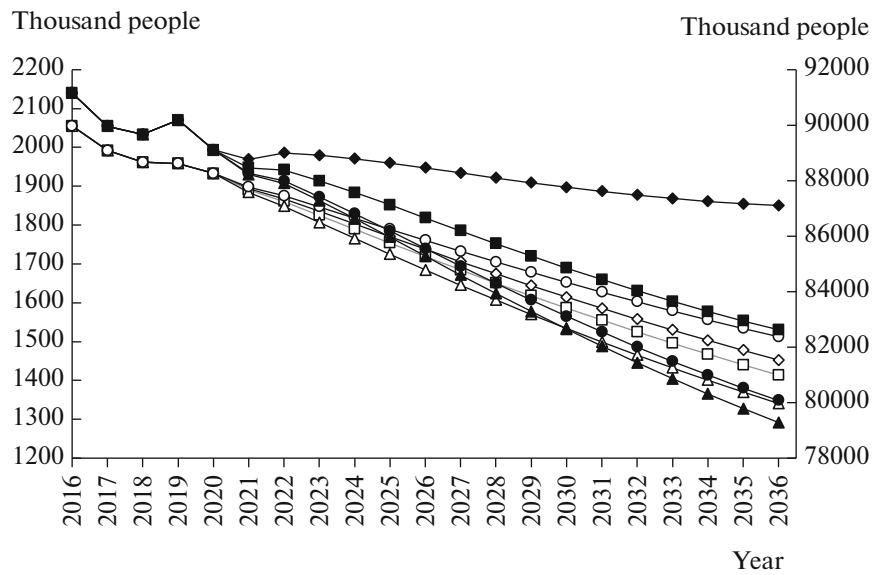
Discontinued students showed significantly different dynamics in the second version of the assessment, while the first version of the assessment was much more accurate. In 2019, the difference is more than 10 pp, only the Nenets Autonomous Okrug showed it, in 2020 the Arkhangelsk oblast was added to it.

For the unemployed, the second calculation option turned out to be more accurate, and in 2019 it described the situation well for all regions, except for the Nenets Autonomous Okrug and, to a lesser extent, for the Arkhangelsk oblast. However, in 2020, even it did not have the necessary predictive power, which means a large impact of the pandemic.

Foreign labor migrants are a mobile group, the number of which also depends on the economic situation. The discrepancies are caused by a more intensive attraction of migrants compared to the hypotheses put forward.

If you do not take into account the Arkhangelsk oblast, and Nenets Autonomous Okrug, the quality of estimates in 2019 will be high, and for 2020, less high.

The lowest estimation accuracy for the Nenets Autonomous Okrug can be associated with the small size of the population of this region, for which even



**Fig. 1.** Estimation of the prospective number of labor resources in Russia (right axis) and the European part of the Arctic by options.

RF: —◆— from 2000; —■— from 2005; —▲— from 2010; —●— from 2015

European part of the Arctic: —◇— from 2000; —□— from 2005; —△— from 2010 —○— from 2015

small changes in absolute numbers mean significant shifts in percentage. In 2019, the estimates differed more from the forecasts compared to 2020. The second region with low accuracy of estimates is the Arkhangelsk oblast. For this, the 2019 estimates were more accurate.

Murmansk oblast due to its active economic development, shows very contradictory trends. For all groups except the employed, the 2019 estimates are better, although the differences from 2020 are small. Accuracy of estimates according to Republic of Komi also depends on the year, but in general it is higher. The differences between the years are small, which allows us to assume a fixed structure of employment and migration of the population in the Republic of Karelia. For both republics, estimates for 2019 are more accurate.

Figure 1 presents the variants of the dynamics of the number of labor resources for the country as a whole and for the European part of the Arctic. It can be seen that the decrease in their number occurs according to all calculation options, but in the country as a whole much more slowly. The total number in 2036 in relation to 2020 will be 88.5–95.4% in the first case and 68.3–77.1% in the second. For the Arctic, the most favorable prospect is shown by the time trend based on 2015–2020, while for the country as a whole, this is observed for the trend based on 2000–2020.

The regions of the European part of the Arctic show different dynamics in the number of labor resources (Table 5). Estimates based on long base time

series show similar results. Extrapolated trends in recent years (since 2010) differ markedly.

The worst indicators are noted in Republic of Komi. This applies to all evaluation options. This situation is due to the departure of the population from Vorkuta and a number of other northern cities. The Arkhangelsk oblast and the Republic of Karelia have similar values, close to the average. In the shortest period, the Arkhangelsk oblast approaches the Republic of Komi, which is a negative trend. The decline in the number of labor resources in the Murmansk oblast is slightly below the average, but estimates based on the shortest time series in the base show the best performance. The Nenets Autonomous Okrug is the only region in which an increase in the number of labor resources is possible, but only for trends laid down in long base time periods. With a decrease in the interval on which the estimate is based, the size of the labor force decreases more and more, although more slowly than the average level.

The dynamics of the working-age population in the European part of the Arctic are estimated to be much less favorable compared to the country as a whole. In Russia, according to all calculation options, the number of the named population will increase by 7–8%, while a significant decrease is expected in the Arctic. These changes will continue to have a priority effect on the size of the labor force and demonstrate more favorable dynamics compared to the dynamics of the total labor force (differences are 10–15 pp). The dynamics in the regions are similar to the dynamics of the total labor force. The only notable exception is the increase in the Nenets Autonomous Okrug for any calcu-

**Table 5.** Estimation of the prospective number of labor resources in the European part of the Arctic by region, 2036 in % by 2020 by calculation options

Region	2000–2020	2005–2020	2010–2020	2015–2020
The number of labor resources				
European part of the Arctic	74.0	72.1	68.3	77.1
Rep. Karelia	75.3	71.7	66.8	78.6
Rep. Komi	70.8	68.9	64.6	71.3
Arkhangelsk oblast	74.1	71.1	66.8	73.7
Nenets Autonomous District	103.2	99.8	94.3	81.6
Murmansk oblast	74.3	74.6	73.3	85.7
Working-age population of working age				
European part of the Arctic	87.1	84.2	79.7	92.5
Rep. Karelia	87.9	84.1	78.2	97.2
Rep. Komi	85.5	81.4	76.6	87.6
Arkhangelsk oblast	87.9	84.3	79.5	88.4
Nenets Autonomous District	111.8	109.5	105.2	103.1
Murmansk oblast	86.1	85.4	82.5	98.7
Foreign labor migrants				
European part of the Arctic	108.8	116.8	108.3	193.3
Rep. Karelia	99.5	76.7	87.3	163.3
Rep. Komi	81.8	68.9	73.1	133.0
Arkhangelsk oblast	96.8	126.6	92.3	135.1
Nenets Autonomous District	300.8	199.9	33.1	45.6
Murmansk oblast	119.1	142.4	134.4	244.1
Persons over working age and adolescents employed in the economy				
European part of the Arctic	38.2	38.9	34.1	23.9
Rep. Karelia	35.8	40.2	33.1	17.6
Rep. Komi	40.3	40.5	32.3	21.3
Arkhangelsk oblast	39.1	34.6	27.7	24.0
Nenets Autonomous District	50.7	49.8	53.1	30.6
Murmansk oblast	34.8	39.6	39.8	28.8

lation option. However, this region does not have a significant impact on the overall picture.

The dynamics of the number of foreign labor migrants are highly heterogeneous, but the contribution of this source of labor resources formation will continue to be insignificant. By 2036, their number will increase to 26.5–28.5 thousand people in the first versions of the forecast and 47.1 thousand people in the fourth, i.e., an increase is expected for all calculation options. The Republic of Komi shows the lowest values, they are also low in the Republic of Karelia. For short variants of the base in the Nenets Autonomous Okrug, a decrease is assumed, since the long time series of the base take into account periods in which the active attraction of foreign labor migrants to a region with a small population was only expected. In the Murmansk oblast the number of labor migrants will increase in any case.

The employed population younger and older than working age is the second most important source of labor force formation, although the contribution of working adolescents is extremely small. For this component, the decrease in the number is expected to be very large due to changes in the retirement age, but for the country as a whole, the decrease will be less than in the European Arctic, where the population is older. Estimation options also differ depending on the time periods of the base; longer ones take into account the changes that have occurred to a lesser extent. The smallest decline is expected in the Nenets Autonomous Okrug, which has a younger population. The worst performance is predicted for the Republic of Karelia and the Republic of Komi.

The dynamics of indicators reflecting the elements of the distribution part of the balance of labor resources are also unfavorable (Table 6). Even for the

**Table 6.** Estimation of the prospective headcount by elements of the distribution part of the balance of labor resources in the European part of the Arctic by region, 2036 in % by 2020 by calculation options

Region	2000–2020	2005–2020	2010–2020	2015–2020
Average annual number of people employed in the economy				
European part of the Arctic	81.1	73.1	71.0	73.6
Rep. Karelia	76.9	67.8	70.6	78.0
Rep. Komi	82.3	73.9	67.7	69.2
Arkhangelsk oblast	80.9	74.7	73.6	72.0
Nenets Autonomous District	115.4	100.0	86.0	83.0
Murmansk oblast	80.1	71.4	70.2	76.5
Students of working age who are studying part-time				
European part of the Arctic	69.4	53.5	66.0	101.1
Rep. Karelia	70.2	56.4	65.1	94.7
Rep. Komi	66.9	51.5	62.3	94.2
Arkhangelsk oblast	70.6	54.6	72.0	105.1
Nenets Autonomous District	81.4	75.5	90.8	82.2
Murmansk oblast	68.7	50.0	59.6	111.5
Working-age population of working age, not employed in the economy and not studying in the education system				
European part of the Arctic	48.7	50.3	50.2	62.2
Rep. Karelia	55.5	58.7	57.5	63.3
Rep. Komi	48.9	42.8	39.9	56.9
Arkhangelsk oblast	46.4	49.3	45.4	59.3
Nenets Autonomous District	53.1	59.5	72.3	69.1
Murmansk oblast	46.5	51.2	57.5	67.5
Unemployed ILO				
European part of the Arctic	67.4	77.7	63.0	77.9
Rep. Karelia	71.4	80.5	66.5	76.2
Rep. Komi	76.3	65.1	52.9	89.1
Arkhangelsk oblast	60.8	90.3	67.7	73.9
Nenets Autonomous District	71.2	73.4	85.1	101.5
Murmansk oblast	62.4	73.9	63.8	71.7

country as a whole, for all options, a decrease in the number of employed by 0.9–12.1% is expected. Their decline in the European part of the Arctic is much greater, but it is comparable to the decline in the number of labor resources. In the first version, the differences are greater than in the others. The Nenets Autonomous Okrug stands out, in which the estimate of the average annual number of employed people depends on the calculation option, but according to more probable options, it is expected to decrease. Fluctuations in the Republic of Karelia and the Republic of Komi are quite noticeable.

The number of students of working age will significantly decrease both in the country as a whole and in the European part of the Arctic. The situation can only be improved by the active involvement of students in the system of secondary vocational education, since in this case the outflow of young people to universities

located outside the Arctic will slow down. This development of events is reflected in the latest version of the calculations, based on the shortest time series of the base. An increase in the number of students is expected in more northern regions, where plans have been implemented in recent years to attract new companies that may need trained local labor resources.

It is quite difficult to assess changes in the number of unemployed people of working age in the new unstable conditions. However, calculations show a significant decrease in their number.

The dynamics of the unemployed are the most homogeneous. For all calculation options, except for 4, the differences between the country as a whole and the European part of the Arctic do not exceed 2%. The COVID-19 pandemic and the introduction of new sanctions against Russia have significantly disrupted the established trends, but the existing labor shortage



suggests a decrease in unemployment (subject to economic stability), therefore, in all calculation options, except for 4, the number of labor resources is reduced by less than the number of unemployed. The Arkhangelsk and Murmansk oblasts deserve special mention. In the first case, a greater decrease is noted for the longest and shortest time periods, and in the second case, for all options except for the third one. This may mean that a large labor shortage is expected in these regions.

Data from the balance of labor resources since 2013 show that the negative trends common to the whole country are more pronounced in the regions of the European part of the Arctic. They will persist in the future, which will lead to a decrease in the size of labor markets in these regions and an increase in labor shortages. As a result, plans for the redevelopment of the Arctic territories will be difficult and will require new approaches for implementation.

A comprehensive assessment of the dynamics and structure of labor resources is needed, which will make it possible to understand how feasible the country's development plans are, what needs to be done to improve the quality of management of the country as a whole and its individual territories, which ways are available and will give the greatest effect. In this context, the analysis and forecast of the migration of the population and labor resources are of paramount importance. For this, various tools can be used, but especially the forecast and reporting balances of labor resources, built and coordinated among themselves at the federal and regional levels. They make it possible to analyze the size, main sources of formation and directions of use of the labor force in a particular region, as well as to trace the dynamics of the modeled indicators, together with other regions and with general trends across the country.

#### CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.

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