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REGIONAL PROBLEMS

The Impact of Pension Reform on the Forecasted Employed Population in the Regions of the Arctic and the Far East

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Abstract—A quantitative forecast estimate of the growth in the number of people employed in the economy in 2030 is formed compared to 2018 in the regions of the Arctic and the Far East, taking into account an increase in the retirement age of five years and the status of the region as the territory of the Far North, as well as changes in the age and sex structure of the population in age categories 50–54; 55–59; 60–64 years old.

Keywords: Arctic, Far East, employment, pension reform

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Introduction. Implementation of the Russian pension reform in 2018, which envisages an increase in work duration by 5 years by 2030, will add a significant number of people employed in the economy to the labor market. An increase in the retirement age inevitably causes the aging of the population employed in the economy, and one of the features of employment is the high proportion of elderly and old people as a consequence of a decrease in the birth rate and an increase in life expectancy [1–7].

The economic and social problems that cause the aging of the workforce are numerous, and there is no convincing practical experience of their successful resolution [3]. A reduction in the number of labor force and a decrease in labor productivity amid a significant increase in the share of the elderly population leads to a slowdown in economic growth and an increase in the burden on the state budget [8]. As a result, the most effective response to these challenges was to increase the retirement age [9, 10].

The choice in favor of raising the retirement age is also substantiated in [11–13], while it is noted that it is only one of the necessary measures to stabilize the situation until 2028.

In [13], it was shown that between the growth of employment of older workers aged 60–64 years and the decrease in employment and a stable level of unemployment, 20- to 24-year-olds do not have direct competition from both labor supply and demand due to significant differences in qualifications obtained.

The opposite position of the expediency of raising the retirement age from a demographic point of view is taken by the authors of [14], according to which, due to the long lag behind most developed countries in reducing mortality, Russia is not objectively ready for it.

The problem of increasing the employment of persons of retirement and pre-retirement ages in the context of demographic aging of the population and labor shortages is considered in [15–20]. In [21], it is estimated that raising the retirement age will cause additional involvement of 4 to 5 million people in the workforce at the age of 55–60 (65) years. At the same time, as a result of the advancing growth in the number of jobs, the number of jobs, unemployment may increase from 3.5–4.0 million up to 7.7–7.8 million and make up 9.6–9.7% of the workforce. In [22], numerical modeling of additional staffing needs revealed its oscillatory sawtooth character over 10 years of pension reform, and its national average value in this period will decrease by 15%.

Among the priority areas of socioeconomic development, a special place is occupied by the regions of the Arctic and the Far East, where there is a significant shortage of qualified personnel and where pension reform could compensate for this shortage [23, 24].

In [25–27], a list of the most popular Arctic professions in the present and in the future was compiled and a comparative analysis of this list with the specialties of training was given; it was shown that not all of them trained in the Arctic zone of the Russian Federation (AZ of the Russian Federation), while 80% of professions from this list require secondary vocational education.

In [28–30], the potential of the Far East education system is presented from the position of ensuring the accelerated development of the macroregion as a priority territory of Russia. It has been established that a low percentage of meeting the needs of the economy

for labor due to graduates of the education system in some regions of the Far East is associated with a high migration outflow of young people outside the district. It is shown that the problem of the region's personnel deficit is solved by attracting foreign and interregional labor migrants to the region.

The purpose of this article is to formulate a forecast estimate of the change in the number of people employed in the economy in 2030 compared to 2018, taking into account the number of working pensioners, as well as changes in the demographic structure of the working age population in the regions of the Arctic and the Far East.

Calculation methodology. On the territory of the Arctic and the Far East, there are 18 subjects of the Russian Federation, each of which has regional specifics. At the same time, in relation to pension reform, these regions can be divided into two distinct segments. The first is 11 subjects of the Arctic zone of Russia and the Far Eastern Federal District, which are fully attributed to the territories of the Far North or equivalent to them (hereafter, northern regions). The population living in these territories has the right to receive an old-age insurance pension five years earlier than residents of other regions. The second is six subjects of the Far Eastern Federal District, only a small part of them are assigned to territories equivalent to the territories of the Far North and the Krasnoyarsk Territory, therefore, the indicators of pension reform are similar to other Russian regions (hereafter, All-Russian regions) [31]. The following table shows the names of the constituent entities of the Federation included in the AZ of the Russian Federation and the Far Eastern Federal District, as well as the number of people (men and women) in these territories and the proportion of the population in the territories assigned or equated to the territories of the Far North. The territories of a number of constituent entities of the Russian Federation are partly part of the Arctic zone of Russia, but in this study, information on them is presented throughout the territory. The need to present indicators in a gender context is due to the different values of the retirement age for men and women.

To estimate the number of employed persons of retirement age (hereafter, working pensioners) between the ages of 50 and 64, four groups of the population are allocated depending on the gender factor (men/women) and the regional category factor (northern or all-Russian), in which the retirement age increases. We denote $g \in \{1,2,3,4\}$ the population group number:

($g = 1$)—women aged 50 to 54 years living in the northern regions.

($g = 2$)—men aged 55 to 59 years living in the northern regions.

($g = 3$)—women aged 55 to 59 years living in all-Russian regions.

($g = 4$)—men aged 60 to 64 years living in all-Russian regions.

To assess the number of working pensioners in these age categories, we used the indicators of the Pension Fund of the Russian Federation on the number of working men and women among the recipients of old-age insurance pension with their age distribution. These working retirees belong to the category of employees, i.e., employees, because for them the employer transfers insurance contributions to the mandatory pension insurance system [32].

The population size, as well as the number of people employed in the economy in the retrospective period by age and gender categories, was formed on the basis of indicators of the Federal State Statistics [33].

The predicted value of the age and sex population for 2030 for each region was calculated by the method of shifting ages based on indicators of the age and sex population in 2018 [33, 34] and survival rates [35], since in statistics the forecast data for the regions are presented only with detailing at three age levels: in the able-bodied, younger and older than able-bodied [36].

Survival rate $\gamma_{a,t}$ defined as the ratio of population $P_{a,t}$ in the year t at age a to population $P_{1,t-(a-1)}$ at the age of one year in a year $t-(a-1)$:

$$\gamma_{a,t} = P_{a,t} / P_{1,t-(a-1)}. \quad (1)$$

Numerical estimation of survival rate dynamics $\gamma_{a,t}$ from $t = 2000$ by $t = 2017$ for Russia as a whole showed that the values $\gamma_{a,t}$ change insignificantly depending on the year t for each of the ages $a = 1,\ldots,100$. The assessment made it possible to approximate the value of the survival coefficient by a standard logistic function γ_a independent of time.

An analytical expression for estimating the stationary survival rate $\hat{\gamma}_a$ has the form:

$$\hat{\gamma}_a = 1/(1 + e^{-(a-b)/c}), \quad (2)$$

where $b = 74$ and $c = 7.87$ are parameters of the logistic function numerically evaluated in [37].

From the formula (1) it follows that the forecast value of the age and sex population $P_{a+\Delta t,t+\Delta t}$ at age $a + \Delta t$ in the year $t + \Delta t$ will be expressed in terms of age and gender $P_{a,t}$ at age a in the year t and survival rates by the ratio:

$$P_{a+\Delta t,t+\Delta t} = P_{a,t}(\gamma_{a+\Delta t,t+\Delta t} / \gamma_{a,t}). \quad (3)$$

Relation (3) was used to calculate the forecast sex and age population in the region for 2030 according to retrospective data from 2018 ($\Delta t = 12$) Subsequently, these forecast data were used to estimate the population in each of the four population groups. $g \in \{1,2,3,4\}$.

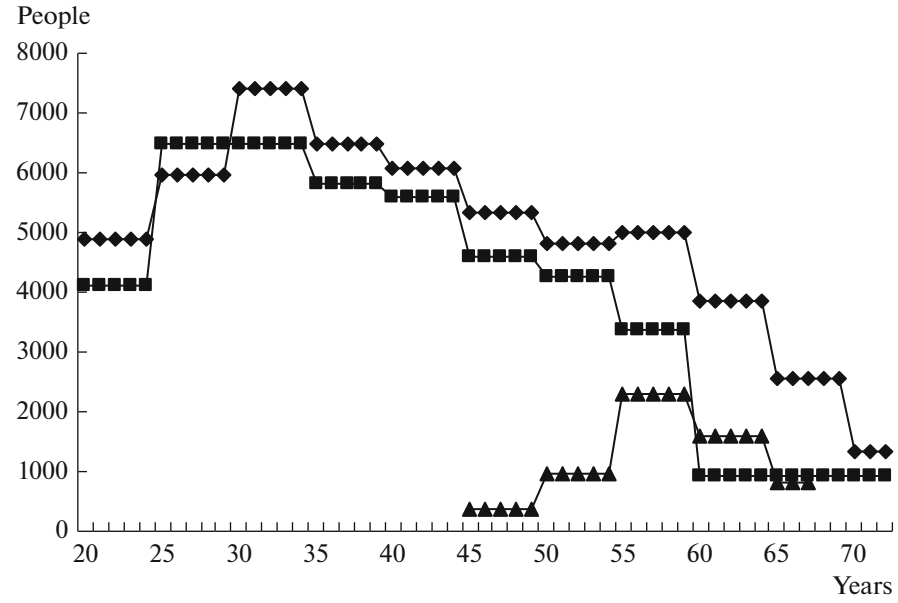

Fig. 1. Population (–◆–◆–◆–) employed in the economy (–■–■–■–) and working pensioners (–▲–▲–▲–) for five-year age categories, Murmansk region, men, 2017, (second group).

The effect of changes in the retirement age on the labor market.

1. *Accounting for working retirees.* To assess the share of working pensioners, a comparative gender and age analysis of the population, the number of people employed in the economy and the number of working pensioners by five-year age categories in 2018 was carried out for each of the four population groups. For the employed population, some of the indicators in the statistics are given for 10-year age categories, including those over the age of 60. Figure 1 as an example, gives indicators for the Murmansk region.

For men aged 55–59 years ($g = 2$) the share of employees in the economy of the Murmansk region is 70% of the population in this age group, and working pensioners $\beta^{(2)}_{a,t_0} = 46\%$ population in the same age group $P^{(2)}_{a,t_0}$. For women aged 50–54 years ($g = 1$) the share of employees in the economy of the Murmansk region is 87% of the population in this age group, and the share of working pensioners is $\beta^{(1)}_{a,t_0} = 57\%$ population in the same age group.

Moreover, the share of working pensioners is determined for each of the four groups according to the formula:

$$\beta^{(g)}_{a,t_0} = L^{(g)}_{a,t_0} \Big/ P^{(g)}_{a,t_0}, \mid g \in \{1,2,3,4\}, \qquad (4)$$

where $L^{(g)}_{a,t_0}$ is the number of working age pensioners a in group g; and $t_0 = 2018$ the year preceding the start of the pension reform.

An analysis of the share of working male (female) pensioners in relation to the total number of male (women) in this age group of the population showed that for the northern and all-Russian regions of the Arctic and the Far East there is a pronounced differentiation with thresholds of 55 and 60 years for men and 50 and 55 years for women (Fig. 2).

At the same time, averaging the share of working pensioners across all territories of the Arctic and the Far East gives a similar age dynamic for all four groups. Figure 3 shows the average share of working pensioners in relation to the total population in this age group of the population.

It can be seen that this dependence on the almost twenty-year-old age horizon is well approximated by a linear function:

$$\hat{\beta}_{a,t_0} = 0.67 - 0.03(a - 50) \mid a = 50,\ldots,67, \qquad (5)$$

where a is the age of working pensioners in the range from 50 to 67 years.

The universal nature of the dependence of relation (5) allows us to use it in the future to estimate the number of working pensioners in other Russian regions.

To regionally compare the quantitative assessment of the impact of pension reform on the increase in the number of people employed in the economy, it is proposed to introduce the indicator $K^{(g)}_1$, $g \in \{1,2,3,4\}$ different for each of the four population groups. For the first group, the indicator $K^{(1)}_1$ represents the difference between the actual number of women $\sum_{a=50}^{54} Pf_{a,t_0}$ aged 50–54 years per year t_0 and the num-

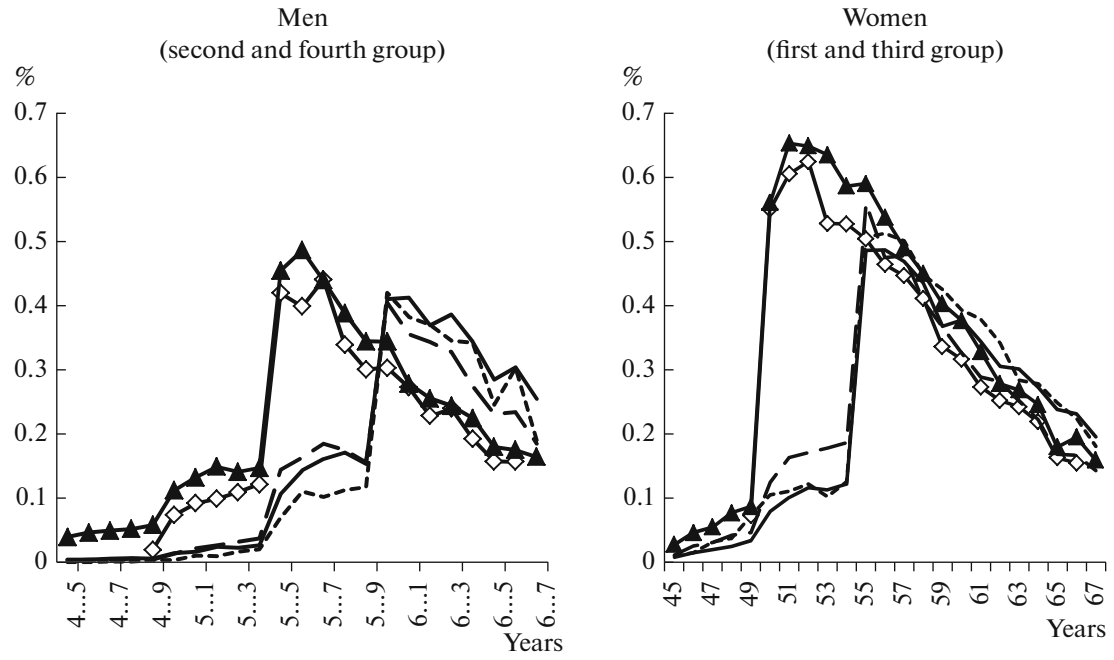

Fig. 2. The share of working pensioners (m/f) in relation to the total population (m/f) in this age group of the population (as of 01/01/2019): ---- Jewish Autonomous Oblast, –◇– Rep. Karelia, –▲– Rep. Komi ——Primorskii krai, ––– Amur Region.

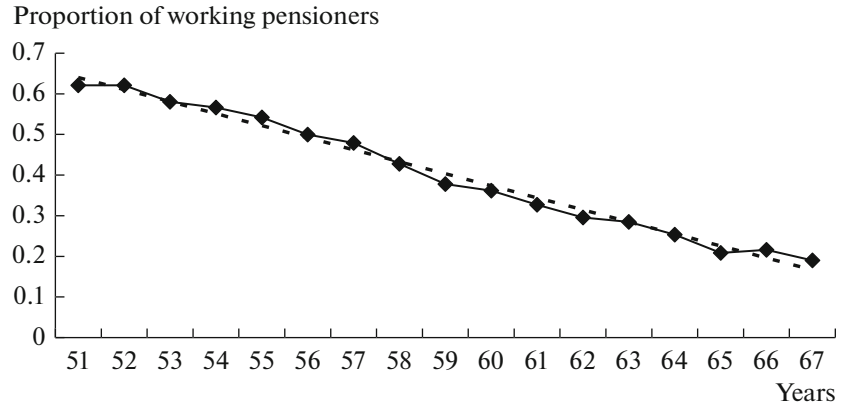

Fig. 3. The share of working pensioners (m/f), in relation to the total population (m/f) in this age group of the population (as of 01/01/2019) An average of four population groups, all subjects of the Arctic and the Far Eastern Federal District: (—◆— actual data, ----- trend line.

ber of working female pensioners $\sum_{a=50}^{54} Lf_{a,t_0}$ in the year t_0 at the same age, expressed as a percentage in relation to the population of women $\sum_{a=15}^{72} Pf_a$ at the age of (15–72 years) in $t_0 = 2018$:

$$K_1^{(1)} = \sum_{a=50}^{54} (Pf_{a,t_0} - Lf_{a,t_0}) \Big/ \sum_{a=15}^{72} Pf_{a,t_0}. \qquad (6)$$

The choice for normalizing the value of the number of women aged (15–72 years) allows you to compare the indicator $K_1^{(1)}$ different regions.

Indicator $K_1^{(1)}$ characterizes the "gain" for the labor market from an increase in the retirement age of women in the northern regions by five years and can only have a positive value. The indicator takes a minimum value $K_1^{(1)} = 0$ if all women aged 50–54 are working pensioners.

Expressions for calculating a metric $K_1^{(g)}$ for the remaining three groups of the population, they are similar to relation (6); only the corresponding indices of the indicators characterizing gender or age will change.

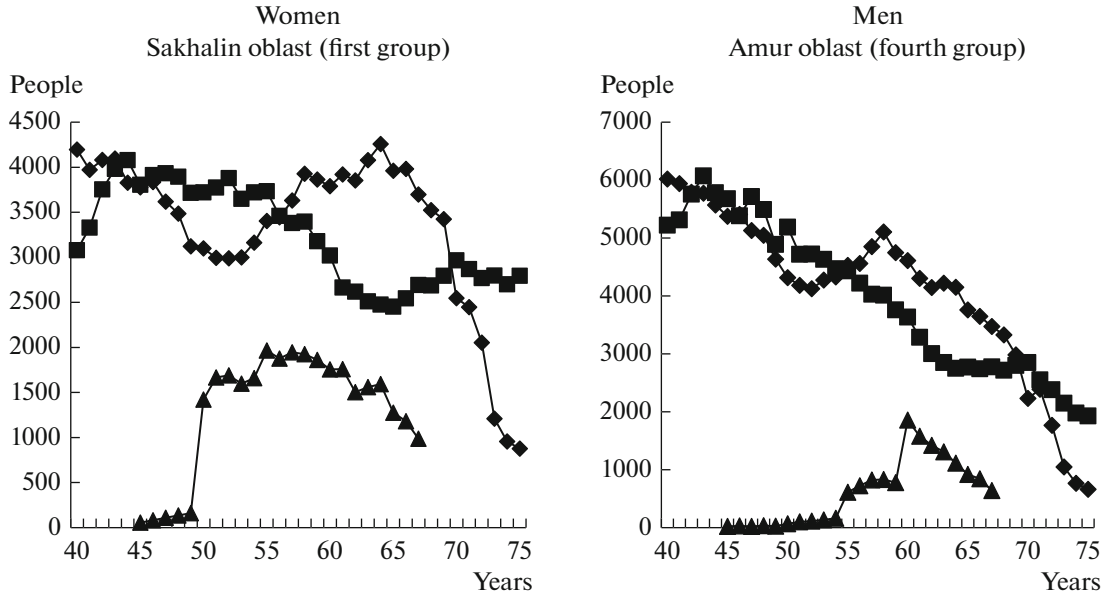

Fig. 4. Population by annual age categories: —◆— 2018, —■— forecast for 2030, —▲— working pensioners in 2018.

2. *The influence of the demographic factor.* Regardless of the pension reform, the number of people employed in the economy is affected by the number of people in the selected age categories, whose importance in the forecast period is determined by demographic factors. In order to regionally compare the quantitative assessment of the impact of the demographic factor on the labor market, expressed in changes in the population in 2030 compared with 2018 in the analyzed age categories, we introduce the indicator $K_2^{(g)}$ also different for each of $g \in \{1,2,3,4\}$ population groups. For northern territories and women ($g = 1$) indicator $K_2^{(1)}$ represents the difference between the predicted numbers of women $\sum_{a=50}^{54} Pf_{a,t_p}$ at the age of (50–54 years) in $t_p = 2030$ and the same actual value $\sum_{a=50}^{54} Pf_{a,t_0}$ in $t_0 = 2018$, expressed as a percentage in relation to the number of women $\sum_{a=15}^{72} Pf_{a,t_0}$ at the age of (15–72 years) in 2018:

$$K_2^{(1)} = \sum_{a=50}^{54} (Pf_{a,t_p} - Pf_{a,t_0}) \Big/ \sum_{a=15}^{72} Pf_{a,t_0}. \qquad (7)$$

The choice for normalizing the value of the number of women aged (15–72 years) allows you to compare the indicator $K_2^{(1)}$ for different regions and within a region with an indicator $K_1^{(1)}$.

Indicator $K_2^{(g)}$ characterizes changes in the population in a given age interval due to demographic factors and can take both positive and negative values.

For the purpose of visual interpretation of the coefficient $K_2^{(g)}$ graphs of the actual population for 2018 and the forecast population for 2030 are given by annual age categories: for the first group of employees for the Sakhalin region and for the fourth group of employees for the Amur region (Fig. 4). As can be seen, the predicted number of women in the interval (50–54) of the year (first group) in the Sakhalin oblast is increasing by 2030 ($K_2^{(1)}$ positive), and the predicted number of men in the interval (60–64) of the year (fourth group) in the Amur region decreases by 2030 ($K_2^{(4)}$ negative).

The calculated values of the coefficients $K_1^{(g)}$ and $K_2^{(g)}$ are shown in scattering diagrams (Figs. 5 and 6).

Coefficient $K_1^{(1)}$ for women in the northern territories is in the range of 3–4%, and for men $K_1^{(2)}$ 4–6%. The scatter of indicators $K_1^{(3)}$ for women and for men $K_1^{(4)}$in the all-Russian regions was more than in the northern territories and amounted to 4.5–6%.

Coefficient $K_{1\max}^{(g)}$ shows the proportion of the population in the 5-year age period in relation to the population aged (15–72 years). This is the maximum possible value of the gain for the labor market as a result of the implementation of the pension reform if there were no working pensioners in this five-year age period:

$$K_{1\max}^{(1)} = \sum_{t=50}^{54} Pf_t \Big/ \sum_{t=15}^{72} Pf_t. \qquad (8)$$

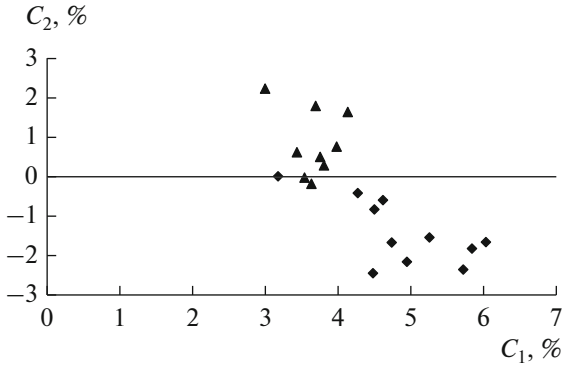

Fig. 5. The values of the demographic factor $K_2^{(1,2)}$ and employment of retirees $K_1^{(1,2)}$ for regions whose territory is assigned to the Far North or is equated to them: ▲ women; ◆ men.

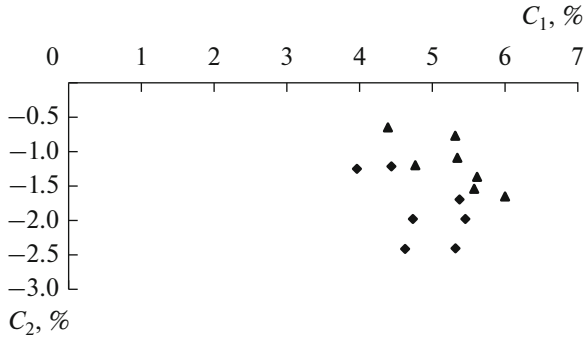

Fig. 6. The values of the demographic factor $K_2^{(3,4)}$ and employment of retirees $K_1^{(3,4)}$ for the Far Eastern regions, a small part of the territory of which is assigned to the Far North or equated to them (all-Russian regions): ▲ women; ◆ men.

The maximum value of the coefficients $K_{1\max}^{(1,2)}$ for the northern regions it makes up from 7.8 to 9.8% and does not depend on gender.

In relation to the all-Russian regions, there is a gender difference for the coefficients $K_{1\max}^{(3,4)}$: women $K_{1\max}^{(3)}$ in the range from 8.8 to 9.6%, and men $K_{1\max}^{(4)}$ from 6.4 to 7.5%. Such a difference is caused not by gender, but by age, since the proportion of working pensioners of men and women is the same in equal age categories (see Fig. 3).

Coefficient $K_2^{(1)}$ for the northern regions it turned out to be positive for women, due to an increase in the number of women in the analyzed age categories (50–54 years), and for the all-Russian regions $K_2^{(3)}$ was negative. A negative value $K_2^{(2,4)}$ was observed for men in both northern and all-Russian regions, due to the fact that the population of both men and women in these age categories (55–59 years old) and (60–64 years old) decreases in 2030 compared with 2018.

3. *Total labor market gain.* The total ratio $K_2^{(g)} = K_1^{(g)} + K_2^{(g)}$ shows the total gain in the labor market in the form of additional workers, taking into account two factors—the number of working pensioners and the absolute change in the population in the corresponding five-year age categories. Summation of indicators $K_1^{(g)} + K_2^{(g)}$is possible because relations (6) and (7) have the same denominators.

$$K_3^{(1)} = \sum_{a=50}^{54} (Pf_{a,t_p} - Lf_{a,t_0}) \Big/ \sum_{a=15}^{72} Pf_{a,t_0}. \qquad (9)$$

Calculated indicator values $K_2^{(g)}$ are in the range from 3 to 5% for all regions of the Arctic and the Far East. Here, $K_{1\max}^{(1,3)}$ makes up 7–9% of the population aged 15–72. Figures 7 and 8 present in a visual form indicators $K_1^{(g)}$, $K_{1\max}^{(g)}$ and the total indicator $K_3^{(g)}$.

The total gain in workers for the labor market is in the range of 4% of the population aged 15–72, both men and women, which is two to two and a half times less than the upper estimate $K_{1\max}^{(g)}$ on the basis of the implementation of the pension reform.

4. *Employees and workers.* Workers and employees are the main actors in the labor market. The number of employees of Russian organizations in 2018 amounted to 45.3 million people, including those who worked under an employment contract and performed permanent, temporary or seasonal work for one day or more [38].

For the labor market, people who create value added are important, and these are people in the "employed" category. In 2018, the number of employees in the Russian economy amounted to 72.6 million people. According to the methodology of the Federal State Statistics Service, in addition to workers, the following main population groups are additionally included in the category of "employed": persons with "informal employment"; part-time workers; family members working gratis in individual or family private enterprises; persons employed by individuals [39].

The quantitative difference between "employed" and "employees" is significant; it amounts to 27.3 million people, or 1.6 times.

The difference in the number of employed and workers is differentiated by constituent entities of the Russian Federation, tends to increase over time and is most significant for such types of economic activities as agriculture and trade. So, in the Primorskii krai and the Republic of Buryatia, the ratio of employed to workers is 1.75, and in the Arkhangelsk region and the Komi Republic, 1.3.

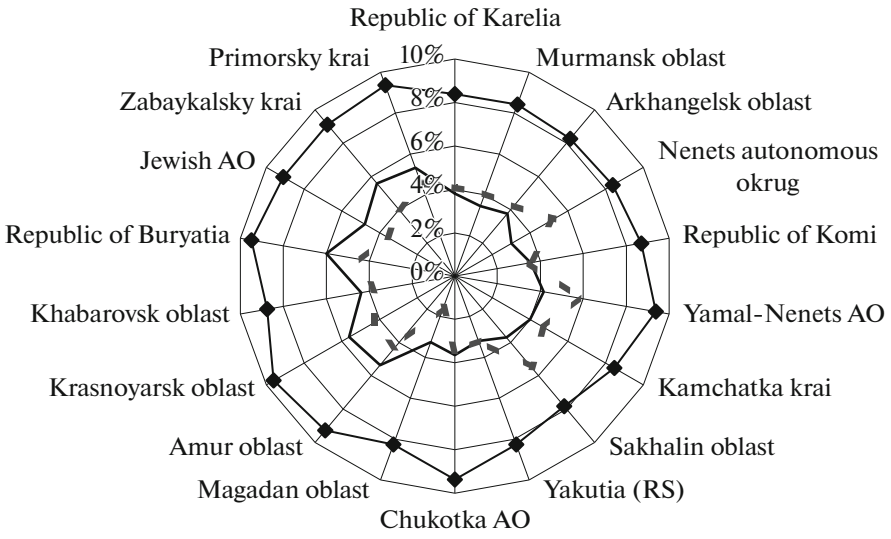

Fig. 7. Coefficient Values $K_1^{(1,3)}$ and $K_3^{(1,3)}$ for the regions of the Arctic and the Far East: women: –◆– $K_{1\max}^{(1,3)}$; —— $K_1^{(1,3)}$; - - - - $K_3^{(1,3)}$.

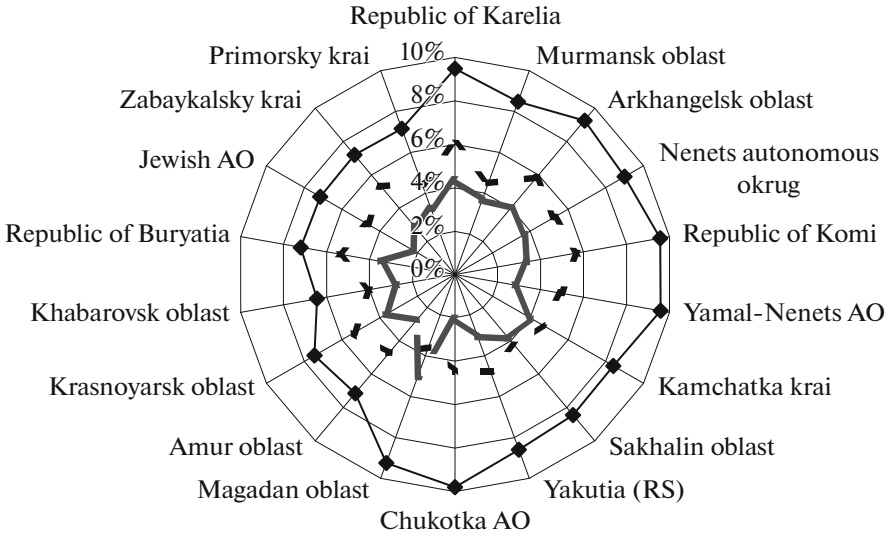

Fig. 8. Coefficient Values $K_1^{(2,4)}$ and $K_3^{(2,4)}$ for the regions of the Arctic and the Far East: men: –◆– $K_{1\max}^{(2,4)}$, —— $K_1^{(2,4)}$, - - - - $K_3^{(2,4)}$.

An analysis of the categories of people in the labor market shows that working retirees from among those receiving old-age insurance pensions belong to the category of workers. From Fig. 1, which shows the number of people employed in the economy and working pensioners by five-year age categories for the Murmansk region, we can see the difference between the number of employees and workers.

To take into account the impact of pension reform on the labor market, it is important to know the ratio of workers $L_{a,t}$ and busy $E_{a,t}$ for age periods $a = 50,\ldots,54$, $a = 55,\ldots,59$ and $a = 60,\ldots,64$. The value of this ratio K_4 for men and women, calculated by five- or ten-year age intervals for each region, showed that these ratios are close to the average values for the territory of this region.

This ratio is presented as an indicator K_4 which was calculated according to $t_0 = 2018$:

$$K_4 = \sum_{a=15}^{72} E_{a,t_0} \Big/ \sum_{a=15}^{72} L_{a,t_0}. \qquad (10)$$

The estimated values of the indicator K_4 are given in the table.

Table 1. Segmentation of Arctic and Far Eastern regions

No.	Federal subject	Segment no.	Population aged 15–72 years, thous. people, 2018			Percentage of population in territories assigned or equated to territories of Far North			Ratio of employed in economy to number of employees, times	Increase in number of employees by 2030 as a result of implementation of pension reform and demographic factors, % $K_3^* = K_1^* + K_2$	
			total	men	women	total	men	women		men	women
1	Rep. of Karelia	1	468.0	216.6	251.3	1	1	1	1.48	3.69	1.89
2	Murmansk oblast	1	579.9	283.9	29.0	1	1	1	1.47	1.80	1.72
3	Nenets Autonomous Okrug	1	32.1	15.8	16.3	1	1	1	0.69	3.70	5.23
4	Arkhangelsk oblast	1	863.1	411.7	451.4	1	1	1	1.35	2.81	2.67
5	Komi Rep.	1	631.1	301.1	330.0	1	1	1	1.31	2.16	1.90
6	Yamal-Nenets Autonomous Okrug	1	413.6	204.3	209.3	1	1	1	0.94	2.77	5.77
7	Krasnoyarsk krai	2	2170.4	1021.0	1149.3	0.16	0.17	0.15	1.49	2.66	2.28
8	Sakha Rep. (Yakutia)	1	711.2	344.9	366.3	1	1	1	1.29	1.78	1.50
9	Chukotka Autonomous Okrug	1	38.3	19.5	18.8	1	1	1	1.01	1.70	3.10
10	Kamchatka krai	1	245.4	125.0	120.4	1	1	1	1.4	2.42	2.86
11	Magadan oblast	1	111.4	54.0	57.4	1	1	1	1.24	1.10	3.67
12	Sakhalin oblast	1	375.9	183.4	192.5	1	1	1	1.47	2.09	3.75
13	Primorsky krai	2	1460.5	711.1	749.5	0.06	0.06	0.06	1.74	1.19	1.52
14	Khabarovsk oblast	2	1005.9	486.1	519.7	0.42	0.43	0.42	1.38	1.83	2.17
15	Jewish AO	2	119.8	57.6	62.2	0.06	0.06	0.06	1.7	0.38	0.45
16	Amur oblast	2	598.6	285.9	312.8	0.13	0.13	0.13	1.41	1.74	2.60
17	Republic of Buryatia	2	707.8	338.6	369.2	0.11	0.11	0.11	1.86	2.09	1.59
18	Transbaikal krai	2	787.7	379.9	407.8	0.02	0.02	0.02	1.75	1.53	1.45

Accounting for the difference between employed and workers will lead to a decrease in the coefficient K_1 in the ratio (6) when calculating the gain from the pension reform and, as a result, to a decrease in the coefficient K_3characterizing the total gain for the labor market from pension reform, both taking into account the number of people employed in the economy, and taking into account changes in the population in 2030 in four groups of the population.

Corrected coefficient value $K_1^{*(1)}$ for the group ($g = 1$) taking into account (10) it has the form

$$K_1^{*(1)} = \frac{\sum_{a=50}^{54}(Pf_{a,t_0} - Ef_{a,t_0})}{\sum_{a=15}^{72} Pf_{a,t_0}} = \frac{\sum_{a=50}^{54}(Pf_{a,t_0} - K_4 Lf_{a,t_0})}{\sum_{a=15}^{72} Pf_{a,t_0}}. \quad (11)$$

The table shows the values of the coefficient K_3^* taking into account (11) for all 18 subjects of the Arctic and the Far East; its value varies from 0.38% (men in Jewish Autonomous okrug) to 5.7% (women in Yamal-Nenets Autonomous Okrug) and averages about 2% . It can be seen that the total gain for the labor market after the implementation of the pension reform is 3–5 times lower than the maximum possible estimate of 9%.

Conclusions. An analysis of the number of working people of retirement age from the number of recipients of an old-age insurance pension in the subjects of the Arctic and the Far East in 2018 at the beginning of the pension reform showed that this value is described by a universal function of age (ratio (5)) and weakly depends on the category of workers (men, women), region, and the presence or absence of northern preferences.

A high level of employment in the economy of people of age categories 50–64 years and a decrease in the number of labor force in the age range of 55–64 years by 2030 determines the level of gain for the labor market from the implementation of pension reform 3–5 times lower than the maximum possible.

For an in-depth analysis of the impact of pension reform on the labor market in the Arctic and Far Eastern regions, it is proposed to compare the gains from increasing the retirement age with the training of specialists in the vocational education system and labor migration flows.

REFERENCES

1. V. V. Ivanter, "Mechanisms of economic growth," Mir Novoi Ekon. **12** (3), 24–35 (2018).
2. A. G. Korovkin, "Employment and labor market dynamics in the Russian Federation until 2030," Stud. Russ. Econ. Dev. **24** (4), 353–365 (2013).
3. V. E. Gimpel'son and A. A. Zudina, "Demographic problems of the labor market," Demoscope Wkly., Nos. 729–730 (2017). http://demoscope.ru/weekly/2017/0729/tema01.php.
4. R. I. Kapelyushnikov, "The phenomenon of population aging: Economic effects," Ekon. Polit. **14** (2), 8–63 (2019).
5. A. V. Kashepov, "Methodology and problems of forecasting employment in the economy and education for the long term," Vestn. Ross. Nov. Univ., No. 4, 9–16 (2017).
6. V. A. Gurtov and E. A. Pitukhin, "Forecasting needs of the economy for qualified personnel: A review of approaches and application practices," Univ. Upr.: Prakt. Anal. **21** (4), 130–155 (2017).
7. "Since 2000, Russia has more people older than working age than those who have not yet reached working age," Demoscope Wkly. http://demoscope.ru/weekly/2010/0443/barom02.php.
8. E. T. Gurvich and M. A. Ivanova, "The economic effect of population aging and pension reforms," Nauchno-Issled. Finans. Inst., Finans. Zh., No. 5, 9–22 (2018).
9. E. T. Gurvich, "Pension policy and population aging," Zh. Nov. Ekon. Assots., No. 2, 177–186 (2019).
10. A. L. Kudrin and E. T. Gurvich, "A new growth model for Russia's economy," Vopr. Ekon., No. 12, 4 (2018).
11. Yu. M. Gorlin, V. Yu. Lyashok, and T. M. Maleva, "Raising the retirement age: Positive effects and probable risks," Ekon. Polit. **13** (1), 148–179 (2018).
12. Yu. M. Gorlin and V. Yu. Lyashok, "Pension gambit," Zh. Nov. Ekon. Assots., No. 2, 138–148 (2019).
13. V. Yu. Lyashok and S. Yu. Roshchin, "Young and older workers in the Russian labor market: Are they competitors?," Zh. Nov. Ekon. Assots., No. 1, 117–140 (2017).
14. A. G. Vishnevskii and E. M. Shcherbakova, "Demography: The pros and cons of raising the retirement age," Zh. Nov. Ekon. Assots., No. 2, 148–167 (2019).
15. Pensions at a Glance 2017: OECD and G20 Indicators, OECD. http://www.oecd.org/els/oecd-pensions-at-a-glance-19991363.htm.
16. U. Hotopp, "The employment rate of older workers," Labour Mark. Trends, No. **2**, 73–88 (2005).
17. I. A. Elshina, "Labor activity of the population of the "third age" in the context of demographic aging of the population (on the example of the Republic of Sakha (Yakutia)," Strategiya Ustoichivogo Razvit. Reg. Ross., No. 28, 124–131 (2015).
18. Yu. V. Sonina, "Economic activity of the elderly in Russia: Following the global trend?," Vopr. Stat., No. 5, 48–58 (2015).
19. M. A. Ivanova, "Demand for older workers and age discrimination: International experience and Russian realities," Vopr. Ekon., No. 6, 99–121 (2019).

20. E. V. Maslova, "Features of regulation of employment in the conditions of the pension reform," FES: Finansy, Ekon. **15** (8), 29–40 (2018).
21. A. V. Kashepov, "Forecasting labor market conditions in the context of modern institutional reforms," Sots.-Tr. Issled., No. 1, 44–56 (2019).
22. E. A. Pitukhin, "Forecasting the number of employees in Russia's economy, taking into account the impact of the pension reform in 2018," Inzh. Vestn. Dona, No. **4**, 160 (2018).
23. N. Yu. Zamyatina and A. N. Pilyasov, "The new theory of (space) development of the Arctic and the North: Multiscale interdisciplinary synthesis," Probl. Razvit. Territ., No. 4, 26–41 (2018).
24. S. V. Baranov and T. P. Skuf'ina, "The impact of the planned pension reform on the working age population of Russia and challenges for the Arctic," in *Multifactor Challenges and Risks in the Context of the Implementation of the Strategy of Scientific-Technological and Economic Development of the North-West Macroregion, Proceedings of the All-Russian Scientific-Practical Conference, October 23–24, 2018* (GUAP, St. Petersburg, 2018), pp. 315–322 [in Russian].
25. V. A. Gurtov, I. S. Stepus', and S. V. Shabaeva, "University graduates in the labor market of the Far East," Vyssh. Obraz. Ross. **28** (12), 36–52 (2019).
26. I. S. Stepus' and S. V. Shabaeva, "The present and future of the labor market in the regions of the Arctic zone of Russia: Professions in demand," Nepreryvnoe Obraz.: 21st Vek, No. 3 (2019). https://lll21.petrsu.ru/journal/article.php?id=5026. https://doi.org/10.15393/j5.art.2019.5026
27. A. V. Simakova, I. S. Stepus', and E. A. Pitukhin, "The education system and staffing requirements of the Arctic regions of Russia: Professional perspective," Perspekt. Nauki Obraz., No. 5, 492–502 (2019).
28. D. A. Izotov and E. L. Motrich, "Foreign labor force in the Far East of Russia," Stud. Russ. Econ. Dev. **30**, 570–577 (2019).
29. N. G. Dzhurka, "Development trajectories of the Russian Far East: Evaluation based on the dynamic model of economic interactions," Stud. Russ. Econ. Dev. **29**, 144–152 (2018).
30. E. A. Pitukhin, A. L. Kekkonen, and S. V. Shabaeva, "Assessment of the potential of the vocational education system of the Far East as a priority territory of Russia," Perspekt. Nauki Obraz., No. 1, 20–36 (2019). https://doi.org/10.32744/pse.2019.1.2
31. The RF Law "On State Guarantees and Compensations for Individuals Working and Living in the Far North and Equated Locations" of February 19, 1993 No. 4520-1 (last amended on March 7, 2018, No. 56-FZ. http://www.consultant.ru/document/cons_doc_LAW_1786.
32. Annual Report 2018, Pension Fund of the Russian Federation, 2018. http://www.pfrf.ru/files/id/press_center/godovoi_otchet/Pension-fund-Annual-report-2018.pdf.
33. Website of the Federal State Statistics Service, Section 1.8. Demographic indicators, Subsection 1.8.3. Age and Gender Composition of the Population as of January 1 of This Year. https://www.fedstat.ru/indicator/33459.
34. *Regions of Russia. Socio-Economic Indicators. 2018: Statistical Book* (Rosstat, Moscow, 2018) [in Russian].
35. Demographic Forecast until 2035, Federal State Statistics Service. http://www.rosstat.gov.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/population/demography/#.
36. Estimated Population Size of the Russian Federation: Statistical Bulletin (Federal State Statistics Service, Moscow, 2018). https://www.gks.ru/compendium/document/13285.
37. V. A. Gurtov, L. V. Shchegoleva, and S. I. Pakhomov, "Forecasting the number of doctors and candidates of sciences in Russia," Inzh. Tekhnol. Sist. **29** (4), 510–528 (2019).
38. *Information on the Number and Salary of Employees in a Full Circle of Organizations for 2018: Form No. 1-T* (Rosstat, Moscow, 2018) [in Russian].
39. *Results of a Sample Survey of Workforce: Statistical Book* (Rosstat, Moscow, 2018) [in Russian]. https://www.gks.ru/compendium/document/13265.