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RESEARCH ARTICLE

Target regional size and structure of the population of the Russian Federation: possibilities to identify and achieve

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Abstract

The article proposes a solution of the task of achieving the target regional population size and structure, which would be sustainable in the long term, by means of managing its movement. The significance of this task is justified by the growing concentration of population and labour in a few number of Russia's regions in the current and projected periods, primarily due to migration processes. The apparatus of matrix equations is used to shape the conditions for reaching the target size and structure of the population. The article presents the estimates of the equilibrium population of the Russian Federation and the possibilities of reaching the target population size in prospect. The demographic forecast of Rosstat up to 2035 in three variants is considered as a target. For each of variants, the required increase of population via birth and immigration is calculated. The possibilities to assess the need in population inflow and to achieve the target population size by using the methodology proposed in the article are shown by the case of the Far Eastern Federal District. It is argued that nowadays a crucial element of social and economic policy in the regions should be creation of new jobs with higher labour productivity and therefore, reduction of the need for foreign labour migrants in the Russian labour market.

Keywords

population of the Russian Federation; forecasting; regional structure; migration movement; natural movement; balance of population movement; balance of labour resources; model of population and labour force movement

JEL Codes J11, J21, J61, E27.

Introduction

Uneven spatial distribution of resources in terms of investments and labour, is a significant limitation on the acceleration of economic growth in Russia (see, for example, Ivanter 2017; Shirov 2018). The country-wide trend is the natural decline of population and the growth of the proportion of population over working age, accompanied by growing concentration of population and labour force (employed population) in few regions. Thus, in 1990, 28.5% of the population were concentrated in 10% of the most populated regions; by 2018 this share increased to 32.3%. Not the least role in this process was played by internal migration of the population, increasing the share of the western regions at the expense of the eastern regions over time: since 2000, the Central, North-West and Southern Federal Districts have been steadily attractive for migrants, while the rest of the districts have faced the population outflow[1]. Over time, the attractive regions became even more attractive, and the losing regions began to lose people even more. When considering the regional level, in the Central Federal District only a third of the regions have a positive migration balance in intra-country migration, all others steadily lose population, both as a result of migration outflow to other regions and as a result of natural decline of the population. In the Southern Federal District, only two regions have a positive migration balance (Krasnodar krai and the Republic of Adygea). In the North-West Federal District, these are the city of St. Petersburg and Leningrad oblast. Thus, interregional population movements contribute to increasing regional disparities in population size, contributing to concentration in only a few regions.

A similar situation is in the territorial distribution of the employed population: in 1990, 29% of the employed population were concentrated in 10% of the most populated regions while in 2018 this share increased up to 35.5%. Within this group of regions, the share of the city of Moscow, the Moscow oblast, the city of St. Petersburg and Krasnodar krai increased. Employment in other regions of this group decreased compared to 1990. The growing concentration of the employed population is also rooted in internal migration processes.

Other things being equal, the concentration of the population and labour force can result in a decrease in the growth rate of the gross regional product, growth of regional differentiation in the level of social and economic development, changes in the volume and pattern of consumption of goods and services by the population, including an increase in the share of health services, changes in the size of the labour force, its age structure and professional composition, etc.

In the light of such prospects, an important role in the system of socio-economic forecasting should be assigned to the development of methods of analysis and forecasting of population movement of the Russian Federation, including interregional migration. Interregional migration is to be taken into account when solving such problems as depopulation of regions of the Far East or the development of the Russian Arctic by encouraging internal and external migration inflow of both population and labour. Otherwise, the alleviation of problems in some regions could exacerbate them in others, ultimately reducing both the social and economic effects of the measures taken.

[1] Rosstat Bulletin "Chislennost' i migracija naselenija Rossijskoj Federacii" [Population and Migration in the Russian Federation], 2000-2018

Demographic scenarios of shifts in the Russia's population size and structure by regions

Most of modern population forecasts in Russia are based on the cohort-component method (see, for example, Predpolozhitel'naja chislennost' 2018; Vishnevsky 2014; Potapenko 2015). The forecast results obtained under this method differ depending on the hypotheses on trends in fertility, mortality and migration adopted in the model. In fact, the accuracy of the forecast is derived from the accuracy of the estimates of the prospective trends of these processes and their interplay. Internal migration in the cohort-component method is incorporated through the forecast of either regional migration balance or departure rates. However, in our opinion, this method does not allow to fully take into account interregional flows of the population, which is especially important with the increasing scale of internal migration of the population and labour force and their significant impact on the population and the state of local labour markets in certain regions[2].

This paper proposes another approach to forecasting the size and territorial structure of the population in the framework of the balance model of movement of labour resources, which takes into account the repeated transitions of people from one state to another (Korovkin 2001). The model is based on the balance of territorial movement of population, which reflects the change in its size and regional structure during the period under review as a result of its natural and migratory movement. When based on this model, the forecast of the population of the Russian Federation and its regions takes into account, among other things, the structure and dynamics of its internal interregional flows.

The demographic forecast elaborated on the basis of this model and presented in this paper, takes into account the trends of interregional migration within two basic periods of time (1991–2015 and 1999–2015). The projected number of births was based on Rosstat calculations (low, medium and high scenarios). Two prospective scenarios were considered for immigration: the constant scale at the level of 2015 and an annual increase of 5%. The combination of these scenarios of fertility, interregional migration and immigration gives 12 variants of forecast scenarios of population size and structure until 2030 (Korovkin et al. 2018). Against this background we have predicted the growth of regional differentiation by population size.

Among the totality of forecast scenarios, three were considered: low (low birth rate, immigration constant at the level of 2015, base period 1991–2015), median (low birth rate, immigration annual increases by 5%, base period 1991–2015) and high (high birth rate, immigration increases by 5% annually, the base period is 1999–2015). Table 1 shows the regions in which the population will grow or decline most by 2030. Regardless of the scenario, the list of the top ten administrative regions with the highest population growth hardly appears to change. Among the leaders in the size of population growth is the city of Moscow, the Moscow oblast, the city of St. Petersburg, due to the high intensity of both internal migration and immigration. The North Caucasus Federal District is represented by three entities whose population growth is due to high birth rates. The growing regions also include the Republic of Sakha (Yakutia), Krasnodar Krai, Tyumen oblast and Kaliningrad oblast. The top ten administrative regions account for population growth from 4.54 million people (low variant) to 6.91 million people (high variant) by 2030 with a decrease in the total

[2] A more detailed comparative analysis of different demographic forecasts is given in Korovkin et al. 2018.

population of the Russian Federation by 1.85 million and 6.1 million people compared to 2016. These ten regions will increase their populations in all variants. The last ten regions, on the contrary, in all three scenarios will lose population with varying intensity depending on the variant: from 1.16 million people (low option) to 0.81 million people (high option). The list of this ten regions is also almost unchanged and is represented by five of the nine regions of the Far Eastern Federal District (Jewish autonomous oblast, Magadan oblast, Sakhalin oblast, Khabarovsk krai, Chukotsky autonomous okrug), three of the 11 subjects of the North-Western Federal District (Pskov oblast, Arkhangelsk oblast, and Komi Republic), three of the 18 subjects of the Central Federal District (Tambov, Tver, and Oryol oblasts), as well as the Kurgan oblast, Kirov oblast and the Republic of Kalmykia. Thus, in any variant the regions listed above, while maintaining the current trends, will steadily lose population with varying intensity.

Table 1. Forecast of population change by administrative regions of the Russian Federation according to three variants, 2030 relative to 2016.

Low		Median		High	
Administrative regions	**growth, %**	**Administrative regions**	**growth, %**	**Administrative regions**	**growth, %**
10 regions with the highest growth					
Republic of Sakha (Yakutia)	127.6	Republic of Sakha (Yakutia)	128.8	Republic of Ingushetia	131.2
Republic of Ingushetia	123.8	Republic of Ingushetia	124.3	Chechen Republic	130.8
Tyumen oblast	117.0	Tyumen oblast	121.7	Tyumen oblast	127.7
city of Moscow	114.4	city of Moscow	116.2	Moscow oblast	121.9
Moscow oblast	112.4	Moscow oblast	115.8	Khanty-Mansi autonomous okrug	118.3
Krasnodar krai	110.1	Krasnodar krai	112.6	city of Moscow	118.2
Chechen Republic	108.8	Kaliningrad oblast	110.1	Krasnodar krai	116.9
Republic of Dagestan	107.8	Chechen Republic	109.0	Kaliningrad oblast	114.6
city of Saint Petersburg	105.2	Novosibirsk oblast	108.6	city of Saint Petersburg	113.5
Kaliningrad oblast	105.1	city of Saint Petersburg	108.5	Nenets autonomous okrug	111.3
Total (thousands)	4 543	Total (thousands)	5 015	Total (thousands)	6 911
10 subjects with the lowest growth					
Pskov oblast	86.5	Republic of Kalmykia	88.8	Tverskaya oblast	93.1
Sakhalin oblast	86.2	Kirov oblast	88.0	Pskov oblast	92.1
Chukotka Autonomous Okrug	84.2	Tambov oblast	88.0	Oryol oblast	91.6
Republic of Komi	84.1	Chukotka autonomous okrug	86.4	Republic of Kalmykia	91.4

Low		Median		High	
Administrative regions	**growth, %**	**Administrative regions**	**growth, %**	**Administrative regions**	**growth, %**
Kurgan oblast	84.0	Kurgan oblast	85.9	Kirov oblast	90.4
Arkhangelsk oblast	83.1	Republic of Komi	85.6	Tambov oblast	90.3
Tambov oblast	81.9	Magadan oblast	84.5	Republic of Komi	89.7
Magadan oblast	80.6	Arkhangelsk oblast	83.8	Arkhangelsk oblast	89.3
Khabarovsk krai	80.0	Khabarovsk krai	82.9	Jewish autonomous oblast	86.5
Jewish Autonomous oblast	73.9	Jewish autonomous oblast	75.5	Kurgan oblast	86.3
Total (thousands)	–1 164	Total (thousands)	–1 045	Total (thousands)	–809

Source: authors' calculations on the basis of the Rosstat data.

The forecast reflects the retrospective trends, therefore, it appears to be extremely difficult to overcome this trend in the future without changes in the dynamics of economic growth and its spatial structure.

Setting a task to achieve the target structure of the population

The task of achieving a particular target structure of the population in some way is the inverse task of the demographic forecast, which determines the prospective size of the population as a result of the dynamics of demographic parameters. As part of this task, it is possible to assess what the basic demographic parameters should be for achieving it.

An analogue of the corresponding task is presented by Kemeny and Snell (1972) as a model to achieve a target structure of balanced distribution of money between regions as a result of the State management when the structure of money movement between regions is described by the probability matrix ($0 \le p_{ij} \le 1$). The corresponding task was also solved within the framework of the study of the movement of certain economic groups (employed population, workers, etc.) (Staroverov 1979; Korovkin 1990). The matrix of probabilities (frequencies) of flows between potential and actual workers, classified according to the type of place of residence (urban/rural), was the basis to calculate the flows (intensity of departure from groups) necessary to achieve the established urban-rural workers ratios. Existence of different types of labour balances, e.g. inter-sector balance, allowed to calculate a set of target structures. Currently, lack of data is the main limit for such calculations.

Availability of statistical data to calculate the balance of territorial movement of the population enables studying the possibility of achieving the target sizes and proportions of the population distribution between regions. In Russia, with its high existing and projected imbalances in the distribution of population between regions, this issue is highly relevant. However, as far as the authors know, such objective has never been set. This is partly due to the fact that in a market economy, unlike in the Soviet period, many methods of regulating the population size of certain regions like organized recruitment (orgnabor) or instruments to reduce personnel turnover, etc., are not in use.

The need to develop regional strategies for social and economic development actualizes the task of regulating the regional size and structure of the population and the development of tools for its implementation. Prerequisites for its solution are the estimates of current and prospective birth rates and mortality, levels of regional technologies, labour productivity, disposition of productive forces, structures of demand for products, etc.. Without this context it is impossible to determine the target territorial structure of the population and the proportions between its individual groups.

In any case, the task of achieving a certain target structure of the population (or its economic groups) involves the identification of at least two key issues: what the future structure of the population should be and how it can be achieved. The answer to the first question lies in the field of studying the equilibrium size and structure of the population of the Russian Federation. In relation to the distribution of the population between the administrative regions of the Russian Federation, we define the sustainable prospective regional structure, which will remain unchanged over time as a result of maintaining its natural and migration movements at the level of the current year, as "equilibrium". The size of the population corresponding to its equilibrium regional structure we also define as " equilibrium".

Maintaining stable structure over a long period is an objective property of the Markovian processes, which can be applied with some degree of conditionality to the regional structure of the population resulting from its migration movement. In this context, two questions are relevant. Does a balanced regional structure of the population, resulting from the current migration pattern, meet the interests of the country as a whole and of its regions? How to determine the desired (target) regional population structure within the framework of long-term planning? Some aspects of the answer to the first question are presented in (Edinak and Korovkin 2018): it is proved that maintaining the interregional migration pattern in the coming years will result in a significant increase in regional imbalance in terms of population size in general and in working age in particular, and this meets neither social, economic, nor geopolitical interests of the country.

Plurality of criteria that can be applied to the target regional population structure (efficiency, ensuring the maximum economic growth rate of the country as a whole and its regions, social justice, geopolitical issues, etc.), as well as the existence of different patterns of urban/regional systems complicate the task of determining the desired (target) regional population structure or at least shaping it in a long term. Generally, there exist two "extreme" regional strategies, namely, emphasis on the development of only urban agglomerations and large cities or development of all smaller towns and municipalities. The golden mean between them has to be found. However, studies show that over-concentration of the population in large cities and agglomerations does not provide sustainable economic growth, therefore, the balanced development of cities of different sizes is needed (Mikheeva 2018).

Let us suppose that some pattern of the distribution of population (or its particular economic groups) are established and fixed at the state level as target indicators, therefore the long-term methods to achieve them are to be determined. In case of annual revision of the related policies (for example, changes in the number of entrants to different specialties, retraining of personnel, economic incentives to move from one region to another, and other kinds of stimulation) the population and the region authorities would be disoriented. Therefore, the methods of achieving the targets should, on the one hand, be flexible, with the possibility of technical corrections, and on the other hand, be stable in the long term, which will allow the country as a whole and regions to adjust.

The measures aimed to regulate the regional population structure can be classified into three groups: affecting natural population movement, external migration and interregional population movement. Kemeny and Snell (1972) and Staroverov (1979) describe how to solve the task of achieving the necessary population structure by regular influence on the processes of natural population movement and external migration in conditions of a constant structure of population movement between regions. Korovkin (2001) argues that the impact of interregional population flows on its regional size can be quantified as part of the task of assessing the significance of flows. For some regions, the impact is meaningful, while for others it is less significant. Depending on this, flows can be divided into important and secondary. As a result, the task may be to determine the number and direction of important flows. In the paper (Edinak and Korovkin 2014) interregional movement of the employed population in terms of its impact on the size of employed population in federal districts is investigated. This paper presents some quantitative estimates of the impact on the intensity of external migration and natural population movement to achieve a given regional population structure.

Methods of assessment of the target (equilibrium) regional population structure and ways of its achievement

Considering population movement over a certain period of time as a Markovian process described by the probabilities of population movement from one state to another ($0 \le p_{ij} \le 1$, $i = \overline{1,n}$, $j = \overline{1,n}$, n is the number of states considered), it is possible to determine the equilibrium regional population structure. In the model, states are understood as regions (internal states), as well as sources of population increase and decrease, such as fertility, mortality, emigration and immigration (external states).

The impact of exclusively internal migration of the population on the formation of its equilibrium regional structure can be estimated on the basis of closed migration balances. This balance describes the change in the regional population structure as a result of its interregional movement, excluding dynamics of natural movement and external migration. In this case, the equilibrium regional population structure, which will develop through r periods after the period t, is calculated as $N(t\text{-}1)\times p^{r}_{closed}$, where $p^{r}_{closed} = p_{ij}$, $i = \overline{1,n}$, $i = \overline{1,n}$ are the probability matrix of interregional population movement; $N(t\text{-}1) = (n_1(t\text{-}1), n_2(t\text{-}1), ..., n_n(t\text{-}1))$ is the vector population at the beginning of the current moment; n is the number of regions.

An open balance enables assessing the joint impact of migration and natural population movement on the equilibrium regional population structure. The latter is defined by the following formula: $\sum_{m=0}^{r} f \times P^{m}$, where $f = (f_1, f_2, ..., f_n)$ is the vector of intake of people from external states, determined by fertility and immigration, $P = \| p_{ij} \|$, $i = \overline{1,n+k}$, $j = \overline{1,n+k}$ is the matrix of population movements taking into account natural movement and external migration, k is the number of external states.

Indicators of balance model of movement of population and labour force taking into account repeated movements of people are used as elements of the matrix P (Korovkin 1990; Korovkin 2001). The size of population at the end of the period within the model is described by the recurrence equation:

$$N(t) = N(t\text{-}1)P(t),$$

where $N(t\text{-}1)$ and $N(t)$ are vector lines of regional population size at the beginning and end of the period, respectively; $P(t) = \left(E - M(t)\right)^{-1} \hat{Q}(t)$ is the matrix of population transition coefficients during the period between regions and external states (its elements calculated on the basis of available statistics are interrelated by the formula $\sum_{j=1}^{n} p_{ij}(t) = 1, i = \overline{1,n}$), $\hat{Q}(t) = diag\{q_i(t)\}$ is the matrix the main diagonal of which are the coefficients of settlement in the regions; $M(t) = ||m_{ij}(t)||$ is the matrix of population transition coefficients at each step of movement between regions and the relationship of regions with external states; n is the number of studied states; E is an identity n-matrix. It should be kept in mind that

$$q_i(t) + \sum_{j=1}^{n} m_{ij}(t) = 1, i = \overline{1,n}.$$

Quantitative estimates of changes in parameters of external migration and natural population movement needed to achieve the target regional population structure can be calculated in the model as follows. Let us denote $g = (g_1, g_2, \ldots, g_n)$ as a desired (target) equilibrium distribution of population between regions. Then, if the goal is achievable, there is a single vector f, the elements of which determine the needs of regions in the inflows of the population from external states to achieve the goal: $f = g(I–P)^{-1} = gN$, where $N = (I–P)^{-1}$; I is an identity matrix.

Estimation of the equilibrium population of the Russian Federation

Fig. 1 shows the equilibrium size of population corresponding to each year, which would have been obtained if the levels of birth rate, immigration, and the structure of interregional population movement in each year would be constant over a long period of time (more than three generations). The graph shows the extent to which the natural and migratory population movements in each year contribute to the growth or decrease of the equilibrium population at the condition that the state of equilibrium is achieved. The trends in fertility and immigration between 2000 and 2010, combined with mortality and emigration, reflected in Fig. 2, negatively affected the equilibrium population size: if the structure

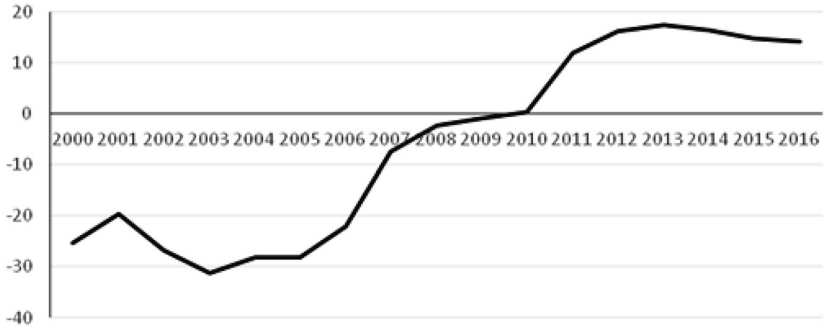

Figure 1. Dynamics of equilibrium population of the Russian Federation (as a share of the actual population at the end of year,%). Source: authors' calculations on the basis of the Rosstat data.

of population movement remains at the same level as in the reporting period it would contribute to the establishment of the equilibrium population of the Russian Federation lower than the actual. Since 2010, the scale and structure of population movements in each reporting year have had a positive impact on its equilibrium size. The most favourable are the parameters of 2013: maintaining their values in the future would lead to an increase in the equilibrium population by 17.5%. After 2013, the structure of the movement somewhat "deteriorates", but continues to positively influence the equilibrium size of the population corresponding to each year.

The equilibrium population size in federal districts repeats the dynamics of the equilibrium population of the Russian Federation with some exceptions. Between 2000 and 2010, for Russia in whole the equilibrium population was lower compared to the actual population, while in the North Caucasus Federal District it was growing due to high fertility rates and low mortality rates. Between 2010 and 2016, for Russia in whole the equilibrium population was higher than the actual population, while the Far Eastern Federal District was steadily losing its population (in some years a decrease was also observed in the Volga Federal District). In 2013, which was the most favourable year, the negative gap between the equilibrium population and actual population in the Far Eastern Federal District was the biggest (7.5% at the end of 2013).

The reported parameters of natural and migratory population movements, which were used in calculating the equilibrium population in Fig. 1, are shown in Fig. 2. Until 2010, total population growth was negative due to natural decline. Since then, the external migration balance increased and natural growth fluctuated at around zero, resulting in positive overall population growth. Projected population growth for the period 2017–2035 (Predpolozhitel'naja chislennost' 2018) gives a large enough "spread" depending on the forecast variant: from minus 756,500 persons in the low variant to plus 845,200 persons in the high one. Within the medium variant of the forecast, the total population growth will be moderately negative and will reach zero by 2034. When implementing a scenario close to the medium

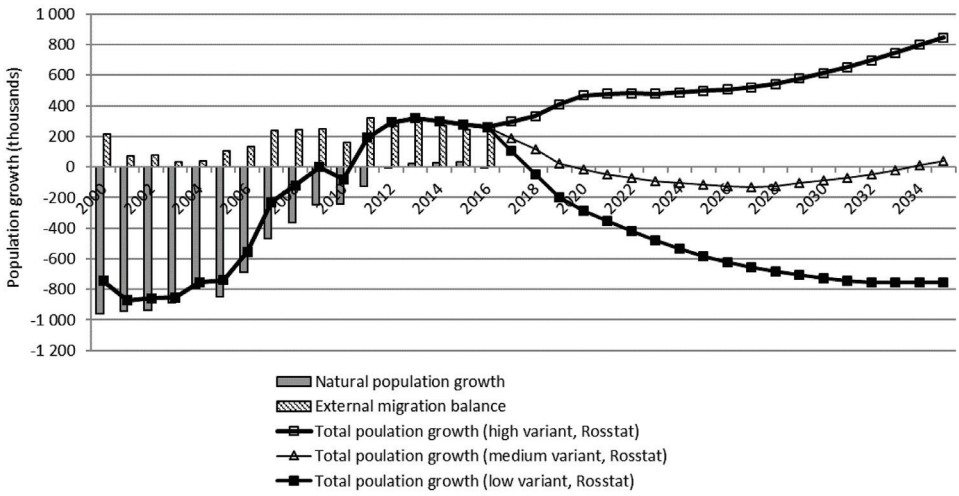

Figure 2. Population growth dynamics of the Russian Federation as a whole and by components, thousand persons. Source: Rosstat data.

variant of the Rosstat forecast, the equilibrium population corresponding to each year of the forecast period will be less than the actual one for the same year; it will have negative impact on certain regional labour markets, most of which are facing outflow of the population and the labour force.

Assessment of the need of the Russian Federation for additional population inflow to achieve its target regional structure

Unlike the target values of the size of employed population in particular administrative regions indicated in some regional development programs, the authors did not encounter assessments of the target regional structure of the population and options for its achievement, taking into account the interests of all regions of the Russian Federation. Therefore, we will take the regional estimates of the population forecasted by Rosstat to 2035 as target ones in terms of achieving the equilibrium state. The authors understand that the demographic forecast of Rosstat is a scenario, not a targeted one, however, we consciously accept such an assumption. Its conceptual meaning is to assess Russia's need for an additional population inflow (not only for the country as a whole, but also for regions) and to assume that the long-term regional distribution of the population forecasted by Rosstat iss stable and constant (i.e. equilibrium). Thus, the regional need in population will be determined by vector $f = (f_1, f_2, \ldots, fn)$, and in the country as a whole - by the sum of its regions. At the same time, it is assumed that the structure of interregional population movement will remain at the level of the current (base) year.

By comparing our estimates with the current and/or forecast estimates of fertility and immigration by Rosstat, we can estimate the shortage of population inflow to the country (in general and in the context of regions) in order to establish the regional population structure as an equilibrium, corresponding to the three variants of the demographic forecast of Rosstat.

The result of the corresponding comparisons is represented by three curves in Fig. 3. These curves reflect the additional population influx into the country from external states necessary to achieve the target regional population structure, provided that the scale of the inflow predicted by Rosstat (in three variants) comes true. The calculations are presented in two variants depending on the structure of population movement as in 2000 (Fig. 3a) and 2016 (Fig. 3b). Since Rosstat gives a forecast estimate of the total migration growth in the administrative regions, without division into internal and external, we have assumed that in the projected period the scale of external migration for all regions would be as in 2016.

In case of the 2000 pattern, with the accepted hypotheses, the period between 2001 and 2035 is divided into three periods. The first period refers to the period up to 2011-2013, depending on the variant. During this period, the actual annual influx of the population from the external states was less than the estimated need (the sum of the elements of vector *f*). Under the low scenario, the need was estimated as 2.1 million, while the actual inflow varied from 1.5 million in 2001 to 2 million in 2010. The second period starts in 2012 (low variant), in 2013 (medium variant), in 2014 (high variant) and lasts up to 2017. If the population influx from external conditions corresponding to this period could be maintained in the long run, it would provide achieving any of the three variants of target size and structure of the population. However, since 2018 (the third period) within the medium

variant of the forecast of Rosstat, taking into account the projected dynamics of the birth rate and the immigration scale as in 2016, the need for population additional inflows from external states arises.

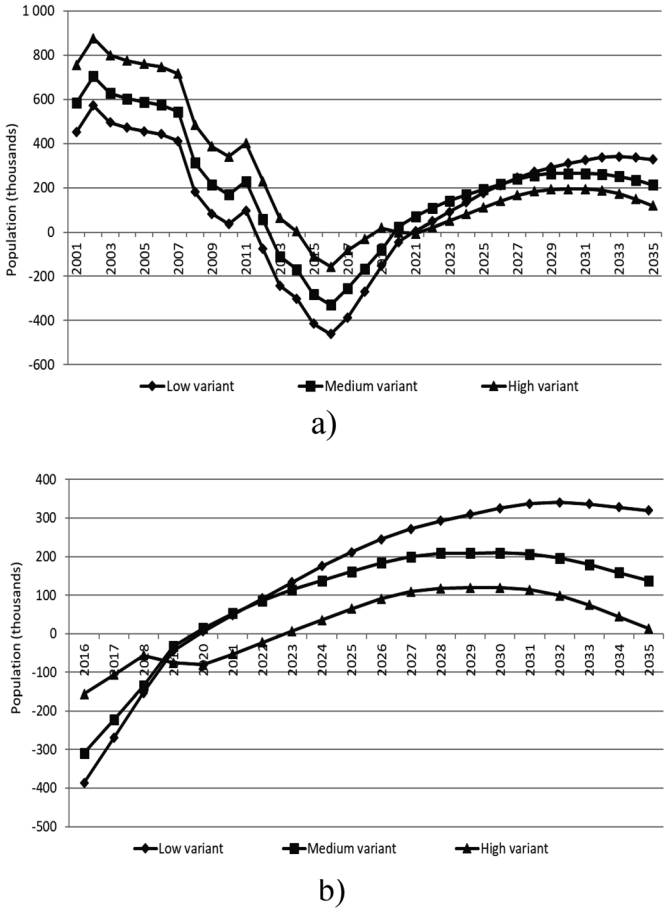

Figure 3. Assessment of the need for additional population inflow from external states to achieve the target size and structure of the population (in three variants), taking into account the preservation of the structure of population movement of the Russian Federation as in 2000 (a) and 2016 (b). Source: authors' calculations on the basis of the Rosstat data.

Calculations based on the structure of population movement as in 2016 (Fig. 3b) also reveal the need for additional population inflows from external states in the projected period, but at a slightly smaller scale. Only in the frames of the high variant, by 2035 the estimated total need in population (*f*) will coincide with the population influx projected by Rosstat (or even exceed it, if immigration exceeds its value in 2016). Under the other two scenarios, the need for additional population inflow until 2035 will remain.

Assessment of the need of the Far Eastern Federal District for additional population inflow to achieve its target regional structure

The appropriate method of calculation enables estimating the need for population influx not only in the entire country, but also in the regional aspect. Regional target population size is set only in the State Program "Socio-Economic Development of the Far East and the Baikal Region". It sets the target of the population growth in the region from the current 6.2 to 6.5 million persons by 2025. To achieve that, a number of measures are proposed to increase the migration attractiveness of the region for internal and international migrants and to anchor of the newly arrived population in the places of settlement. In terms of migration structure, first of all, the emphasis is placed on attracting labour-age population by creating modern, highly paid jobs in the territories of implementation of investment projects, as well as infrastructure development.

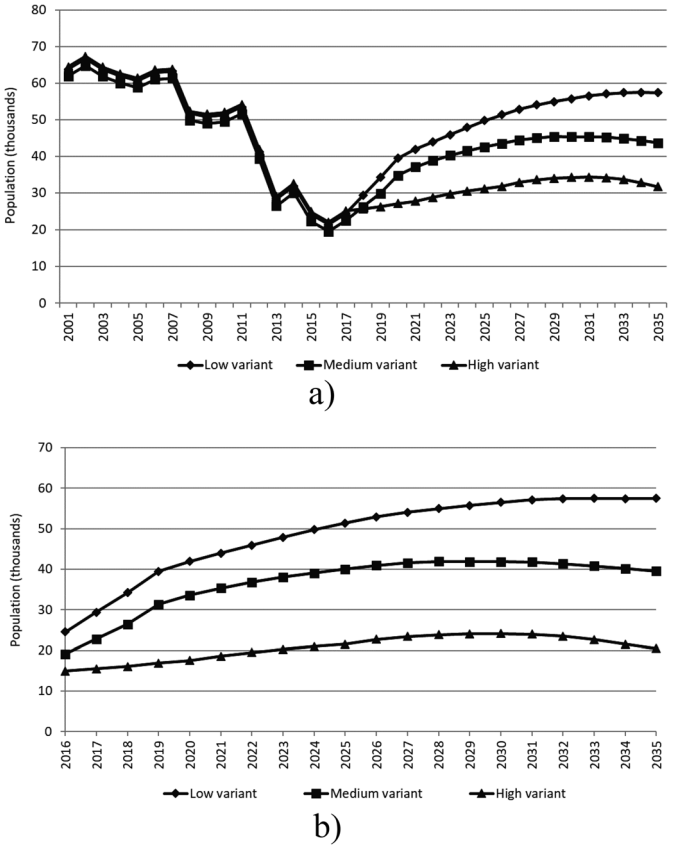

Figure 4. Assessment of the need for additional population inflow to the Far Eastern Federal District to achieve the target number in the equilibrium regional structure (in three variants) taking into account the preservation of the structure of population movement of the Russian Federation as in 2000 (a) and 2016 (b). Source: authors' calculations on the basis of the Rosstat data.

According to the calculations of Rosstat, the "spread" of the possible population size of the Far Eastern Federal District by 2035 is 1.2 million persons depending on the scenario (5.5 million persons for the low variant and 6.7 million persons for the high one; in the medium scenario the corresponding number is 6 million persons). The share of the District in the total population of the country will increase only within the high scenario: from 4.2% in 2019 to 4.3% in 2035, while in the other two scenarios its share decreases to 4.1 or 4%.

Within the framework of our model we can determine the need of the Far Eastern Federal District in additional population inflow to achieve the target population number as defined in the State Program. For this purpose, in all three of Rosstat's scenarios the population of the Far Eastern Federal District (excluding the Baikal region) is increased to 6.5 million people. Fig. 4 presents an assessment of the need of the Far Eastern Federal District for additional population inflow to achieve the target value in the equilibrium regional population structure.

In order to achieve the declared target, the Far Eastern Federal District needs an additional influx of population during the entire period under review, both reporting and forecasted. In the forecast period, the additional need of the District in population will grow, but at different rates depending on the forecast variant. The highest need for the population inflow in the District will be in the case of realization of Rosstat's low scenario (up to 57.5 thousand persons in 2035), which is explained mostly by the projected decrease in the birth rate in the District. Noteworthy, the scale of the need for population inflow is roughly the same regardless of the structure of migration flows in 2010 or 2016.

Conclusions

The need for additional population in the Far Eastern Federal District can be achieved by rise in fertility, increase in the number of immigrants, reducing the migration outflow of population, and the encouragement of resettlement of citizens to work in these regions. The actively implemented but highly controversial measure related to granting a plot of one hectare of land in the Far East region, is also aimed at attracting the population from other regions for economic development of virgin lands and encouragement of small and medium size businesses. Ishaev et al. (2017) analyze in detail and with calculations of costs, their sources and benefits, the proposal to pay a lump-sum targeted subsidy (so called "Far Eastern capital") for potential migrants. According to the authors' calculations, the total number of migrants who could resettle to the Far East region by 2035 thanks to the introduction of this proposed long-term tool, would be 620,000 persons (of them highly qualified workers — 458,000 persons). The annual inflow of migrants encouraged by the "Far East capital" would be increasing from 7,500 persons in 2019 to 35,000 persons by 2029-2035. If we compare these estimates with our own, we will see that this measure could fully cover the need in additional population, including the labour force, in the case of realization of the high scenario and only partially in the case of the medium or low scenarios.

The reduction in the growth rate of the working-age population in the late 1960s brought to the forefront the task of increasing the efficiency of the use of available labour resources. In this regard, a large number of studies have been aimed at determining the optimal distribution of labour resources among industries, professions and regions and shaping the ways to achieve it. At present, the issue of setting target parameters in relation to the distribution of population and its economic groups among industries, professions and regions is not on the research agenda. This is probably due to the hope of the market self-regulation which

is to establish reasonable proportions "automatically". However, the studies show (see, for example, Edinak and Korovkin 2018), self-regulation of the movement of the population and labour does not always lead to the desired results; reduction of imbalances in some sectors creates other challenges that require state regulation in order to coordinate country-wide interests with regional interests and determine objective possibilities for their implementation.

The current trend of active attraction of foreign labour migrants is to some extent a reflection of the mechanism of compensation of the negative effects of an unbalanced economy formulated by Yaryomenko (1998) and the use of a kind of "underpinners", which in fact ensure the preservation of the imbalances in the future (Ivanter 2017). The reduction of the working-age population, with a slowly changing structure of jobs, predetermine the shortage of labour, including skilled and highly skilled specialists in the national and regional labour markets (Korovkin et al. 2006), resulting in the growing inflow of unskilled foreign workers, which is a cheaper resource. However, the massive influx of foreign labour migrants does not solve the problem of labour shortages in the long run, but preserves the low efficiency of labour use in the national economy, expressed in low productivity. The increase in labour productivity would ensure the transition of the economy to a higher technological level and would reduce the need for the inflow of foreign migrant workers to the Russian labour market. The stimulation of labour productivity growth should be accompanied by both encouragement of cross-regional migration and job creation policies in the regions. In this context, it is necessary to update the objectives of State migration policy and to elaborate regional programs to increase different kinds of mobility of the population and labour force as a part of coordinated regional socio-economic development programs.

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