Population and Economics

Population and Economics 5(1): 90–97
DOI 10.3897/popecon.5.e65133

RESEARCH ARTICLE

Influence of migration processes on the demographic development in the Yamal–Nenets Autonomous Okrug

Dmitry V. Pomazkin[1]

1 *JSC NPF "Gazprombank Fund", Moscow, 117556, Russia*

Received 26 February 2021 ♦ **Accepted** 31 March 2021 ♦ **Published** 21 April 2021

Citation: Pomazkin DV (2021) Influence of migration processes on the demographic development in the Yamal–Nenets Autonomous Okrug. Population and Economics 5(1): 90-97. https://doi.org/10.3897/popecon.5.e65133

Abstract

The article discusses the influence of migration on the development of demographic processes in the Yamal–Nenets Autonomous Okrug. The study shows that the current level of migration will lead to a decrease in the population due to the uneven sex and age structure of the population of the region. In this context, the author presents estimates of the number and costs of shift workers, that need to be attracted to compensate for the economically active population reduction.

Keywords

migration, population size, mathematical modelling

JEL codes: J11, I19

Introduction

The State demographic policy in the Russian Federation is aimed at developing human capital, increasing life expectancy, ensuring the required amount of labour resources, and reducing the migratory outflow. Despite significant regional differences, almost in all Russian regions over the past years there has been positive dynamics in life expectancy.

The development of population policies in the Yamal–Nenets Autonomous Okrug is significantly influenced by migration processes caused by the mass change of residence after the termination of employment. Given the large influx of labour in the Yamal–Nenets Autonomous Okrug during the 1990s related to the development of natural deposits and the northern territories, an increase in migration outflows due to termination of employment and retirement could soon be expected.

Literature provides different approaches to the concept of migration. The researchers consider proposals for the application of socio-economic measures of improving migration

policy as a mechanism for ensuring demographic security (Grebenyuk 2018), analyse the consequences of labour migration along with the comparison of the goals of national policies in the field of labour migration (Zueva 2018), and study the issues of uneven population settlement (Moiseev 2000).

Taking into account the negative trends in the labour market in the Russian Federation associated with the reduction in the labour force, as well as the expansion of the labour market, the attraction of labour resources to the northern territories will imply increasing financial costs and creation of professional job positions (Yakshibayeva 2017).

Methods and main results

The study employs the data on the sex and age population distribution for 1990–2019, provided by the Federal State Statistics Service. When forecasting demographic, the author considers dynamics of mortality and migration. Mortality decrements are based on mortality tables, and migration decrements are obtained according to the change in the number and sex and age structure of the Yamal–Nenets Autonomous Okrug population (see annex).

So far, there has been an increase in the population of the Yamal–Nenets Autonomous Okrug. Assuming that the pattern of migration inflows — sex and age proportion of arriving migrants, measured as a percentage of the current population — does not change in the near future, the number of the population in the age groups between 50 and 60 years old, which form the main migration outflow, will remain high in the coming years (Figure 1). At the same time, the number of the population aged between 20 and 30 years will be at the minimum level since 1990.

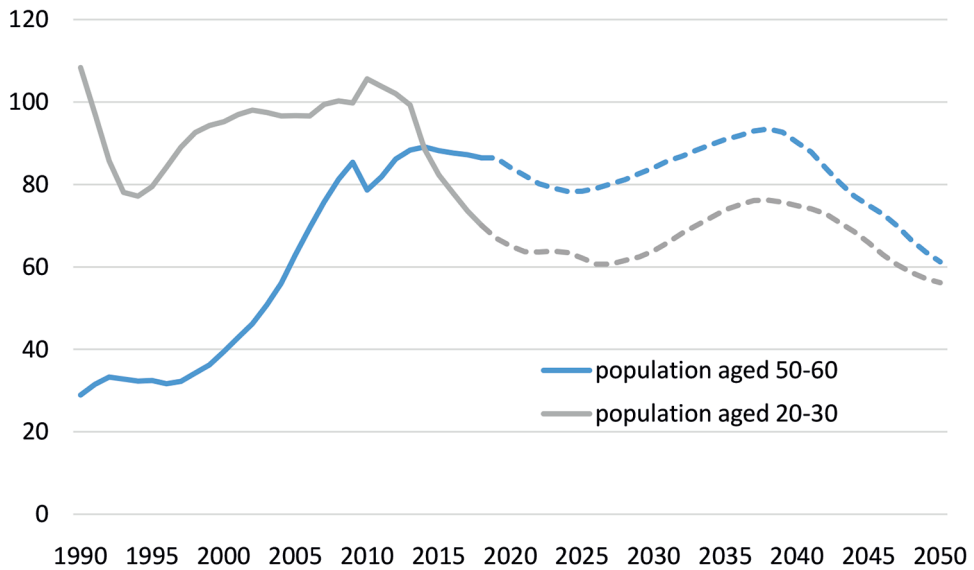

Figure 1. Population of the Yamal–Nenets Autonomous Okrug in different age groups, thousand people. *Source:* calculated by the author

To ensure a constant number of economically active population permanently residing in the Yamal–Nenets Autonomous Okrug, the region needs an increase in the migration flow by 4–6 thousand people per year. In the case of substitution of the drop with shift workers, the annual number of the latter should increase annually, and after 10 years the number of shift workers may increase by 25–30 thousand people. The current number of shift workers reaches 80 thousand people, employed mainly in the construction of new facilities (for example, at the Yamal LNG project in the village of Sabeta).

In addition to the financial costs associated with the maintenance and provision of the shift, there are risks associated with increasing dependence on the existing infrastructure remaining intact with the increase in the share of the shift. First of all, the risk associated with labour costs increases substantially. Rising costs can accelerate inflation processes and cause changes in the labour market. The dependence of the established infrastructure on the scale of shift work increases the risk of rising costs for its maintenance. Suppose that shift maintenance costs are a random variable the expected value of which can be estimated if the projected number and incremental level of expenditure are known. Also, suppose the required number can be predicted, and costs depend both on the labour market situation as a whole and on force majeure situations (such as, for example, recent events related to the coronavirus). As a result, the unit cost of attracting additional workers can fluctuate, and the confidence interval, given the inadmissibility of stopping continuous technological processes, may be wide.

We shall consider the distribution of unit costs for shift maintenance, assuming that the annual excess of their growth rate may be in the range from 0 to 5%. We can assume that the average growth rate will be 2.5%, which, for example, over 10 years will lead to an increase in costs by 28% ($=1.025^{10}$). However, if it is necessary to meet the cost requirement with a probability of 95%, according to Monte Carlo method, the cost increase might be 37% over 10 years and 81% in an interval of 20 years. This estimate is of interest because it provides a probable value of cost increases. Thus, for 10 years it comes up to 3.2% ($=1.37^{0.1} - 1$), and for an interval of 20 years — 3% ($=1.81^{0.05}$). These estimates allow adjusting the average expected growth rate by approximately 20% ($=3/2{,}5 - 1$).

Additionally, we can consider a simple individual model that enables comparing the costs of the shift workers and of employees with permanent residence. Suppose that shift costs in the first (base) year are 100 units and increase by 5% annually. Costs per employee with permanent residence are 50 units and increase by 3% annually. At the same time, the initial costs for an employee with permanent residence are 500 units. Now, we can compare the change in the net present value (NPV) for the two cases described above. The discount rate for the calculation of NPV is taken at 4%. Figure 2 shows the change in NPV depending on working time for shift workers and workers with permanent residence.

This example is illustrative; however, it shows that shifts become more expensive over time. One-time costs of moving to permanent residence might be high, but due to transportation costs and operating costs, regular costs become higher for shift workers. Over time, due to the expected deterioration in the labour market resulting in an increase in the demand for labour resources, the costs per shift workers will overcome the costs of resident ones.

As can be seen in Figure 2, on a 10-year horizon, the cost per one shift worker begins to exceed the costs per resident worker, and with the defined assumptions after 25 years it becomes approximately 75% higher. Taking into account the above-mentioned risk estimates, the growth rate of these costs may be 20% higher, resulting in almost two-fold difference in cost in 25 years (96%).

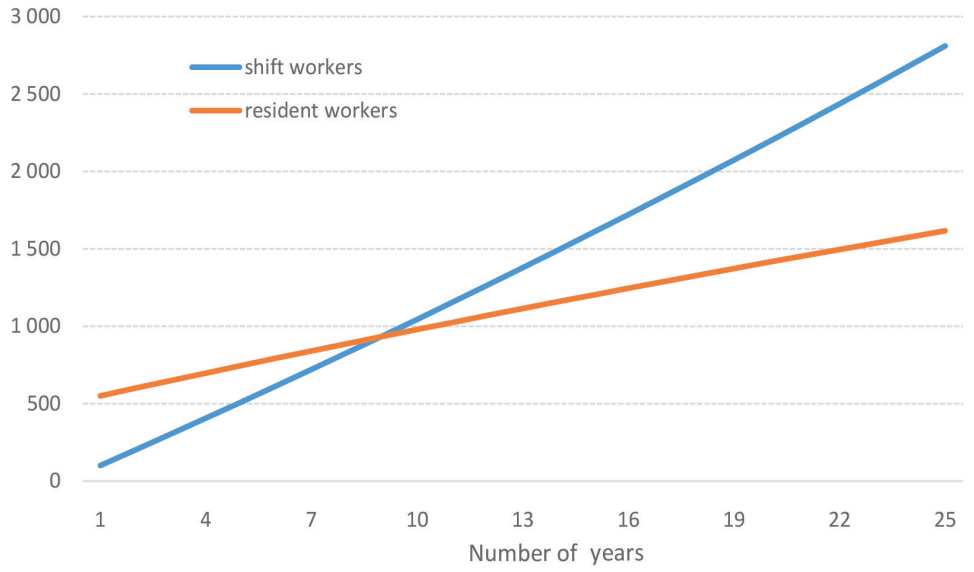

Figure 2. Dynamics of the NPV for two types of workers in time. *Source:* calculated by the author

Clarification of the assumptions may shift the time interval during which the cost ratio will change but will not have a fundamental impact on the conclusions. The cost of the shift method is higher, and the proportion of shift workers is likely to be determined by the resource and financial constraints existing in the region.

In the case of full substitution of retirees with shift workers, the annual wage fund may increase by 2–2.5 times within 30 years; it corresponds with an increase in the share of shift workers to 30%.

It is important to note that, apart from quantitative characteristics, we should account for ither factors. It is difficult to estimate the rate of fixed assets depreciation in case of growth in the share of shift workers, but it is logical to assume higher depreciation, since the shift work produces various economic, legal and social risks for employees themselves and economy in general. We can name the following main risks:

- excessively hard labour;
- severe living conditions during the shift;
- powerlessness and social insecurity of employees;
- high rate of injury of workers;
- disintegration of families;
- a remaining depressed state of small towns and villages.

Therefore, it can be concluded that the development of promising territories should not be based solely on shifts. Perhaps there will be a modification of the shift method itself, associated with the increase in the duration of the shift up to several years, and the share of the shift will be determined in the process of self-organization.

The territorial development of Russia in the future could lead to a reduction in concentration in agglomerations, whose growth in past periods has been linked to economic conditions. Now, we observe an increase in remote work, which is likely to lead to a decrease in population concentration. Regions with natural and infrastructural advantages might become population attractors and will influence the formation of

demographic policies in the future. With the strategic importance of Yamal territory related to the development of fuel and energy complex and possible underestimation of the economic and geographical position, this region should have a developed productive, social, and transport infrastructure in order to become a territory of advanced development in the nearest future.

Suppose that some of the additional migration flow will be compensated by shift workers. We can estimate the proportion of such workers, assuming that the volume of additional migration inflow associated with the relocation of permanent residence is limited. The number of coming shift workers could be calculated depending on the projected volume of migration inflow. Let us determine the share of shift workers in the total number of economically active population depending on the intensity of the additional migration inflow at the level of 5 thousand people per year with an estimated annual increment rate of 5% (Figure 3). In order to maintain the number of economically active population at the present level, the proportion of the additional shift is zero. To guarantee an increase in the number of economically active population to 400 thousand people, the share of shift workers should reach about 20% of the total economically active population by 2035, and to see an increase in the number of economically active population to 500 thousand people we should put the share of shift workers over 45%.

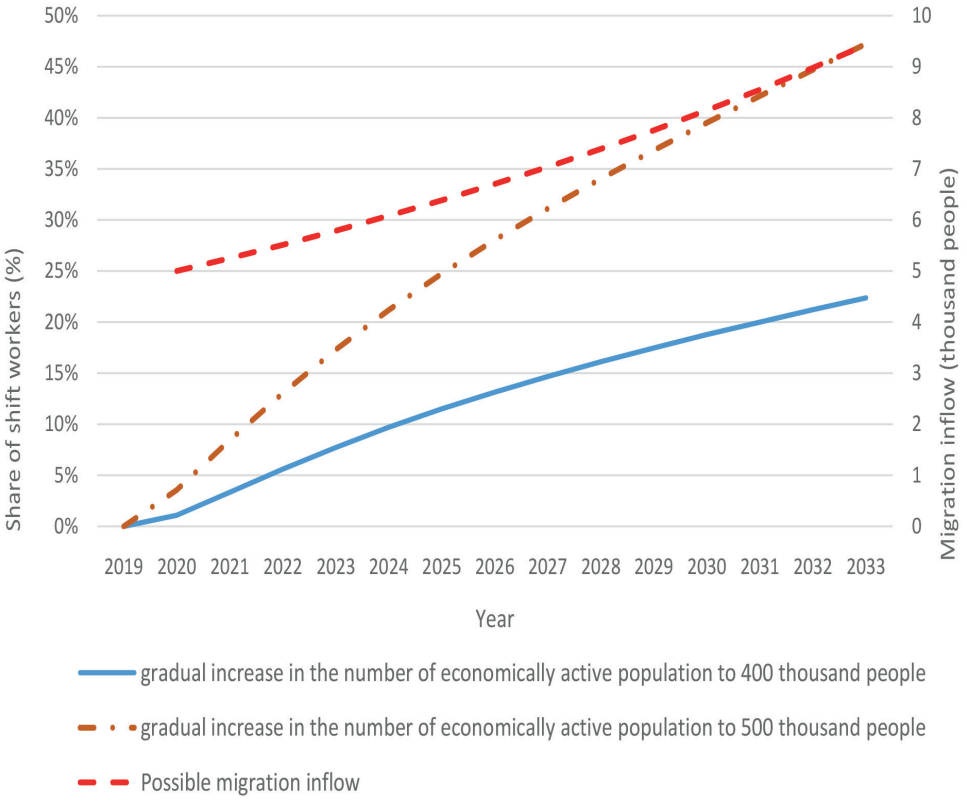

Figure 3. Percentage of shift workers, depending on the number of economically active population.
Source: calculated by the author

Our estimates show that in case of an increase in the number of economically active population, the current migration flow is insufficient and additional recruitment of shift workers is required. However, in the future, such attraction may be noticeably more expensive, which will reduce the pace of development of the region. In addition, the smoothing of regional differences and the development of social infrastructure can lead to a significant increase in the work period in the Yamal–Nenets Autonomous Okrug and modification of the shift method of work. Figure 4 provides estimates for the annual migration flow (thousands of people) depending on the need for labour force in case of a significant decrease in the share of the shift workers.

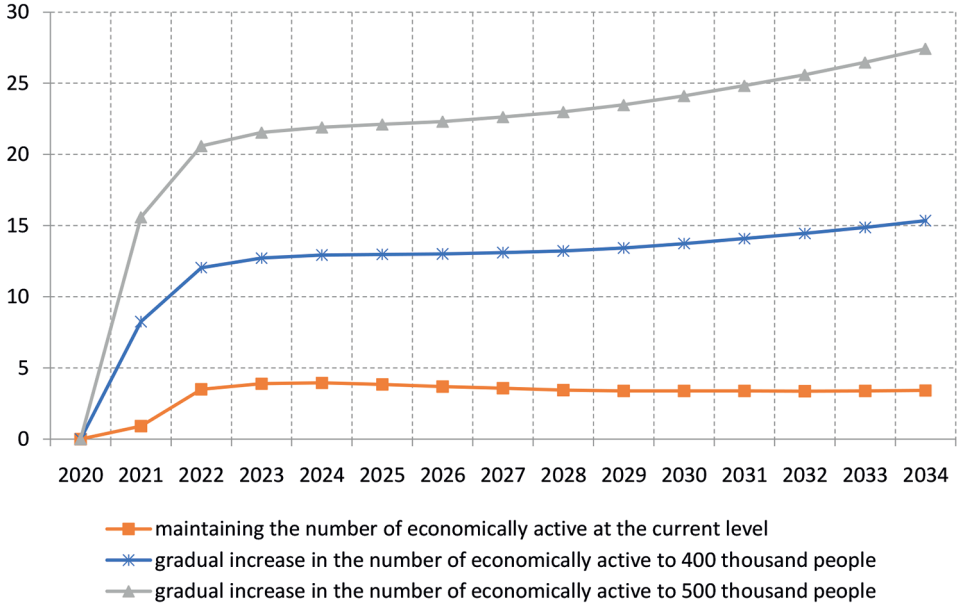

Figure 4. Annual migration flow (thousand people), depending on the projected number of economically active population. *Source:* calculated by the author

Conclusions

The study revealed that maintaining the number of economically active population of the Yamal–Nenets Autonomous Okrug at the level of 300 thousand people requires additional migration inflows of the citizens of working age at the level of 3–4 thousand people per year. Full substitution of retirees with shift workers will lead to a substantial increase in the annual wage fund.

Development of promising territories and territories of advanced development, which primarily refers to the territory of Yamal, can not rely exclusively on shifts. It is possible that there will be a modification of the shift method itself, associated with the increase in the duration of the shift up to several years, and the share of the shift will be determined in the process of self-organization.

The geography of migration flows, including those happening within the borders of Russia, may be affected by the ongoing climatic changes. Today, the main centers of attraction for internal migrants are regions such as the city of Moscow, Moscow, Tyumen, and Leningrad Oblasts, and Krasnodar Krai. However, as atmospheric temperatures rise, a shift in migration towards the northern territories is possible.

Appendix

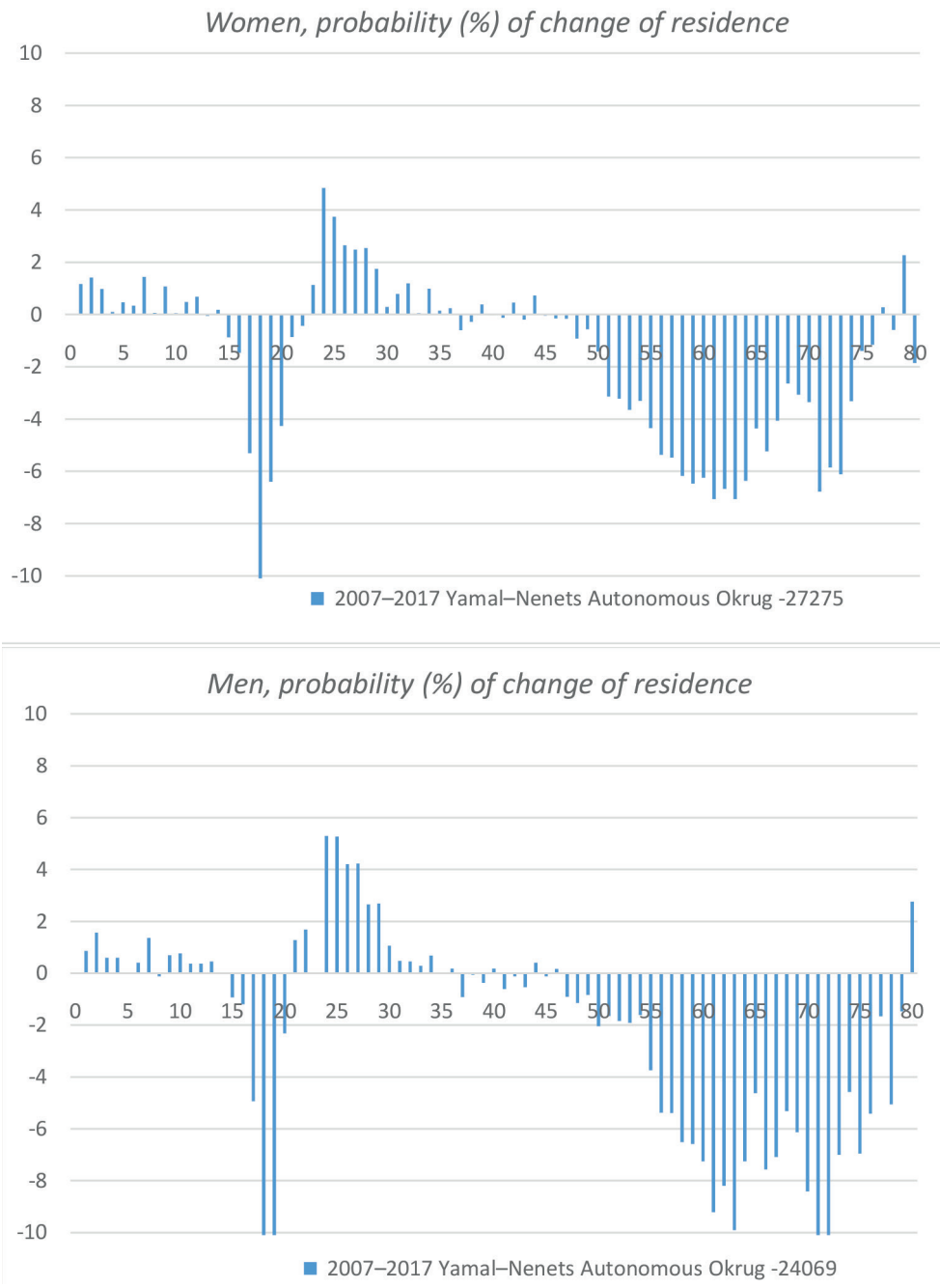

Figure: Probability of place of residence change among the population of the Yamal–Nenets Autonomous Okrug depending on age, %. *Source:* calculated by the author

Reference list

Grebenyuk AA (2018) Tipologiya posledstvii vozdeistviya trudovoi migratsii na sotsial'no-ehkonomicheskoe razvitie [Typology of the labour migration impact on social and economic development]. Migratsiya i sotsial'no-ehkonomicheskoe razvitie [Migration and socio-economic development]: 3(2): 89–102. https://doi.org/10.18334/migration.3.2.41032 (in Russian)

Zueva AS (2018). Primenenie sotsial'no-ehkonomicheskikh mer sovershenstvovaniya migratsionnoi politiki kak mekhanizm obespecheniya demograficheskoi bezopasnosti regiona (na primere Dal'nevostochnogo federal'nogo okruga) [The application of socio-economic measures to improve migration policy as a mechanism to ensure demographic security of the region (on the example of the Far Eastern federal district)]. Migratsiya i sotsial'no-ehkonomicheskoe razvitie [Migration and socio-economic development]: 3(4): 167–72. https://doi.org/10.18334/migration.3.4.41048 (in Russian)

Moiseev NN (2000) Sud'ba tsivilizatsii [The fate of civilization]. Put' Razuma [Way of Reason]. M.: Publishing house "Languages of Russian culture". (in Russian)

Yakshibaeva GV (2017) Analiz dinamiki i klassifikatsiya tipov trudovoi migratsii v Rossii [Analysis of dynamics and classification of types of labour migration in Russia]. Ehkonomika truda [Economics of Labour]: 4(4): 431–46. https://doi.org/10.18334/et.4.4.38589 (in Russian)

Other data sources:

1. Federal State Statistics Service data. URL: http://www.gks.ru

Information about the author

■ Dmitry Vladimirovich Pomazkin, Cand. Sci. (Econ.), actuary, non-government pension fund "Gazprombank Fund". E-mail: dmitri.pomazkin@mail.ru