Loss of Human Capital Caused by Emigration

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Abstract—Today, the question is often raised about the need to increase investment in human capital, the efficiency of its use, as well as attraction to the regions. Working on the accumulation of human capital, it is necessary to ensure that it does not “leak” from the country; especially for highly skilled workers. The article considers the features of modern migration statistics in Russia. Using the methodology developed by the author, the paper assesses the losses caused by emigration. According to the results of the study, it was found that emigration statistics do not correctly reflect real migration flows. The resulting estimates of the loss of human capital turned out to be quite significant. Taking into account the additional potential losses caused by a possible slowdown in the scientific and technological development of the country, it is necessary to pay close attention to the ongoing processes, the adjustment of economic development programs and migration policy.

Keywords: migration, statistics, brain drain, emigration, human capital, education, Russian economy

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Introduction. In works devoted to demographic and migration problems, it is reported that many qualified specialists and scientists have left and continue to leave Russia. According to various estimates, this number is very significant and has been steadily growing in recent years. For example, Academician of the Russian Academy of Sciences N.K. Dolgushkin at the General Meeting of the Russian Academy of Sciences spoke of this in April 2021 [1].

Often people leave in order to improve their living conditions, to fulfill themselves [2, 3]. From this point of view, emigration is a natural process, caused by various push and pull factors [4]. However, the outflow of qualified personnel jeopardizes the development of the economy of the donor country. In modern conditions, in many developed countries, there is a high demand for qualified specialists [5], for the sake of attracting which conditions are created for the realization of their human capital [6].

For Russia, the outflow of such specialists is especially critical. Apart from costs for their training and education (both from the state budget and from private expenditures of the population and firms), there are added potential losses from underproduction and a decrease in the efficiency of the economy, and inhibition of the scientific and technological development of the country.

In order to assess the scale of losses, it is necessary first of all to determine the number of citizens of the Russian Federation who annually leave Russia for permanent residence abroad. In practice, this turns out to be far from the most trivial task.

Problems of accounting for migration in statistics. Currently, most of the information about emigrants is provided by the Federal State Statistics Service, some data is published by the Ministry of Internal Affairs of the Russian Federation.

There are studies that show the inconsistency of the methodology for collecting data on migration flows since the collapse of the Soviet Union [7, 8]. Despite the fact that this methodology has been revised more than once, the correct display of migration flows has not yet been implemented.1

Until 2010, the population movement registration system focused mainly on data on registration at the place of residence (“propiska”) and departure sheets, which were compiled only upon deregistration to travel abroad for permanent residence [9]. The old system led to a large number of unrecorded arrivals of foreigners, since, in general, they were not registered at their place of residence.

Since 2011, according to the new methodology, people who register at the place of residence (for a period of nine months or more) began to get into the

1 Minutes of the meeting of the Scientific and Methodological Council of the Federal State Statistics Service (meeting No. 18) dated September 28, 2017. https://rosstat.gov.ru/storage/subblock/subblock_document/2018-06/28/prot18.pdf  (Accessed: May 31, 2021).
As a result, we are seeing a sharp jump in the dynamics of migration flows since 2011, where the share of foreign citizens and stateless persons (SP) is growing significantly: from 3–5% (before 2010) to an average of 80% or more after the revision of the methodology (Fig. 1). In fact, in many cases this is just a technical representation of the expiration of the registration. However, the fact that administrative sources reflect mainly administrative procedures, rather than people, was indicated as early as 1998 in the Recommendations on International Migration Statistics developed by the UN [10].

Since then, the accounting methodology has not changed dramatically [11]. But in 2016, in practice, among the reasons for changing their place of residence, the column “Returned after a temporary absence” began to be singled out; people who have ended their temporary registration without reference to their real movements are automatically included here. This problem is typical both for accounting for internal migration (moreover, the peculiarities of the data collection methodology significantly affect the conclusions about internal migration processes [12]), and for accounting for external migration (when taking into account external migration, the process of coordinating information between the Ministry of Internal Affairs, where data are available, has not yet been established), on the registration of citizens, and the border service of the FSB of Russia, where there is data on the facts of border crossing [13]). These and other significant shortcomings [7] in the method of recording movements reduce the quality of migration statistics.

When trying to analyze to which countries the population of the Russian Federation mainly leaves, the researcher will encounter the following picture (Fig. 2). More than 75% of emigrants go to the CIS countries. The top five recipient countries in 2019 included Ukraine, Kazakhstan, Uzbekistan, China and Tajikistan.

The share of most individual states included in the category “Other countries” does not exceed 0.5%. A similar distribution of emigrants is typical for previous years (2011–2018). the trend continued in general in 2020 (adjusted for a decrease in the flow of migrants due to the coronavirus pandemic).

Russia has close ties with all recipient countries that have become leaders on the basis of labor migration. Therefore, it is not at all surprising that people, after the termination of fixed-term employment contracts, return home, replenishing, according to the method of recording migrants, the category of those who left Russia (emigrants), or are automatically counted in the migration flow when crossing the border of the Russian Federation, not even associated with a change in place of residence.

Moreover, the same people can return to work in the region from which they were automatically discharged in the same calendar year (or receive a new registration to replace the expired one). So they will be taken into account several times in the reporting period, although in fact in this case we are not talking about permanent migrants, but about circular (temporary) ones [9]. This phenomenon can be seen in the statistics of migration flows between Russia and the CIS countries (Fig. 3).

In our opinion, estimates of migration flows within the framework of the existing approach are not fully adequate and consistent. This fact is also confirmed by experts [9]. To assess the loss of human capital, data on the emigration of citizens of the Russian Federation are more important (with a certain degree of assumption). Probably, there are not so many Russian citizens among the circular migration flows between the CIS countries and some others (China, Vietnam, India).

To date, it has been quite difficult to track the departed citizens. In fact, official statistics can take into account those leaving only on the basis of data on those who have withdrawn from registration and applied for permanent residence in another country [13], which not everyone does [14, 15]. On the other hand, a person does not always leave the country forever. You can participate in cyclic migration for years without setting yourself the goal of moving to permanent residence, or you can leave for a short-term study and decide to stay in another country for life [16]. You
can move to anywhere in the world, but work remotely in a domestic company. There are many options for organizing life, and not all of them can be statistically tracked. More important for our study are cases where the export of human capital is likely to occur. This often happens when moving to more developed countries with strict migration policies and high qualification requirements for migrants.

As a rule, immigration statistics are much more accurate than emigration statistics [13, 17]. Considering that departing people often do not notify the appropriate authorities about this, more accurate estimates of migration flows can be obtained by analyzing the statistics on the reception of recipient countries. Let us compare the data of Rosstat and the corresponding statistical bodies of some European countries hosting Russian residents (Fig. 4).

According to the data obtained, most of the discrepancies are significant, and most often in domestic statistics the number of emigrants is significantly underestimated. Other researchers come to a similar conclusion [17, 18].

**Estimation of losses of human capital as a result of migration processes.** Using the official data of Rosstat as a basis, we will evaluate the losses caused by emigration in the context of the theory of human capital. Without dwelling on the discussion about the theory of human capital and its features, we only note that human capital (HC) will be assessed according to a retrospective approach according to the methodology developed by the author [19].

The assessment methodology has been forcibly simplified from the point of view of the choice of industries that form the HC. This is due to the fact that in the available detailed data on migration, the only known characteristic of the quality of human capital is the level of education of those who left. Therefore, in this paper, HC will be estimated on the basis of past public and private spending on education.

For such an assessment, it is necessary to have information about the structure of citizens of the Russian Federation who left Russia by level of education.
Rosstat does not publish such details, so we will evaluate it according to the available data.

Let us turn to the table “Distribution of migrants aged 14 years and older by reasons for changing their place of residence and citizenship in the Russian Federation” and highlight the reasons why citizens of the Russian Federation mostly leave. It is not as easy as it seems at first glance. As mentioned above, in 2016, the option “Returned after a temporary absence” was included among the reasons, which began to include people whose registration had ended. In fact, the introduction of a new category has led to a significant change in the structure of citizenship for other reasons. For clarity, we will show the structure by citizenship for several years, including for the moment of transition to a new classification of causes, as well as the pandemic year 2020, which is specific in terms of migration and other processes (Table 1).

According to the data obtained, it can be seen that until 2016, for almost all reasons, foreign citizens and LBGs prevailed. According to some authors, the reason indicated during registration was automatically recorded after registration as well [20]. And with the introduction of the “Returned after a temporary absence” column, the citizenship structure in retirements due to work, study, environmental problems and a criminal situation, personal circumstances has changed significantly. This fact does not allow sharing data for 2011–2015 in the analysis, and from 2016 onwards, despite the fact that they were collected using the same methodology. The structure in 2016–2020 is quite stable and maintained for reasons that cause quite a lot of people to leave.

Based on the foregoing, we will use data on the emigration of citizens of the Russian Federation in the period from 2016 to 2020 for the following reasons: in connection with studies, in connection with work, due to the aggravation of the crime situation, due to environmental problems, due to inconsistencies natural and climatic conditions, circumstances of a personal nature, as well as other and unspecified. In most cases, Russian citizens leave for the above reasons, so it seems possible to impute the structure of those who left according to the level of education to emigrants-citizens of the Russian Federation who left Russia.

As a result of the calculations, the following structure of Russian citizens who left for other countries for 2016–2020 was obtained (Fig. 5).

A significant part of those who left had higher (including candidates and doctors of sciences) and incomplete higher education. Only according to known data, educated people annually in the structure of those who left are almost 60%, but the number of people who did not provide information about themselves is also quite high. As a rule, rather qualified people with higher, secondary or primary vocational education go to more developed countries, therefore, in our opinion, it would be wrong to assume that the unknown data mainly included people without education, thereby underestimating the losses of HC.

In 2020, due to the pandemic, the emigration flow has significantly decreased: for the selected reasons, it has almost halved for each of the levels of education. But these are temporary difficulties of the new reality, which will be resolved over time. Provided that the
| Indicator | 2015 | 2016 | 2019 | 2020 |
|-----------|------|------|------|------|
| | citizens of the Russian Federation | foreign citizens, SP, not specified | citizens of the Russian Federation | foreign citizens, SP, not specified | citizens of the Russian Federation | foreign citizens, SP, not specified | citizens of the Russian Federation | foreign citizens, SP, not specified |
| In connection with study | 9.7 | 90.3 | 95.6 | 4.4 | 85.4 | 15 | 90.7 | 9.3 |
| In connection with work | 4.8 | 95.2 | 94.3 | 5.7 | 93.5 | 7 | 93.4 | 6.6 |
| Return to previous place of residence | 48.8 | 51.2 | 81.8 | 18.2 | 97.1 | 3 | 95.9 | 4.1 |
| Due to aggravation of interethnic relations | 11.4 | 88.6 | 66.7 | 33.3 | 35.0 | 65 | 100.0 | 0.0 |
| Due to aggravation of the crime situation | 9.7 | 90.3 | 75.0 | 25.0 | 90.0 | 10 | 50.0 | 50.0 |
| Environmental trouble | 23.8 | 76.2 | 93.1 | 6.9 | 96.0 | 4 | 95.5 | 4.5 |
| Noncompliance with natural and climatic conditions | 32.1 | 67.9 | 95.5 | 4.5 | 95.6 | 4 | 91.7 | 8.3 |
| Personal reasons, family reasons | 29.2 | 70.8 | 92.3 | 7.7 | 95.8 | 4 | 92.4 | 7.6 |
| Other reasons | 23.5 | 76.5 | 71.1 | 28.9 | 85.2 | 15 | 44.3 | 55.7 |
| Returned after temporary absence | 0 | 0 | 14.2 | 85.8 | 14.2 | 86 | 11.4 | 88.6 |
| Reason not specified | 9.7 | 90.3 | 83.6 | 16.4 | 75.2 | 25 | 63.6 | 36.4 |

Source. Calculated by the author based on Rosstat data.
reasons stimulating departure persist, the flow of migrants can recover.

Information about the level of education is necessary in order to more accurately take into account the quality of the lost HC. Working in line with the prerequisites of a dynamic intersectoral model (DIM) with a block of human capital [19], it is necessary to estimate the amount of expenses for the training of one specialist with a certain level of education. In DIM, human capital is modeled in much the same way as fixed capital: the sphere of its formation is a fund-creating industry in the model, the human capital itself is formed through investments, and its retirement is also modeled (associated with the termination of people’s employment and retirement). In terms of the model, the assessment of the costs of training specialists who entered the job after training is the commissioning of human capital formed through investment in education.

Figure 6 shows the cost estimate of the commissioning of human capital, formed during training at a certain level for one person (on the example of average values in 2016–2020).

The calculations were carried out on the basis of published statistical data on public and private spending on education and the number of students according to the methodology developed by the author [19].

Based on the data obtained, it is possible to estimate the losses of HC as a result of the emigration of Russian citizens, expressed in terms of the introduction of HC. The calculation results are shown in Table 2.

During the period under study, the losses in terms of commissioning the HC annually amounted to about 1% of the total human capital introduced in Russia in the corresponding year in value terms.

To assess the losses of the HC itself, it is necessary to calculate the accumulated losses from a certain base year, taking into account the retirement rate. In the presented calculations, the base year is 2015, after which losses were calculated in terms of the commissioning of the HC. The retirement rate is calculated taking into account information on the average work experience in Russia (35 years according to the RF FIU).

The results of estimating the losses of accumulated HC are shown in Fig. 7. For comparison, the graph

Table 2. Losses of HC as a result of emigration of citizens of the Russian Federation in 2016–2020, in terms of the commissioning of HC, billion rubles (in 2019 prices)

| Year | Due to the departure of people with higher and incomplete higher education (including candidates and doctors of sciences) | Due to the departure of people with secondary and primary vocational education | Due to the departure of people with secondary education and below; did not indicate the level of education | Total |
|------|------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------|-------|
| 2016 | 8.3                                                                                                             | 3.1                                                                           | 7.2                                                                            | 18.6  |
| 2017 | 9.0                                                                                                             | 3.1                                                                           | 6.2                                                                            | 18.3  |
| 2018 | 9.3                                                                                                             | 3.3                                                                           | 6.7                                                                            | 19.3  |
| 2019 | 8.5                                                                                                             | 2.9                                                                           | 5.5                                                                            | 16.9  |
| 2020 | 4.2                                                                                                             | 1.8                                                                           | 3.2                                                                            | 9.2   |

Source. Calculated by author.
along the auxiliary axis shows the amount of accumulated human capital in Russia (formed at the expense of spending on education), calculated using the same method.

In total, taking into account the retirement of the HC (retirement), almost 129 billion rubles were lost by 2020, which is 0.2% of the total human capital accumulated by 2020 (formed at the expense of spending on education). Considering the fact that the data on the emigration of Russian citizens, apparently, are significantly underestimated, this loss estimate should be increased several times.

Moreover, based on data on labor productivity in Russia, it can be calculated that due to the emigration of the population, about 20 billion rubles are under-produced every year. According to statistics, most of the citizens of the Russian Federation who left were aged 20–35 years; on average, these people could have worked for about 30 more years. Without taking into account the pandemic 2020, this gives a potential value of underproduced GDP in the amount of about 530 billion rubles each year (approximately 0.5% of GDP in the corresponding year).

**Conclusions.** Considering that the migration policy of developed countries is quite strict with regard to the qualifications of migrants, those who want to move for some time are forced to improve their skills, remaining on the territory of the donor country, working for its benefit. In a conventionally short-term period, this leads to the appearance of positive externalities in the donor country, caused by the outflow of the qualified population. Unfortunately, sooner or later, not seeing opportunities for his growth and the application of his qualifications, a person will leave and take with him all the human capital accumulated at their own or state expense.

To retain the population, it is necessary, but not enough, to ensure socioeconomic well-being in the country. Following the hierarchy of needs according to Maslow [21], this significant and very important factor can be attributed to the basic need in the general hierarchy. People are forced to leave to no lesser extent by the lack of an inspiring environment (the prestige and demand for the profession, healthy competition), the lack of opportunities to implement their ideas [22]. According to Academician of the Russian Academy of Sciences A.P. Kuleshov: “When a country needs smart people, then the entire generation is slowly becoming smarter. And if smart people do not feel in demand, then they will gradually disappear” [23]. But this is the very human capital, which, with the effective organization of socioeconomic processes in the country, not only accumulates, but launches a multiplicative process of its reproduction.

The task of preserving people with high potential in the country has been set by the President of the Russian Federation for a long time [24]. Restraining and limiting factors for the preservation of the population as a whole are also known: this is the lack of funding for industries important in terms of the formation of human capital [23], and the current lack of a social environment that allows the realization of ambitions [25]. Until these problems are resolved, the outflow will continue.

The assessment of losses and gains caused by migration processes in terms of human capital is complicated by the quality of published migration statistics, but even on these data, the loss of human capital in Russia turned out to be significant.

It is also important to take into account that according to statistics (taking into account the problems of accounting for migrants discussed above), there are quite a lot of people who do not have education in the structure of newcomers (for example, in 2020, 49% of migrants arrived due to finding a job without education). Considering immigrants as a possible means to compensate for natural and migration losses of the population, it is necessary to continue working on programs to attract qualified personnel by establishing requirements for the level of education and/or qualifications, or establishing additional preferences for highly qualified visitors. This will ensure the improvement of the qualitative structure of the HC involved.

The process of socioeconomic transformation is long and difficult, but all the opportunities to create an attractive environment and improve the migration situation in the country exist, it remains only to set priorities.

**REFERENCES**

1. Russian Academy of Sciences: Since 2012, five times more scientists have gone abroad, TASS. Nauka.
https://nauka.tass.ru/nauka/11198355. Cited September 27, 2021.

2. L. Sjaastad, “The costs and returns of human migration,” J. Polit. Econ., No. 70 (5) Part 2, 80–93 (1962).

3. R. Kh. Simonyan, “Migration sentiment of Russian youth: A regional aspect,” Monitoring Obschhestv. Mneniya: Ekon. Sots. Peremeny, No. 6, 313–326 (2017). https://doi.org/10.14515/monitoring.2017.6.16

4. V. A. Koretskaya-Garmash, “The use of migrant labor – a threat or an advantage for the development of the Russian economy,” Ekon. Reg., No. 2, 471–484 (2016).

5. I. P. Tsapenko, “Intellectual migration in developed countries,” Nauka. Innov. Obrazov., No. 4, 125–151 (2008).

6. A. S. Maksimova, “Migration of highly qualified specialists from Russia: Estimation methodology and shadow trends,” Stat. Ekon., No. 16 (3), 34–43 (2019). https://doi.org/10.21686/2500-3925-2019-3-34-43

7. O. S. Chudinovskikh and A. V. Stepanova, “On the quality of federal statistical monitoring of migration processes,” Demogr. Obozr. 7 (1), 54–82 (2020).

8. V. V. Maslennikov, A. S. Linnikov, and O. V. Maslen- nikov, “Estimation of losses of the Russian economy from population migration to other countries,” Finan- sy: Teor. Prakt. 22 (2), 54–65 (2018).

9. O. S. Chudinovskikh, The use of administrative sources and sample surveys for the production of international migration statistics in Russia, Rosstat Scientific and Methodological Council on September 28, 2017. https://www.gks.ru/free_doc/new_site/rosstat/NMS/ prevz-chud.pdf. Cited May 31, 2021.

10. UN. Recommendations on International Migration Sta- tistics (United Nations, New York, 1998). https://rosstat.gov.ru/storage/mediabank/migr.pdf. Cited March 3, 2022.

11. O. S. Chudinovskikh, About the status of migration sta- tistics, Rosstat. https://rosstat.gov.ru/storage/mediabank/dEXAWk81/migrant.pdf. Cited May 31, 2021.

12. E. A. Edinak and A. G. Korovkin, “Assessment of the Influence of the Movement of the Population of the Russian Federation on Its Regional Structure in the Long Term,” in Collection of scientific papers of the Institute of Economic Forecasting of the Russian Academy of Sciences (MAKS Press, Moscow, 2018), pp. 528–549 [in Russian].

13. S. Ryazantsev and A. Luk’yanets, “Emigration of youth from Russia: Forms, trends and consequences,” Vestn. Tadzhik.o Gos. Univ. Prava, Bizn. Polit., No. 1, 59–72 (2016).

14. Yu. F. Florinskaya and L. B. Karachurina, “New wave of intellectual emigration from Russia: motives, channels and mechanisms,” Monitoring Obschhestv. Mneniya: Ekon. Sots. Peremeny, No. 6, 183–200 (2018). https://doi.org/10.14515/monitoring.2018.6.09

15. S. V. Ryazantsev and M. N. Khramova, “Factors of emigration from Russia in the post-Soviet period: Regional features,” Ekon. Reg. 14 (4), 1298–1311 (2018). https://doi.org/10.17059/2018-4-19

16. V. A. Ioncsev and A. G. Magomedova, “Socio-demo- graphic potential of regional development,” Ekon. Reg., No. 3, 89–102 (2015). https://doi.org/10.17059/2015-3-8

17. M. S. Savoskul, Emigration from Russia to non-CIS countries at the end of the 20th — beginning of the 21st century, Demoscope. http://www.demoscope.ru/weekly/2017/0719/analit01.php. Cited September 27, 2021.

18. M. Denisenko, Emigration from Russia to non-CIS countries, Demoscope. http://www.demoscope.ru/ weekly/2012/0513/tema05.php. Cited December 17, 2021.

19. A. O. Baranov, V. N. Pavlov, Yu. M. Slepennkova, and T. O. Tagaeva, “Dynamic input-output model with a human capital block applied to forecasting of the Russian economy,” Stud. Russ. Econ. Dev. 29 (6), 654–664 (2018).

20. N. Mkrtchyan, “Problems in the statistics of internal Russian migration, generated by the change in the accounting methodology in 2011,” Demogr. Obozr. 7 (1), 83–99 (2020).

21. A. Maslow, Motivation and Personality (Harper & Brothers, New York, 1954; Piter, St. Petersburg, 2019).

22. O. D. Vorob’eva and A. A. Grebenyuk, Emigration from Russia in the Late 20th Early 21st Century (Komitet Grazhd. Initsiativ, Moscow, 2016) [in Russian].

23. O. Sokolenko, “Since there is no competition, then smart people are not needed”: The rector of Skoltech about investments in science and the “brain drain” from Russia, Forbes. https://www.forbes.ru/forbeslife/429685-raz-net-konkurencii-i-umnye-lyudi-ne-nu- zhny-rektor-skolteha-ob-investiciyah-v. Cited September 27, 2021.

24. Meeting of the Council for the Development of Civil Society and Human Rights, President of Russia, Krem- lin. http://www.kremlin.ru/events/president/transcripts/deliberations/55947. Cited September 27, 2021.

25. A. Aronova, New “brain drain”: How and why the creative class leaves Russia for the USA, Forbes, http://www.forbes.ru/karera-i-sov-biznes/390953-novaya-utechka-mozgov-kak-i-zachem-kreativnyy-klass-tezzhaet-iz-rossii-v. Cited September 27, 2021.