"Agglomeration of flows": case of migration ties between the Arctic and the southern regions of Russia

Nadezhda Zamyatina[1] | Ruslan Goncharov[2]

[1] Lomonosov Moscow State University, Faculty of Geography, Russian Federation

[2] National Research University Higher School of Economics, Faculty of Urban and Regional Development, Russian Federation

Correspondence:

Nadezhda Zamyatina, Lomonosov Moscow State University, Faculty of Geography, 119991, Moscow, GSP-1, Leninskie gory, Russian Federation.

E-mail: zamyatina@geogr.msu.ru

ABSTRACT

Although the northern regions of Russia are relatively sparsely populated, they account for a significant portion of all-Russian migrations. Contrary to the widespread stereotype that these migrations are based on the return of people who migrated to the North and Arctic during the Soviet era, there is a two-way migration (although outflow from the North in many cases prevails). At the same time, a number of pairs of regions (northern - southern) have developed, migration between which is especially strong. To identify them, the method of calculating Migration Indices of Proportionality of (spatial) Structure was used. It is based on calculating migration volumes in a model based on the hypothesis of a uniform distribution of migration flows. The discrepancy between the real volumes of migration and the model ones makes it possible to identify extraordinary flows between a couple of regions. Examples of such flows are: Murmansk Oblast '- Novgorod Oblast', Magadan Oblast' - Belgorod Oblast ', Kamchatka Oblast' - Kaliningrad Oblast', Yamal-Nenets Autonomous Okrug - Republic of Bashkortostan, etc. The history of the "exit" of migrants to the North during the Soviet era, but also to a large extent with the unique institutional features of individual regions of Russia.

KEYWORDS

Arctic, migrations, agglomeration, proximity, space of flows

1. INTRODUCTION

Obviously, interregional socio-economic interactions are the most important factor in regional development, ensuring the spatial redistribution of material objects, finance and knowledge. Among interregional interactions, an important role is played by the movement of people, including one of its types - migration. Although the regional economy knows examples of very interesting studies of single movements (for example, international air travel), migration is perhaps the most actively studied type of movement, and it is relatively easy to study. Migrations ensure the redistribution of labour, knowledge and competencies (it is no coincidence that Feldman (Feldman, 1999) singled out-migration as diffusion of "ideas in people" among the main ways of spreading innovations). In addition, if we take into account the role of social networks in the formation of other types of economic interactions (such as financial and trade flows, for example), it will become obvious that migration is not only the transfer of people themselves as a labour force or as information "containers", but and as a factor in the formation of non-spatial (according to A. Torre - organized types of proximity (see: Torre & Rallet, 2005), which, in turn, influence the formation of other types of interactions (including the following migrations). The latter aspect is especially interesting in the context of modern trends in the development of regional science, and especially new economic and evolutionary geography. Paul Krugman (see: Fujita, Krugman & Venables, 1999) powerfully raised the question of the factors that explain the uneven spatial development. They put the agglomeration effect at the forefront, explaining how increasing returns make economic activity "incrementally" concentrate at points of attraction that have arisen, in urban agglomerations (link to a textbook or some of Krugman's earlier works!). However, they essentially stop at explaining, to some extent, the "frozen" agglomeration effect. They study the effect of fixed locations to which flows of capital, materials and information are secondary. However, if we shift the focus away from the locations to the flows themselves, or from the space of places to place of flows, in terms by Castels (Castels, 1996) we see that in the "space of flows" it is also evident.

We are talking about a phenomenon that is absolutely analogous to the agglomeration effect: once being chosen (perhaps even accidentally), the direction of movement due to the principle of increasing returns turns out to be more convenient for subsequent movements - for example, thanks to the possible help of migrant pioneers for fellow countrymen moving behind them.

In fact, we are dealing with a phenomenon that has been sufficiently well studied within the

framework of migration studies themselves (see Massey, 1998, etc). It is known that the presence of a diaspora or community of people from a certain place on a certain territory increases the flow of migrants from this place to this territory - something like self-amplification of flows is happening. Although there are many nuances in this issue, in general, the topic of the influence of diaspora ties can be considered as well studied - with the exception of the aspect that such phenomena of "self-reinforcement" of migration flows can be rediscovered as "agglomeration effect inflows", or even "agglomeration of flows".

Let's try to repeat the logic of the new economic geography in this respect. Suppose the phenomenon of self-amplification of flows would not exist. The most migration flows are formed under the influence of certain stable factors (at least within the framework of the old concept - the push and pool concept) - and would be directed, for example, from regions with low labour costs (low average wages) to regions with high labour costs (average wages); to build the logic of this model, you can use many other factors - all that does not depend on the "history of the issue", namely from earlier cases (wages, unemployment, competition in the labour market, real estate market, etc.). Whatever the set of these factors, it is obvious that two conditions with the same factors (acceptable, low labour cost) are conditionally equal in terms of the chances of giving migrants to the region with opposite conditions (for example, high labour cost). The "regulating" factor will be up to the potential recipient region. Two regions with the same factors of conditions, located at the same distance from the recipient region, theoretically, the same flows of migrants. This logic corresponds to the simplest models of socio-economic interactions between cities, for example, the Christaller model (см.: Fujita, Krugman & Venables, 1999), or various attempts at mathematical modelling of the settlement system (it seems Berkman was at the beginning: Berkman, 1958) model, which takes into account only the "weight" of cities in terms of their population and distance between them; city ranking is also often taken in the account (Karachurina, Mkrtchyan, 2020; Karachurina, 2018).

Empirical studies of migration flow using the example of such a vast country like Russia (Andrienko & Guriev, 2008; Fauzer, Lytkina & Smirnov, 2020; Karachurina & Mkrtchyan, 2020, 2018, 2016; Karachurina, 2018, Kumo, 2007, Mkrtchjan, 2004; Heleniak, 1999, 2009; Vakulenko, 2013; Zajonchkovskaia, 1991 etc.) show that population of migrant-receiving cities and distance between certainly play its role to a certain extent. However, there are a number of some "inexplicable", but rather powerful flows, such as powerful migration flows between the northern and southern regions of the country. In some cases, economic factors and distance are not enough to explain them (for example Zamyatina et al, 2019) - and here it

is just right, following Krugman's logic, to ask the question of "where did such strange flows come from".

The Arctic and North of Russia have a low infrastructure density, with an acute shortage of both infrastructure, population density, urban network and even "institutional thickness" (Zamyatina et al, 2020), and as a result, any interregional interactions are generally hampered here. For example, a sparse network of cities increases the average distance between them and, consequently, the distance that must be covered even between neighbouring cities. According to our earlier studies, the migration of residents of the northern cities of Russia, on average, is more distant than the southern ones (Zamyatina and Goncharov, 2018).

That is why the space of the North is especially sensitive to any manifestations of increasing returns (here you can recall the classic works of Kosmachev (Kosmachev, 1974) on frontier processes, who wrote that often even a separate fishing hut can have the advantage to become a starting point for a new industrial project over completely virgin spaces (with some reservations of cause). This sensitivity of the space of the North and the Arctic to the effects of increasing returns explains our focus on the northern territories in our work. In general, the authors are convinced that the North is an excellent testing ground for the study of many regional processes since in the extreme conditions of the North they appear brighter and more powerful, and this is especially true for phenomena associated with agglomeration, concentration, Spatio-temporal rhythms and patterns of formation of the settlement network.

2. HYPOTHESIS

The northern and Arctic regions of Russia still provide a significant part of the country's entire migration flow. The population of the Arctic zone in 2018 have 2.4 million people or about 1.6% of the country's population. At the same time, the share of migration in this region exceeds 5% of the national total (in 2018 - 139 thousand departures). The Far North and territories equated to it (for specifics of the definition, see below in the methodological section of the article): with a population share of 6.7%, the share in migration outflows is 16%.

There is a simple explanation for the power of this migration flow as a return movement of people who left earlier, back in Soviet times, to "explore the North" (in many respects, this opinion is formed under the impression of a really powerful departure of people from the North after the collapse of the Soviet system).

However, upon closer examination, it becomes clear that we are dealing with a much more complex phenomenon. In this article, to analyze the phenomenon under study, an analysis of

data on migration flows between regions of Russia for 2015-2019 is undertaken, according to Rosstat data. To explain the observed migration features, materials of qualitative research by authors and other researchers conducted in various cities of the Arctic were used.

The topic of migrations between northern and southern regions of Russia has repeatedly attracted the attention of researchers (for reviews see: «Children of the Nineties» ..., 2020; Zamyatina et al., 2019; Fauzer et al, 2020; total statistical observe: Mkrtchjan, 2002). In Soviet times, the main emphasis was placed on studying the circumstances of resettlement to the northeastern regions of the country, as a rule, in connection with the solution of economic problems of the development of these territories. There is a powerful work of the classic of this topic, J.A. Zajonchkovskaja on "fixing" migrants (Zajonchkovskaja, 1972). In the context of our research, it   is important that already in the 1970s, migration between the conditional "north" and "south" (more precisely, as it was customary to say in the USSR, "regions of the Far North", which included not only the northern, but also the eastern regions of the country, and "the main zone of settlement") were of a two-sided nature. The growth of the population of the northern and eastern regions of the country, including the Arctic regions, was the result of two counter-directed flows, among which the flow "to the North", in fact, only slightly exceeded the powerful counterflow, it was no coincidence that Zajonchkovskaja put the issue of "fixing" migrants at the fore - and not a question of strengthening measures to attract new settlers (Zajonchkovskaja, 1972). The problem of fixing and delaying new settlers in the North has a lot of economic and cultural aspects. At the end of the Soviet period, they were well characterized by Viktor Perevedentsev (Perevedentsev, 2010), and even earlier - in the work of the Magadan scientist Vladimir Yanovsky "Man and the North", due to his residence in the North, he deeply felt the problem: "Not everyone sees the North as a permanent residence - there are few of them. Every year tens of thousands of people who have lived in the North for ten years or more leave forever from its districts. The new population settles at the abandoned, but not yet cooled down, hearths of the old residents who left the North. Is this process logical? We think so. It should not be forgotten that in most northern cities and industrial settlements only the first generations of the population, attracted from other regions of the country, are formed, and the connection of this population with the regions of exit is quite strong for a number of reasons. It will be preserved for future generations as well. Therefore, the outflow of a part of the population of older age groups from the regions of the North will, apparently, take place for decades to come. " (Yanovskii, 1969. P. 37).

There is a point of view according to which one cannot at all consider migrations from the North as a one-time move in one direction or another: in practice, there is a complex chain of not only

return migrations but also, in fact, the phenomenon of distributed life, when people spend separate segments of life (often in within one year) in different regions of the country («Children of the Nineties» ..., 2020) - but this direction practically does not lend itself to statistical analysis, therefore, in this case, we will still consider migration, that is, moving for a relatively long period, recorded by statistics.

This is how we approached the specific features of northern and arctic migrations. The first and obvious feature is the two-way nature of migration. The phenomenon of western drift, when carefully studied, is not just a departure from the North and East of the country, but the resultant bilateral migration. This was also the case in Soviet times when the northern and eastern regions of the country were involved in powerful flows of both incoming and outgoing migration, and this was well understood in the Soviet Union (Zajonchkovskaja, 1972). It is important to understand that modern migrations, in which the population of the northern and Arctic regions of the country is involved, is also not just an outflow, it is an intensive migration exchange, where during this period powerful migration flows of outbound migration prevail over inbound ones powerful).

The second aspect of the Arctic and Northern migration specific features is the territorial structure and the redistribution of migration flows between North and South. There are, in general, three groups of factors influencing migrant flows: economic, social and institutional, as well as spatial.

The latter reason seems so obvious to demographers that even the classic writes without a shadow of a doubt that, for example, in Saint Petersburg "it is difficult to" breakthrough "into it from Siberia and the Far East" (Zaionchkovskaia & Nozdrina, 2008: 109) - this looks surprising against the backdrop of studies in the northern cities themselves, where St. Petersburg is viewed as an obvious and traditional direction of migration (Zamyatina, 2017). Moreover, the North and the Arctic are a clear exception when it comes to the work of spatial factors. The law of "decrease in the density of migration exchange by the population as regions move away from each other" (Rybakovskii, 2009) ceases to work here. As the researcher writes, "the indicators of arrivals to the Central Federal District from the Siberian and Far Eastern Federal Districts are increasing and become at the level of the indicators of arrivals from the federal districts adjacent to the Central Federal District. It is impossible to explain this by a higher level of intensity of final disposals from them. ... "(Rybakovskii, 2009: 50-51).

The system of migration between North and South is influenced by both economic and institutional and social factors. Earlier works (Zamyatina & Yashunskii, 2017) show (albeit

using indirect data from social networks on migrations only from Norilsk) that both principles work: economic (housing cost and average wages) and geographical factors (proximity of exit and entry points migrants) explain a significant number of migration cases - and at the same time, some directions are inexplicably popular - in particular, migration from Norilsk to Belgorod and St. Petersburg. The "inexplicability" of migrations, in particular, to Belgorod only by economic factors has been repeatedly stated by researchers (Mkrtchjan, 2004; Vakulenko, 2013). A study dedicated specifically to the "Belgorod phenomenon" showed that it was formed under the influence of a number of factors, among which the leading role belongs to institutional and social ones (Osobennosti ..., 2019).

The experience of qualitative sociological research in Arctic cities (Zamyatina, 2017, 2016b) allows us to put forward a hypothesis that complex multifactorial migration links (not reducible to a one-time cycle of "inflow to the North - outflow from the North") between individual regions of the Arctic, similar to the "Belgorod phenomenon" and regions outside the Arctic zone. Using the analogy with international migrations, one can also consider them as "territorial migration systems" - Savoskul, 2015) - however, apparently, this is a broader phenomenon associated not only with t h e migration itself but also with a number of economic phenomena (information flows, goods, etc.) - Zamyatina wrote about this, proposing the concept of "large regions" (Zamyatina, 2016a). It can be assumed that cases of "distributed life" («Children of the Nineties» ...) and other interesting and so far little studied phenomena of social life in the North and the Arctic are formed around them.

To approach the study of these complex phenomena, let us set the task of identifying cases of "extraordinary" migration from the point of not the economy or the previous place of living before moving to the North, but the very geographic structure of migration (the methodology of this kind of research was proposed by O.L. Rybakovskiy (Rybakovskiy, 2009) in his doctoral dissertation. Despite some of its controversy, it has an undoubted advantage: it allows (in contrast to the more widely used coefficients such as coefficients of interdistrict migration links intensity, CIMLIs by L.L. Rybakovskiy – Rybakovskiy et al, 2019) to single out "unusually" powerful migration flows on a national scale as a whole, and not only in pairs of regions.

3. METHOD OF WORK

To characterize individual migration directions (in our case, pairs of regions) there was taken the Migration Indices of Proportionality of (spatial) Structure (MIPS) of departures, arrivals or

turnover. The MIPS indicators of outflows represent the ratio of the real volumes of interregional outflows to such notional volumes of outflows in which there would be no preference between the regions of exit and entry of migrants. In this case, all private interregional volumes of departures are proportional to the total interregional volumes of departures from the regions where migrants leave and the total interregional volumes of arrivals to the regions where migrants enter. The value of any MIPS indicator of departures reflects the level of migration preferences in departures in a particular pair direction. (Rybakovskiy, 1999: 10). It should be emphasized that the MIPS parameter is a characteristic of the pair direction, and not of individual regions. The MIPS on disposal is used in this article.

The matrix of migration flows provided by Rosstat upon request (in our case, for 2015– 2020) is used as the initial data. MIPS of outflows was calculated from the average value of the volume of migration flows over five years using the following formula (Rybakovskii, 1999):

$$MIPS \; EM_{ij} = M_{ij} \, / \, (EM_i * IM_i \, /(OM - IM_i),$$

Where $MIPS \; EM_{ij}$ – MIPS departures from region i to region j, M_{ij} – average volumes of departures from region i to region j, EM_i – the total volume of departures from region i, IM_i – total arrivals to region i, IM_j – total arrivals to region j, OM – total turnover of migration between all regions.

In accordance with the recommendations of the author of the methodology, in order to increase its validity, regions giving statistically insignificant volumes of migration were excluded from the calculation: the Republic of Ingushetia, the Republic of Tyva, the Republic of Kalmykia and the Republic of Altai, and the following regions are combined: the Republic of Adygea and Krasnodarskii Krai, the Republic of Khakassia and Krasnoyarskii Krai, Magadan Oblast' and Chukotka Autonomous Okrug, Jewish Autonomous Oblast' and Khabarovskii Krai, Moscow Oblast and the City of Moscow, Leningrad Oblast and the city of St. Petersburg, as well as three republics: Karachay-Cherkessia, Kabardino-Balkaria and North Ossetia - Alania.

The results represent a matrix in the rows of which the MIPS of departures from the sought region to each of the regions of the country (or their associations) are reflected. A fragment of the matrix is shown in Fig. 1.

region j (to immigrate) → ↓ region i (from emigrate)	Karelia, Republic of	Komi, Republic of	Nenets, Autonomous Okrug	Arkhangelsk, Oblast	Vologda, Oblast	Kaliningrad, Oblast	Murmansk, Oblast	Novgorod, Oblast	Pskov, Oblast	Saint-Petersburg & Leningrad, Oblast	...
Karelia, Republic of		0,63	0,53	2,33	4,08	1,25	10,23	2,61	2,77	5,28	...
Komi, Republic of	0,73		6,74	4,09	3,83	1,63	0,79	1,09	0,96	1,89	...
Nenets, Autonomous Okrug	0,40	9,51		38,30	3,35	1,17	1,02	1,60	0,60	1,62	...
Arkhangelsk, Oblast	2,35	4,38	27,32		13,57	2,17	4,78	1,31	1,28	3,09	...
Vologda, Oblast	4,47	4,05	3,09	14,29		1,04	4,92	1,72	1,33	3,31	...
Kaliningrad, Oblast	1,26	1,51	1,02	1,93	0,95		2,66	0,85	1,60	1,94	...
Murmansk, Oblast	9,84	0,65	0,92	4,12	5,15	2,36		5,07	3,70	3,35	...
Novgorod, Oblast	2,54	0,74	1,55	1,15	1,51	0,73	3,19		5,41	6,11	...
Pskov, Oblast	2,55	0,84	0,56	1,26	1,21	1,15	2,76	5,84		5,50	...
Saint-Petersburg & Leningrad, Oblast	6,38	2,38	1,83	3,75	3,81	1,52	3,76	7,39	6,67		...
...	...	...	...	...	...	...	...	...	...	...	

Fig. 1. Sample of MIPS matrix (emigration), Northwestern Federal District, 2015-2019

For further analysis, it is also necessary to determine which regions are considered Arctic and northern. This task is fraught with certain difficulties. In Russia, there are the concepts of "regions of the Far North and equivalent areas" and "Arctic zone of the Russian Federation", which have different legal status and only partially coincide territorially (for more details, see: Zamyatina, 2020). At the same time, many regions are part of the officially approved Arctic zone only partially, and if we take the "Far North ..." category, it also includes a number of regions or their parts located in the very south of the country (Primorskii Krai, Republic of Tyva, etc.). Meanwhile, in the works of many international teams, "Arctic" is more often understood as some kind of intermediate option between the "Arctic zone of the Russian Federation" officially approved by the Presidential Decree and "regions of the Far North and equivalent areas" (for example: Statistics Norway, 2015 and subsequent issues). We will do the same, considering the following regions of Russia as Arctic and / or northern ": Murmansk Oblast', Republic of Karelia, Arkhangelsk Oblast', Nenets Autonomous Okrug, Yamal-Nenets Autonomous Okrug, Khanty-Mansiysk Autonomous Okrug - Yugra, Republic of Sakha (Yakutia), Magadan Oblast' and Kamchatka Oblast' and Chukotka Autonomous Okrug (Fig. 2).

The Russian Arctic & The Russian North

the Arctic Zone border
the Extreme North border
equated to the Extreme North
the analyzed regions

Notes: as of 01.01.2020

400 km

Fig. 2. Borders of the Russian Arctic Zone and the Extreme North, as of 01.01.2020

4. RESULTS

Among all 359 cases of large extraordinary departure flows (MIPS more than 2.5, in other words, real migration rates are 2.5 times or more higher than theoretical ones), almost all flows to *distant regions* are flows to the regions of the North and the Arctic (see Appendix).

The criterion of distance is somewhat problematic however. Rybakovskii argues that, in general, the factor of the contiguity of regions, like the mileage, in the formation of migration flows is rather conditional, and as the author writes, most of all migrations are intensified by the presence of a railway connection (Rybakovskii, 1999: 177-178).

Almost every Northern/Arctic region has a set of distant partners, sometimes unexpected, migration ties to which are particularly close. To such groups, it seems possible to apply the term previously used to characterize international migration – territorial migration systems (Savoskul, 2015), implying close bilateral migration links. In a broader context (taking into account the flow of knowledge, innovation, and other manifestations of not only migration itself, but also economic activity), these are "large regions" whose existence was previously indicated

(Zamyatina, 2016a; «Children of the Nineties»...).

These migration nodes are as follows.

Saint Petersburg and Leningrad Oblast' is a powerful migration center of the entire European North, connected by bilateral migrations not only with the neighboring Republic of Karelia, Novgorod Oblast' and Pskov Oblast', but also with the Vologda Oblast', Arkhangelsk Oblast' and Murmansk Oblast' (all three have approximately the same MIPS values of about 3, then as Novgorod and Pskov - 6.1 and 5.5, respectively).

In general, this is an easily explainable phenomenon, but something else is interesting, namely: migrations to Saint Petersburg did not give high MIPS values anywhere in Siberia or in the Asian North: the MIPS of outgoing migration to St. Petersburg only slightly exceeds 1. This contradicts the well-known (and supported by a number of studies - in particular, in Norilsk - (Zamyatina, 2017)) thesis that Saint Petersburg is the most attractive migration center for northerners and Siberians. After all, this city is a traditional center of education for the North. Northern youth have traditionally entered Leningrad universities for decades, including through special programs (for example, at the Institute of Peoples of the North at the Herzen Russian State Pedagogical University) (Zamyatina, 2017). For decades to this day, the leading institutes of a number of industries have been operating, providing "development services" (Sysoev, 1979) for the regions of the Far North (for example, the leading geological institute of the country - the A.P. Karpinsky All-Russian Research Geological Institute), etc. In general, it seemed that it was not necessary to prove the importance of Leningrad / St. Petersburg for the North and the Arctic - and it is logical, that it could be seen as a solid base for increased migration. However, the analysis showed that the exit of migrants from the regions of the Asian North to St. Petersburg by no means reaches extraordinary values, and in a number of regions (Yamal-Nenets Autonomous Okrug, Khanty-Mansi Autonomous Okrug) - the jade is below the model. Slightly higher than 1 are the MIPS of emigration to Saint Petersburg only from the Far Eastern regions - Yakutia (1.07), Kamchatskii Krai (1.69), Khabarovskii Krai (1.16), Magadan Oblst' and ChAO (1.02), Sakhalin Oblast' (1.06). This indicator is slightly less than one in the Krasnoyarskii Krai, in most of the Siberian regions (except for the Omsk Oblast'). In the case of Norilsk, where the connection with St. Petersburg was recorded by surveys, the explanation can be that the migration flow of Norilsk residents to St. Petersburg is "drowning" in the generalized statistics for the Krasnoyarskii krai. However, the respondents in Norilsk repeatedly reported that "all Leningraders have already left" - and apparently, this is the explanation that should be taken as the main one. In other words, the reverse migration of those who initially went to "explore the North" (which O. Rybakovskii identified as the main

factor of connectivity between the regions of the Far North and the regions of the western part of the country), in fact, has already dried up, and the importance of St. Petersburg as a migration partner for the entire Russian North and the Arctic is now outdated: it remains the main partner of only the European North.

At the same time, the European North does not represent an exclusively "monocentric" system: Murmansk Oblast 'has extraordinarily powerful migration flows not only with St. Petersburg but also with the Arkhangelsk Oblast' and Vologda Oblast', and what is especially interesting, with the Novgorod Oblast' and Pskov Oblast' (respectively, 5 and 3.7 times more than calculated).

Migration flows from the Arkhangelsk region to the Novgorod and Pskov regions are only slightly higher than the calculated ones (1.31 and 1.28, respectively) - but the region has powerful, moreover, bilateral ties with Yaroslavl Oblast'.

However, the aforementioned ties can still be considered to some extent "neighborly".

Against this background, really distant migration systems are especially interesting - here the **_Kaliningrad Oblast' and Belgorod Oblast'_** stand out most clearly. Both regions are among the five most attractive regions for migration in the country (along with Moscow and St. Petersburg with the corresponding regions, and the Krasnodarskii Krai). But what's interesting here is that both the Kaliningrad Oblast' and Belgorod oblast' are extraordinary "magnets" of migrants, in fact, from only two sources, from the nearest neighbors (in the case of the Kaliningrad region, this can be conventionally considered the Smolensk region) and from the Far North. In the case of the Kaliningrad region, it is obvious that the coastal regions are gravitating towards it. These regions are the Kamchatskii Krai, Murmansk, Sakhalin, Magadan regions (the MIPS of outgoing migration is more than one in the Krasnoyarskii Krai and the Komi Republic also having high MIPS of outgoing migration to Kaliningrad Oblast'). In relation to the Belgorod region, the "continental" component is more noticeable: it is also attractive for migrants from the Magadan region and the ChAO, Kamchatka Territory, but also the Komi Republic (mainly, we are talking about Vorkuta) and Yamal-Nenets Autonomous Okrug. More than 1 are MIPS emigration to the Belgorod region from the Krasnoyarsk Territory (Belgorod is one of the most popular destinations for the departure of the Norilsk residents), the Arkhangelsk Region, NAO, Yakutia, and a number of regions of the Far East.
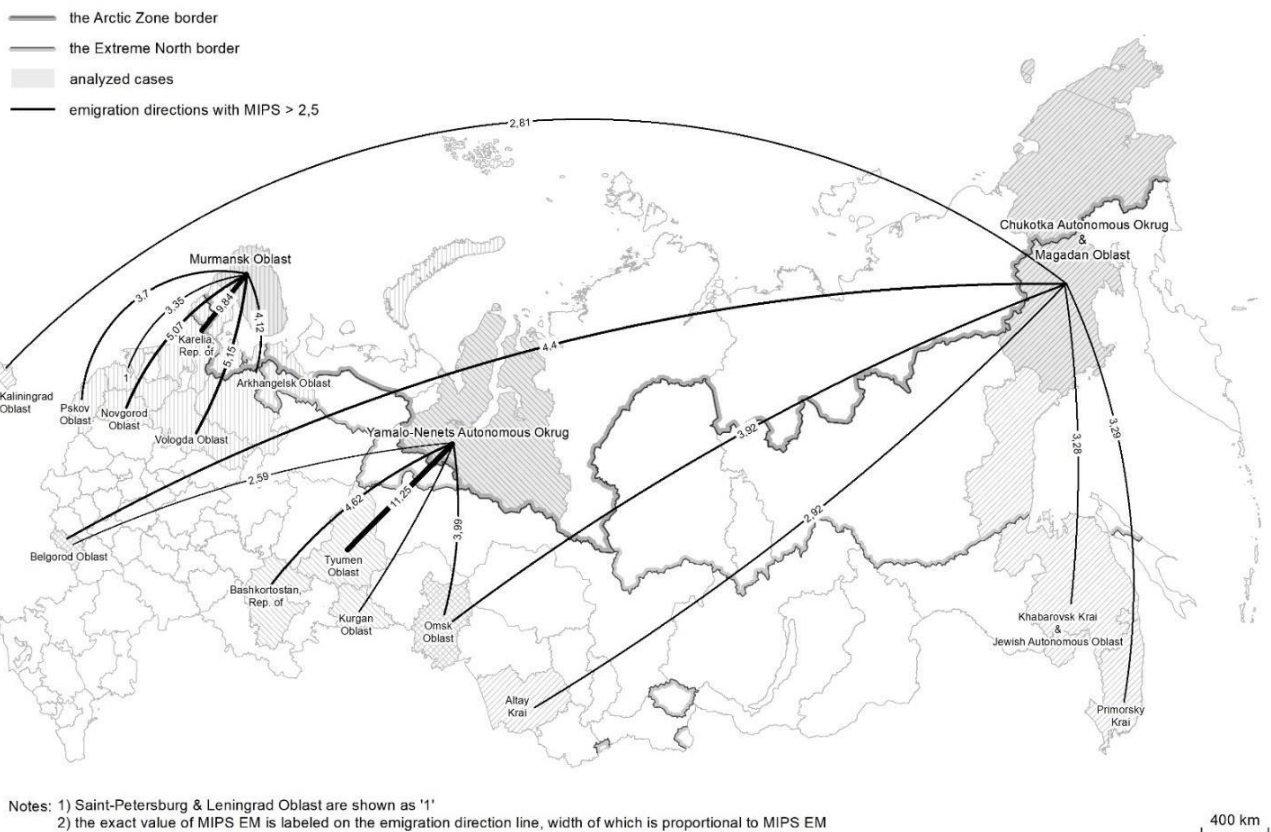
The Russian Arctic: Emigration Cases

Fig. 3. Some selected Russian Arctic Emigration Cases: MIPS data for 2015-2019 migration statistics

What is important, these areas, which are the most powerful migration "magnets" in the country, are in fact popular with the northerners: from anywhere from the Urals or the Volga region practically nobody do not go to the Belgorod region. The opposite is also true: the northern regions

- Murmansk, Kamchatka, Magadan regions - are extraordinary directions of migration from Belgorod Oblast'. In other words, a unique system of bilateral long-distance migration links has developed between the Kaliningad and Belgorod regions, on the one hand, and the regions of the Far North, on the other. It is associated with studying at a university, changing residence after retirement, taking vacations, etc. The system of bilateral relations is rather difficult and multi- stage, and is categorically not reducible to the binary scheme "came to the North - left the North" (for example, one of the authors interviewed in Norilsk a pensioner who had moved to Belgorod and returned to Norilsk to earn money due to the serious illness of his wife who remained in Belgorod). The system of such ramified and repeated migrations between the North and the South is described on the basis of many years of qualitative research in the book: («Children of the Nineties» ..., 2020).

Interestingly, Krasnodarskii Krai does not give a similar picture, although, judging by field studies, this is a popular and traditional area of settlement for the migrants from the North. With regard to migration to the Krai, in general, there are similar phenomena as in the Belgorod and Kaliningrad regions, but on a smaller scale: IIPS outputs in Krasnodarskii Krai are in the range from 1 to 2 for the Magadan region and ChAO, the Republic of Sakha (Yakutia) Republic Komi, Sakhalin Oblast, Kamchatka Krai, Yamal-Nenets Autonomous Okrug and Khanty-Mansi Autonomous Okrug (here IIPS are almost equal to one), etc. However, in contrast to Belgorod and Kaliningrad regions, Krasnodarskii Krai shows increased (compared to the calculated model) values of migration not only from the North, but from many regions of the country - for example, IIPS of outgoing migration are in the range from 1 to 2 for the Krasnodarskii Krai, observed not only for the northern regions, but also for the Primorskii Krai and Krasnoyarskii Krai, Sverdlovsk and Chelyabinsk, Kemerovo and Irkutsk, Tomsk and Omsk Regions, etc.

The reasons for the extraordinary preference of Belgorod by the northerners are analyzed in detail by us in the article (Osobennosti ..., 2019). Its brief conclusions boil down to the fact that a large role in shaping the flow of migrants from the North was played by: 1) proximity to Ukraine for ethnic Ukrainians migrants (many of them returned from the North not to Ukraine, but to Belgorod region as the region of Russia[1] closest to a large Ukrainian urban center, Kharkov), 2) a number of institutional factors associated with the targeted attraction of northerners to Belgorod (including policy in the field of real estate and higher education), 3) a relatively favorable climate, 4) in recent decades - already a positive image of Belgorod as places of migration and the presence in it of relatives and friends, as well as compatriot organizations). Kaliningrad Oblast' is today positioned as "Europe within Russia", but initially a certain role was apparently played by educational institutions in the field of fishing (for example, the Baltic State Academy of the Fishing Fleet) and service in the Navy.

In addition to the specifically named system "North - Belgorod + Kaliningrad Oblast", the study also revealed a number of interesting bilateral systems that could be called "local" if they did not reach thousands of kilometers in scope:

- Khanty-Mansy Autonomous Okrug - Yugra – Republic of Dagestan (a very complex and multidimensional system of interrelations between regions has formed here, including

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[1] This is indirectly confirmed by the fact that Belgorod differs from many regional centers precisely in the high proportion of those born outside of Russia - and according to census data, according to survey data: "Only in Belgorod is this ratio approximately twofold (29.1% of natives of other settlements of Russia and 12, 8% - the former republics), in other cases there are 3-5 times more Russians by birth (in Vladivostok, even 10 times). " (Zaionchkovskaia & Nozdrina, 2008: 101).

the supply of, for example, traditional products like mutton - see Kapustina, 2014; Sokolov, 2017)

- Khany-Mansy Autonomous Okrug - Yugra – Republic of Bashkortostan and Yamal-Nenets Autonomous Okrug - Yugra – Republic of Bashkortostan (initially, connections were formed during the recruitment of labor for oil fields in the old oil production areas in Bashkortostan, but these connections are being reproduced now through a number of family, professional and other ties (Zamyatina & Pelyasov, 2013).

- Nenets Autonomous Okrug - Kirov Oblast' (the region, along with the Komi Republic, is a transport and logistics base for the development of the Nenets Okrug),

- Magadan Oblast' - Altaiskii krai. Here, too, the impetus for the formation of migration links was the recruitment of labor in the Soviet era, followed by return migration. So, in the 90s from the Magadan region there were "two tendencies in the formation of migration flows: the residents of the region tried to leave for the areas from where they once came and where relatives remained (Ukraine, Rostov region, Krasnodar, Primorsky, Stavropol, Altai regions), or in areas where housing was built for northerners (Moscow, Vladimir, Tula regions) "(Soboleva & Mel'nikov, 1999: 59). It is curious that today only Altai Krai (and the closer Primorsky Krai) remained extraordinary among the named directions. Apparently, the situation here is to some extent similar to Moscow and St. Petersburg, Krasnodarski Krai and other regions attractive on a national scale: these areas receive migrants more or less evenly from different regions of the country, and extraordinary values are observed only for regions neighbors. The situation is different, as already mentioned - the Belgorod and Kaliningrad regions are an amazing "dream of the northerners". Altai krai is from the second group - but only for a narrower range of regions (some excess of migration flows over the calculated ones is also observed between Altaiski Krai and Kamchatski Krai).

Similar results were obtained for the pair "Magadan Oblast' - Republic of Ingushetia" in the initial analysis of the entire complete migration matrix, but Ingushetia was excluded as a region with insignificant migrant flows according to Rybakovskii's methodology. Field studies in Magadan Oblast, however, show that the increased volume of migrants between Magadan Oblast' and Ingushetia has a real basis: Ingush traditionally work in the gold mining industry of Kolyma. Another interesting phenomenon is, apparently, a relatively recent history of close ties between the Omsk region and the Magadan Oblast' - Chukotka Autonomous

Okrug group (in absolute terms, the migration flows between the Omsk region and Chukotka are several times higher than those between the Omsk and Magadan regions, so that the orientation towards the Omsk region is a purely ChAO phenomenon). It can be assumed that the beginning of these ties was laid during the governorship (2001—2008) of the Chukotka Autonomous Okrug by Roman Abramovich, who was also the founder of the large oil company Sibneft, which had large assets in the Omsk region (an oil refinery, etc.). Obviously, using his social and corporate ties, the governor initiated strengthening of ties between enterprises and organizations of Chukotka and the Omsk region - for example, he organized the trip of Children from Chukotka to the rest in the Omsk Region, etc. (Detey ..., 2001)

5. CONCLUSION

Migrations between the Northern and Southern regions of the country are one of the most important clusters of extraordinarily powerful migrations - along with migrations from nearby regions to Moscow, St. Petersburg, from Chechnya to neighboring southern regions of Russia, and also between many regions of Siberia and Novosibirsk region. Apart from partly the latter case, migrations between North and South are distinguished by a unique, more than 1000 km, range of movements. The range of close stable bilateral migration ties is both a paradox and a specificity of Arctic migrations.

The work confirms the well-known phenomenon of the almost complete absence of significant migration links between the regions of the North themselves, except for the pair of Murmansk - Arkhangelsk regions and, to a much lesser extent, regions of the Far East, the population of which is actively migrating among themselves (for example, Magadan region - Republic of Sakha (Yakutia) gives MIPS (departures) of 1.2 from the Magadan region to Yakutia and 1.8 back). Thus, the Arctic and northern migrations are in the overwhelming majority of cases of migration between the North and the South, and not with neighboring regions. This phenomenon is known in the studies of the North, but generally completely out of the general national trend of an increase in the density of migrations with a decrease in the distance between the exit territories. and the entrance of migrants. The North and the Arctic give the exact opposite picture.

There are three groups of characteristic long-distance migrations between, conventionally, North and South:

1. Migrations from the Far North and the Arctic to some of the most attractive regions of

the country: to Saint Petersburg and the region, to Krasnodarskii Krai, etc. However, against the national background, the flows of northerners here are not something extraordinary (except for migrations from the European North to St. Petersburg).

2. Migration to regions that are attractive for almost all regions of the Far North and the Arctic - to the Belgorod and Kaliningrad regions, where a powerful institutional infrastructure for attracting migrants has been created (real estate companies specialized "for the northerners", the policy of educational institutions, powerful compatriot organizations, etc.)

3. Migration between pairs of historically closely related regions, among which the most striking are: Murmansk Oblast' - Novgorod Oblast', Arkhangelsk Oblast' - Yaroslavl Oblast', Murmansk and Arkhangelsk regions - St. Petersburg, NAO - Kirov Oblast', Khmanty-Mansy AO- Yugra -- Dagestan, Yamal-Nenets Okrug - Republic of Bashkortostan and Khmanty-Mansy AO - Yugra - Republic of Bashkortostan, ChAO (formally: Magadan Oblast' and ChAO) - Omsk Oblast', Magadan region - Altaiskii krai (and possibly Ingushetia).

The main result of this article is an inventory of migration flows that are "too" powerful in terms of mutual location and involvement of regions in migration processes. Apparently, these are "agglomerations of flows", fueled not only and not so much by the general economic factors of migration, but also by the especially powerful role of increasing returns on migration flows once "launched" in one way or another. In other words, this work has identified migration flows between the North and South of Russia, the existence of which, with a high degree of probability, relies on country ties. The experience of field study of the migration situation in some of these regions allows us to confidently assert that such ties are indeed strengthened due to the formation of a number of types of organized (Torre & Rallet, 2005) proximity in the corresponding pairs of regions. First of all it is social proximity (social networks, including institutionally formed communities and even organizations to promote resettlement[2], also organizational (branches of firms, including the networks of real estate firms, as well as educational institutions - links to interviews in Belgorod - university, branches, Norilsk, etc.), etc. Such migration flows should be considered in the context of preparation institutional "routes" for future interactions - commodity, financial, knowledge and others. At the first stage of the study, the specific applied mechanisms of using such

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[2] For ex: Interview of L.A. Solomahka (Deputy of the Norilsk city Council) by Zamyatina, 2019 etc. (Field materials gathered by the same grant project).

"agglomeration of flows" are not entirely obvious. However, based on studies of the role of migration in economic (and especially innovative) processes (here the works of AnnaLee Saxenian (for ex.: Saxenian, 2006) stand out especially), it can be assumed that such networks can be used to enhance innovation processes and knowledge flows. The management of these processes is especially important for such difficult-to-manage development regions as the North and the Arctic.

ORCID

Nadezhda Zamyatina, https://orcid.org/0000-0002-4941-9027
Ruslan Goncharov, https://orcid.org/0000-0002-8677-5354

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APPENDIX

Recipient regions of extraordinarily powerful migration flows (MIPS more than 2.5)

Region of departure	Receiving regions: cases of the greatest excess of model values (in descending order of MIPS)								
	1	2	3	4	5	6	7	8	9
Altai krai	Novosibirsk Oblast'	Kemerov o Oblast'	Tomsk Oblast'	Krasnoyarskii Krai and the Republic of Khakassia	Magadan Oblast' and ChAO	Kamchatskii Krai			
	11,52	8,89	5,34	3,15	2,91	2,63			
Amur Oblast'	Khabarovskii Krai and JAR	Primorski i Krai	Zabaikalskii Krai	Sakhalin Oblast'	Republic of Sakha (Yakutia)	Magadan Oblast' and ChAO			
	20,57	9,14	6,51	6,31	4,82	2,52			
Arkhangelsk Oblast' without NAO	HAO	Vologda Oblast'	Yaroslavl Oblast'	Murmansk Oblast'	Komi Republic	Санкт-Петербург			
	27,32	13,57	8,31	4,78	4,38	3,09			
Astrakhan Oblast'	Volgograd Oblast'	Republic of Dagestan	Chechen Republic						
	8,55	8,41	7,47						
Belgorod Oblast'	Kursk Oblast'	Voronezh Oblast'	Magadan Oblast' and ChAO						
	10,00	7,49	3,57						
Bryansk Oblast'	Orel Oblast'	Smolensk Oblast'	Kaluga Oblast'	Kursk Oblast'					
	8,01	6,80	4,39	3,87					
Vladimir Oblast'	Ivanovo Oblast	Nizhny Novgorod Oblast'	Moscow City and the Moscow Oblast'						
	7,79	5,95	2,85						
Volgograd Oblast'	Astrakhan Oblast'	Saratov Oblast'	Chechen Republic						
	6,73	3,19	2,56						

Region								
Vologda Oblast'	Архангельская область без НАО	Yaroslavl Oblast'	Murmansk Oblast'	Republic of Karelia	Komi Republic	г. Saint Petersburg and Leningrad Oblast'	Kostroma Oblast'	Nenets Autonomou s Okrug
	14,29	8,92	4,92	4,47	4,05	3,31	3,27	3,09
Voronezh Oblast'	Lipetsk Oblast'	Belgorod Oblast'	TambovOblast'	Kursk Oblast'				
	10,81	5,98	4,11	2,91				
Zabaikalskii Krai	Republic of Buryatia	Иркутска я область	Amur Oblast'	Khabarovskii Krai and JAR	Primorskii Krai	Novosibirsk Oblast'	Krasnoyarskii Krai and the Republic of Khakassia	Republic of Sakha (Yakutia)
	24,95	10,02	6,76	4,19	3,82	3,49	2,83	2,81
Ivanovo Oblast	Kostroma Oblast'	Vladimir Oblast'	Yaroslavl Oblast'	Nizhny Novgorod Oblast'				
	10,07	8,30	5,57	3,72				
Irkutsk Oblast'	Republic of Buryatia	Krasnoya rskii Krai and the Republic of Khakassia	Zabaikalskii Krai	Republic of Sakha (Yakutia)	Novosibirsk Oblast'			
	15,07	9,63	7,37	4,48	4,35			
Kaliningrad Oblast'	Kamchatskii Krai	г.Sevasto pol'	Smolensk Oblast'	Murmansk Oblast'				
	4,24	3,10	2,95	2,66				
Kaluga Oblast'	Bryansk Oblast'	Tula Oblast'	Smolensk Oblast'	Moscow City and the Moscow Oblast'				
	4,49	4,10	3,43	2,99				
Kamchatskii Krai	Primorskii Krai	Kaliningr ad Oblast'	Khabarovskii Krai and JAR	г. Sevastopol'	Belgorod Oblast'			
	8,52	5,66	3,72	3,04	2,75			
KBR, KCR and North Ossetia-Alania	Stavropolskii Krai	Chechen Republic						
	9,78	4,88						
Kemerovo Oblast'	Tomsk Oblast'	Novosibir sk Oblast'	Altai krai	Krasnoyarskii Krai and the Republic of Khakassia				

	15,89	9,67	7,01	4,20					
Kirov Oblast'	Mari El Republic	Komi Republic	Udmurt Republic	Nizhny Novgorod Oblast'	Republic of Tatarstan	Nenets Autonomous Okrug	Kostroma Oblast'	Permsky Krai	Архангельс кая область без НАО
	15,99	9,68	7,10	4,40	4,08	3,89	3,29	3,16	2,65
Kostroma Oblast'	Yaroslavl Oblast'	Ivanovo Oblast	Kirov Oblast'	Vologda Oblast'	Nizhny Novgorod Oblast'				
	17,41	11,48	3,54	3,50	**2,73**				
Krasnodarskii Krai and the Republic of Adygea	Rostov Oblast'	Stavropol skii Krai	KBR, KCR and North Ossetia-Alania						
	4,66	2,84	2,71						
Krasnoyarskii Krai and the Republic of Khakassia	Irkutsk Oblast'	Tomsk Oblast'	Kemerovo Oblast'	Altai krai	Novosibirsk Oblast'	Republic of Buryatia	Republic of Sakha (Yakutia)		
	7,54	4,83	4,66	3,09	3,06	2,88	2,54		
Kurgan Oblast'	Chelyabinsk Oblast'	Tyumen region without Autonom ous districts	Sverdlovsk Oblast'	Khanty-Mansi Autonomous Okrug - Yugra	Yamal-Nenets Autonomous Okrug				
	11,55	11,45	7,99	4,55	3,17				
Kursk Oblast'	Belgorod Oblast'	Orel Oblast'	Bryansk Oblast'	Voronezh Oblast'					
	11,06	9,82	3,29	3,07					
Lipetsk Oblast'	Voronezh Oblast'	Tambov Oblast'	Orel Oblast'						
	11,29	5,00	2,76						
Magadan Oblast' and ChAO	Belgorod Oblast'	Omsk Oblast'	Primorskii Krai	Khabarovskii Krai and JAR	Altai krai	Kaliningrad Oblast'			
	4,40	3,92	3,29	3,28	2,92	2,81			
Moscow and the Moscow Oblast'	Tula Oblast'	Kaluga Oblast'	Ryazan Oblast'	Tambov Oblast'	Republic of Mordovia	Vladimir Oblast'	Tver' Oblast'	Smolensk Oblast'	Bryansk Oblast'
	3,26	3,24	3,14	3,03	2,90	2,85	2,80	2,66	2,63
Murmansk Oblast'	Republic of Karelia	Vologda Oblast'	Novgorod Oblast'	Архангельск ая область без НАО	Pskov Oblast'	г. Saint Petersburg and Leningrad Oblast'			

	9,84	5,15	5,07	4,12	3,70	3,35		
Nenets Autonomous Okrug	Архангельская область без НАО	Komi Republic	Kirov Oblast'	Vologda Oblast'	Mari El Republic			
	38,30	9,51	4,77	3,35	2,79			
Nizhny Novgorod Oblast'	Republic of Mordovia	Vladimir Oblast'	Chuvash Republic	Kirov Oblast'	Mari El Republic	Ivanovo Oblast		
	10,28	6,60	4,87	3,97	3,74	3,38		
Novgorod Oblast'	г. Saint Petersburg and Leningrad Oblast'	Pskov Oblast'	Tver' Oblast'	Murmansk Oblast'	Republic of Karelia			
	6,11	5,41	3,56	3,19	2,54			
Novosibirsk Oblast'	Altai krai	Kemerovo Oblast'	Tomsk Oblast'	Republic of Sakha (Yakutia)	Omsk Oblast'	Irkutsk Oblast'	Zabaikalskii Krai	Krasnoyarskii Krai and the Republic of Khakassia	Republic of Buryatia
	11,82	9,57	5,31	5,09	4,70	3,47	3,25	3,12	3,02
Omsk Oblast'	Khanty-Mansi Autonomous Okrug - Yugra	Yamal- Nenets Autonom ous Okrug	Novosibirsk Oblast'	Tyumen region without Autonomous districts	Magadan Oblast' and ChAO			
	4,74	3,75	3,49	3,26	3,25			
Orenburg Oblast'	Samara Oblast'	Republic of Bashkort ostan	Chelyabinsk Oblast'					
	7,58	3,48	3,01					
Orel Oblast'	Kursk Oblast'	Bryansk Oblast'	Tula Oblast'	Lipetsk Oblast'				
	10,17	7,47	4,35	3,11				
Penza Oblast'	Republic of Mordovia	Saratov Oblast'	Samara Oblast'	Ulyanovsk Oblast'				
	5,61	5,01	3,46	2,98				
Permsky Krai	Udmurt Republic	Sverdlovs k Oblast'	Kirov Oblast'					
	12,92	7,28	2,77					
Primorskii Krai	Khabarovskii Krai and JAR	Kamchats kii Krai	Sakhalin Oblast'	Amur Oblast'	Zabaikalskii Krai	Magadan Oblast' and ChAO		
	17,74	9,64	9,54	8,46	3,55	3,38		

Pskov Oblast'	Novgorod Oblast'	г. Saint Petersburg and Leningrad Oblast'	Tver' Oblast'	Smolensk Oblast'	Murmansk Oblast'	Republic of Karelia			
	5,84	5,50	3,20	2,95	2,76	2,55			
Republic of Bashkortostan	Chelyabinsk Oblast'	Khanty- Mansi Autonom ous Okrug - Yugra	Republic of Tatarstan	Yamal- Nenets Autonomous Okrug	Orenburg Oblast'	Udmurt Republic			
	6,87	5,87	5,41	4,54	3,88	2,77			
Republic of Buryatia	Zabaikalskii Krai	Irkutsk Oblast'	Republic of Sakha (Yakutia)	Krasnoyarskii Krai and the Republic of Khakassia	Tomsk Oblast'	Novosibirsk Oblast'	Sakhalin Oblast'	Magadan Oblast' and ChAO	
	23,53	20,06	8,26	3,84	3,53	3,34	2,59	2,53	
Republic of Dagestan	Astrakhan Oblast'	Stavropol skii Krai	Chechen Republic	Khanty-Mansi Autonomous Okrug - Yugra					
	8,35	5,12	4,41	3,88					
Republic of Karelia	Murmansk Oblast'	г. Saint Petersburg and Leningrad Oblast'	Vologda Oblast'	Pskov Oblast'	Novgorod Oblast'				
	10,23	5,28	4,08	2,77	2,61				
Komi Republic	Kirov Oblast'	Nenets Autonomous Okrug	Yaroslavl Oblast'	Архангельск ая область без НАО	Vologda Oblast'	Belgorod Oblast'	Nizhny Novgorod Oblast'		
	10,64	6,74	4,94	4,09	3,83	2,62	2,58		
Republic of Crimea	Sevastopol'								
	31,13								
Mari El Republic	Kirov Oblast'	Chuvash Republic	Republic of Tatarstan	Nizhny Novgorod Oblast'	Nenets Autonomous Okrug				
	12,03	11,31	9,49	3,54	3,26				
Republic of Mordovia	Nizhny Novgorod Oblast'	Penza Oblast'	Ulyanovsk Oblast'	Moscow City and the Moscow Oblast'					
	8,17	5,38	3,55	2,88					
Republic of Sakha (Yakutia)	Republic of Buryatia	Amur Oblast'	Novosibirsk Oblast'	Irkutsk Oblast'	Khabarovskii Krai and JAR	Zabaikalskii Krai			
	6,03	5,85	5,36	5,09	3,29	2,84			

Republic of Tatarstan	Udmurt Republic	Mari El Republic	Ulyanovsk Oblast'	Chuvash Republic	Republic of Bashkortostan	Kirov Oblast'	Samara Oblast'		
	8,93	8,59	5,96	5,19	4,96	3,62	3,09		
Rostov Oblast'	Krasnodarskii Krai and the Republic of Adygea	Chechen Republic	Volgograd Oblast'	Stavropolskii Krai					
	3,47	2,74	2,70	2,59					
Ryazan Oblast'	Tambov Oblast'	Tula Oblast'	Moscow City and the Moscow Oblast'	Republic of Mordovia					
	3,58	3,27	3,01	2,51					
Samara Oblast'	Ulyanovsk Oblast'	Orenburg Oblast'	Penza Oblast'	Saratov Oblast'	Republic of Tatarstan				
	11,27	6,47	3,70	3,21	2,97				
Saint Petersburg and Leningrad Oblast'	Novgorod Oblast'	Pskov Oblast'	Republic of Karelia	Vologda Oblast'	Murmansk Oblast'	Архангельска я область без НАО			
	7,39	6,67	6,38	3,81	3,76	3,75			
Saratov Oblast'	Penza Oblast'	Samara Oblast'	Volgograd Oblast'	Chechen Republic					
	5,02	3,32	3,11	2,52					
Sakhalin Oblast'	Khabarovskii Krai and JAR	Primorski i Krai	Amur Oblast'	Kamchatskii Krai	Kaliningrad Oblast'				
	11,94	10,41	5,73	2,97	2,92				
Sverdlovsk Oblast'	Kurgan Oblast'	Permsky Krai	Chelyabinsk Oblast'	Tyumen region without Autonomous districts	Khanty-Mansi Autonomous Okrug - Yugra				
	7,91	6,92	5,46	4,52	3,17				
Sevastopol'	Republic of Crimea	Kamchats kii Krai							
	30,37	3,05							
Smolensk Oblast'	Bryansk Oblast'	Kaluga Oblast'	Moscow City and the Moscow Oblast'						
	6,14	3,68	2,59						
Stavropolskii	KBR, KCR and	Chechen	Republic of	Rostov Oblast'	Krasnodarskii				

Krai	North Ossetia-Alania	Republic	Dagestan		Krai and the Republic of Adygea				
	9,36	4,80	4,28	2,89	2,57				
Tambov Oblast'	Lipetsk Oblast'	Voronezh Oblast'	Ryazan Oblast'	Moscow City and the Moscow Oblast'					
	6,51	3,91	3,66	2,77					
Tver' Oblast'	Novgorod Oblast'	Pskov Oblast'	Moscow City and the Moscow Oblast'						
	3,54	3,03	2,52						
Tomsk Oblast'	Kemerovo Oblast'	Altai krai	Krasnoyarskii Krai and the Republic of Khakassia	Novosibirsk Oblast'	Republic of Buryatia				
	16,95	5,95	4,88	4,71	3,65				
Tula Oblast'	Orel Oblast'	Kaluga Oblast'	Ryazan Oblast'	Moscow City and the Moscow Oblast'					
	4,39	3,96	3,17	3,04					
Tyumen region without Autonomous districts	Kurgan Oblast'	Yamal- Nenets Autonom ous Okrug	Khanty-Mansi Autonomous Okrug - Yugra	Sverdlovsk Oblast'	Omsk Oblast'				
	12,15	10,94	9,37	5,31	4,15				
Udmurt Republic	Permsky Krai	Republic of Tatarstan	Kirov Oblast'	Republic of Bashkortosta n					
	13,36	8,20	6,57	2,53					
Ulyanovsk Oblast'	Samara Oblast'	Republic of Tatarstan	Republic of Mordovia	Penza Oblast'	Chuvash Republic				
	11,70	4,93	4,31	3,90	3,58				
Khabarovskii Krai and JAR	Amur Oblast'	Primorski i Krai	Sakhalin Oblast'	Kamchatskii Krai	Zabaikalskii Krai	Republic of Sakha (Yakutia)	Magadan Oblast' and ChAO		
	16,44	16,14	10,16	4,12	3,64	3,18	3,03		
Khanty-Mansi Autonomous Okrug - Yugra	Tyumen region without Autonomous	Republic of Bashkort ostan	Omsk Oblast'	Kurgan Oblast'	Republic of Dagestan	Sverdlovsk Oblast'			

	districts							
	9,60	5,87	4,73	4,44	3,40	3,26		
Chelyabinsk Oblast'	Kurgan Oblast'	Republic of Bashkort ostan	Sverdlovsk Oblast'	Orenburg Oblast'				
	10,17	6,45	5,70	2,80				
Chechen Republic	Astrakhan Oblast'	KBR, KCR and North Ossetia-Alania	Stavropolskii Krai	Republic of Dagestan	Volgograd Oblast'	Saratov Oblast'	Rostov Oblast'	
	9,01	6,05	5,71	5,58	3,60	3,54	3,34	
Chuvash Republic	Mari El Republic	Republic of Tatarstan	Nizhny Novgorod Oblast'	Ulyanovsk Oblast'				
	7,36	4,44	4,40	3,79				
Yamal-Nenets Autonomous Okrug	Tyumen region without Autonomous districts	Republic of Bashkort ostan	Omsk Oblast'	KurganOblast'	Belgorod Oblast'			
	11,25	4,62	3,99	3,28	2,59			
Yaroslavl Oblast'	Kostroma Oblast'	Vologda Oblast'	Архангельск ая область без НАО	Ivanovo Oblast	Komi Republic			
	15,96	8,96	6,81	5,49	4,22			

Abbreviations: KBR, KCR and North Ossetia-Alania - Kabardino-Balkar Republic, Karachay-Cherkess Republic and the Republic of North Ossetia - Alania, NAO - Nenets Autonomous Okrug, JAO - Jewish Autonomous Oblast', ChAO – Chukotka Autonomous Okrug.