URBAN STUDIES

Large Russian Cities and Their Suburbs as Centers of Attraction for Internal Migrants

N. V. Mkrtchyan[a], * and R. I. Gilmanov[b], **

[a] National Research University Higher School of Economics, Moscow, Russia
[b] Rosstat, Department of Population and Health Statistics, Moscow, Russia
*e-mail: nmkrtchyan@hse.ru
**e-mail: ussuritiger6@inbox.ru

Abstract—Large cities and their suburbs are the main centers of attraction for internal Russian migrants, pulling population from peripheral territories. Based on detailed data on internal Russian migration for 2011–2020, the scale of net migration is estimated in Moscow, St. Petersburg, and five groups of cities with populations of 100 000 inhabitants or more, and their suburbs. The size of the suburbs depends on the populations of the cities: the larger the population, the father the distance the cities extend their influence and, accordingly, the larger the radius of allocation of suburbs. The number of inhabitants of cities and their suburbs is determined from 2010 census data, and based on the distance from the city center, near, middle, and far suburbs are distinguished. It is estimated that 89.6 mln people lived in major cities and their suburbs (2010). The population concentration process has continued. The migration growth of large cities and their suburbs is comparable in size, but suburban growth is significantly larger in intensity. The suburbs of regional capitals and largest cities have the most intensive migration growth. The nearest suburbs of cities grow the most intensively owing to migration. Every year, large cities lose 40 000–50 000 people in migration with their suburbs. We are disinclined to consider this evidence of suburbanization; the main role is played by city sprawl and the attractiveness of living in the zone of maximum transport accessibility to city centers. Migration in the suburbs of Moscow and St. Petersburg deserves further study.

INTRODUCTION

In the 2010s, Rosstat recorded 38.9 mln migrations within Russia. Internal migration actively redistributes the country's population between regions, but to an even greater extent, it contributes to population concentration in individual centers, which are large cities and their suburbs. However, while migration to large cities has been studied to a more or less sufficient extent, migration to the suburbs is extremely difficult to measure due to the lack of detailed spatial data. In addition, nothing is known about migration directions, since these data are developed and published only in very general form. This article examines the net migration of cities with populations of 100 000 or more and their suburbs, near, middle and distant, identified based on distances from the centers of settlements in the suburbs to the centers of large cities. The main problems addressed are the following: (1) estimate migration growth (loss) of population in cities of different sizes and their suburbs and the ratio of its intensity; (2) identify the main sources of migration growth in cities of different sizes and their suburbs; (3) esti-

mate the population flow between large cities, groups of large cities, and their suburbs.

These problems are solved by delimiting cities and their suburbs and analyzing the net migration of settlements belonging to them. Data used for calculations give opportunity to analyze migration at detailed spatial level.

LITERATURE REVIEW

Large cities, megalopolises, and urban agglomerations are interesting to researchers because of their special role in international and internal migration. They can act as "escalator regions" (Fielding, 1992) and the upper levels in a hierarchical settlement system (Newbold, 2011; Plane et al., 2005), within which population flow occurs. The migration balance of a limited number of large and major cities and their systems serves as a measure of spatial concentration/deconcentration of the population. In addition to large cities, special attention is paid to the development of suburbs and suburbanization, which started in developed countries in the second half of the 20th cen-

tury (Fielding, 1982). By now, in the United States and Europe, the population flow from cities to suburbs is a common and proven phenomenon.

Migration to the suburbs by large sections of the middle class most often occurs at certain stages of the life course (Kooiman, 2020), most notably at the stage of starting a family and having children. In this regard, studies have been carried out, e.g., on the migration of families with children from large cities (Sandow and Lundholm, 2020), the movement of young families to the suburbs before children are born, which leads to higher fertility in the suburbs (Vobecká and Piguet, 2012) and in in metropolitan areas in general (Rodrigo-Comino et al., 2021). Among other things, this type of migration can lead to problems with the employment of young mothers (Kley and Drobnič, 2019). On the one hand, in addition to the population groups mentioned above, large cities lose highly educated populations in exchange with suburbs and peripheral areas (Hansen and Aner, 2017), and on the other hand, immigrant groups, e.g., participate in moving to the suburbs (Křížková and Ouředníček, 2020).

Migration to large cities leads to the expansion of their borders at the expense of adjacent rural areas (Kowalczyk et al., 2019). In developed countries, concerns arise about the decline of urban centers (Dieleman and Wegener, 2004), self-segregation in suburbs (Watt, 2009); in countries undergoing rapid urban growth, this process is accompanied by many other negative consequences, most notably environmental degradation (Jiang and O'Neill, 2018).

In Russia, migration balance studies for cities of different sizes, including over a fairly long time period, showed that after the turning point in the 1990s, the usual role of large cities as the main magnets for migration was restored (Makhrova and Kirillov, 2014; Nefedova and Treivish, 2010). The relationship between the population dynamics of large cities and their suburbs was noted in the late USSR (Khorev, 1980), but suburbs remained virtually unstudied for a long time, initially manifested as the study of cottage settlements (Makhrova, 2008) and seasonal suburbanization in Moscow oblast (Makhrova et al., 2008). Relatively recently, researchers in other regions have become interested in this topic; the best known studies are on Ulan-Ude (Breslavsky, 2014) and Irkutsk (Grigorichev, 2016) (a detailed review of research is presented in (Breslavsky, 2020)). Separately, it is worth mentioning a study that uses data from mobile network operators (Makhrova and Babkin, 2018; 2019) for Moscow and Moscow oblast, which give an idea of the spatial configuration of the Moscow suburbs in terms of regular work commutes and weekly and seasonal pulsations.

Quantitative studies of migration in urban agglomerations and suburbs in Russia were limited by the lack of data at a more or less detailed spatial level and also complicated the study of the problem of their delimitation. With the advent of publicly available data at the level of urban districts, municipal districts, and even rural settlements, research into large cities and their suburbs has received a new impetus. Studies have appeared (Karachurina and Mkrtchyan, 2021; Karachurina et al., 2021) showing that, based on the intensity of migration growth, suburbs are outstripping the cities around which they formed. However, these studies are based on statistics for municipalities but not on a complete their list thereof. Methods have emerged for a clearer delimitation of settlement systems at the agglomeration and supra-agglomeration levels, which are closer to international standards (Antonov and Makhrova, 2019; Raisikh, 2020).

MATERIALS AND METHODS

We consider migration in Russian cities with populations of 100000 people or more, i.e., in large cities and their suburbs. The populations of cities and their suburbs are calculated based on data from the 2010 All-Russian Population Census[1] (VPN-2010), since this is the only available data source containing information about each locality. The largest megacities, Moscow and St. Petersburg, are highlighted separately, while the remaining cities are combined into five groups depending on population. Data on the populations of cities and their suburbs is a serious methodological limitation of this study, since the population could have changed significantly since 2010. The populations of large cities could have increased by several percent during this time, in some cases by tens of percent (e.g., the cities of Tyumen and Krasnodar); the populations of the suburbs could have increased even more significantly, since often this growth could have occured from a very low base (e.g., the cities of Murino and Kudrovo in Leningrad oblast, which arose instead of villages with the same name).

For Moscow and St. Petersburg, we include as suburbs all settlements located less than 100 km from urban centers. For cities with populations of 750000 to 1600000 people, this distance is less than 50 km; for cities with populations of 250000−750000 people, up to 30 km; for 100000−250000, up to 20 km. As calculations based on data on municipalities at the level of cities and rural settlements have shown, at approximately this distance, the suburbs of regional capitals of these sizes maintain migration growth in population (Karachurina et al., 2021). The territories of so-called New Moscow (Troitsk and Novomoskovst districts) were classified as suburbs in this study.

The distance within which suburbs were identified was calculated based on the distance from the center of each locality to the center of a city of the corresponding size. We used the straight line distance determined from geocoordinates. If the suburb in question was

---

[1] This data is not publicly accessible, provided by A.E. Raisikh.

Table 1. Total population living in large cities and their suburbs, mln people (at end of 2010)

Cities	Number of people living in center	Number of people living in suburbs			
		near suburbs	middle suburbs	distant suburbs	total
Moscow	11.3	2.2	1.9	2.7	6.8
St. Petersburg	4.9	0.2	0.4	0.4	1.0
Cities with populations from 1 000 000 to 1 600 000 people	11.8	1.2	1.0	2.2	4.4
Cities with populations of 750 000 to 1 mln people	3.8	0.5	0.1	0.5	1.1
Cities with populations of 500 000−750 000 people	12.1	1.6	−	1.0	2.6
Cities with populations of 250 000−500 000 people	12.5	2.3	−	1.8	4.1
Cities with populations of 100 000−250 000 people	10.2	1.0	−	2.1	3.1
TOTAL	66.6	9.0	3.4	10.7	23.1

Source: VPN-2010; authors' calculations.

simultaneously included in two or more suburban zones (e.g., the cities of Saratov and Engels or Moscow and Krasnogorsk), then it was attributed to a center of a higher order. If a settlement fell within the zone of two centers of the same level, then it was attributed to the one with a shorter distance. For example, the city of Lermontov was classified as a suburb of Pyatigorsk, since it is located closer to it, although it is part of the 20-km zone of Essentuki. Also, due to overlaping of zones, a number of large cities, e.g., in Moscow oblast—Krasnogorsk, Balashikha, Mytishchi, etc.— did not have their own suburbs but were included in the suburbs of a larger city, Moscow.

For the largest cities, near, middle, and distant suburbs were distinguished. The near suburbs included, on the one hand, the territory into which the city "sprawls," squeezed by its administrative boundaries (the boundaries of the urban district); on the other hand, a territory that has the best transport accessibility to the city and its center, which is important for periodic trips for various purposes and which determines the migration attractiveness of the near suburbs (Karachurina, 2022). Middle suburbs are areas that do not border or merge with the city, but are still closely related to it and are convenient for people whose activity is related to trips to the city. Distant suburbs are areas that are not as so closely related to the city, but still experience its proximity. Residents of distant suburbs (Makhrova and Babkin, 2018) participate in commuting to the center, although to a lesser extent For cities with populations of less than 750 000 inhabitants, only near and distant suburbs were identified. The number of residents of settlements living in large cities and their suburbs at the end of 2010 amounted to 89.6 mln people (Table 1). Of these, 66.5 mln lived in the centers, and almost three times less, in the suburbs.

Migration calculations were based on individual depersonalized data of long-term migrants who moved within the territory of Russia (intracountry) for the period from 2011 to 2020. These are data with spatial detail, making it possible to analyze migration flows down to individual settlements. This approach makes it possible to study migration between settlements of different sizes at different distances from each other. The study used a database of settlements of the Russian Federation (almost 160 000 in total), each of which was compared with the population size based on the results of the VPN-2010, geocoordinates (latitude, longitude) and a unique code, the first 11 characters of which correspond to the OKATO and OKTMO codes.

Distances between pairs of settlements (in a straight line) were calculated using array formulas in Excel. For example, to determine the distance from each settlement to the nearest million-plus population, their entire population was divided into two groups: million-plus cities and other settlements. Next, the lengths of the intervals from a given settlement to each major city were determined and the minimum of the obtained values was entered in the database in the corresponding line.

Only a very small share of migration recorded by Rosstat could not be referenced (to specific settlements and geocoordinates), which amounted to 0.04% of all migrations for the entire period.

The data made it possible to highlight migration recorded on the basis of registration at place of residence and place of stay, as well as to separately take into account and analyze data on departures, which Rosstat generates automatically as the registration period for migrants at the place of stay expires (hereinafter referred to as autoreturn). These people are considered to have "returned to their place of residence after a temporary stay in another territory"; i.e., they are counted as having left the territory (settlement) where they are registered at their place of residence. For people, this means migrating in the opposite direction to the place where they had migrated previously.

Until 2011, Rosstat counted people who registered at their place of residence as long-term migrants. Since 2011, long-term migrants also began to include those who registered at their place of stay for a period of nine months or more, which brought the methodology for recording long-term migration in Russia closer to the criteria recommended by the UN (Chudinovskikh, 2019). As a result, by 2013, the number of long-term migrants counted had doubled and the volume of population redistribution between and within individual parts of the country had increased. However, as the number of autoreturns increased, by 2015−2016, the effect of changes in accounting methods in terms of population redistribution practically disappeared (for more details, see: Mkrtchyan and Gilmanov, 2023). Using individual data, we can calculate both with and without autoreturn.

As calculations have shown, autoreturn primarily affects migration growth of the population of large cities, reducing it by almost half; this influence extends to the suburbs to a lesser extent (Table 2). This is apparently because, in large cities, migrants most often register at the place of stay and, accordingly, leave as soon as period of registration ends. For example, these may be students, many of whom come to study in large cities and settle in them rather than in the suburbs. In the suburbs, the role of migration with registration at the place of stay is lower, and the role of autoreturn is correspondingly lower.

In this article, we use data taking into account autoreturn, which means that over the period under review, migration growth in large cities may be underestimated to a greater extent than in their suburbs. We believe that some migrants whose registration at their place of residence has expired do not return to their place of permanent residence, but remain without registering or not registering immediately, since there is no serious responsibility for this in accordance with the current legislation, and the ability to use social services is not as strictly tied to registration. The possibility of getting a job does not depend on availability of registration.

RESULTS

For the period from 2011 to 2020, the total migration increase in the population of large Russian cities in intrarussian migration, taking into account autoreturn, amounted to more than 1.7 mln people; excluding autoreturn, 3.4 mln. The suburbs grew due to migration by 1.8−2.3 mln people, respectively. That is, the migration growth of the population of large cities of different sizes in absolute values is commensurate with the growth of their suburbs. Among the latter, the nearest suburbs clearly stand out, accounting for the bulk of the population influx. However, the populations of the suburbs is significantly smaller than the populations of the cities around which they are formed; therefore, the migration growth rate of the

near suburbs is several times higher than that of the centers (Fig. 1). At the same time, in cities with populations of 750000 or more (except for the case of St. Petersburg, where extreme migration growth is concentrated only in the near suburbs), not only the near, but also the middle suburbs lead the centers. Distant suburbs are growing in cities with populations of 500000 people or more; the attractive force of smaller cities is no longer enough for them. Note that in the group of cities with 500000−750000 inhabitants, which included Krasnodar, Tyumen and other rapidly growing centers according to the VPN-2010, distant suburbs increased their population due to migration at the same rate as these cities themselves, but this rather an exception to the general rule. In the 2010s, these cities and their suburbs had a very high migration attractiveness, greater than the agglomerations of many mln-plus cities (such as Omsk, Volgograd, Rostov-on-Don). In this situation, the intensive migration growth was sufficient for both near and distant suburbs. Krasnodar krai, in addition, is generally a highly attractive region of the country for migrants due to the almost unique natural and climatic potential of its territory.

Cities with populations of 100000−250000 are losing population due to migration, while their surrounding suburbs are growing. Population growth in this case is ensured by migration from centers to suburbs—this is a general trend for large Russian cities, as will be shown below. The schematic "profile" of migration growth in large cities and their suburbs is similar to a truncated cone (or rather, a volcano crater)—with a hole in the center, high edges and a gradual decline from them (Fig. 2).

The migration growth excluding autoreturn in the group of cities with populations of 750000 or more (including Moscow and St. Petersburg) and their suburbs is greater than that calculated and published by Rosstat. This means that many migrants arrive in these territories, register at their place of stay, and as the registration period expires, they "automatically" leave. The value of the intensity of migration growth, taking into account and excluding autoreturn, varies most directly in large cities (from 43.7 to 83.4 ‰). In smaller cities, the value of this indicator ranges from 10.2 to 22.5‰; in their suburbs it varies little.

Despite the fact that cities with populations of 100000 to 750000 people and their suburbs did not have such an intense migration increase as a group of larger cities, their immediate suburbs still had a very high population inflow by Russian standards.

The coefficients of the intensity of migration growth of individual suburbs, calculated based on the population size for 2010, primarily the near suburbs of St. Petersburg, are overestimated, as already noted. However, even if the indicator were calculated correctly, their growth due to the low base effect would still be many times faster than the indicators of the

Table 2. Net migration of large cities and their suburbs, taking into account and excluding autoreturn, 2011−2020 (average per year, thous. people)

Cities and suburban areas	Migration increase (decrease), total	Migration increase (decrease) excluding autoreturn	Difference	
			thous. people	%
Moscow	**57.7**	**111.4**	**53.7**	**93.1**
Moscow suburbs	87.2	118.6	31.4	36.0
near, up to 30 km	55.7	74.8	19.1	34.2
medium, 30−50 km	27.1	36.2	9.1	33.4
distant, 50−100 km	4.3	7.6	3.3	76.6
St. Petersburg	**39.2**	**70.9**	**31.7**	**80.7**
St. Petersburg suburbs	23.6	31.5	7.9	33.3
near, up to 30 km	20.3	23.7	3.4	17.0
medium, 30−50 km	2.6	4.9	2.3	86.5
distant, 50−100 km	0.7	2.8	2.1	320.6
Cities with populations from 1 000 000 to 1 600 000	**27.2**	**54.5**	**27.3**	**100.1**
Suburbs of cities with populations ranging from 1 000 000 to 1 600 000.	27.4	26.7	−0.7	−2.6
near, up to 20 km	22.1	22.8	0.7	3.3
medium, 20−30 km	3.9	3.2	−0.6	−16.5
distant, 30−50 km	1.4	0.6	−0.8	−56.7
Cities with populations from 750 000 to 1 mln	**14.7**	**28.2**	**13.5**	**91.4**
Suburbs of cities with populations of 750 000 to 1 mln	75	75	0.0	−0.2
near, up to 20 km	5.7	5.7	−0.1	−1.2
medium, 20−30 km	1.3	1.2	−0.1	−9.6
distant, 30−50 km	0.5	0.7	0.2	37.0
Cities with populations of 500 000−750 000	**26.9**	**56.1**	**29.3**	**109.0**
Suburbs of cities with populations of 500 000−750 000	25.8	28.7	2.9	11.2
near, up to 20 km	23.6	26.3	2.7	11.5
distant, 20−30 km	2.2	2.4	0.2	8.2
Cities with populations of 250 000−500 000	**26.3**	**45.9**	**19.6**	**74.6**
Suburbs of cities with populations of 250 000−500 000	11.3	9.0	−2.3	−20.0
near, up to 20 km	13.4	13.5	0.1	0.7
distant, 20−30 km	−2.2	−4.5	−2.3	108.7
Cities with populations of 100 000−250 000	**−17.7**	**−23.9**	**−6.2**	**34.9**
Suburbs of cities with populations of 100 000−250 000	−4.6	−11.8	−7.2	158.1
near, up to 10 km	2.4	0.8	−1.6	−65.9
distant, 10−20 km	−7.0	−12.7	−5.6	80.4

center around which they are formed. In suburbs with old buildings (e.g., the city of Dzerzhinsk, Nizhny Novgorod oblast), in which large-scale construction is impossible due to a lack of available land, population growth due to migration is not as high or is absent (Karachurina et al., 2021).

The migration balance of large cities and their suburbs has different components. Moscow and St. Petersburg are increasing their populations due to interregional migration, with Moscow experiencing a slight migration decrease to New Moscow. The suburbs of Moscow and St. Petersburg are also growing
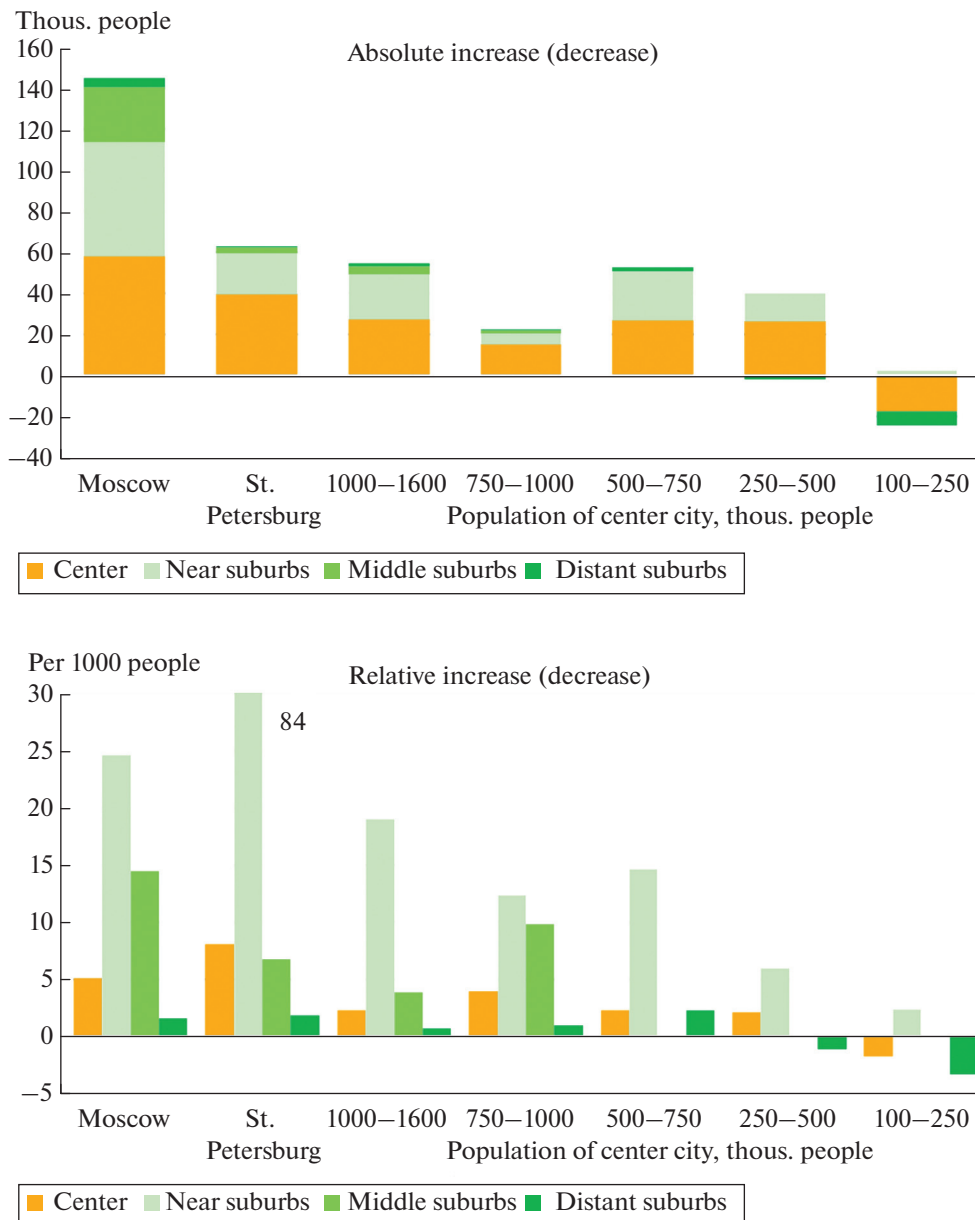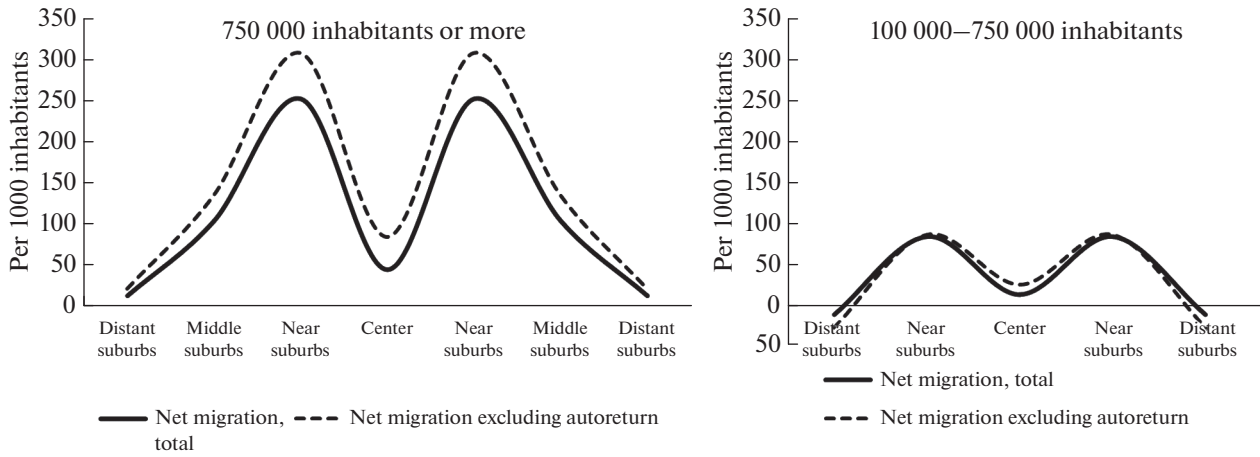
Fig. 1. Net migration of population of large cities and their suburbs, 2011−2020.

due to interregional migration, with the near and middle suburbs of the capital slightly increasing their population due to migration from Moscow, as well as from the distant suburbs and the territory of Moscow oblast outside the suburbs. In the near suburbs of St. Petersburg, the role of migration from the center (St. Petersburg) in migration growth is more significant at 35%.
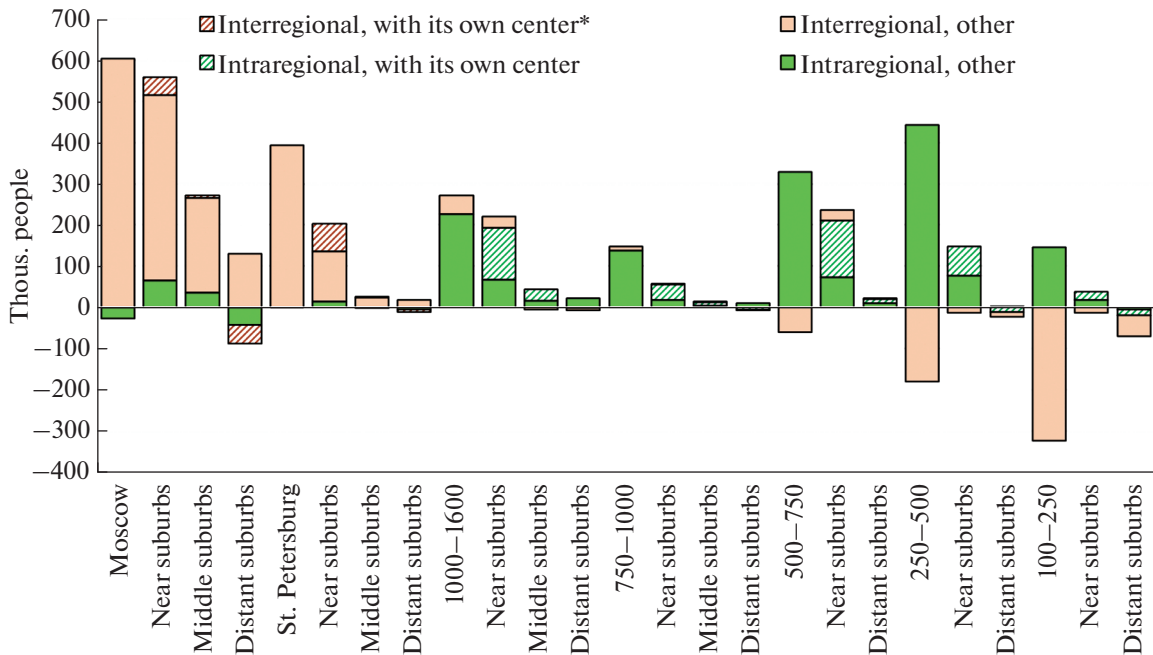
Cities with populations of over 1 mln and cities with populations of 750000−1000000 people are growing due to intraregional migration; interregional migration plays an insignificant role in their balance. Cities with smaller populations grow only due to intraregional migration, with populations of 100000−250000 yielding to other regions more than they

attract from their own regions. The suburbs are growing mainly due to migration from the center; this inflow is larger than from other territories of their regions. Even the near suburban cities of 100000−250000 residents with an outflow attract little population from them (Fig. 3).

The population flow from large cities to their own suburbs annually amounts to 47100 people, including 49800 to the near suburbs, 4600 to the middle, while the distant suburbs themselves yield population to large center cities (7300 people). Without taking into account autoreturn, the total flow from the centers to the suburbs is 44600, including to the near, middle, and distant suburbs—52200, 4600, and 12200, respec-

Fig. 2. Net migration in cities with populations less than 750 000 and more than 750 000 and their suburbs, 2011–2020, per 1000 people.

Fig. 3. Net migration of large cities and their suburbs by components, 2011–2020, thous. people.
* With Moscow and St. Petersburg.

tively. It is interesting that this flow closely coincides with the estimate from data on intraregional migration for 2017 for almost 40 regional capitals and their suburbs given in (Karachurina and Mkrtchyan, 2021), where it was estimated at 40 000–45 000 annually.

The near suburbs are the most attractive territories in terms of migration, drawing in migrants even from the cities around which they form. Middle suburbs receive a small portion of this spillover; distant suburbs almost always lose population in migration to the cities around which they form.

For a more detailed analysis of the migration balance of major megacities and their suburbs, Table 3 was compiled. Each of its columns shows the increase (decrease) in the migration of megacities themselves, as well as their suburbs (near, middle, and distant) with each other; groups of large cities, differentiated by size, and their suburbs; and smaller settlements. Below is the total migration growth of population, which, e.g., for St. Petersburg amounted to 371 800 for the period from 2011 to 2020. The table shows that the mutual population flow between major cities (with their suburbs) is small. The near suburbs of St. Peters-

Table 3. Net migration of populations of Moscow, St. Petersburg, and their suburbs by components, 2011−2020, thous. people

In migration with settlements and their groups	Moscow	Moscow suburbs				St. Petersburg	St. Petersburg suburbs			
		near	medium	distant	total		near	medium	distant	total
Moscow	0.0	41.9	6.5	−44.8	3.6	−7.4	0.3	−0.3	−0.4	−0.4
Suburbs of Moscow:										
near	−41.9	0.0	1.8	−37.3	−35.5	−3.4	0.1	−0.2	−0.4	−0.5
medium	−6.5	−1.8	0.0	−21.8	−23.6	−0.3	0.3	−0.1	−0.2	0.0
distant	44.8	37.3	21.8	0.0	59.1	2.3	0.6	0.1	−0.1	0.6
Total	−3.6	35.5	23.6	−59.1	0.0	−1.4	0.9	−0.2	−0.6	0.1
St. Petersburg	7.4	3.4	0.3	−2.3	1.4	0.0	66.2	2.9	−7.1	62.0
Suburbs of St. Petersburg:										
near	−0.3	−0.1	−0.3	−0.6	−0.9	−66.2	0.0	−2.9	−3.9	−6.8
medium	0.3	0.2	0.1	−0.1	0.2	−2.9	2.9	0.0	−1.0	1.9
distant	0.4	0.4	0.2	0.1	0.6	7.1	3.9	1.0	0.0	4.9
Total	0.4	0.5	0.0	−0.6	−0.1	−62.0	6.8	−1.9	−4.9	0.0
Cities with populations from 1 000 000 to 1 600 000	65.3	37.7	13.8	6.1	57.6	34.9	8.1	1.3	0.8	10.2
Suburbs of cities with populations from 100 000 to 1 600 000	12.1	9.6	4.6	3.0	17.2	7.2	2.1	0.4	0.4	3.0
Cities with populations from 750 000 to 1 mln	25.3	13.8	5.0	2.1	21.0	11.5	2.6	0.4	0.2	3.2
Suburbs of cities with populations of 750 000 to 1 mln	4.6	3.4	1.6	1.0	6.0	2.0	0.6	0.1	0.1	0.8
Cities with populations of 500 000−750 000	79.1	51.4	20.9	8.5	80.9	50.5	12.1	1.8	1.1	14.9
Suburbs of cities with populations of 500 000−750 000	7.3	7.2	3.6	1.9	128	4.3	1.3	0.3	0.3	2.0
Cities with populations of 250 000−500 000	86.7	64.1	26.7	9.4	100.1	74.5	19.8	3.1	1.9	24.9
Suburbs of cities with populations of 250 000−500 000	15.2	14.9	7.8	4.7	27.4	13.7	4.0	0.7	0.8	5.5
Cities with populations 10 000−250 000	62.1	49.2	22.7	13.1	84.9	66.3	17.6	3.1	2.2	22.9
Suburbs of cities with populations of 100 000−250 000	13.5	128	7.0	5.8	25.5	8.1	2.5	0.5	0.6	3.6
Other settlements (with populations less than 100 000)	165.0	159.6	92.8	65.7	318.0	169.6	49.3	11.3	7.9	68.5
Net migration, TOTAL	540.5	505.1	236.9	14.3	756.3	371.8	194.1	23.6	3.4	221.1

burg have a tiny, but symbolically positive migration balance with Moscow and its suburbs, even though St. Petersburg also symbolically loses little to Moscow and its suburbs. Also interesting is the small increase in migration between the middle suburbs of Moscow to the near suburbs. It can be suggested that this is the first sign of saturation in the near suburbs and expansion of the most active development zone beyond their borders.

Moscow and St. Petersburg and their immediate suburbs are growing largely due to the inflow from other large cities and their suburbs; the flow from the periphery plays a smaller role. Distant suburbs experience a significant migration loss, which consists of migration with their centers and nearer suburbs, but it is compensated by inflow from outside, equally due to other agglomerations and inflow from small and medium-sized cities and rural settlements on the periphery.

DISCUSSION AND CONCLUSIONS

In the 2010s, the near suburbs of large cities were the most dynamically growing territories in Russia due to internal migration; in second place were the middle suburbs, which we identified for cities with populations of 750 000 or more. These were followed by the cities themselves around which they are formed. Cities with populations of 100 000 to 250 000, as well as distant suburbs, either have a low migration increase or experience migration decrease. Therefore, these cities can't be classified as centers of population attraction.

Large cities maintain intensive growth, but this growth is extensive, due to the spillover of construction activity (Kurichev and Kuricheva, 2018) and associated settlement of the population beyond their administrative boundaries (perhaps this is most clearly manifested in the near suburbs of St. Petersburg—the cities of Murino and Kudrovo). Such fast-growing suburbs exceed the cities around which they form in terms of housing and population density, making them indistinguishable from these cities. At the same time, a formal analysis, if carried out on population dynamics and net migration, will show that large cities are inferior in growth to a considerable number of small and medium-sized cities and individual areas of rural areas, which can be interpreted as signs of suburbanization. However, the near suburbs of large cities are to a greater extent a continuation of large cities, their sprawl, which is not formalized by the transfer of administrative boundaries, and not classic low-rise suburbs. Of course, there are variations: the St. Petersburg or Moscow suburbs are not like those of Ufa, Krasnodar, or Ulan-Ude. However, it is increasingly clear that analysis of urbanization and population concentration should be done not at the level of large cities themselves and/or cities in general, but taking into account their immediate territories. Therefore, to study these processes, data with high spatial detail are required, making it possible to study migration at the level of individual settlements and population centers. Even the level of urban and municipal districts is insufficient here (Karachurina et al., 2021), since their dimensions are too large for this. This study uses a fairly simple, even crude approach to segmenting the space of suburbs of large cities; one can challenge the appropriateness of delimiting the boundaries of near, middle, and distant suburbs and the use of straight-line distances for this, rather than actual road distances or travel time, etc. Research in this direction will undoubtedly continue.

As calculations have shown, estimates of the migration growth of the suburbs of large cities, to a lesser extent than the large cities themselves, depend on the peculiarities of accounting for long-term migration in the 2010s (autoreturn and the associated decrease in population flow between individual territories of Russia recorded by Rosstat). In addition, the extremely high migration growth of certain suburbs may be a consequence of the "low base" effect. The revealed strong difference between the migration growth of large cities and their suburbs is a fact, but in reality, it may not be as acute as shown by the calculations in the article.

In this study, for the first time, the population flow from all large cities to their suburbs was estimated, 40 000−50 000 people annually, and almost all of it falls on the near suburbs. If we consider large cities and their suburbs separately, this means "deconcentration" of the population, a redistribution of part of the migration increase received by large cities in favor of smaller settlements. However, the authors hew to the opinion that this flow should be considered a redistribution of the population to the outskirts of a closely related system of settlements, in which a large city acts as the center and which, without it, cannot exist in this form. The migration growth of the suburbs is not independent and occurs only due to their proximity to a large city.

It is also shown for the first time that Moscow and St. Petersburg, the largest megacities, are losing population in migration to their near suburbs. However, they do not determine the movement from the centers to the suburbs: this trend is ubiquitous and characteristic even of the "smallest" large cities. The nature of the universality of this trend is still unclear, requiring more in-depth research.

In general, migration increase of the city and its surrounding suburbs depends on the city size. Calculations have shown that the suburbs of cities, like their centers, experience a migration outflow from cities and their suburbs, which have a slightly higher level in the settlement hierarchy, even if this outflow is not as great. Exceptions to this rule are possible; e.g., the city of Sochi and its suburbs (in the number of included settlements they are close to the Sochi urban okrug) have a migration increase in population with all mil-

lion-plus cities, except Krasnodar, and even with the latter, the decrease is symbolic. Similar exceptions to the general rule may be true of other resort areas (Karachurina and Mkrtchyan, 2021), and they deserve a more in-depth study based on more detailed calculations. However, we again (Mkrtchyan and Gilmanov, 2023) are convinced that in Russia even the suburbs and their growth obey the rule of population flow up the settlement hierarchy.

CONFLICT OF INTEREST

The authors of this work declare that they have no conflicts of interest.

REFERENCES

Antonov, E.V. and Makhrova, A.G., Largest urban agglomerations and forms of settlement pattern at the supra-agglomeration level in Russia, *Reg. Res. Russ.*, 2019, vol. 9, no. 4, pp. 370–382.
https://doi.org/10.1134/S2079970519040038

Breslavskii, A.S., *Nezaplanirovannye prigorody: sel'sko-gorodskaya migratsiya i rost Ulan-Ude v postsovetskii period* (Unplanned Suburbs: Rural–Urban Migration and the Growth of Ulan-Ude in the Post-Soviet Period), Ulan-Ude: Buryat. Nauchn. Tsentr Sib. Otdel. Ross. Akad. Nauk, 2014.

Breslavskii, A.S., Who studies the suburbs of big cities in contemporary Russia and how?, *Gorod. Issled. Prakt.*, 2020, vol. 5, no. 4, pp. 16–34.
https://doi.org/10.17323/usp54202016-34

Chudinovskikh, O.S., On revision of the UN Recommendations on Statistics of Migration (1998) and the Russian context, *Vopr. Statist.*, 2019, vol. 26, no. 8, pp. 61–76.
https://doi.org/10.34023/2313-6383-2019-26-8-61-76

Dieleman, F. and Wegener, M., Compact city and urban sprawl, *Built Envir.*, 2004, vol. 30, no. 4, pp. 308–323.
https://doi.org/10.2148/benv.30.4.308.57151

Fielding, A.J., Counterurbanisation in Western Europe, *Progress Plan.*, 1982, vol. 17, pp. 1–52.

Fielding, A.J., Migration and social mobility: South East England as an escalator region, *Reg. Stud.*, 1992, vol. 26, no. 1, pp. 1–15.

Grigorichev, K.V., Diversity of the suburb: Suburbanization in Siberian region (the case of Irkutsk, *Gorod. Issled. Prakt.*, 2016, vol. 1, no. 2, pp. 7–23.
https://doi.org/10.17323/usp1220167-23

Hansen, H.K. and Aner, L.G., On the location dynamics of highly educated people migrating to peripheral regions of Denmark, *Population, Space and Place*, 2017, vol. 23, no. 8, e2076.
https://doi.org/10.1002/psp.2076

Jiang, L. and O'Neill, B.C., Determinants of urban growth during demographic and mobility transitions: Evidence from India, Mexico, and the US, *Population Dev. Rev.*, 2018, vol. 44, no. 2, pp. 363–389.
https://doi.org/10.1111/padr.12150

Karachurina, L.B., Urbanization and suburbanization: Which one determines population migration in Moscow oblast?, *Vestn. S.-Peterb. Univ. Nauki o Zemle*, 2022, vol. 67, no. 2, pp. 360–381.
https://doi.org/10.21638/spbu07.2022.208

Karachurina, L.B. and Mkrtchyan, N.V., Intraregional population migration in Russia: Suburbs outperform capitals, *Reg. Res. Russ.*, 2021, vol. 11, no. 1, pp. 48–60.
https://doi.org/10.1134/S2079970521010068

Karachurina, L.B., Mkrtchyan, N.V., and Petrosyan, A.N., Spatial patterns of net migration in the suburbs of Russian regional centers, *Vestn. Mosk. Univ. Ser. 5. Geogr.*, 2021, no. 6, pp. 123–134.

Khorev, B.S., The role of commuting migration in the relationship between urban and rural settlement pattern and the main tasks of its regulation, in *Problemy rasseleniya v SSSR* (Problems of Settlement Pattern in the USSR), Moscow: Statistika, 1980, pp. 222–234.

Kley, S. and Drobnič, S., Does moving for family nest-building inhibit mothers' labour force (re-)entry?, *Demogr. Res.*, 2019, vol. 40, pp. 155–184.
https://doi.org/10.4054/DEMRES.2019.40.7

Kooiman, N., Residential mobility of couples around family formation in the Netherlands: Stated and revealed preferences, *Population, Space and Place*, 2020, vol. 26, no. 8, e2367.
https://doi.org/10.1002/psp.2367

Kowalczyk, C., Kil, J., and Kurowska, K., Dynamics of development of the largest cities — evidence from Poland, *Cities*, 2019, vol. 89, pp. 26–34.
https://doi.org/10.1016/j.cities.2019.01.018

Křížková, I. and Ouředníček, M., Immigrant internal migration in a new destination country: Do immigrants suburbanise in Czechia and why? *Population, Space and Place*, 2020, vol. 26, no. 7, e2326.
https://doi.org/10.1002/psp.2326

Kurichev, N.K. and Kuricheva, E.K., Regional differentiation of buyers' activity in the primary housing market of the Moscow agglomeration, *Reg. Res. Russ.*, 2018, vol. 8, no. 4, pp. 322–333.

Makhrova, A.G., The organized cottage settlements: New type of settlements (on the example of the Moscow area), *Reg. Issled.*, 2008, vol. 17, no. 2, pp. 13–20.

Makhrova, A.G. and Kirillov, P.L., The "housing dimension" of contemporary urbanization in Russia, *Reg. Issled.*, 2014, vol. 46, no. 4, pp. 134–144.

Makhrova, A.G. and Babkin, R.A., Analysis of Moscow agglomeration settlement system pulsations based on data from mobile network operators, *Reg. Issled.*, 2018, vol. 60, no. 2, pp. 68–78.

Makhrova, A.G. and Babkin, R.A., Methodological approaches to the delimitation of the boundaries of the

Moscow agglomeration based on data from mobile network operators, *Reg. Res. Russ.*, 2019, vol. 10, no. 3, pp. 373−380.
https://doi.org/10.1134/S2079970520030090

Makhrova, A.G., Nefedova, T.G., and Treivish, A.I., *Moskovskaya oblast' segodnya i zavtra: tendentsii i perspektivy prostranstvennogo razvitiya* (Moscow Oblast Today and Tomorrow: Trends and Prospects for Spatial Development), Moscow: Novyi Khronograf, 2008.

Mkrtchyan, N.V. and Gilmanov, R.I., Moving up: Migration between levels of the settlement hierarchy in Russia in the 2010s, *Reg. Res. Russ.*, 2023, vol. 13, no. 2, pp. 305−315.
https://doi.org/10.1134/S2079970523700727

Nefedova, T.G. and Treivish, A.I., Cities and countryside in Russia: Their state and correlation, *Reg. Issled.*, 2010, vol. 28, no. 2, pp. 42−57.

Newbold, K.B., Migration up and down Canada's urban hierarchy, *Can. J. Urban Res.*, 2011, vol. 20, no. 1, pp. 131−149.

Plane, D.A., Henriec, C.J., and Perry, M.J., Migration up and down the urban hierarchy and across the life course, *Proc. Nat. Acad. Sci. United States Am. (PNAS)*, 2005, vol. 102, no. 43, pp. 15313−15318.
https://doi.org/10.1073/pnas.0507312102

Raisikh, A.E., Defining the boundaries of urban agglomerations: Problems, international experience, solutions and results, *Demogr. Obozr.*, 2020, vol. 7, no. 1, pp. 27−53.
https://doi.org/10.17323/demreview.v7i1.10819

Rodrigo-Comino, J., Egidi, G., Sateriano, A., Mosconi, E.M., and Morera, A.G., Suburban fertility and metropolitan cycles: Insights from European cities, *Sustainability*, 2021, vol. 13, no. 4, pp. 1−14.
https://doi.org/10.3390/su13042181

Sandow, E. and Lundholm, E., Which families move out from metropolitan areas? Counterurban migration and professions in Sweden, *Eur. Urban Reg. Stud.*, 2020, vol. 27, no. 3, pp. 276−289.
https://doi.org/10.1177/0969776419893017

Vobecká, J. and Piguet, V., Fertility, natural growth, and migration in the Czech Republic: An urban−suburban−rural gradient analysis of long-term trends and recent reversals, *Population, Space and Place*, 2012, vol. 18, no. 3, pp. 225−240.
https://doi.org/10.1002/psp.698

Watt, P., Living in an Oasis: Middle-class disaffiliation and selective belonging in an English suburb, *Envir. Plan. A*, 2009, vol. 41, no. 12, pp. 2874−2892.
https://doi.org/10.1068/a41120