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The «Borrowed size» of the city is a factor of the dynamic development of the urban system of the region

Introduction.

A feature of the spatial structure of modern Russia is the high concentration of population, labor and financial resources in the metropolitan region, million-plus cities and the dispersion of resources from the center to the periphery. In the constituent entities of Russia, the majority of the population lives in the capitals of the regions, it is logical that the migration increase in large cities contributes to the growth of prices in the real estate market, services, etc. One of the factors constraining the increase in the cost of living in the capital region and the centers of the subjects of the Russian Federation is the placement of labor resources in satellite cities. In this situation, the theory of "borrowed size" becomes particularly relevant, according to which small and medium-sized cities can "borrow" part of the advantages of agglomeration from their neighbors, while avoiding the costs of agglomeration. A city with a borrowed size receives average benefits from its size, typical of a larger city. Thus, size and proximity generate external technological effects that increase the productivity of small cities to the level of large ones. The growth of small towns is explained by the introduction of geographical space (geographical proximity, not just the size of the urban industrial complex) as a source of externalities and growth.

The purpose of the study is to identify the presence of "borrowed sizes" and determine their impact on the dynamic development of the urban system of the region in modern Russian conditions.

A literary review of the study.

Spatial interdependence allows small cities to "borrow size" and perform functions that they could not perform in isolation. The concept of borrowed size was introduced by W. Alonso (1973) to explain the discrepancy between the size and functions of small towns that are part of the agglomeration [1]. The scientist emphasized that "a small city or agglomeration exhibits the characteristics of a larger city if it is located next to other concentrations of population" [1], i.e. small cities borrow the advantages of agglomeration from their larger neighbors, while avoiding the costs of agglomeration [1]. W. Alonso emphasizes that the borrowed size is a key issue in understanding the urbanization model of Northwestern Europe: the processes of borrowed size are observed in European urban models:

Germany and the Netherlands, whose cities are small. A number of scientists define the concept of «borrowed size» as a «shadow of agglomeration» [4, 5, 6].

The concept of «borrowed size» explains why second-rank cities grow economically without physical expansion: their location in polycentric urban systems replaces their individual physical size [11]. N. Phelps applied this concept to explain economic development in suburban cities or suburban areas [17].

To determine the «borrowed size», W. Alonso defines the following indicators: «per capita income» and «population growth rate». In more recent studies, a sectoral approach is applied. M. Hesse, when studying Luxembourg, connects the amount of borrowing with the observation that "a small settlement has functions characteristic of large megacities, receives a high share of employment in the field of financial and corporate services [2].

Based on the theory of central places [7] and the theory of urban systems [8], the new economic geography predicts the effect of large cities on neighboring ones, which means an increase in territories near places of a higher order. As for the availability of consumer amenities, it can be expected that places located near large cities actually have fewer consumer amenities than isolated localities of similar size. This expectation reflects that the provision of higher-level amenities in large cities is often facilitated by control over a wider region as a shopping area for high-end functions, where subordinate centers help to provide a minimum threshold of demand to support these functions [9, 10].

Among the Russian scientists dealing with topical issues of cities, it is advisable to single out the following: E.A. Kolomak – modern spatial development of cities of the Russian Federation [12]; A.N. Bufetova – features of cities of various sizes [13]; N.V. Zubarevich – socio-economic development of cities and regions of the Russian Federation [14]; B.S. Zhikharevich – urban development strategies [15]; O.S. Mariev – the impact of urbanization on atmospheric pollution [16]. It should be noted that there are no developments in the domestic literature regarding the concept of "borrowed size" in the system of Russian cities, which emphasizes the importance of this work.

Research methodology.

In foreign literature, the borrowed size of a city is calculated as the spatial lagging population living in neighboring cities, discounted by distance [18]:

$$\text{заимствованный размер}_a = \sum_{j=1}^{n} \frac{pop_j}{w_{geoja}} \qquad a \neq j \qquad (1)$$

where:

a и *j* are two different cities;

w_{geo} is a distance weights matrix that formalizes spatial interdependence between all cities;

pop_i is the vector of the urban population.

In view of the wide differentiation of natural, geographical and climatic conditions on the territory of the Russian Federation, the stated analysis will be carried out separately for the cities of the central part of the country, the European North and Siberia. The source of information will be the data of the official statistics service and the portal "RuDorogi".

In our opinion, the indicators of the presence of a borrowed size are the territorial proximity to a large city and the presence of migration growth.

In the study, the identification of the borrowed size will be carried out for cities located within a radius of 100 km. from the center of the agglomeration with the availability of transport links and at the same time having a high rate of population growth due to migration.

The results of the author's research.

Moscow agglomeration Central Federal District: the Moscow region includes 71 settlements, their total population as of 2020 is 5,738 thousand people, population density is 175.25 people/km2, GRP per capita is 556.4 thousand rubles. The territorial proximity with Moscow determines the growth rates of the cities of the Moscow region, the pendulum migration and the phenomenon of borrowed size.

Figure 1 shows the dynamics of the rate of migration growth in the cities of the Moscow region in 2013-2020.

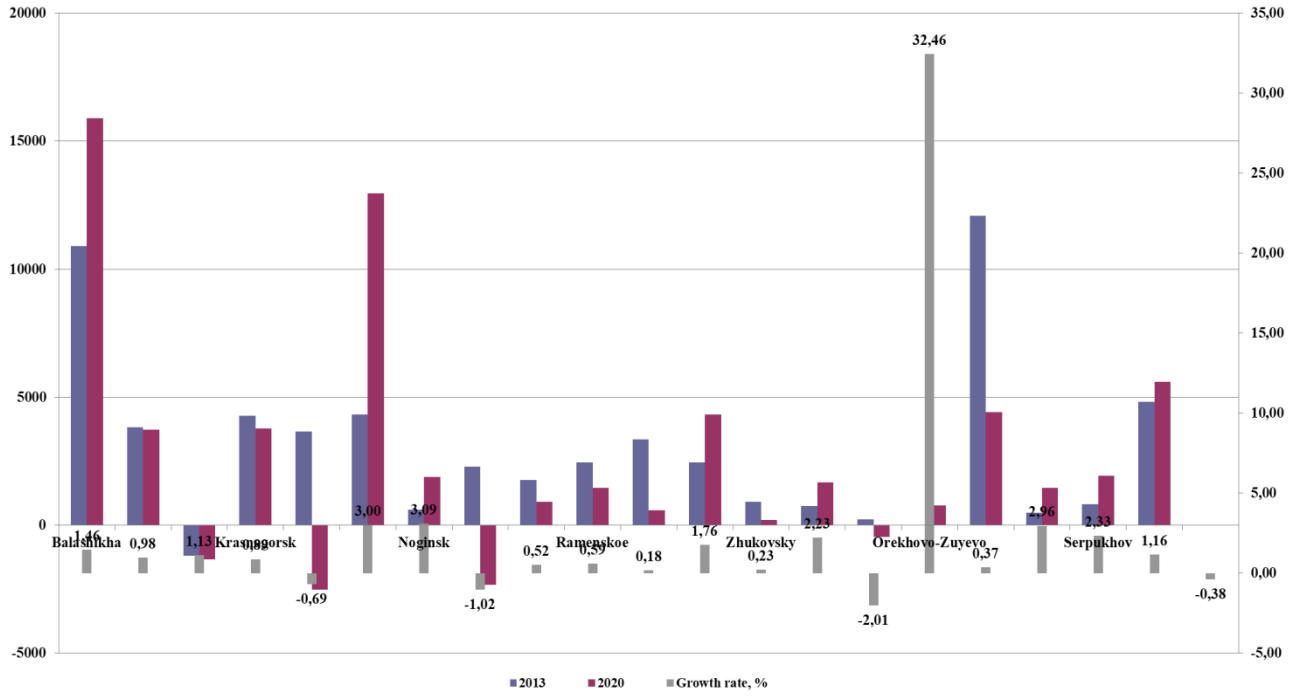

Fig. 1 The dynamics of migration growth in the cities of the Moscow region in 2013-2020, people.[1]

In the sample of cities in the Moscow region for the analyzed period, there is a migration increase in the population (the exception is Sergiev Posad, Lyubertsy in 2020, Odintsovo in 2020, Klimovsk in 2020, Elektrostal in 2020). We emphasize that the figure data demonstrate not only the presence of migration population growth, but also a significant growth rate of the indicator for the analyzed period period. Thus, the results obtained show the presence of a borrowed size in the cities of the metropolitan region, which is logical and natural. The population makes daily trips by public transport to Moscow, as they are employed in the capital, and also enjoys all the benefits of the capital (cultural and entertainment events, markets for food and non-food products, etc.), while the costs of purchasing and renting real estate are significantly lower.

Leningrad Region North-Western Federal District:

On the territory of the Leningrad region there are 33 cities with a total population of 977 thousand people, the population density is 22.78 people / km2.

Figure 2 shows the dynamics of the growth rate of migration growth in the cities of the Leningrad region in 2013-2020.

[1] Calculated according to the data of the Federal State Statistics Service

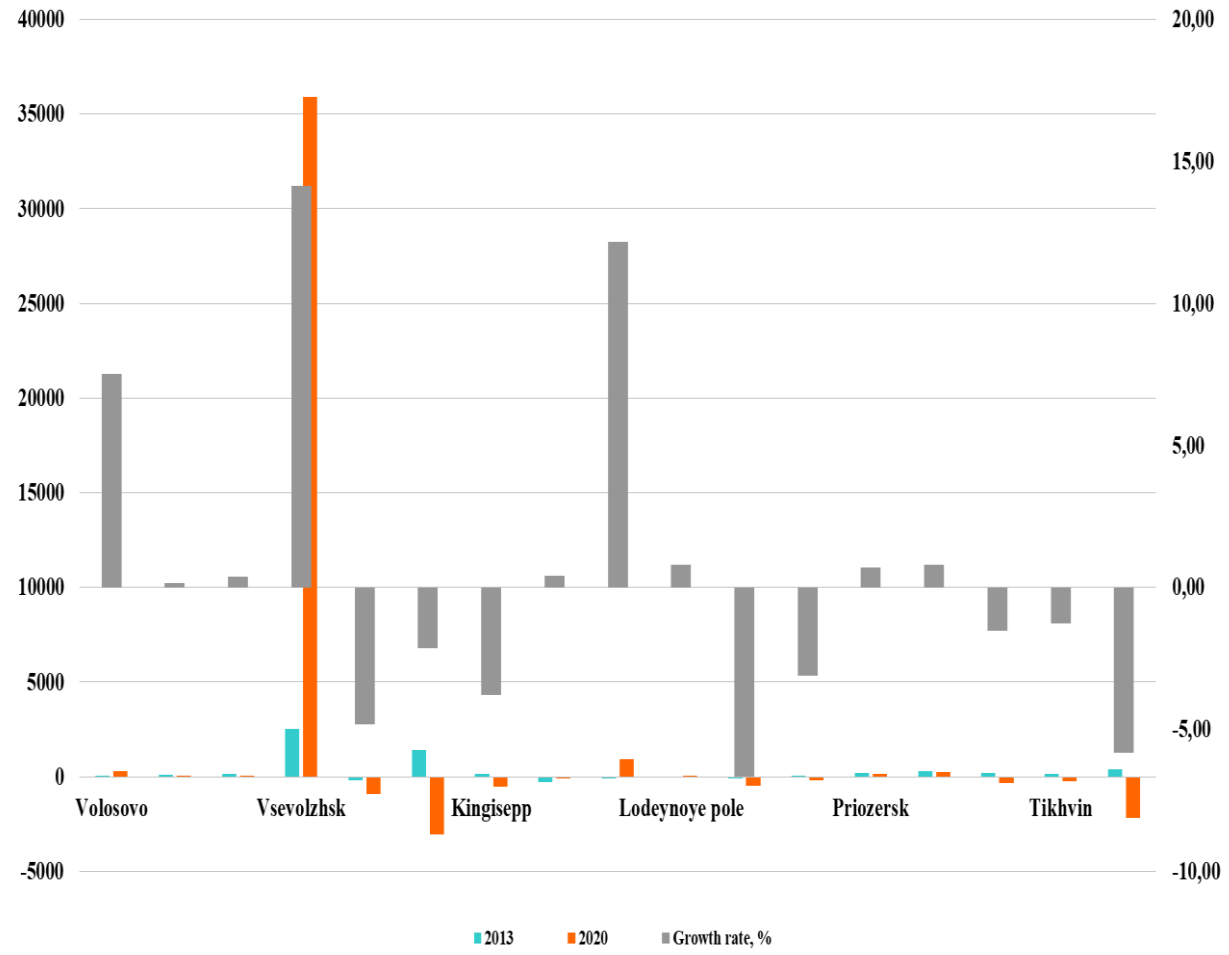

Fig. 2 The dynamics of migration growth in the cities of the Leningrad region in 2013-2020, people.[2]

The data in Figure 2 demonstrate not only a significant migration increase in Vsevolzhsk, but also a significant growth rate of the indicator, this city is located at a distance of 24 km. from St. Petersburg, so these criteria show the presence of a borrowed size in this city.

Factors indicating the borrowed amount are present in Volosovo (distance to St. Petersburg 71 km.) and Kirovsk (distance to St. Petersburg 51 km.).

Belgorod region Central Federal District:

As of 2021, there are 11 cities and 18 urban-type settlements in the Belgorod region. The largest city, the administrative center, is Belgorod (population – 394 thousand people on 01.01.2020). Traditionally, the second largest city is Stary Oskol – the center of ferrous metallurgy. It is home to 224 thousand people . Gubkin is the third city in the region – a single-industry town, since 2018 the territory of advanced socio-economic development has 86 thousand people. The

[2] Calculated according to the data of the Federal State Statistics Service

category with a population of 20 thousand–50 thousand people can include five cities and urban-type settlements (pgt), 10 thousand–20 thousand people. – 7, up to 10 thousand people – 14.

Figure 3 shows the dynamics of the growth rate of migration growth in the cities of the Belgorod region 2013-2020.

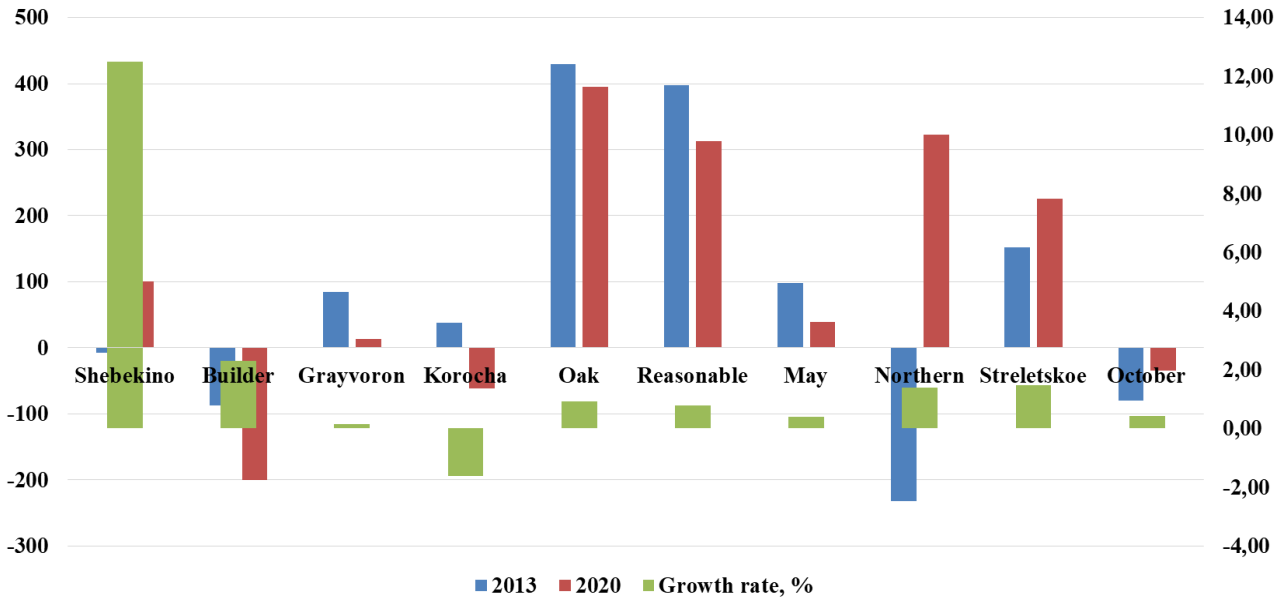

Fig. 3 The dynamics of migration growth in the cities of the Belgorod region in 2013-2020, people[3].

In cities located within a radius of no more than 80 km. from the regional center in the Belgorod region, indicators of borrowed size were found for Shebekino, Oak, Reasonable, Northern and May. It is particularly necessary to pay attention to the migration situation in the North, where in 2013 there was a migration decline, and in 2020. a significant migration increase in the population. In this locality, in recent years, there has been an active individual housing construction, a number of programs for young families are being implemented, which generally increases the attractiveness of the territory and contributes to the influx of population, since the price of real estate is lower than in the regional center, and the distance of 8 km allows you to make daily trips to work and study in Belgorod and enjoy the benefits cities (cultural and entertainment events, markets for food and non-food products, etc.).

Novosibirsk region Siberian Federal District:

There are 14 cities located on the territory of the Novosibirsk region, of which seven cities of regional significance are distinguished (four cities form separate

[3] Calculated according to the data of the Federal State Statistics Service

urban districts and three cities are included in the corresponding municipal districts) and seven cities of district significance; with a total population of 2020 thousand people, population density – 15.64 people / km2.

Figure 4 shows the dynamics of the growth rate of migration growth in the cities of the Novosibirsk region 2013-2020.

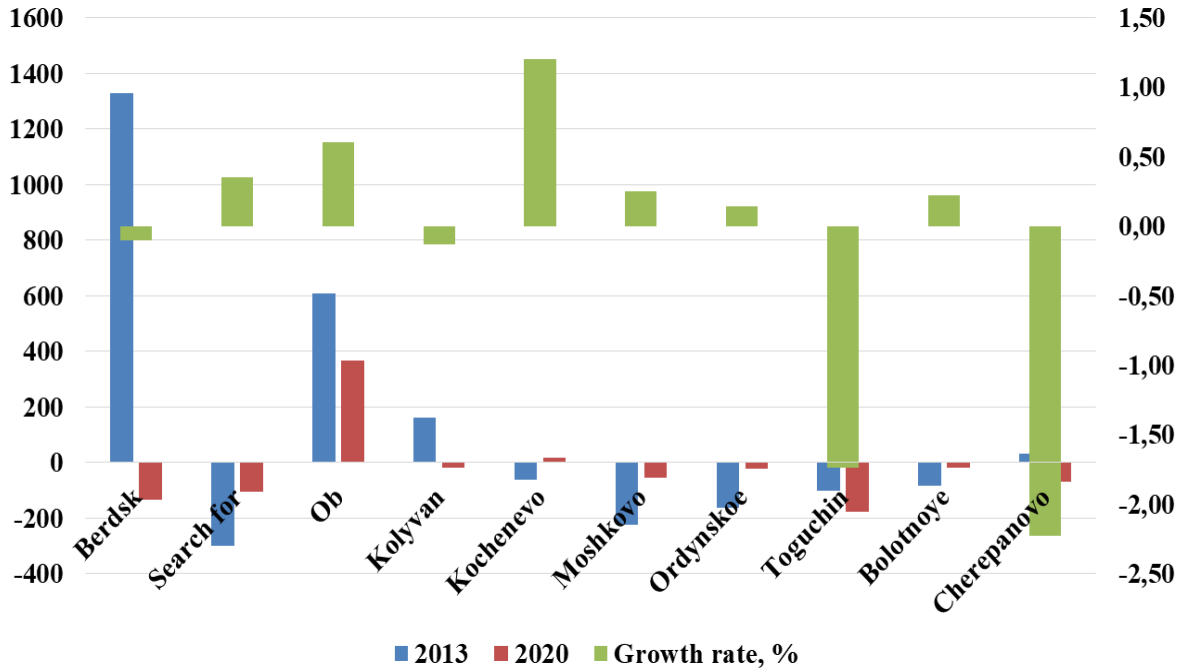

Fig. 4 The dynamics of migration growth in the cities of the Novosibirsk region in 2013-2020, people[4].

According to the data presented in Figure 4, migration growth in 2020 is observed in the city of Ob, but over the analyzed period the dynamics is negative. Positive dynamics of migration growth is planned in Kochenevo, Ordynskoye. A negative picture is observed in Berdsk, in this city in 2013 the migration influx amounted to 1330 hours, and in 2020 the migration loss was 133 hours. Thus, we can conclude that the borrowed size is present in the city of Ob (the distance to Novosibirsk is 18 km.).

Conclusions.

The conducted research complements the cycle of works on the spatial economy of Russia and allows us to draw the following conclusions:

[4] Calculated according to the data of the Federal State Statistics Service

– the theory of "borrowed size" is gaining popularity at the present stage of economic development.

– in the Moscow agglomeration, there is a borrowed size in a number of cities, which is logical, since living in the cities of the capital region reduces the cost of living (rent or purchase of housing, utility bills), but at the same time proximity to Moscow allows you to enjoy all the benefits of the metropolis (cultural events, the presence of large markets for food and non-food products).

– in the Leningrad agglomeration, the phenomenon of "borrowed size" is less pronounced. This factor can be explained by the peculiarities of the geographical location of St. Petersburg and the climatic factors of the region.

– active individual housing construction is developing in the Belgorod region, a number of programs for young families are being implemented, which generally increases the attractiveness of the territory and contributes to the influx of population into the Belgorod agglomeration. The analysis showed the presence of "borrowed size" in Oak, Reasonable, Northern and May.

– The Russian Federation is diverse in terms of natural resource potential and climatic conditions, which is determined by the placement of labor resources in the territorial space. The study showed that the "borrowed size" is typical for satellites of large cities that are located in favorable climatic conditions: Moscow and Belgorod agglomerations.

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