RESEARCH PAPER

CONSTITUENT ENTITIES OF THE RUSSIAN FEDERATION WITH CITIES OF OVER ONE MILLION INHABITANTS: THE STATE OF AND TRENDS IN THEIR INTERNAL DISPARITIES

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ABSTRACT. Sustainable development in Russia requires work to be done in a number of areas. One of the mechanisms for solving internal problems is to decrease the gaps in the level of socioeconomic development between the country's regions. This article provides an overview of the current state of the internal disparities in the socioeconomic development of the constituent entities of the Russian Federation that include cities with a population of over one million.

The constituent entities of the Russian Federation were analyzed in terms of the concentration of their population in the administrative centres. The population concentration ratio for cities of over one million inhabitants and the population polycentricity ratio for the corresponding entities were calculated. The ranking of entities was carried out based on these indicators. An analysis of the "contributions" of cities and peripheral areas to the formation of the gross regional product of the studied entities of the Russian Federation was carried out. The economic concentration ratios of cities with over one million inhabitants were calculated. The relationship of this indicator with the population ratio was established. Based on this, the following categories were identified: entities that are not in danger of a population or economy hyper-concentration in the administrative centre; entities with moderate population concentration in the city of more than one million inhabitants combined with an upward trend in their economic concentration; and entities with a high concentration of the population and economy in the administrative centre and signs of decrease in the population and economic concentration.

KEY WORDS: cities with population of over one million, administrative centre, population concentration ratio, population polycentricity ratio, economy concentration ratio, internal disparities

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INTRODUCTION

The involvement of Russia in global economic processes inevitably leads to the transformation of the spatial development of its regions. In modern conditions, issues regarding the regulation of the spatial organization of the economy are becoming key on a functional basis in Russia (Animitsa 2013). The need to ensure the competitiveness of the constituent entities of Russia leads to the use of their strengths. In this regard, the current spatial organization of the socioeconomic regions of the country has been deformed, which typically reinforces the exiting disparities in territorial development. One of these disparities is associated with stable settlement trends in recent decades. This trend is expressed in the powerful migration outflow of the population directed from east to west and from north to south (Obedkov 2018) as well as from peripheral areas to regional centres (Zubarevich 2013) and the largest megacities in the country (Varshavskij 2018; Blyahman 2014). Against this background, the most noticeable and ever-increasing trend is the "contraction" of the population into cities with over one million inhabitants and the "desertion" of rural areas. In the presence of significant economic gaps, uneven development both between the regions of Russia and within them is objectively inevitable (Buchvald and Kolchugina 2019).

The purpose of this study is to review the current state and some trends in the development of internal disparities among entities with cities of over one million inhabitants by establishing a relationship between their population and economic concentration ratio.

MATERIALS AND METHODS

The works of many Russian and foreign scientists were devoted to the special contribution of megalopolises to the economic growth of the state and the obvious advantages of the agglomeration effects (O'Hara 1977; Carlino 1978; O'hUallachain and Satterthwaite 1992; M.A. Saxenian 1994; Venables 1994; Lyons 1995; Krugman 1996). According to modern sources, disruption of a stable settlement system poses a direct threat to the country's national security (Shmidt et al. 2016). Following the relevant state strategy to ensure its security, it is necessary to reduce the level of interregional differentiation in the social and economic

development of the constituent entities of the Russian Federation (Buchvald and Kolchugina 2019). Measures to achieve this goal are included in the Strategy for Spatial Development of the Russian Federation until 2025. However, the problem of determining the tools for its implementation remains open for discussion (Minakir 2018, Kuznecova 2019, Zubarevich 2019).

According to researchers, in Russia, unlike any other developed country in the world, there are still quite strong contrasts between the centre and the periphery of provinces in terms of living conditions and population. This sharp differentiation was initially based on climatic, natural resource, cultural and historical factors. This also includes the results of the historical formation and evolution of the territorial structure of the Russian economy, as well as the specifics of the current state-territorial structure of the country (Animitsa et al. 2009; Blochliger and Durand-Lasserve 2018). Additionally, the internal territorial differentiation in the regions of the Russian Federation does not contribute to their balanced social and economic development (Minakir 2019).

By the beginning of the 20th century, Russia was still an agrarian country with approximately 2% of the population living in large cities. In Soviet Russia, large-scale industrialization led to the increased growth of population and economic importance of large cities. If the crises in the first half of the twentieth century did not allow for the formation of a clear trend in this process, then the middle of the century was marked by the emergence of new cities with over one million inhabitants against the background of decreasing role of the regions' periphery. By the end of the 1980s, as the country entered a new crisis, urban growth began to slow down but contrasts in the economic importance of administrative centres and that of the peripheral regions remained.

In the 1990s, research on the topic was interrupted and there were no clear trends. By the beginning of the 21st century, the economic recovery in administrative centres expanded the range of jobs available there that were lacking in many regions. This gave a new impetus to the concentration of demographic and economic potential of regions in their largest cities including cities with over one million inhabitants.

Of course, there is high variability in the economic contribution of cities to regional development. However, overall, the following pattern has emerged concerning the distribution of productive forces in Russia: the more developed is the region, the more noticeable is its internal polarization. The issues of centralization and reasons for this phenomenon have been studied by G.V. Ioffe and others (Ioffe and Nefedova 2001). The spatial relationship between the cities and rural areas in Russia is considered in the works of A.I. Treyvish and T.G. Nefedova (Treyvish and Nefedova 2010). The dynamics and consequences of the compression of rural regions in Russia along with the idea of the Russian periphery as a socioeconomic phenomenon were disclosed in the works of T.G. Nefedova (Nefedova 2008 and 2012). The growing economic centralization in Russia intensified more than a hundred years ago, and the contrast between large urban centres and the rest of the territory is becoming more noticeable. Polarization has manifested itself not only between the regions of the country but also intra-regionally.

The "centre-periphery" theory ("the theory of four Russias"), as one of the models that experts use today to explain the country's internal heterogeneity (Zubarevich 2015 and 2019), is generally applicable to the constituent entities of the Russian Federation. The hierarchy in the intra-entity space in this case looks as follows: centre, which corresponds to the administrative centre and/or the largest city in the entity; semi-periphery territorial agglomerations (excluding the main city) and, in their absence, the smaller and medium-sized cities in the entity; periphery - small towns and rural settlements not included in the agglomeration (if any). These three types of spaces, which are connected throughout the country and exist in each region, have different potential and resources for development (Khlestova 2017).

In this study, the author considers the current state of the population and economy distribution between administrative centres and peripheral regions using sample entities with cities of over one million inhabitants. These entities differ in the severity of their internal socioeconomic contrasts. However, the persistence of the population and economy "contraction" in these entities is especially characteristic.

During the research, analytical, synthetic and statistical methods were applied. The research was based on data from the Federal State Statistics Service, "Institute for Urban Economics" Foundation.

Differentiation of administrative centres in the constituent entities of the Russian Federation by population concentration

The population is a part of the economic potential of a region that is closely tied to the region's location. Therefore, the location of the population often repeats the patterns in the territorial structure of the economy (Zubarevich and Safronov 2019). The identification of the population placement features in the constituent entities of the Russian Federation was carried out using the indicator for the concentration of the population in administrative centres (except for the Moscow and Leningrad regions, since the special status of Moscow and Saint Petersburg, as well as the existing characteristics of their socioeconomic development (Chalov et al. 2015) does not allow them to be evaluated accurately within the framework of this study). The classification of administrative centres based on this indicator is presented in Table 1.

The cities were combined into 6 groups according to the share of the population of an entity living in the administrative centre. Thirty-seven percent of the cities covered by the study belong to the third group, in which 31-40.9% of the population is concentrated in the administrative centre. A total of 24% of the administrative centres have a population concentration of 41-50.9%. Around 8.5% of cities were in the groups of less than 21% and 51-60.9% of the population living in the administrative centre. An exception is Magadan, where almost 70% of the Magadan region population is concentrated (Table 1).

During the grouping process, the following features were also identified. The first group includes the administrative centres of those constituent entities that include cities with population concentration exceeding the value of this indicator for the administrative centres themselves. For example, the population concentrations of Nefteyugansk, Nizhnevartovsk and Surgut are 1.3-3.7 times larger than that of the capital of Khanty-Mansiysk Autonomous Okrug. The same is true for Noyabrsk and Novy Urengoy in Yamalo-Nenets Autonomous Okrug; their population concentration is more than two times higher than of the capital, and the value of this indicator for Nadym is almost equal to that for Salekhard. More than 24% of the population of Ingushetia lives in Nazran, while only 1.8% lives in Magas. The population

Table 1. Estimated water demand for the studied allotment projects

№	Group number (part of the region's population living in the administrative centre, %)					
	1	2	3	4	5	6
	less than 20.9%	21-30.9%	31-40.9%	41-50.9%	51-60.9%	61% and more
1	Magas	Belgorod	Syktyvkar	Kursk	Tyumen	Magadan
2	Khanty-Mansiysk	Mahachkala	Arkhan-gelsk	Yoshkar-Ola	Petropavlovsk-Kamchatsky	
3	Salehard	Tver	Kazan	Kirov	Astrakhan	
4	Stavropol	Irkutsk	Yakutsk	Orel	Tomsk	
5	Simferopol	Vladimir	Chita	Izhevsk	Naryan-Mar	
6	Grozny	Cherkessk	Pskov	Kostroma	Novosibirsk	
7	Kemerovo	Vologda	Vladivostok	Saransk	Omsk	
8		Rostov-on-Don	Yuzhno-Sakhalinsk	Vladikavkaz		
9		Barnaul	Saratov	Voronezh		
10		Krasnodar	Abakan	Ulan-Ude		
11		Ufa	Chelyabinsk	Lipetsk		
12		Blagove-shchensk	Ekaterin-burg	Petroza-vodsk		
13		Gorno-Altaysk	Krasno-yarsk	Birobidzhan		
14		Orenburg	Bryansk	Khabarovsk		
15		Anadyr	Samara	Kaliningrad		
16			Kyzyl	Ryazan		
17			Majkop	Yaroslavl		
18			Novgorod	Ulyanovsk		
19			Tula			
20			Kurgan			
21			Smolensk			
22			Elista			
23			Nizhny Novgorod			
24			Murmansk			
25			Penza			
26			Ivanovo			
27			Perm			
28			Volgograd			
29			Kaluga			
30			Cheboksary			

of Novokuznetsk is only 5 thousand less than in the capital Kemerovo. Among the cities in the second group, the value of this indicator for Vologda is 0.5% less than for Cherepovets.

There are several constituent entities of the Russian Federation with the administrative centres belonging to groups 2-4, which also include some cities with lower concentration. Usually, these cities cannot be compared with the capital cities in terms of population concentration and are at a lower level of city classification in terms of population size, but they stand out significantly among other settlements. These include Naberezhnye Chelny in Tatarstan, Novocheboksarsk in Chuvashia, Severodvinsk in Arkhangelsk region, Orsk in Orenburg region, Togliatti in Samara region, Engels and Balakovo in Saratov region, Dimitrovgrad in Ulyanovsk region, Bratsk and Angarsk in Irkutsk region; Sochi and Novorossiysk in Krasnodar Krai, Biysk and Rubtsovsk in Altaysk Krai, Ussuriysk, Nakhodka and Artyom in Primorsk Krai and Komsomolsk-on-Amur in Khabarovsk Krai.

Most likely, for the entities, in which there are some kind of alternative economic centres that complement the capital, especially if they are not part of an existing agglomeration, the problems of population hyper-concentration and "contraction" of economic potential are smoothed out to a certain extent. It seems that this situation is much more typical of entities with cities of more than one million inhabitants. These cities in terms of the share of the entity population living in them are scattered across groups 2-5. Therefore, entities that include these larger cities will be rather heterogeneous in their territorial development and therefore can be representative objects of the study.

The concentration ratio, which specifically reflects the population concentration in entities with cities of over one million inhabitants, was adopted as the main criterion for ranking the entities. This indicator is calculated using the following formula:

$$Rpc = Psac / PSp \quad (1)$$

where *Rpc* is the population concentration ratio, *PSac* is the population of the administrative centre and PSp is the population

of the entity's periphery. The *PSp* indicator is calculated using the population of the entity outside of the administrative centre.

The resulting ranking of the cities with over one million inhabitants for this indicator are presented in Fig. 1.

Based on this indicator, cities with more than one million inhabitants are conditionally divided into 3 groups. The cities with relatively low population concentration are Rostov-on-Don, Ufa and Kazan, in which less than a half of the entity's population is concentrated (i.e., the concentration coefficient did not exceed 0.5). Chelyabinsk, Ekaterinburg, Samara and some other cities were characterized by an average concentration ratio from 0.5 to 1.0, while Novosibirsk and Omsk were identified as having the highest population concentration. Since the ratio here is significantly higher than 1.0, it can be said that in these cities there is a hyper-concentration of the population of their corresponding entities.

To some extent, natural resource conditions and the specifics of their economic development also affect the concentration of the population into cities with over one million inhabitants. The economy of the city itself is based on industry and services. At the same time, the administrative centres of entities with a developed primary economy sector are characterized by lower concentration coefficients due to a smaller network of settlements. Several entities have alternative centres in addition to their capitals that appear to have significant economic value. However, their presence is an exception rather than a rule.

Another used indicator was the population polycentricity ratio. It characterizes the degree of population dispersal between the capital and other large cities in the entities with cities of over one million inhabitants. The population polycentricity ratio is calculated by the formula:

$$Rpc = Pskg / PSr \quad (2)$$

where *Rpc* is the polycentricity ratio, *PSkg* is the share of cities with a population of over 100 thousand people (excluding the city with population higher than one million), and *PSr* is the share of the remaining population in the total population of the entity.

The ranking of entities with cities of over one million inhabitants according to polycentricity ratio is presented in Fig. 2.

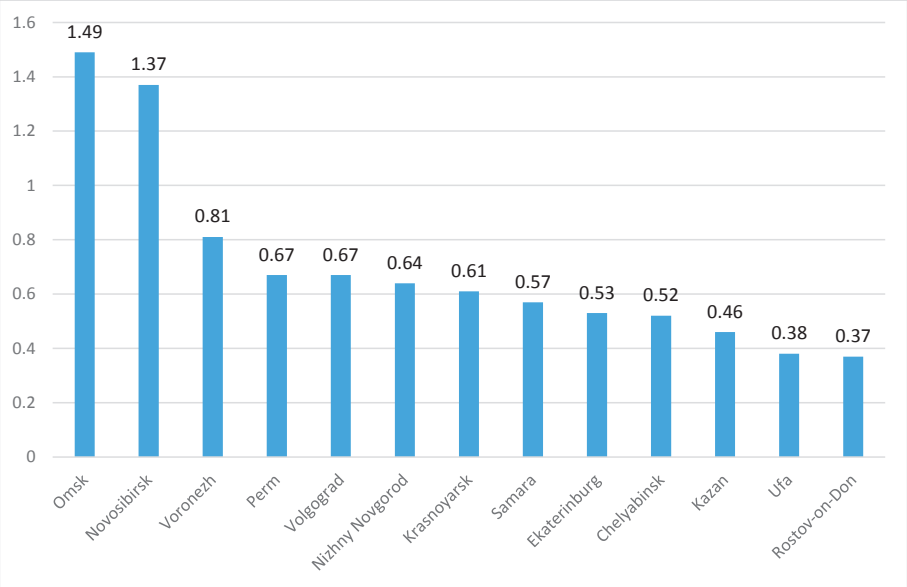

Fig. 1. The ranking of cities with over one million inhabitants according to the population concentration ratio of the corresponding entity (as of the end of 2017)

Source: Federal State Statistics Service

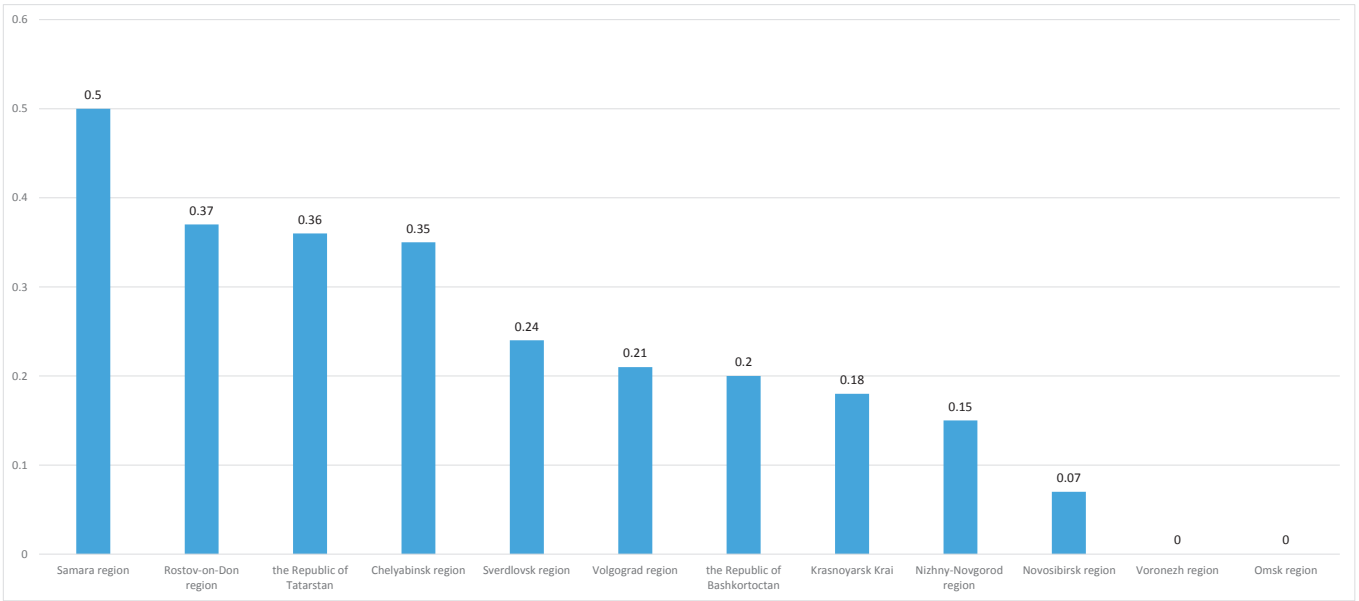

Fig. 2. The ranking of entities with cities of over one million inhabitants according to the polycentricity ratio (as of the end of 2017)

Source: Federal State Statistics Service

The figure shows that the ranking of entities according to this indicator is almost exactly the opposite of the previous ranking. The leader in terms of the dispersion rate is Samara region, followed by Rostov-on-Don region, Chelyabinsk region and Tatarstan. Novosibirsk region has a very low polycentricity ratio. Voronezh and Omsk regions ranked last as they do not have any cities with a population of over 100 thousand people.

Economic differentiation of the constituent entities of the Russian Federation with cities of more than one million inhabitants

To identify the actual economic differentiation in intra-entity spatial research, the analysis of the dynamics of the gross regional product (GRP) produced by each entity was carried out. This indicator considers the entity as a whole, and the degree of participation of administrative centres and peripheral territories in its formation was determined.

The gross product of the studied cities (city gross product, CGP) and urban agglomerations is presented on the official website of the Institute of Urban Economics[1,2],. The gross product of the periphery in the constituent entities with cities of over one million inhabitants was calculated based on indicators from the Federal State Statistics Service[3] by excluding the CGP (and the gross product of the city's agglomeration in 2015) from the GRP of the constituent entity. The indicators for 2015 and 2017 are compared within the respective entities (Fig. 3).

In absolute and relative terms, all the entities of the Russian Federation demonstrated growth in their GRP in 2017 compared to 2015. The dynamics, however, was different as the increase in the range of 5-10% was observed for Volgograd, Voronezh, Omsk and Samara regions as well as Bashkortostan; 11-15% in Tatarstan, Rostov-on-Don region, Chelyabinsk region and Perm Krai, and 16-18% in Krasnoyarsk Krai along with Novosibirsk and Nizhny Novgorod regions. Growth of more than 20% was observed in Sverdlovsk region.

The inflation rate, which varied insignificantly for the considered entities in 2017 (within 1.7%, from 101.4% to 103.1%), also strengthened the emerging trend in the growth of GRP. This is especially true for entities with the highest inflation rate between 2015 and 2017. These include, first of all, Sverdlovsk region, as well as several entities with relatively low rate of the absolute growth of their GRP (Volgograd, Voronezh and Samara regions).

At the same time, the main contribution to this indicator is made by the administrative centres of the respective entities. Therefore, according to the 2015 data, 30-35% of

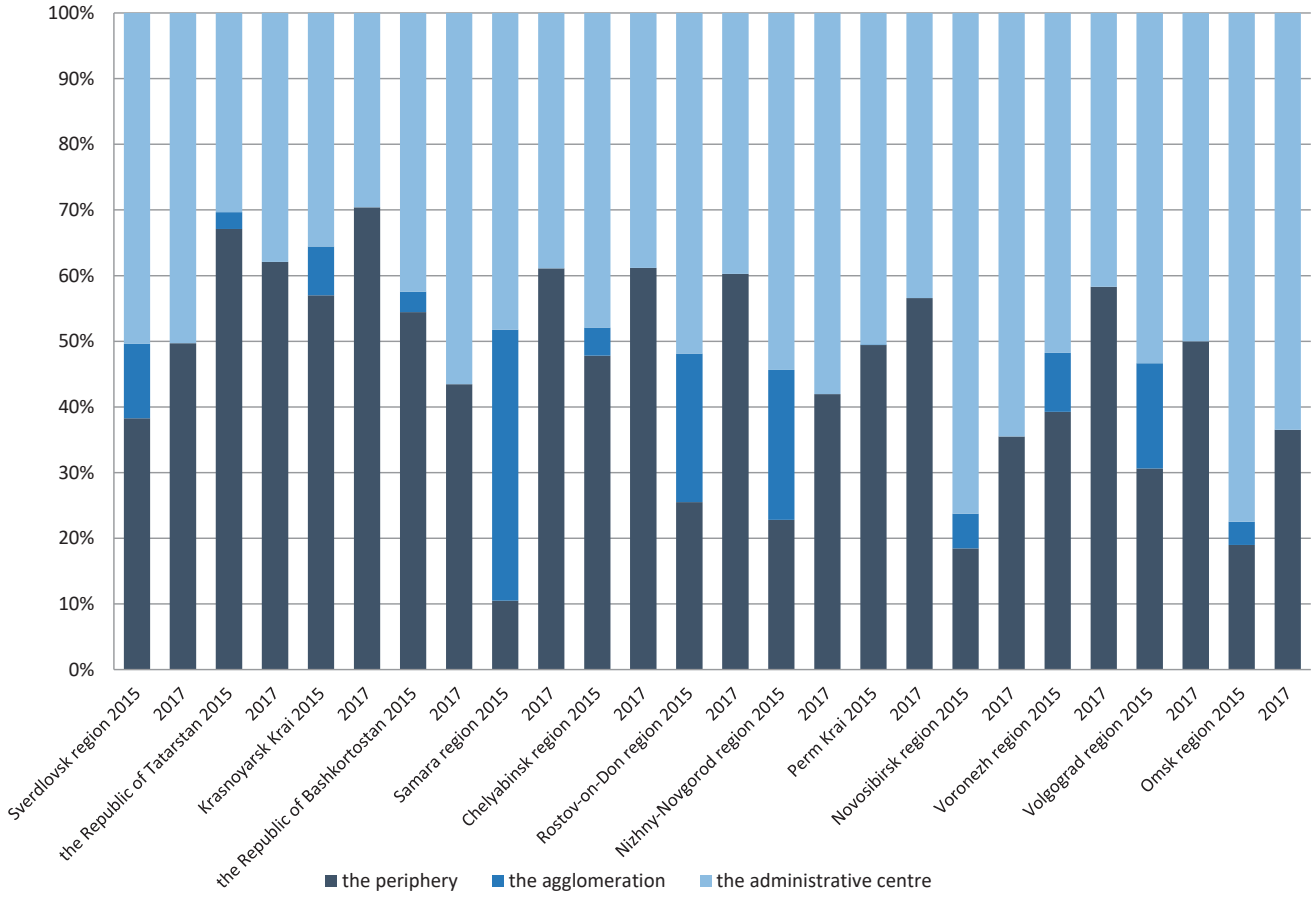

Fig. 3. Contributions of cities with over one million inhabitants and peripheral territories to the formation of the GRP of the constituent entities of the Russian Federation

Source: Federal State Statistics Service; The Institute for urban economics

[1]Institute for Urban Economics. Rating city IUE. Available at: http://www.urbaneconomics.ru/research/analytics/rating_city_IUE.html Accessed 01 April 2020L / per capita / day), boarding schools (95 L / per capita day), schools by term (22 L / per capita / day), offices (40 L / per capita / day), sewing workshops (40 L / per capita day) and auto repair shops (75 L / per capita / day), averaging at 47.5 L / per capita / day. This value was multiplied by the maximum number of people in a microenterprise (9 employees), just for comparison purposes, which generated a demand of 427.5 L / lot / day.

[2] Institute for Urban Economics. The economy of Russian cities and urban agglomerations. Available at: http://www.urbaneconomics.ru/sites/default/files/vypusk 5 rossiiskie_aglomeracii v globalnoi_ekonomike.pdf Accessed 12 March 2020

[3] Rosstat, 2017-2019. Aviable at: https://www.rosstat.gov.ru / bgd/regl/b18 _14p/ Main. html Accessed 01 April 2020

the GRP of Tatarstan and Krasnoyarsk Krai was produced in the capital cities, and 42-48% was produced in the capital cities of Bashkortostan as well as Chelyabinsk and Samara regions. More than 50% of the GRP of the corresponding entities was produced in Voronezh, Volgograd, Rostov-on-Don, Perm and Ekaterinburg. The absolute leaders in this respect were Nizhny Novgorod, Novosibirsk and Omsk (70.4%, 76.2% and 77.4% of the GRP, respectively).

Due to their economic characteristics, these entities differ in the degree of development of their settlement systems. While Nizhny Novgorod region is characterized by a relatively developed network of cities (with the large cities of Arzamas and Dzerzhinsk, and another 25 small and medium cities), in Novosibirsk region there are only 13 cities (1 large) and in Omsk region – only 5 (all of which are small). Taking into account the area of the entities, this is clearly not enough to support the development of the peripheral territories. Thus, significant economic differentiation between the centre and the periphery of the studied entities becomes obvious.

It should also be noted that cities with a population of over one million almost inevitably become centres for the formation of agglomerations. The level of their socioeconomic development, of course, cannot be equated with that of the periphery of the entities. However, judging by the 2015 data, these cities act as the "engines" of growth for most of these entities.

Among agglomerations where economically important non-metropolitan settlements are quite extensive, the Samara-Togliatti region stands out. This name already indicates at least a dual-centre territorial structure. Samara accounts for only approximately 55% of the CGP produced here. Zhigulevsk, Novokuibyshevsk, Oktyabrsk, Syzran, Togliatti, Chapaevsk and Kinel play the most important economic roles. More than 31% of the CGP of the Nizhny Novgorod agglomeration was produced outside the central city (in Bor, Dzerzhinsk and other settlement). For the Rostov-on-Don agglomeration, 24% of the CGP is produced outside Rostov-on-Don (Azov, Bataysk, Novocherkassk, Novoshakhtinsk, Taganrog), and 21.6% of the CGP is produced outside the Volgograd agglomeration (mainly in the city of Volzhsky).

A total of 15-20% of the CGP is produced outside the centres of the Voronezh (Novovoronezh), Sverdlovsk (Aramil, Asbest, Beloyarsky, Berezovsky, Verkhnee Dubrovo, Verkhnyaya Pyshma, Degtyarsk, Zarechny, Malyshevsky, Novouralsk, Pervouralsk, Polevskoy, Revda, Reftinsky, Sredneuralsk, Sysert, Uralsky) and Krasnoyarsk (Zheleznogorsk, Divnogorsk, Sosnovoborsk) agglomerations.

Other capital cities are characterized by a significant degree of concentration of the economic potential in their corresponding agglomerations. Thus, extra-metropolitan areas in the Ufa, Kazan and Chelyabinsk agglomerations produce only 7, 8 and 8.2% of CGP, respectively. The cities of the Novosibirsk agglomeration (Berdsk, Iskitim, Koltsovo, Ob) account for no more than 6% of the CGP, and those of Omsk contribute no more than 4.4%. In the Perm agglomeration, almost the entire volume of CGP is formed in the capital city of the corresponding entity.

The analysis of the GP produced by administrative centres and peripheral territories (excluding agglomerations for which the data were not available) of the studied entities in 2017 revealed the following features. For each entity, the leading role of the administrative centre in the formation of its GP was preserved. Volgograd, Kazan, Ufa and Samara strengthened their positions in absolute and relative terms. Together with the economy of the Sverdlovsk region, the CGP of Ekaterinburg has also increased. This allowed the administrative centre to maintain its share in the formation of GRP.

However, for other cities with over one million inhabitants, the opposite trend emerged. With the smaller CGP values than in 2015, the share in the formation of the GP of the corresponding entities decreased for the following administrative centres: Omsk - by 13.8%; Novosibirsk, Rostov-on-Don and Nizhny Novgorod - by 12-12.5%; Voronezh - by 10%; Chelyabinsk - by 8.3%; Perm - by 7%; and Krasnoyarsk - by 6.2%. Accordingly, the "contribution" of the periphery to the formation of this indicator increased. For Krasnoyarsk Krai, it exceeded 70% (due to the GPs of Achinsk and Norilsk); in Chelyabinsk and Rostov-on-Don regions it became more than 60% (also due to the GPs of other cities). The situation in Voronezh region and in Perm Krai are in line with these examples. The share of the peripheral territories of Nizhny Novgorod, Novosibirsk and Omsk regions in the formation of the GP, despite this trend, remained low - at 35-40%.

From the analysis of the GRP growth rates from 2015 to 2017, only two entities with positive dynamics in the GPs of both the administrative centre and the periphery were identified. These were Tatarstan and Sverdlovsk region, which are characterized by an average population concentration in the capital cities (0.46 for Kazan and 0.53 for Ekaterinburg) and have a fairly developed network of settlements (46 cities in the Sverdlovsk region, including the large cities of Nizhny Tagil, Kamensk-Uralsky and Pervouralsk, and 6 cities in Tatarstan, including the large cities of Almetyevsk and Nizhnekamsk, as well as the largest city, Naberezhnye Chelny).

However, it should be noted that the growth of GP within the capital and peripheral territories of Tatarstan also differs significantly. While the CGP of Kazan for the considered period increased by 45%, the GP in the rest of the entity increased by only 2.5%. Thus, there is a very noticeable acceleration in the development of the capital of the Republic. For Sverdlovsk region, the differences in these indicators were not significant (20 and 21%, respectively). With the general growth of GRP, this may indicate relatively stable and balanced economic development in this entity. This is due to the presence of "auxiliary" economic points with centres being one of the main conditions for the formation of a supporting framework and comprehensive realization of a territory's potential.

Negative growth in GRP from 2015 to 2017 of 12-19% was demonstrated in the periphery of entities, in which the administrative centres have strengthened their positions in the economy. These are Bashkortostan along with Volgograd and Samara regions (with an increase in CGP of 20% for Volgograd and 40% and 41% - for Samara and Ufa, respectively). This may indicate a continuing concentration of the economic potential into the central cities and deepening of the territorial differentiation, which may cause the formation of economically weak areas in this context and, possibly, incomplete realization of the economic potential in the constituent entities of the Russian Federation.

In contrast, in some cases there was also noticeable positive growth in the GPs of the entities, in which the CGPs of their administrative centres decreased (for Voronezh, Rostov and Chelyabinsk regions as well as for Perm Krai and Krasnoyarsk Krai, the CGPs of the administrative centres decreased by 27-44% in 2017 compared to 2015, for Nizhny Novgorod region the decrease was 67%). An understanding of the interdependence of these trends was obtained by assessing the dynamics of the GPs of the

entities' capitals. For Perm, Nizhny Novgorod, Krasnoyarsk and Chelyabinsk, the decline in CGP for the considered period ranged from 2 to 5%. Therefore, the development in the periphery of the entities was truly significant. The GP of Rostov-on-Don decreased by 12%, but the increase of GP in the periphery amounted to 44%. Meanwhile, in Voronezh the CGP decreased by 16.5% with no significant increase in the GP of the periphery of the entity, which may reveal certain risks to its further development.

The most significant increase in the "contribution" of the periphery to the formation of GRP was in Novosibirsk and Omsk regions (71 and 74% growth in their absolute values from 2015 to 2017, respectively). Such changes along with the general growth in the GP of the entities may indicate, for example, the beginning of some economic dispersion away from the capital cities that already have hyper-concentrated populations. But more precisely the reason for this phenomenon can be revealed only from a detailed analysis of the economy of each of them in the considered period.

RESULTS AND DISCUSSION

Based on the obtained data, the ratio of economic concentration was calculated for the administrative centres of the studied entities of the Russian Federation. To calculate this ratio, the following formula was adopted:

$$Cec = CGP / PGP \quad (3)$$

where *Cec* is the economic concentration ratio, *CGP* is the city gross product and *PGP* is the peripheral gross product (the difference between the *GP* and *CGP* of the corresponding entity).

Even though these two indicators are calculated using different methods, their ratio allows to characterize the differentiation in the intra-regional economies. The values of the economic concentration ratio for entities with cities of over one million inhabitants in 2015 (blue columns) and in 2017 (light-blue columns) are shown in Fig. 4.

The diagram shows that the economic concentration ratio in the administrative centres of the studied entities of the Russian Federation generally correlates with the ratio for population concentration while exceeding it to varying degrees. At the same time, the dynamics of the economic concentration ratio from 2015 to 2017 is ambiguous. The pattern of this correlation allows us to identify the features of the modern economic development of these regions as formed by the population and economic components.

Thus, the entities in which the population concentration in the capital is associated with a centralizing trend in the economy are distinguished, these are Volgograd region, Tatarstan and Samara region. To date, the population concentration in the administrative centres of these entities is moderate. However, while the trend towards the "concentration" of the economy continues, there are certain risks for the further development of the agglomerations they form, especially in the peripheral territories.

Entities with a decrease in the share of cities in the formation of GRP such as Perm and Krasnoyarsk Krais along with Rostov-on-Don, Voronezh and Chelyabinsk regions, are also characterized by relatively low population concentration. This probably indicates that there is no threat of the population and economy hyper-concentration in the capital cities at this time. The situation is similar for Nizhny Novgorod region, although the concentration of the economy in the administrative centre there is quite high.

In Sverdlovsk region, the CGP of Ekaterinburg and the GP of the periphery are comparable, while the population concentration in the administrative centre is relatively low. This region can be classified as stable in terms of the dynamics of the economic concentration ratio. At the same time, it seems possible to assess the interaction tendencies between the centre and periphery in more detail, taking into account only the aspects of its agglomeration development.

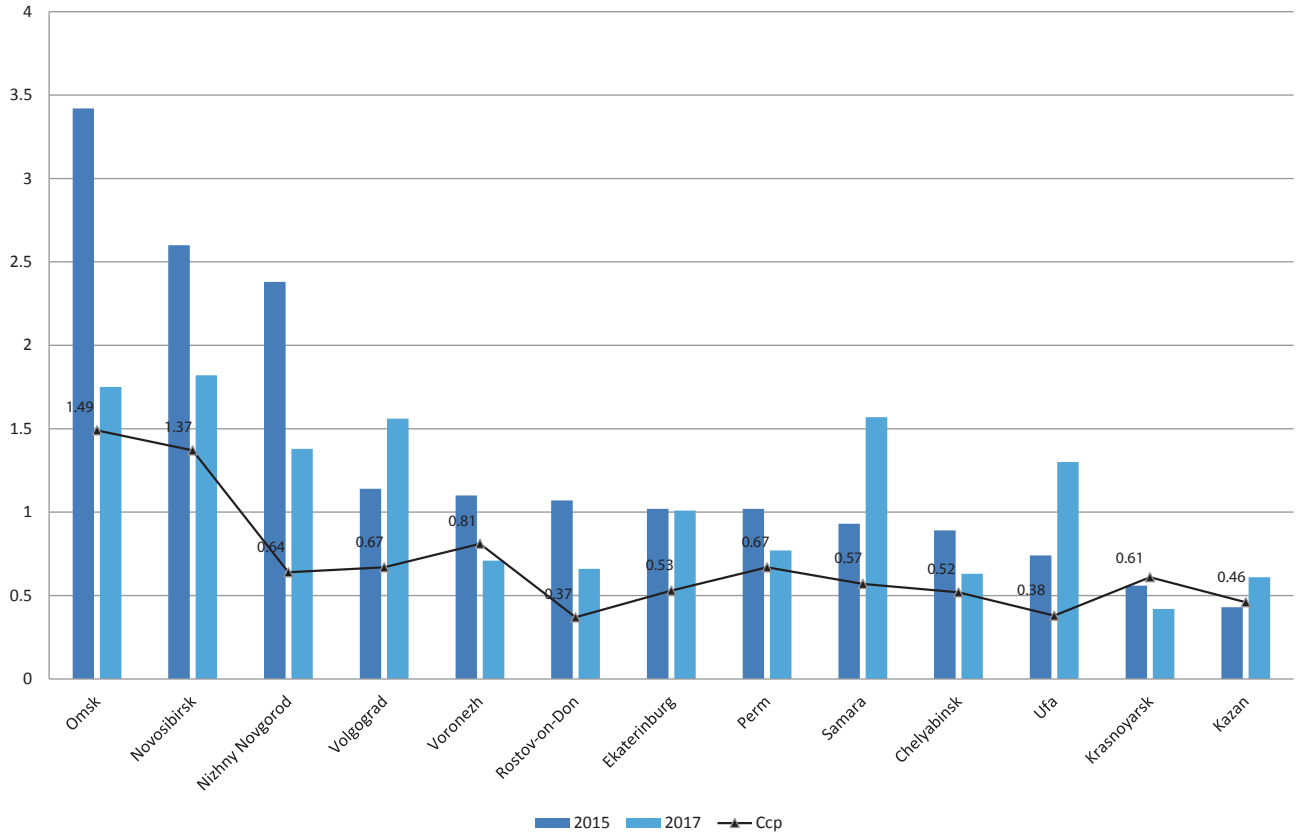

Fig. 4. Economy concentration ratio dynamics (ratio between CGP and PGP of an entity)

Omsk and Novosibirsk are absolute leaders in terms of the population and economy concentration within the cities with more than one million inhabitants. It is in these constituent entities of the Russian Federation where the differentiation between the centre and periphery is sharply manifested. However, judging from the materials analyzed, there are signs of active dispersion forces. This is expressed primarily in the economic dispersion away from administrative centres and an increase in the role of the periphery in the formation of GRP. However, the territorial disparities in economic development are still very significant today.

CONCLUSION

An analysis of the population and economic concentration ratios in the constituent entities of the Russian Federation with cities of over one million inhabitants confirms the existence of significant disparities in the development of these entities' spatial economies. The periphery of the entities and other large cities almost always lag significantly behind the administrative centres.

Of course, large cities and agglomerations formed around them are the "drivers of the economy" and "engines of growth". However, the concentration of socioeconomic potential in one area inevitably leads to the "desolation" of territories (Lebedeva 2015). This is expressed in a large gap between the level of development in the centre and periphery of an entity along with higher population concentration in the administrative centre. However, for the constituent entities of Russia with cities of more than one million inhabitants, various internal tendencies towards the "reorganization" of the spatial economy were observed. These tendencies are evident due to the specificities of the spatial development strategies of many entities.

This is happening not only due to the influence of globalization but also to the general trend in the post-industrial transformation. If in the past the leading factors in the placement of productive forces were labour, capital and natural resources, now the factors of information, knowledge, qualified personnel, the image of the territory and the availability of innovative infrastructure facilities start to play a more important role (Pelyasov 2014). Under these conditions, the cities with more than one million inhabitants are more attractive to the population and promising in terms of economic development. The strategies of the federal districts are also linked to the development of their territories, primarily, of large agglomerations. The districts plan to create a service infrastructure for doing business that meets international standards, including the widespread use of the achievements of national research institutes.

At the same time, practice shows that the effective functioning of an entity is negatively affected by both the excessive dispersal and the hyper-concentration of economic potential in one settlement. This serves as an incentive to establish strategies for the spatial development of Russia's regions. The peculiarities of their implementation probably determine the different directions of the internal "reorganization" of the spatial economies in the entities with cities of over one million inhabitants. However, it seems inappropriate to speak of these strategies as stable trends today.

It seems that the optimal option for the spatial development of these entities would be a polycentric model. Such models have already been widely developed by modern researchers and are included in strategies for the spatial development of hyper-concentrated entities of the Russian Federation (Zubarevich and Safronov 2019), industrial megalopolises (Lavrikova et al. 2017; Lavrikova 2019) and other types of settlements. The presence of additional or alternative economic entities at the same time smooths out the consequences of high levels of population and economy concentration in the capital cities and stimulates the socio-economic development of the adjacent peripheral territories. It is the provision of polycentric entities that will be the necessary condition for maintaining the balance between various types of settlements as the basis for supporting their framework and economy. Therefore, this should be the most important aspect of the implementation of a strategy for the economic and national security of the state.

REFERENCES

Animitsa Ye.G. (2013). The largest Russia's cities in the context of global urbanization processes. Ars Administrandi, 1, 82–96 (in Russian with English summary).

Animitsa P.E., Novikova N.V., Khodus V.V. (2009). Typology as a method for studying the socio-economic development of regions. Bulletin of the Ural State University of Economics, 23 (1), 52-59 (in Russian with English summary).

Blochliger H. & Durand-Lasserve O. (2018). The drivers of regional growth in Russia: a baseline model with applications. Working paper OECD for conference «Monitoring the Russian Economy». Moscow 19 October.

Blyakhman A.A. (2014). Features of regional development in the modern economic framework in Russia. Regional Science: Policy and Practice, 6(2), 143–152, DOI:10.1111/rsp3.12033.

Bukhvald E. M. & Kolchugina A.V. (2019). The spatial development strategy and national security priorities of the Russian Federation. Economy of region, 15(3), 631-643 (in Russia with English summary), DOI: 10.17059/2019-3-1.

Carlino G. A. (1978). Economies of Scale in Manufacturing Location. Boston: Martinus Nijhoff, 343.

Chalov S., Sigrist P. & Kolossov V. (2015). International Geographical union conference in Moscow, 17-22 August 2015: Geography, Culture, and Society for our future Earth // GEOGRAPHY, ENVIRONMENT, SUSTAINABILITY, 2, 96-99.

Ioffe G.V., Nefedova T.G. (2001). The center and periphery in agriculture of Russia's regions. Journal for Economic Forecasting, 6, 100-110 (in Russian with English summary).

Khlestova K.S. (2017). Transformation of regional economic area in modern Russia: problems and prospects. Universum: Economics and jurisprudence, 1(34). [online] Available at: http: // 7universum.com/ru/economy/archive/item/4133 [Accessed 12 Jan. 2020] (in Russian with English summary).

Kuznetsova O.V. Trade-offs of spatial development priorities choice. Economic issues, 2019, 1, 146-157 (in Russia with English summary).

Krugman P. (1996). Urban Concentration: The Role of Increasing Returns and Transport Costs. International Regional Science Review, 19, 5–30.

Lavrikova Y., Akberdina V. & Mezentseva E. (2017). Strategic guidelines of a megalopolis's development: New industrialization and ecological tension. IOP Conference Series: Earth and Environmental Science, 72(1), 012011, DOI: 10.1088/1755- 1315/72/1/012011.

Lavrikova Yu. G. (2019). Technologies for designing spatial development of an industrial metropolis. Journal of New Economy, 20(2), 85–99 (in Russian with English summary), DOI: 10.29141/2073-1019-2019-20-2-5.

Lebedeva E.V. (2015). Prospects of the Samara-Toliatti agglomeration in the framework of the state policy on the development of urban agglomerations in the Russian Federation. Eurasian Union of scientists, 4-12(13), 141-144 (in Russian with English summary).

Lyons D.I. (1995). Agglomeration Economies among High-Technology Firms in Advanced Production Areas: The Case of Denver/Boulder. Regional Studies, 29, 265–278.

Minakir P.A. (2018). Spatial Development Strategy: A View from the Concepts of Spatial Organization in the Economy. Spatial Economics, 4, 8–20 (in Russian with English summary), DOI: 10.14530/se.2018.4.008-020.

Minakir P.A. (2019). Russian Economic Space: Strategic Impasses. Economy of region, 15(4), 967-980 (in Russian with English summary), DOI: 0.17059/2019-4-1.

Nefedova T.G. (2008). Russia's periphery as a socio-economic phenomenon. Regional Studies, 5(20), 14-30 (in Russian with English summary).

Nefedova T.G. (2012). Compression and polarization of rural space in Russia / Demoscope Weekly, 2 (507-508). (in Russian with English summary) [online]. Available at: http://www.demoscope.ru/weekly/2012/0507/analit01.php [Accessed at 02 Sep. 2020].

Obedkov A.P. (2018). Peculiarities of population placement and current trends in the development of settlement in Russia (in Russian with English summary) [online]. Available at: https://cyberleninka.ru/article/n/osobennosti-razmescheniya-naseleniya-i-sovremennye-tendentsii-v-razvitii-rasseleniya-v-rossii [Accessed at 03 Sep. 2020].

O'Hara D.J. (1977). Location of Firms within a Square Central Business District. Journal of Political Economy, 85, 1189–1207.

O'hUallachain B. & Satterthwaite M.A. (1992). Sectoral Growth Patterns at the Metropolitan Level. Journal of Urban Economics, 31, 25–58.

Pelyasov A.N. (2014). The distribution of productive forces in the conditions of innovative economy. Modern productive forces, 1, 22-37.

Saxenian A.L. (1994). Regional Advantage: Culture and Competition in Silicon Valley and Route 128. Cambridge Mass: Harvard University Press, 226.

Sestayo R.L., Gómez Is.N. & Yrigoyen C.Ch. (2017). Entrepreneurship at Regional Level: Temporary and Neighborhood Effects. Entrepreneurship Research Journal, 7(4). DOI: 10.1515/erj-2017–0111.

Shmidt A.B., Antonyuk V.S. & Francini A. (2016). Urban Agglomerations in Regional Development: Theoretical, Methodological and Applied Aspects. Economy of Region, 12(3), 776–789 (in Russian with English summary), DOI: 10.17059/2016-3-14.

Taşan-Kok T. & Baeten G. (2012). Contradictions of neoliberal planning: Cities, policies, and politics / Springer Science & Business Media, 217.

Treyvish A.I., Nefedova T.G. (2010). Cities and Rural Areas: State and Relationship in the Space of Russia. Regional Studies, 2 (in Russian with English summary) [online]. Available at: https://elibrary.ru/item.asp?id=15638384& [Accessed at 03 Sep. 2020].

Varshavskiy A.E. (2018). Spatial inequality and centripetal movement of the population of Russia: threats to the economic, scientific, technological and national security. Concepts, 1(37), 3–27 (in Russian with English summary).

Venables A.J. (1994). Economic Integration and Industrial Agglomeration. Economic and Social Review, 26, 1–17.

Zubarevich N.V. (2013). Transformation of Rural Settlement and Rural Service Networks. Russian Academy of Sciences bulletin. Series Geographic, 3, 26-38 (in Russian with English summary).

Zubarevich N.V. (2015). Geopolitical priorities in Russia's regional policy: opportunities and risks. Contrapunkt, 1, 1-11 (in Russian with English summary).

Zubarevich N.V. (2019). Inequality in regions of Russia and major cities: what has changed in the 2010s? Social Sciences and modernity, 4, 57-70 (in Russian with English summary), DOI: 10.31857/S086904990005814-7.

Zubarevich N.V. & Safronov S.G. (2019). People and Money: Incomes, Consumption, and Financial Behavior of the Population of Russian Regions in 2000–2017. Regional Research of Russia, 4, 359–369 (in Russian with English summary), DOI: 10.1134/S2079970519040129.

Zubarevich N.V. & Safronov S.G. (2019). Russia largest cities development in 2010s. Researches of region, 1, 39-51 (in Russian with English summary). DOI: 10.5922/1994-5280- 2019-1-4.

Zubarevich N.V. (2019). Spatial development Strategy: Priorities and instruments. Economic issues, 1, 135-145 (in Russian with English summary), DOI: 10.32609/0042-8736-2019-1-135-145.