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INFLUENCE OF POPULATION DYNAMICS IN THE REGIONS' PERIPHERY ON ECONOMIC GROWTH: SPATIAL FEATURES

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The article examines the impact of agglomeration processes on the development of Russian regions in 2009–2022 and its features in the western and eastern regions. The aim of the study is to form macro regions with a close relationship between the indicators of the periphery and the growth of the region's economy and to construct equations explaining the features of their development. It has been revealed that the population growth in regional capitals has practically no effect on the dynamics and efficiency of the economy as a whole, and the impact of changes on the periphery of the regions is decisive. The western regions are influenced by the Moscow and Saint Petersburg agglomerations, and population migration from the periphery of half of the regions to the regional capital does not compensate for the outflow of population to the two megacities. As a result, the faster the population of the periphery of the western regions is declining, the slower their gross regional product is growing. The eastern regions are characterized by the absence of such centers of attraction, with cities of millions growing in several of them, but the positive migration balance is not comparable with the two megacities. Despite the movement to the west and south, the population of the periphery in the eastern regions is on average one and a half times larger than in the European part of the country, and is declining more slowly. The efficiency of the economy of the capitals of most eastern regions is higher than that of the periphery, as migration from the periphery to the capital contributes to economic growth in the latter. Thus, the faster the population of the periphery of the eastern regions decreases, the faster the gross regional product per capita grows. The concentration of population and other resources in the Moscow and Saint Petersburg agglomerations leads to their shortage, which slows down the economic growth of the western regions and the country as a whole. At the same time, there are territories that can develop successfully, but they need support, primarily in vocational education and improving the urban environment.

Agglomeration, regional periphery, population, Moscow, Saint Petersburg, gross regional product, labor productivity.

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Introduction

In recent years, the population of capitals and suburban areas has grown in many Russian regions, which is associated with the intensification of agglomeration processes (Kolomak, 2019; Zubarevich, Safronov, 2019). As a rule, salaries are higher in the region's capital, businesses tend to get closer to the authorities, and services and management of resources located on the periphery of the region are concentrated here (Tagarov, 2020).

Until the 1990s, many industrial enterprises producing products, including for the region, were concentrated in the capitals of the regions. But during the reforms, some of them were eliminated, and some were moved outside the city limits to free up the territory for residential areas, shopping and business centers. At the same time, new enterprises were often created near the capital, the center of the market economy, which expanded the boundaries of the agglomeration.

The capital, with its priority positions in the administrative and educational spheres, concentrated specialists and gradually became the center of high-quality service and a variety of services: information, financial, medical, cultural, communication, transport, construction – for the population and business not only of the city, but also of the regional periphery. Decisions are also being made in the capital of the region to support projects for the development of the periphery and their promotion to the federal level.

The economy of agglomerations is highly efficient: universities, research centers and innovative enterprises are located in them, which initiate innovations that spread to the periphery (Lachininsky, Sorokin, 2023; Leishman, Liang, 2022; Ma, Huang, 2022). The influence of universities on the development of the region's economy and on changes in its structure should be particularly noted, since the effectiveness of enterprises depends on the quality of human capital (Moretti, 2004).

The development of the regional centers of the Russian Federation has an impact on the rest of the municipalities of the region, but now it is weaker than before the start of market reforms. Almost all universities and most institutions of secondary vocational education (SVE) are located in the capitals of the regions. Some graduates leave to work in the periphery, although their number is much lower than before the 1990s.

The main direction of migration – from the periphery to the center – contributes to career building and income growth for those who have moved (Kartseva et al., 2021). The paper also noted that early mobility contributes to increased mobility in the future: a graduate of an educational institution who came to a regional center in their youth is ready to go to a larger city (Ehrenfried et al., 2022). However, the regional center may not be very attractive to residents of the periphery who are moving to other regions, even four regions with cities of one million people are losing their population: the Perm Territory, the Nizhny Novgorod, Volgograd and Omsk regions.

Scientific centers in the Russian Federation were also mostly established in or near regional capitals (for example, Akademgorodok and Koltsovo near Novosibirsk), where design institutes and design bureaus operated. In the 1990s, a significant part of them closed down

and the innovative support of the periphery was sharply reduced. Basically, enterprises that were part of federal structures continued to develop, but technology renewal and modernization projects for them were developed in other regions. The data from the Northwestern Federal District shows that municipalities are successfully developing thanks to such enterprises and institutions (Kozhevnikov, 2023).

Migration from municipalities with university branches, vocational education institutions, and developed transport infrastructure is relatively low, which is important in active cooperation with neighboring regions (Druzhinin, 2023a). Such municipalities can develop successfully with the support of regional authorities (Bukhvald, Valentik, 2021).

The development of agglomerations leads to an increase in intraregional differentiation, and if the center specializes in the production of innovative products, the periphery specializes in the production of traditional products by enterprises often with low labor productivity (Fujita, Thisse, 2002; Wu, Su, 2024). The development of communications contributes to the expansion of the positive impact of the metropolitan agglomeration, but provided that municipalities have a specialization that complements the agglomeration (Fu et al., 2022; Chen et al., 2023).

At the same time, the concentration of population and other resources in the center has a negative impact on the periphery (Schmidt et al., 2016; Izhguzina, 2016). There is a weakness in the links between the agglomeration and the periphery: the agglomeration, taking resources from the periphery, gives it little in return (Druzhinin, Kuznetsova, 2023). In general, inter-municipal ties are weak in Russian regions, and many inter-municipal agreements are formal (Sokolova, Astakhova, 2020). In such conditions, population growth in a regional center can lead to "enclavization", when the vast majority of the population lives in the capital and its suburbs, while the surrounding territories are abandoned or work there is carried out on a shift basis (Degtyarev, 2018). Left behind places have little chance of developing without strong financial and non-financial support (Fiorentino et al., 2024; Etherington et al., 2022; Druzhinin, Kuznetsova, 2024).

In countries with large territories and different natural conditions, the dynamics of the regions' indicators and their interrelationships can vary greatly. A study of population dynamics in China's regions has shown significant differences between eastern and western regions: while income levels have a decisive influence on migration in the eastern regions, social factors play an increasingly important role in the western regions. While population growth continues in the centers of the western regions, the population of the centers of the eastern regions is practically not growing (Yang et al., 2023).

In the Russian Federation, the development of regional capitals and the formation of agglomerations affect the economy of the region as a whole, but the analysis of Russian regions has shown that their influence is also multidirectional. In some regions, the growth of the capital's population leads to an acceleration of economic growth, in others, on the contrary, to a slowdown in growth due to the degradation of the population-losing periphery. The difference between the eastern and western regions of the Russian Federation is especially great. The southern regions are also different, most of which are characterized by rapid population growth.

The analysis of data by region led to the following hypothesis: the dynamics of the economy is weakly dependent on the development of the capitals, it is influenced by changes in the population-losing periphery of the region, and this influence is the opposite in the western and eastern regions of the country. Accordingly, the aim of the study is to form macro-regions with a close relationship between the indicators of the periphery and the growth of the region's economy and to construct equations explaining the development features of the selected macro-regions.

Methodology and data

To conduct the study, we collected data on the regions of the Russian Federation,

their capitals and the periphery of the regions for 2000–2021. The main sources are collections "Regions of Russia. Socio-economic indicators"[1], "Regions of Russia. The main socio-economic indicators of cities"[2] and municipalities' indicators database (MI database)[3].

We carried out calculations for 76 constituent entities (the Nenets Autonomous Area is included in the Arkhangelsk Region, the Khanty-Mansi and the Yamal-Nenets Autonomous areas are included in the Tyumen Region). Moscow and the Moscow Region, Saint Petersburg and the Leningrad Region were considered separately because of their special status and significant differences from other regions. The study excludes new regions due to the lack of statistical information. We divided the capital from the rest of the region, which was defined as its periphery for data analysis and calculations.

The regional economy is characterized by the gross regional product (GRP), labor productivity and GRP per capita, which are considered depending on the population and employed of the region, its capital, periphery and their changes, the concentration of the region's population and employed in its capital and their changes. The methodology for calculating the number of people employed has changed several times, and the assessment of changes in employment through the ratio of the number of people employed in 2009 and 2021. It may differ significantly from the estimate obtained through the indices of changes in the average annual number of employed over the same period, for example, for Ingushetia – 281 and 143%, respectively. The second option is accepted in the framework of the article.

As we have already noted, there is no general relationship between the two groups of indicators for 76 regions, since the Russian regions vary significantly. We formed groups of regions with similar characteristics to identify the dependencies between the dynamics of economic development and the indicators characterizing the capital of the region and the periphery. Different approaches to the allocation of groups were considered, and as a result, the most effective approach was based on the division of the country into federal districts. According to Rosstat, migration is mostly confined within federal districts, with only about a third of migrants leaving for other districts.

We identified three markedly different federal districts: the Central Federal District (CFD), the Siberian Federal District (SibFD) and the North Caucasus Federal District (NCFD) and the dependencies existing for their regions were identified, then neighboring regions were considered. Gradually, groups were formed from geographically close regions located in two, three or four bordering districts. For the selected groups, graphs were constructed and the dependences of the dynamics of the region's development on indicators characterizing the population and its employment in the capitals of the regions and on their periphery were analyzed.

In the process of grouping, we formed three macro-regions with different dependencies of indicators gradually: the central and northern regions of the European part of the Russian Federation (CFD, part of the regions of the Northwestern (NWFD), Volga (VFD) and Southern (SouFD) federal districts); regions of the Asian part of the Russian Federation (part of the regions of the Siberian, Far Eastern (FEFD), Volga and Ural (UFD) federal districts); southern regions (NCFD, part of the regions of the Southern and Ural federal districts). They include most of the Russian regions and differ in the nature of the relationship between the development of the region's economy and changes in population and employment. The data analysis by region led to the identification of three centers – in Moscow (more precisely, a double center, including Saint Petersburg), Novosibirsk and Krasnodar. It is worth saying that the regions' grouping is not very strict, and some bordering western regions may be

[1] Regions of Russia. Socio-economic indicators. 2024: Statistical collection. Rosstat. Moscow, 2024. 1081 p.

[2] Regions of Russia. The main socio-economic indicators of cities. 2024: Statistical collection. Rosstat. Moscow, 2024. 436 p.

[3] Rosstat. Available at: https://rosstat.gov.ru/storage/mediabank/munst.htm (accessed: 14.01.2025).

included in other macro-regions, since the influence of the Moscow agglomeration on them is rather weak. Also, three regions are not included in the macro-regions due to the features of their location and employment of the population (Chukotka, Magadan, and Kaliningrad regions).

We analyzed differences in average indicators across macro-regions to explain the reasons for the revealed dependencies. We also considered the development indicators of the centers and the rest of the macro-regions (Moscow and the Moscow Region, Saint Petersburg and the Leningrad Region, the Novosibirsk Region and the Krasnodar Territory).

To identify the development features of macro-regions, equations were constructed for the relationship between the dynamics of GRP, labor productivity and GRP per capita from indicators characterizing the capital and the periphery of the region (number of people and employed in the region, its capital, peripheries and their change, concentration of the population of the region and employed in its capital and their change; innovation and educational processes; specific number of students, innovation activity level), the location of the region (northern latitude, distance from the capital of the region to Moscow), migration processes (migration balance for 2010–2021, specific migration balance for 2010–2021), the regional economy structure (share in GRP of manufacturing, extractive industry, agriculture, trade), and the average salary. We carried out the calculations for the period 2009–2021 using the formula:

$$Y = A_0 + \sum_{j=1}^{M} A_j \times X_j, \qquad (1)$$

where:

Y – GRP dynamics (for the macro-region "East" – GRP per capita);

X_j – indicator j; M – number of indicators; A_0, A_j – calculated parameters.

Results

The western and eastern regions have markedly different natural conditions, population density, development dynamics, and economic structure. The different economic structure affects its efficiency, and the northern regions also have a high share of the extractive sector, while the southern regions have a growing population.

Migration to the largest agglomerations, characterized by a high standard of living, has a significant impact on the regional development. In the course of the research, we identified four fast-growing agglomerations that affect the surrounding regions – Moscow, Saint Petersburg, Novosibirsk and Krasnodar, and the first two affect not only the regions of their district. The migration balance for 2010–2021 to Moscow, Saint Petersburg, the Moscow and Leningrad regions amounted to 4,185 thousand people, to the Krasnodar Territory – 644 thousand people and to the Novosibirsk Region – 158 thousand people; while in macro-regions, the migration balance is negative excluding their central regions.

Comparing macro-regions, we should note that the economy of the macro-region "West" and its efficiency grew faster than in the eastern regions *(Tab. 1)*. This is largely due to the economic structure: the extractive sector, if growing, is slow. But thanks to it, labor productivity and GRP per capita in the macro-region "East" are significantly higher.

Population of the eastern regions, their capitals and peripheries are almost one and a half times larger than that of the western regions. The population of the western regions is decreasing, the population growth of the capitals is insignificant, and in many regions, it is also decreasing; migration to the center of the region from the periphery does not compensate for the outflow to megacities. In the east, the population of the regions is decreasing slightly; in the capital, it is growing noticeably, and in the periphery, it is decreasing more slowly than in the western regions. Migration to the Moscow and Saint Petersburg agglomerations is small, and the concentration of the population in the capitals is increasing faster, while employment is decreasing more slowly. It is worth noting that the urban population in the east is growing, unlike in the

Table 1. Comparison of three macro-regions by main economic indicators

Indicator	34 western regions	28 eastern regions	11 southern regions
GRP dynamics, %	132.1	124.4	127.6
GRP dynamics per capita, %	143.3	128.2	120.5
GRP per capita in 2021, thousand rubles	598.8	814.3	300.0
Regional population dynamics, %	93.2	98.6	108.2
Population dynamics of the capitals, %	101.7	110.1	124.0
Population dynamics of the periphery, %	88.8	93.1	104.1
The average population of the region, thousand people	1298	1873	1595
Average population of the capital, thousand people	484.0	688.1	376.5
Average population of the periphery, thousand people	814.2	1184	1218
Labor productivity, thousand rubles	1206	1640	784
Regional employment dynamics, %	91.0	96.0	105.5
Employment dynamics of the capitals, %	84.8	91.7	99.3
Employment dynamics in the periphery, %	92.6	95.2	108.4
Labor productivity dynamics, %	147.3	130.9	123.9
Migration balance, thousand people	-531.1	-456.1	515.6
According to: Rosstat data.			

west, and if you do not take into account the capital of the region, it is decreasing much more slowly. The average population of settlements in the western regions is significantly less than in the eastern regions.

The total migration balance for 2010–2021 in the macro-region "West" is negative and 16% more than in the macro-region "East". In the West, the higher the GRP growth, the greater the migration surplus. In the east, migration is directed to more populated regions, if the population of the region is more than 2.7 million people, then the migration balance is positive, if less than 2.7 million people, then negative, but there are two exceptions – the student Tomsk Region and Khakassia, where the migration balance is slightly more than zero and the population has hardly changed over the inter-census period. There is a linear relationship between the population of a region and the ratio of the migration balance to the population of the region (R^2 = 0.51). There is no such dependence in the western regions, for them the center of gravity is the Moscow and Saint Petersburg agglomerations. We should say that apart from Novosibirsk, the macro-region "East" has two more centers of attraction – Kazan and Tyumen.

Unlike in the eastern regions, the decline in the population of the periphery in the western regions did not contribute to increased efficiency, since in many regions labor productivity in the periphery is higher than in the capital and is growing faster. In the eastern regions, the decline in the population of the periphery did not affect the dynamics of GRP, but led to an increase in efficiency, as the less efficient periphery lost its population. The lack of a link between the population dynamics of the capital and the periphery shows that migration from the periphery was directed to other regions. As a result, although the average migration balance of the macro-regions "West" and "East" differs slightly, the outflow from the periphery had a different impact on the dynamics and effectiveness of the regional economies' development.

An analysis of the development of the Central Federal District and the Northwestern Federal District showed that the zones of influence of Moscow and Saint Petersburg partially overlap (Uskova et al., 2024; Druzhinin, 2023b; Druzhinin, 2025). Only the Kaliningrad Region, as a semi-enclave, is weakly affected by them due to its special geographical location. An analysis of the development of the western regions of the

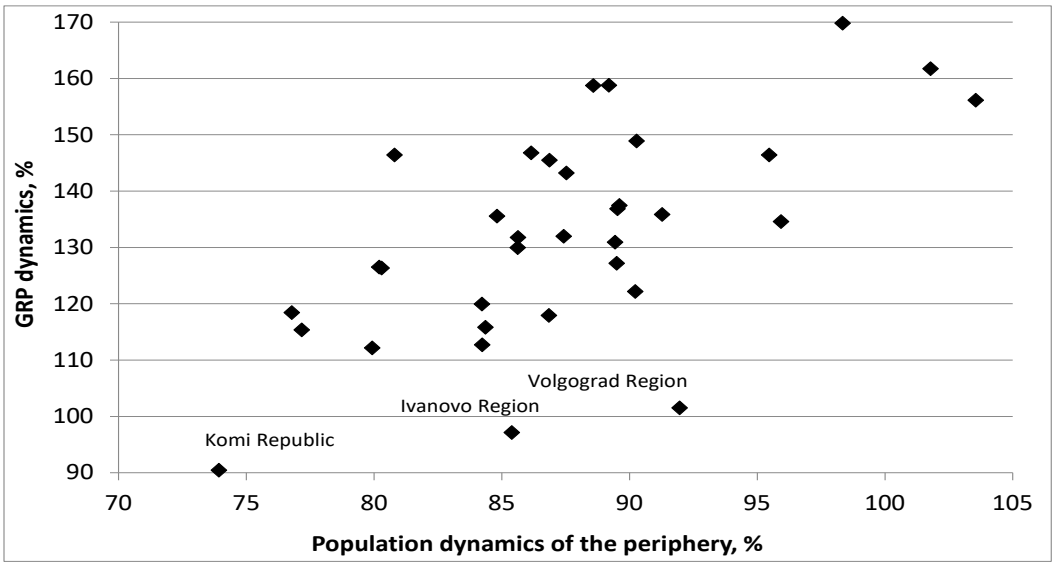

Figure 1. Dependence of GRP dynamics in the macro-region "West" on population changes in the periphery of the regions in 2009–2021, 2009 – 100%

According to: Rosstat data.

Volga Federal District proved that they are also in the zone of Moscow influence (Druzhinin, 2025). The constructed macro-region "West" consists of 34 regions (excluding Moscow, Saint Petersburg, Moscow and Leningrad regions), which are influenced by the Moscow and Saint Petersburg agglomerations with the highest GRP and labor productivity growth rates. Calculations of production functions by region have shown a very high elasticity of labor, which suggests that the outflow into two agglomerations limits the economic growth opportunities of the regions (Druzhinin, 2025).

In the macro-region "West", the regions' population is decreasing, a faster decline in the population of the periphery leads to a rapid increase in population concentration, but the population of the capitals of the regions is changing slightly. The increase in the number of residents of the regions' capitals depends on the distance to Moscow: up to 250 km – the population is growing, then up to 450 km – it is decreasing in most regions, up to 1,100 km – it is growing again in most regions. And the change in the population of the region is largely determined by the periphery (R2 = 0.55). Accordingly, GRP growth is determined by the dynamics of population and employment in the periphery: the slower it decreases, the faster GRP grows *(Fig. 1)*. There is no dependence of economic development on the population and employment in the region's capital, population concentration in the capital or their changes. We should note that the three depressed regions (Komi Republic, Ivanovo and Volgograd regions) slightly fall out of the general dependence, and if they are not taken into account, the statistical characteristics of the regression equations noticeably improve.

The employment analysis makes it possible to refine the estimates made, since it partially takes into account the commuting and otkhodnichestvo. The impact of changes in employment is similar to the impact of population changes. There is no effect of changes in employment in the region's capital on the GRP growth rate, and they are negatively affected by a decrease in employment in the periphery *(Fig. 2)*. There is no connection between changes in employment in the capital and on the periphery. In most regions, a decrease in employment on the periphery does not lead to an increase in its concentration in the capital, which means that the outflow from the periphery is directed not to the capital of its region, but to more attractive centers and regions: Moscow, Saint Petersburg, the Moscow and Leningrad regions. It is worth saying

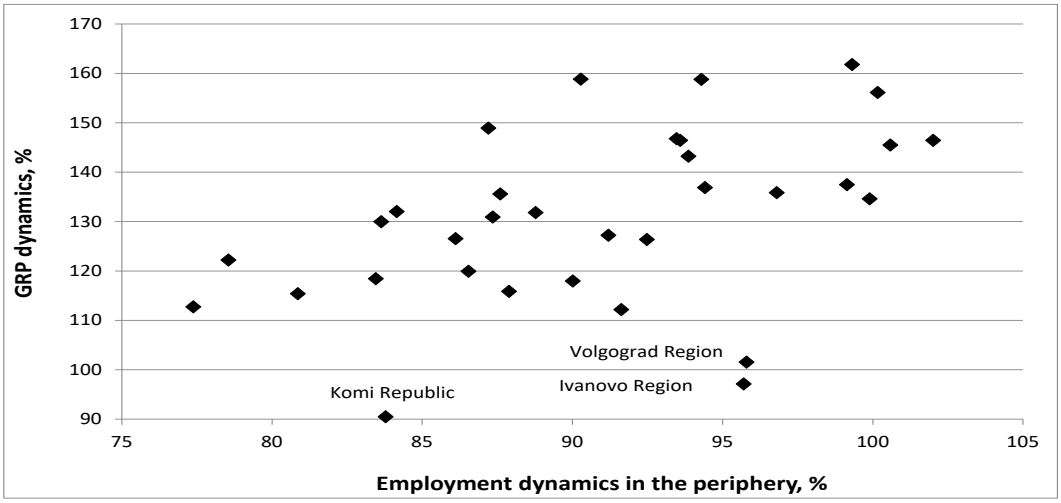

Figure 2. Dependence of GRP dynamics in the macro-region "West" on changes in the number of people employed on the periphery of the regions in 2009–2021, 2009 – 100%

According to: Rosstat data.

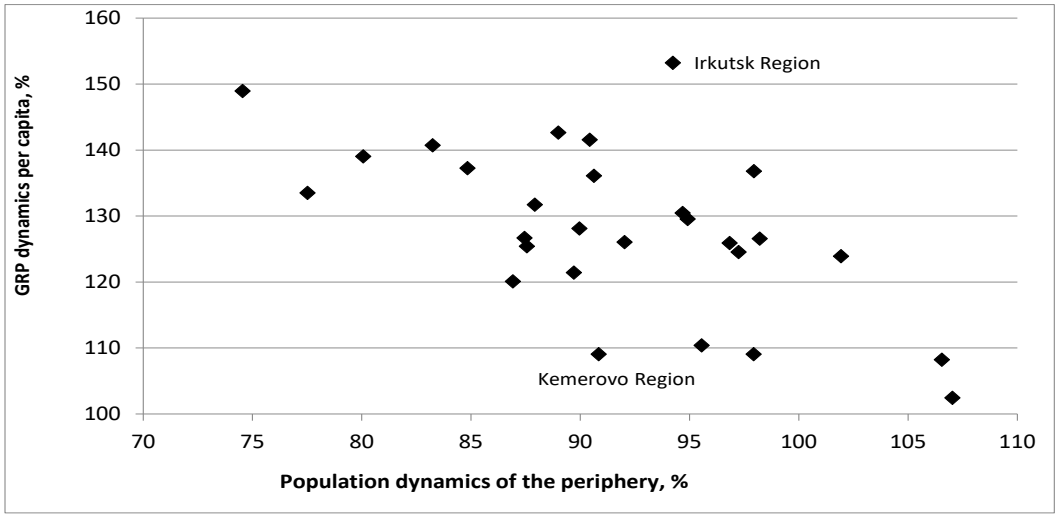

Figure 3. Dependence of GRP dynamics per capita in the macro–region "East" on the change in the population of the periphery of the regions in 2009–2021, 2009 – 100%

According to: Rosstat data.

that changes in employment in the region, its capital and on the periphery do not affect changes in labor productivity. Also, population changes do not affect the GRP dynamics per capita, which means that population migration within the macro-region "West" is not directed to more efficient regions.

The second macro-region "East" includes 28 regions of the SibFD, FEFD, UFD and VFD with the highest labor productivity and population concentration in the capital of the region. Unlike the macro-region "West", their population is decreasing more slowly, the number of residents in the capitals is growing, and employment is also decreasing more slowly. A special feature of the macro-region is that the GRP dynamics per capita is determined by the dynamics of the population and employed on the periphery: the faster the population of the region's periphery declines, the faster the GRP per capita grows *(Fig. 3)*.

Not all regions of these districts are included in the macro-region, in particular, the Chukotka Autonomous Area and the Magadan Region are not included in it due to their special geographical location, high proportion of shift work and transport isolation. The population here was rapidly declining, and mining

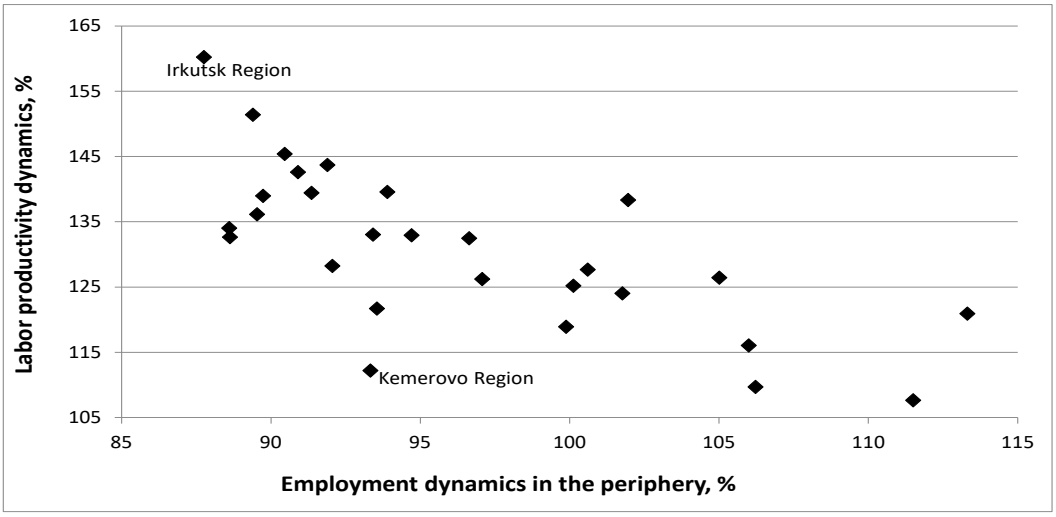

Figure 4. Dependence of GRP dynamics per capita in the macro-region "East" on the change in the number of people employed on the periphery of the regions in 2009–2021, 2009 – 100%

According to: Rosstat data.

operations (MO) was increasing due to the use of the shift method. The depressed Kemerovo Region falls out of the general dependence somewhat, without taking it into account, the statistical characteristics of the regression equations noticeably improve, especially in terms of employment.

The number of people employed did not affect the indicators of regional economic development, but the results of the analysis indicate that there is a dependence of changes in labor productivity on changes in employment in the region and on its periphery *(Fig. 4)*. At the same time, there is no relationship between changes in the number of people employed in the capital and the dynamics of indicators of regional economic development. We should also note that the greater the share of students in a region, the faster employment in the periphery grows. The change in employment in the region is completely determined by the change in employment in the periphery (R^2 = 0.95). In both macro-regions "West" and "East", the periphery is losing population, but the need to develop and recycle natural resources is leading to slower employment in the east.

The macro-region "South" includes 11 regions of the NCFD, some regions of the SouFD and UFD with the lowest average labor productivity and growth rates and with the largest population of the periphery and its growth rates; the faster the population of the periphery and the region increases, the faster the GRP grows *(Fig. 5)*. But in this case, there is also a connection between the growth of the capital's population and the GRP dynamics, therefore, the growth of the region's population has a positive effect on the increase in GRP (R^2 = 0.83).

The macro-region "South" is characterized by rapid population growth in both the capital and the periphery, respectively, by rapid employment growth. Employment in the capitals remains virtually unchanged, and the increase in the region's employment rate is entirely determined by the periphery. It is worth noting that the number of people employed in the republics of Ingushetia and Chechnya is growing rapidly (when comparing the figures for 2009 and 2021, they increased by 2.8 and 2.1 times and significantly less when measured using indices, which limited the possibilities of constructing an equation for labor productivity and employment, *Fig. 6*).

Calculations concerning the impact of factors on regional economic growth by macro-regions have shown that in addition to the population dynamics of the periphery, it is influenced by other factors regarding the equation, although their significance is much less. However, these factors are different for the three macro-regions *(Tab. 2)*.

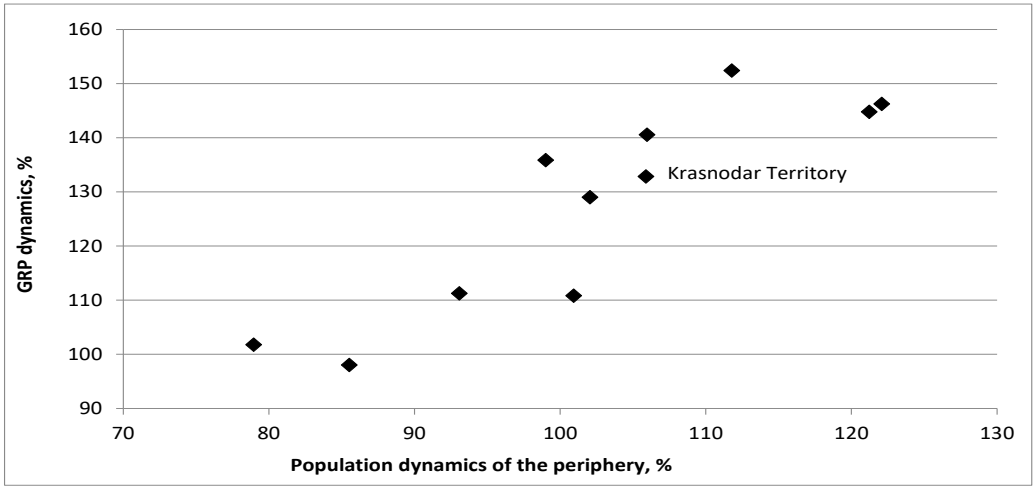

Figure 5. Dependence of GRP dynamics in the macro-region "South" on population changes in the periphery of the regions in 2009–2021, 2009 – 100%

According to: Rosstat data.

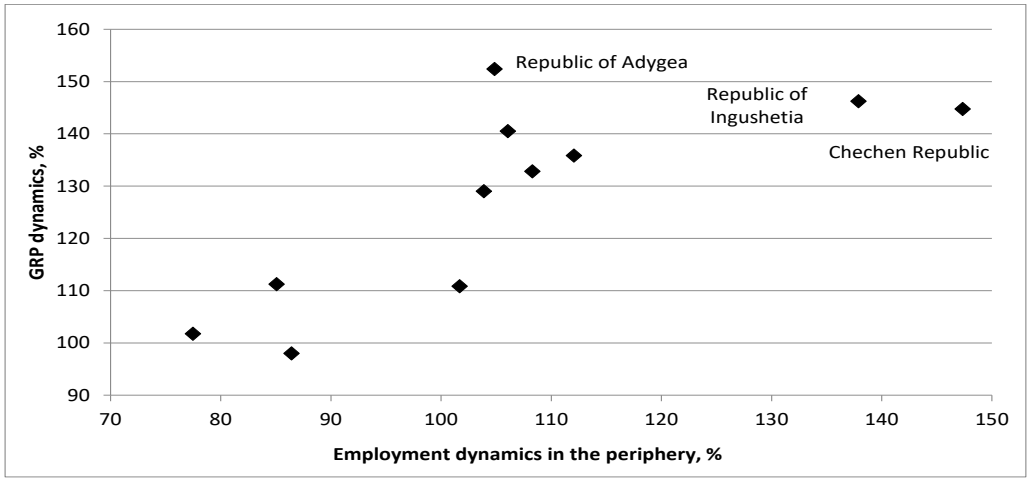

Figure 6. Dependence of GRP dynamics in the macro-region "South" on changes in the number of people employed on the periphery of the regions in 2009–2021, 2009 – 100%

According to: Rosstat data and employment change indices.

Table 2. Results of calculations to assess the impact of factors on the dynamics of regional economic development in 2009–2021

Parameter	Value of parameters and statistical characteristics		
	Macro-region West	Macro-region East	Macro-region South
ln A	30.24	235.8***	-10.9
Population dynamics of the periphery, %	1.090**	-1.253***	0.964***
Share of agriculture in GRP, %	0.844	–	–
Migration balance, thousand people	0.075*	–	–
Population of the capital, thousand people	–	0.012**	–
Share of manufacturing industry and MO in GRP, %	–	-0.774***	–
Average salary, thousand rubles	–	0.712***	–
Share of trade in GRP, %	–	–	1.072***
Ratio of the migration balance to the population	–	–	0.602**
R^2	0.50	0.63	0.93
p	0.00011	0.00029	0.00020

*** p <0.01, ** p <0.05, * p <0.1
According to: Rosstat data.

When calculating the regression equations, it turned out that the structure of the economy is significant for all macro-regions, migration – for the macro-regions "West" and "South", the population of the capital and the salary level – for the macro-region "East".

Discussion

The Moscow and Saint Petersburg agglomerations are attractive to residents of all capitals and the periphery of Russian regions, but migration activity depends on distance. As a result, while in the macro-region "East" the population of almost all regional capitals is growing, in the macro-region "West" it is only half. The periphery is no longer making up for the migration losses of the region's capital, primarily educated youth (Moroshkina, Potasheva, 2025). The population of the periphery of the western regions is decreasing much faster, the population of remote municipalities is accelerating, their infrastructure is deteriorating and "left behind places" are expanding, which affects the dynamics of the development of the region as a whole. Agglomeration processes in the macro-region "West" actually slow down the economic growth of the regions. In addition, the growth of agglomerations is slowing down, and the reverse process has begun in some western regions. In the macro-region "East", agglomeration processes have so far had a positive impact on the regional economy.

The proliferation of "left behind places" is typical for many countries around the world. Various approaches have been proposed to reduce intraregional differentiation, in particular, identifying and stimulating the development of municipalities with potential for development (Melnikova, 2024). Inter-municipal cooperation can facilitate the penetration of innovations to the periphery, and digital technologies can play a significant role in the interaction between the center and the periphery (Oppido et al., 2023). To implement this option, educational institutions should be developed on the periphery, qualified personnel are needed for investment projects, and then the financial situation of young people can improve. To retain the population, it is necessary to improve the urban environment quality, make medical services available, and upgrade their quality.

The conducted studies of the relationship between the formation of agglomerations and innovative and educational processes have shown that most regions of the macro-region "West" have a negative migration balance and do not receive a significant effect from universities, since graduates of provincial universities tend to move to larger cities. At the same time, for the macro-region "East", higher education is probably a factor contributing to the periphery development, which is mainly associated with the extractive sector and the processing of raw materials. An important role belongs to large firms promoting innovations in the peripheral municipalities where their divisions are located (Kozhevnikov, 2023; Arctic Exploration..., 2022).

Conclusion

Thus, the conducted research proved that the development of regional capitals has little effect on the dynamics and efficiency of the region's economy as a whole, and the main influence is exerted by the periphery, namely how quickly it loses its population and other resources. Regional capitals are limited in their capabilities and have little impact on the development of other municipalities, which rely on their own resources if federal structures have not shown interest in them. "Desertification" of territories is already taking place in the western regions, and after a while similar process may begin in the eastern regions. Therefore, it is necessary to develop systems of interaction between regional capitals and developing municipalities, create a network of educational institutions on the periphery, primarily vocational education institutions and university branches, create favorable living conditions for the population; promote inter-municipal cooperation, allocate promising territories, attract resources for their development and improve infrastructure.

In the macro-region "West", it is precisely the outflow from the regions that limits the opportunities for economic growth, and universities do not contribute to reducing population migration, as is the case, for example, in Finland, therefore, universities need to focus on cooperation with regional businesses and establish horizontal links between universities in the districts, enhance innovation and create conditions for attracting university graduates from two megacities.

In the future, each macro-region will be studied in more detail over a longer period, agglomerations and peripheries will be considered in accordance with regional documents.

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