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TRENDS OF CENTRE-PERIPHERY POLARIZATION IN SVERDLOVSK REGION BETWEEN 2008 AND 2015

The significant imbalances in the economic space of a region, particularly between the centre and the periphery, present a serious challenge for economists, politicians and policy makers. Which measures are to be taken to remedy this situation? What should they be aimed at? These are the main questions to be addressed by the researchers and the government. To develop a competent policy it is essential to understand the dynamics of intra-regional variations in a long-time period. This article seeks to describe the trends in the centre-periphery polarization dynamics of a Russian region by analyzing the indicators of socio-economic development of its constituent municipalities. In their calculations the authors used the coefficient of centre-periphery variation and the methods of statistical analysis.

The comparative analysis of the contribution made by peripheral and central municipalities to the key socio-economic indicators of the region in the period of 2008-2015 has shown that there is a growing centre-periphery polarization within Sverdlovsk region. The authors calculated the coefficient of centre-periphery variation for specific municipalities and the periphery in general by using the average volume indices of the retail turnover, investments in the main capital, new housing supply, the turnover of organizations and average monthly salary. The dynamics of this coefficient and that of the GRP in the given period demonstrates that while the centre-periphery gap is narrowed during the recession, it widens when the economic situation stabilizes.

The scientific novelty of this research is achieved through identifying the main trends in the centre-periphery polarization within Sverdlovsk region at various stages of its socio-economic development. These research results can be applied to develop a regional policy aimed at reducing the centre-periphery differences and polarization of the regional economic space.

Keywords: region, centre, periphery, economic space, geographical polarization, regional policy, coefficient of centre-periphery variation

Introduction

The study of disparities in the spatial development of Russian regions has both theoretical and practical significance since it brings to light the underlying causes of this phenomenon and the target areas in the development of the region and its constituent parts.

The foundations of spatial economics are described in the works of Walter Isard, Jacques Boudeville, Johann Heinrich von Thünen, Walter Christaller, Alfred Weber, and others. Characteristics of the economic space of Russia are discussed by S.S.Artobolevsky, O.A.Biyakov, L.B. Vardomsky, A.N. Demyanenko, P.A. Minakir, T.G. Nefedova, G.V. Ridevsky, B.B. Rodoman, A.I. Treivish, A.L. Alexandrova, A.N. Bufetova, E.E. Grishina, A.A. Pobedin, I.D. Turgel, and others.

It should be noted that the vast majority of these studies focus on specific cases of asymmetry in the socio-economic development of municipalities in Russian regions. This leaves unexplored one more type of spatial polarization - 'centre-periphery', which is why we decided to conduct this research in Sverdlovsk region. How did the centre and the periphery of the region develop in the period between 2008 and 2015? Did the disparity between the periphery and the centre reduce or increase? These are the questions that this article seeks to answer.

Conceptual framework for studying geographical marginality

Originally, the concept of periphery (Rudolf Kjellén, Friedrich Ratzel, Friedrich Naumann, Halford Mackinder, and others) was associated with geographical remoteness from the area that is chosen as the

spatial centre. Ratzel considered the boundary as the 'peripheral organ' of a state, seeing borders as the expression of changes inside the state (expansion or contraction) [1, p.55]. Mackinder was the first to create the 'centre-periphery' model. Mackinder divided the contemporary world into three parts − the Heartland, the 'Inner or Marginal Crescent', formed by Germany, Austria, Turkey, India, and China, and the 'Outer or Insular Crescent', which included Great Britain, South Africa, Australia, the United States, Canada, and Japan [2].

Another attempt to discuss the centre-periphery relationship on a less global level, can be found in the works of Karl Haushofer, who developed the theory of pan-regions. He identified four dominating regions or heartlands, within which there was the centre and the periphery.

Logistical remoteness from the centre is associated with the concept of periphery in location theories (Johann Heinrich von Thünen, August Lösch, Walter Christaller, Alfred Weber, Wilhelm Launhardt, and others). This understanding of periphery implies 'nearly static conditions for actors because distances to centres and population densities are hard to change in a short period' [3, p.2].

In the twentieth century, periphery started to be associated with less economically developed countries and regions located within the zone of economic influence of the centre. This is how periphery is described by the centre-periphery model developed by Jonathan Friedman, the world systems theory, the theory of peripheral economy, and so on. The researchers also observe, however, that the periphery has some specific characteristics of its own. One of the founders of the peripheral economy theory Raul Prebisch pointed out that periphery has its own peculiar characteristics which manifest themselves in a great variety of ways − technology and consumption, production structure, the level of development and democratization, the system of land tenure and surplus formation, the demographic growth [4, p.200]. The institutional approach sees periphery as territories with institutional characteristics that impede their economic development.

Table 1.

Central and peripheral territories in different theories [5, p.56-58]

Theory	Centre		Periphery	
Dependence scale	- capitalist mode of production - developed inter-industrial relationships; - export-oriented production		- heterogeneous: pre-capitalist and capitalist modes of production; - exports raw materials and imports manufactured goods; - is exploited by the centre; - has deformed economic structure	
Theory of world systems	Centre	Semi-Periphery		Periphery
	- high rate of capital accumulation; - considerable technological progress	- less powerful that the centre but more powerful than the periphery; - loses of the status of the centre due to deindustrialization and gains the status of the centre through industrialization		- absence of capital and technologies; - produces commodities and sells them to the centre for a relatively low price; - relies on natural resources for its development
Institutional economics	- institutional environment supports the development; - innovative; - has its own identity		- the existing institutions impede its development; - unable to adapt to the changing environment	

Theory of centre-periphery	- has a high degree of autonomy; - capable of innovation; - can encompass the key changes or impetuses for development	- remote and poorly developed territories; - low modernization rates; - dependent on the centre; - heterogeneous: internal and external; - serves as a resource base for the system.

The characteristics of central and peripheral territories shown in Table 1 and identified by different theories point to the fact that the centre is usually constituted by economically efficient territories. For Russia, that would usually be administrative centres of regions, which is explained by the fact that large cities usually have a 'significant resource base in combination with compactness. This enables them to claim the status of autonomous areas, which they are eventually granted' [6].

Thus, in most Russian regions the centre is associated with the capital of the region. In this connection, the question arises as to what constitutes the periphery. There are several viewpoints on this problem: for example, T.M.Vazhenina understands peripheral municipalities as 'territories that are geographically remote from a certain centre(a state capital or a regional centre) and that enjoy local self-government that exists along with the state government to address local issues' [7, p.11]. Some researchers also associate periphery with certain characteristics of its socio-economic development. T.G. Nefedova points out that 'internal periphery (province) can include not only territories that are remote from the centre but also territories that are facing a severe socio-economic downturn due to their location' [8, p.14]. According to N.P.Ketova, E.D.Tasina, and V.N.Ovchinnikova, 'periphery has not only the geographical meaning, rather it refers to areas not being involved into the decision-making and priority setting on the country level, including the national policies and strategies' [9, p. 48]. In other words, these authors propose to apply a managerial approach to defining periphery, which boils down to the fact that the key managerial decisions affecting the periphery are taken elsewhere. O.A.Chernova and L.G.Matveeva consider periphery from the point of view of innovation. They believe that 'peripheral territories, even those that possess resources for modernization, are limited by certain general and specific factors that impede the process of innovation diffusion, thus turning these territories into mere suppliers of these resources' [10, p. 23].

There are also points of view that link marginality of territories to their cultural identity. For example, A.S.Makarychev considers province as one of the kinds of periphery and points out that province is a 'politically loyal but culturally and historically distinctive and self-sufficient space with its own values and its own identity' [11]. Maria Giulia Pezzi and Giulia Urso point out that 'peripheral territories possess a territorial capital of exceptional value and diversity but which is largely unused as a consequence of the long-term demographic decline due to urbanization processes' [12, p.3].

Within the environmental approach, the periphery is seen primarily as territories with high levels of pollution. In this research, we are going to use a combination of several approaches to define periphery (for more detail see [13]). According to Frances Brown and Derek Hall [14], the definition of periphery should include political, socio-economic dimensions [15, p.60].

We believe that the geographical approach is the most suitable for defining interregional periphery in combination with economic and managerial approaches since remoteness from large administrative centres affects areas with different statuses. Unfortunately, the information base containing municipal statistics is not developed enough; therefore, we cannot solely rely on the economic approach.

In this article, regional periphery will be understood as municipalities that are 'remote from the administrative centre of the region (of the Russian Federation); are dependent on the centre; are characterized by the comparatively low level of socio-economic development and by the dominance of traditional types of economic activity, incapable of fully realizing their potential due to the inadequate transport infrastructure' [16, p.88-89]. In Sverdlovsk region, urban districts play the main role among municipality types (68 out of 94), and, therefore, we shall focus on peripheral urban territories, which comprise sets of urban districts.
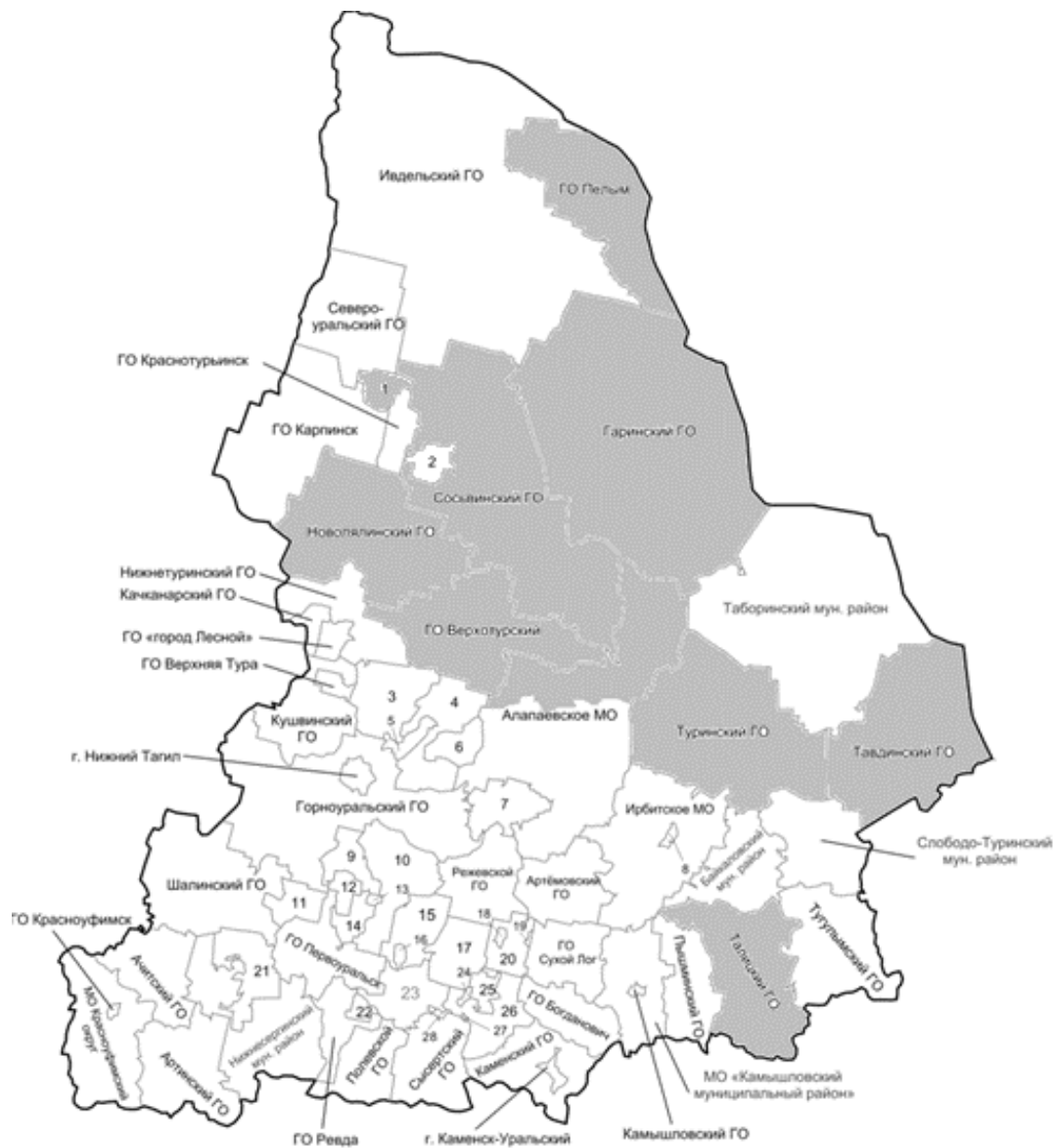
1 – Volchansk urban district; 2 – Serov urban district; 3 – Krasnouralsk urban district; 4 – Verkhnaya Salda urban district; 5 – Svobodny closed administrative-territorial unit and urban district; 6 – Nizhnaya Salda urban district; 7 – Alapaevsk municipality; 8 – Irbit municipality; 9 – Kirovgrad urban district; 10 – Nevyansk urban district; 11 – Staroutkinsk urban district; 12 – Verkhny Tagil urban district; 13 – Verkh-Neyvinsk urban district; 14 – Novouralsk urban district; 15 – Verkhnaya Pyshma urban district; 16 – Sredneuralsk urban district; 17 – Berezovsky urban district; 18 – Malyshev urban district; 19 – Reftinsky urban district; 20 Asbest urban district; 21 – Bisert urban district; 22 – Degtyarsk urban district; 23 – Ekaterinburg, municipality; 24 – Verkhnee Dubrovo urban district; 25 – Zarechny urban district; 26 – Beloyarsky urban district; 27 – Uralsky Settlement, municipality; 28 – Aramil urban district.

Fig. 1. *Periphery of Sverdlovsk region*

Centre-periphery polarization of Sverlovsk region: main approaches

To evaluate the degree of the centre-periphery polarization within the region we will be using two approaches. The first is widely applied and evaluates parameters of socio-economic development of specific areas and their contribution to the overall performance of the region. Thus, we will be able to identify the areas playing the pivotal roles in the economic development of the region. When applying this approach, it should be remembered, however, that we need to take into account that there are certain peculiarities to

the way key statistical figures are formed in municipalities. If we ignore these peculiarities, it might lead us to underestimating or overestimating the role of some municipalities in the regional economy. Therefore, we will be using this approach to evaluate the degree of polarization only in combination with other approaches.

The second approach, proposed by the research team from the Institute of Economics and Industrial Engineering, Siberian Branch of the Russian Academy of Sciences represented by A.N.Bufetova [17] is more specific: it estimates the gap in the socio-economic development between the regional centre and the regional periphery. This approach needs to be adjusted because it uses some indicators which are absent from the available municipal statistical data.

For our calculations we used the data provided by the Regional Office of the Federal State Statistics Service in Sverdlovsk Region: the volume of industrial production, retail turnover, investment into the main capital, and the supply of new housing space per capita.

Centre and periphery of Sverlodvsk region

We agree that 'periphery is a complex phenomenon which one indicator cannot describe despite all the attempts to narrow its definition' [18, p.36]. Therefore, our definition of the regional periphery comprises three aspects:

1) logistical remoteness from the administrative centre, which is specified for road transport usage;
2) socio-economic development of the area;
3) and its economic potential.

Thus, we classify areas as peripheral if they are more than three hours away from the centre, have the level of socio-economic development less than 70% and/or the value of economic potential less than 20% from the average.

The periphery of Sverdlovsk region consists of ten municipalities; each of them has a status of urban district [19] (see Figure 1). The centre of the region is the city of Ekaterinburg.

Centre-periphery polarization of Sverdlovsk region: dynamics

Centre-periphery polarization of Sverdlovsk region can be characterized by applying the first approach and comparing the contribution that the central and peripheral areas have made to the regional performance (Table 2).

Table 2.

Share of the centre and periphery of Sverdlovsk region in the key socio-economic indicators of the region, %

	2008	2009	2010	2011	2012	2013	2014	2015
Population								
Periphery	5.0	5.0	4.7	4.6	4.5	4.4	4.4	4.3
Centre (Ekaterinburg)	31.4	31.7	32.2	32.8	33.1	33.5	33.8	34.1
Turnover of organizations								
Periphery	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2
Centre (Ekaterinburg)	26.5	31.2	28.0	27.9	26.6	28.7	26.3	24.5
Capital investments								
Periphery	0.4	0.3	0.3	0.7	0.5	0.5	0.7	1.0
Centre (Ekaterinburg)	35.9	28.4	28.2	40.3	40.1	32.6	40.4	42.7
Supply of new housing								
Periphery	1.4	1.2	2.0	1.6	1.1	1.3	1.3	1.5
Centre (Ekaterinburg)	56.1	51.3	58.0	57.6	57.5	51.1	43.0	48.3
Retail turnover								
Periphery	1.3	1.3	1.3	1.2	1.1	1.1	1.1	1.1
Centre (Ekaterinburg)	68.1	68.2	69.8	70.8	70.8	71.0	70.8	70.1

Source: Database of Indices of Municipalities in Sverdlovsk Region. Retrieved from http://www.gks.ru/dbscripts/munst/munst65/DbInet.cgi

The data presented in Table 2 show that in the period between 2008 and 2015 the percentage of the population living in the periphery of Sverdlovsk region was steadily declining. The reasons for such decline were the migration outflow, which was 12,561 people in the period of 2010-2015, and the natural population decline (2,173 people). The centre, on the contrary, increased its share in the overall population of the region from 31.4% in 2008 to 24.1% in 2015. As S.A.Makovkina reasonably pointed out, million-plus cities such as Ekaterinburg 'have historically been centres of attraction for the population' [20, p.56]. From 2010 to 2015, the population of Ekaterinburg grew by 71,380 people due to migration.

The higher population density in the regional centre can affect demographic indicators, for example, birth rates, 'provided that the population is receiving positive encouragement to build and support families, to have children...' [21, 96]. In Ekaterinburg, the natural population growth has been observed since 2009. In general, in the given period, the natural population growth in the regional centre was 29,135 people.

The contribution of peripheral territories to the turnover of organizations and retail turnover in the region remained the same throughout the period of 2008-2015. The share of Ekaterinburg prevailed in these indicators due to the higher concentration of the population in the city, a larger number of organizations and business enterprises of different kinds.

Due to project implementation timelines, certain fluctuations in the contributions of different areas to the regional economy were found in the sphere of housing supply and investment into the main capital.

The comparison of contributions made by the centre and the periphery to the regional economy shows that the development of the region is extremely polarized, with one municipality as the leader.

Let us try to estimate the gap between the centre and the periphery of Sverdlovsk region by applying the coefficient of centre-periphery variation of the average volume indices that can be calculated according to the following formula:

$$u_y^k = \sqrt{\frac{\sum_i\left(x_{it}^{kc} - x_{it}^{kp}\right)^2}{\sum_i\left(x_{it}^{kp}\right)^2}} \qquad (1)$$

where x_{it}^{kc} is the average index *i*, which characterizes the growth of the regional centre *k* in year *t*; x_{it}^{kp} is the average index *i*, which characterizes the growth of the periphery in region *k* in year *t* [17, c. 58-89].

To calculate the coefficient of centre-periphery variation we used the average data of retail turnover; the amount of investment into the main capital, the supply of new housing, turnover of organizations as well as the average monthly salary (Table 3).

Table 3.

Coefficient of centre-periphery variation of the average volume indices

Municipality	2008	2009	2010	2011	2012	2013	2014	2015
Pelym urban district	21.214	17.617	14.059	13.901	12.862	14.350	14.772	13.024
Volchansk urban district	5.349	4.128	4.979	3.041	3.006	5.007	4.051	7.859
Verkhoturye urban district	13.265	13.099	13.292	14.562	14.939	14.995	14.146	10.229
Gari urban district	21.214	17.617	14.059	13.901	12.862	14.350	14.772	13.024
Novaya Lyalya urban district	7.867	12.027	11.752	13.750	14.325	13.816	13.495	13.822
Sosva urban district	6.165	5.424	7.687	8.699	10.220	9.739	9.781	9.550
Makhnevo municipality	-	-	11.552	11.578	16.401	15.310	14.838	15.318
Tavda urban district	10.855	11.166	11.614	12.836	13.329	13.259	12.880	12.279
Talitsa urban district	8.476	8.266	8.153	8.204	9.363	7.305	6.747	6.699
Tura urban district	5.492	5.730	6.095	6.691	7.232	7.607	6.648	6.267
On average in the periphery	*11.100*	*10.564*	*10.324*	*10.716*	*11.454*	*11.574*	*11.213*	*10.807*

Source: Database of Indices of Municipalities in Sverdlovsk Region. Retrieved from http://www.gks.ru/dbscripts/munst/munst65/DbInet.cgi

In comparison to Ekaterinburg, municipalities in the periphery of Sverdlovsk region demonstrated different rates of development: in the given period, three municipalities (Pelym, Gari, and Talitsa) managed to get quite close to the regional capital and to reduce the centre-periphery disparity. The other six municipalities manifested the opposite trend: the growing coefficient of centre-periphery variation reflects an increase in the disparity between the centre and the periphery.

If we look at the changes in the coefficient more closely, we can notice that in the recession period its value declined while in the years of stabilization, increased (see Figure 2). This means that the disparity between the centre and the periphery in the region falls in the years of downturn and rises in good years.
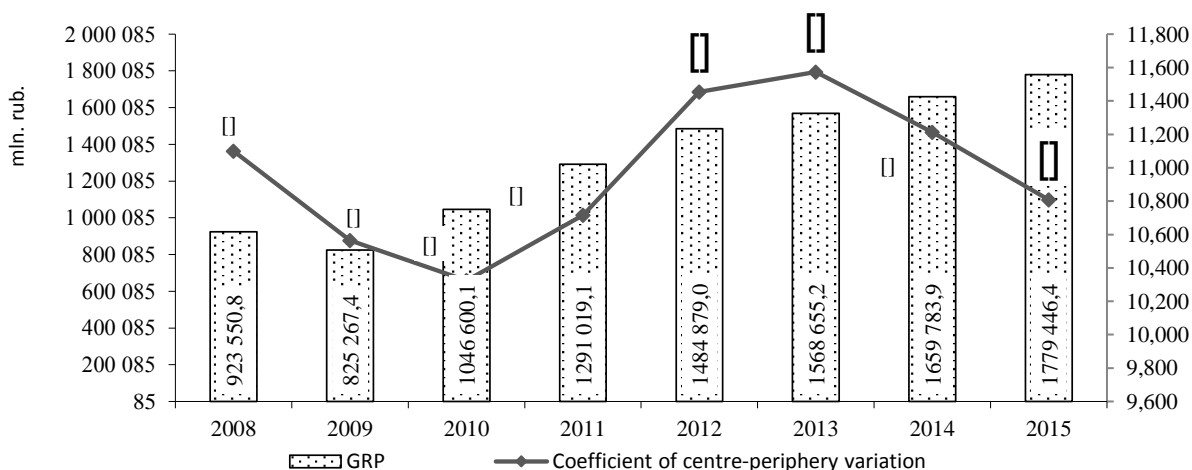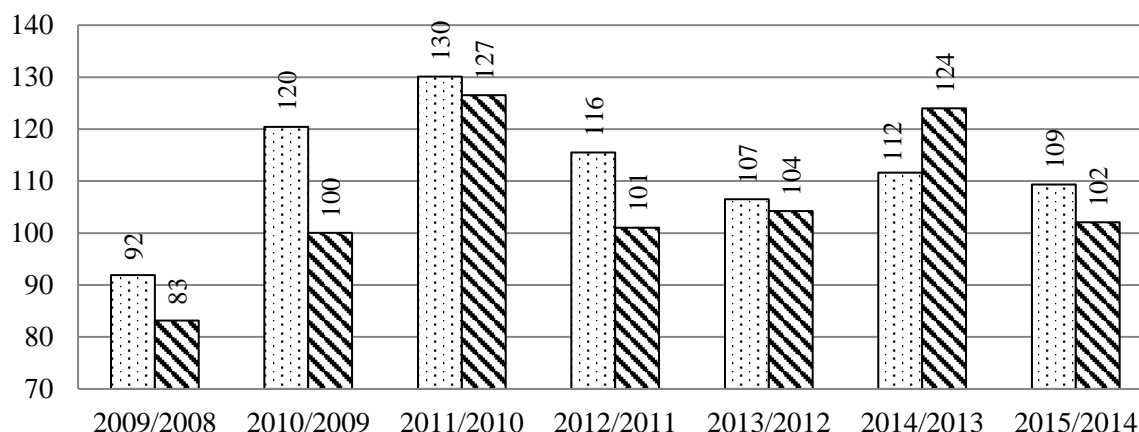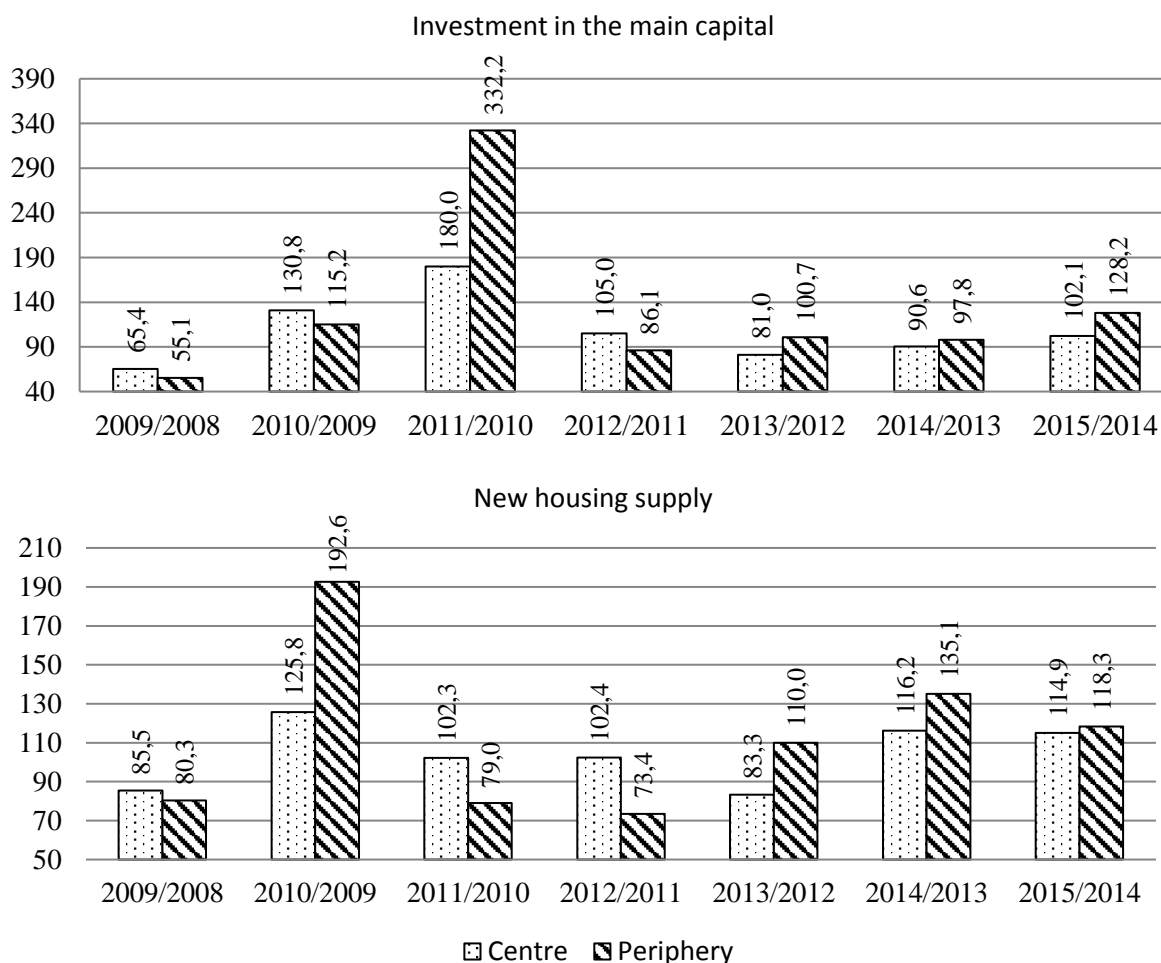

Source: Database of Indices of Municipalities in Sverdlovsk Region. Retrieved from http://www.gks.ru/dbscripts/munst/munst65/DbInet.cgi

Fig. 2. *Dynamics of the GRP of Sverdlovsk region (left scale) and the coefficient of centre-periphery variation (right scale)*

The coefficient of centre-periphery variation does not reveal the reasons for this phenomenon. However, by analyzing the indices of socio-economic development of municipalities in Sverdlovsk region, we come to the conclusion that the centre-periphery gap (its increase or reduction) is to a great extent dependent on the rates of development of the regional centre (Ekaterinburg) (see Figure 3). The regional capital, in contrast with the periphery, maintains its high rates of development during the periods of economic recession and tends to recover faster than marginal territories.

Turnover of large and medium enterprises

Investment in the main capital

New housing supply

☐ Centre ◼ Periphery

Source: Database of Indices of Municipalities in Sverdlovsk Region. Retrieved from http://www.gks.ru/dbscripts/munst/munst65/DbInet.cgi

Fig. 3. *Dynamics of the key socio-economic indicators of the centre and periphery, % of the previous year*

Conclusion

The problem of centre-periphery polarization plays a significant role in the economy of the region. The centre (Ekaterinburg) dominates the economic life of the region, which has a positive as well as negative impact on its development. On the one hand, the centre is the 'growth pole' and the driving force of innovation, providing the periphery with commodities and services and consuming the production of marginal territories. On the other hand, the domination of the regional capital in the economy means that the attention of regional authorities is focused on the problems of specific municipality and/or the surrounding area and that it receives most of the funding, which undermines the already limited potential for the peripheral development. During the recession, the centre-periphery polarization usually decreases but in more favourable economic conditions, the centre, unlike the periphery, revives faster.

The growing disparity between the centre and the periphery can lead to the situation 'when the threshold values of polarization are exceeded and the positive effects of the growing rates of regional development will become insufficient to compensate for the losses from the inter-regional fragmentation of the economic space' [22].Thus, further research in this sphere should concentrate on finding measures to reduce the centre-periphery gap and on developing the adequate regional policies for this end.

Acknowledgements

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