REGIONAL ECONOMY

Economic Activity in Russian Regions*

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Abstract. The paper deals with the issues of concentration of economic activity in Russian regions influenced not only by factors of the "first nature" – presence of minerals, fertile land, favorable geographic position, but also by factors of the "second nature", in particular, the agglomeration effects and potential savings in the scale. Analysis of the geographic concentration and the region-specific focus reflects the general trend in the concentration of industrial production, investment and human resources, provides the necessary information framework for a harmonized economic policy. The purpose for the study is to theoretically justify and analyze economic activity concentration in terms of assessment of concentration and specialization of Russian regions over time. The paper reveals terminological aspects of concentration, agglomeration, specialization, agglomeration economics and urbanization. The applied methodological tools of assessment include the localization factor, Herfindahl-Hirschman and Krugman concentration and specialization indices, Gini index. The research novelty lies in the formation of the terminological framework of the location theory, namely the definition of agglomeration as a process of concentration of activities in a region supported by circular logic at several levels with a distinction between its two types – "economy of localization" and "economy of urbanization"; in the identification of the relative and absolute types of geographic concentration. Elements of the research novelty are contained in the methodological framework of the study – the system of traditional indicators for assessing the concentration and specialization of regional economy is supplemented by relevant Krugman indices similar in content to the Herfindahl-Hirschman indices, but reflecting the heterogeneity of development

to a greater extent; the localization factor is used to identify potential economic clusters in the territory when making decisions in the process of regions' management. High concentration of investment and industrial production in Russian regions, consistent upward trend of the labor force is revealed. This situation leads to increased inter-regional inequality. The manufacturing industry has experienced a decline in employment. The tendency towards concentration is identified in the pulp and paper industry, publishing and printing, metallurgy, manufacturing of transport vehicles and equipment, and chemical production. The regions with a high level of specialization include Kamchatka Krai, Chukotka Autonomous Okrug, the Sakhalin, Magadan, Ivanovo and Lipetsk oblasts. The obtained results can be used in scientific research to analyze the concentration of economic activity, assess the development of agglomeration processes, or as recommendations for implementing the economic policy in the regions.

Key words: new economic geography, regional economy, theories of location, concentration of economic activity, Russian regions.

Introduction. The study of trends in regions' economic activity, the emerging and developing processes of concentration and agglomeration of economic activity, changes in regional profile helps implement target regional policy. It is important to understand what conditions should be created to attract new production; what the future population will be and what the reason for this change will be; whether provision of subsidies will have the proper effect; what transport links should be developed in the first place. To date, the theories of economic activity have proved to be untenable: the factors of the "first nature" have ceased to explain effective development of many types of economic activity and their concentration in separate regions. Based on the improvement of the existing scientific provisions in this area, ultramodern currents in science such as new economic geography, new and modern theories of international trade appear, prerequisites for their unification into a single doctrine are created. The theoretical foundations in the regions of world nations are constantly tested.

The issues of economic activity are currently relevant at the global level. Industrial production is concentrated in large cities, leading regions and some countries; half of world industry is localized on 1.5% of the territory. Cairo, which produces more than half of Egypt's GDP, occupies 0.5% of the country's territory. Three South-Central regions of Brazil, with the share of 15% of the country's area, produce more than half of its GDP. Three quarters of the world economy is located in the countries of North America, the EU, and Japan, with less than a billion people living there[1]. Moscow occupies 0.015% of the Russian territory; its share in the manufacturing industry comprises 14.5%[2].

The relevance of studying the concentration of economic activity is caused by a high inequality both among countries and at the intra-country regional level.

The issues of concentration, agglomeration and specialization were raised in the works of Russian researchers. We revealed specific features which do not significantly contradict the provisions of modern scientific doctrines:

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[1] *World Development Report 2009. Reshaping economic geography.* Available at: https://openknowledge.worldbank.org/handle/10986/5991 (Accessed: 18.04.2017).

[2] As of 01.01.2016. Calculated by the author according to: Russian regions. *Main socio-economic indicators of cities. 2016: statistics book.* Rosstat. Moscow, 2016. 442 p., pp. 106-107; *Russian regions. Socio-economic indicators.* 2016: statistics book. Rosstat, Moscow, 2016. 1326 p., p. 18.

1) the level of spatial concentration in Russian regions increases at least in terms of indicators of GRP, employment and population (Kolomak, 2014);

2) the system of "core–periphery" relations is formed when resources tend to move to regions with higher production concentration, which significantly increases territorial differentiation (Rastvortseva, 2013);

3) the positive effects apply to all settlements included in the urban agglomeration with proper development of the transport infrastructure (Gonchar, 2010); economic growth tends to go beyond the region's borders and spread to the neighboring regions (for the whole territory of Russia) and then – only for the Western part of the country (Kolomak, 2010);

4) the agglomeration processes in the regions stimulate productivity growth, have a direct impact on the well-being of the population; the processes of economic activity concentration are accompanied by an inflow of labor resources and, subsequently, lower wages (Rastvortseva, 2013);

5) the socio-economic development is influenced by the location of the region relative to the national border: regions bordering the former Soviet republics in a better position, regions with maritime borders are less profitable (Rastvortseva, Usmanov, 2015);

6) the operation of enterprises amid agglomeration processes increases average revenues by 3.8% per year (Vorobyov et al., 2014); at this level, greater importance for efficiency belongs to internal returns on the scale rather than on external one (Gonchar, 2010).

The purpose for the research whose results form the basis of the article is to theoretically justify and analyze the economic activity in terms of assessing the concentration and specialization of Russian regions over time.

The scientific novelty of the research lies in the formation of the terminological framework of the theory of economic activity concentration, namely the definition of agglomeration as a process of concentration of activities in the region supported by circular logic at several levels with a distinction between its two types – "localization economics" and "urbanization economics" –, in the identification of relative and absolute types of geographical concentration. Elements of scientific novelty are contained in the research methodology: we propose to include in the system of traditional indicators for assessing the concentration and specialization of the regional economy the corresponding P. Krugman indices similar in the content to Herfindahl-Hirschman indices, but to a greater extent reflecting the development heterogeneity; the localization factor is recommended to be used for identifying the territory's potential economic amid decision-making in the process of regional management.

The article is constructed as follows. The first section presents the research terminology – the concepts of concentration, agglomeration and specialization are described. In view of the fact that in the Russian economic science, agglomerations can be considered in two ways, this category is considered in more detail in the second section of the article. The paper presents the research methodology (section 3) and the results of analyzing agglomeration processes in Russian regions (section 4). Conclusions are drawn in the final part.

1. Concentration, agglomeration, specialization: issues of terminology. Modern economic science considers the provisions of the concentration of economic activities in two main areas: from the perspective of the new economic geography (in the framework

of studying and explaining the concentration of economic activity in certain regions) and from the perspective of the new theory of trade (explanation of the position of border regions under specific trade conditions). Checking the adequacy of the theoretical provisions in the regional economies of world countries will provide new aspects in the development of this field of knowledge; will serve not only as a subject of additional research, but also as a framework for re-consideration and supplementation of theories of concentration of economic activity.

The concentration of economic activity in the region is characterized by the level of concentration, agglomeration and speciali-zation. While the latter is unambiguously interpreted in relation to the region and assesses the extent to which economic activity domi-nates (or is evenly distributed), the differences between concentration and agglomeration in the literature are not so obvious. First of all, we review the term concentration.

Concentration is defined in relation to the type of economic activity, sector, sub-sector, industrial group, etc. and means the degree of concentration or sparseness of industrial production within a given territory. It is necessary to distinguish between absolute and relative concentration. The industrial sector is *absolutely concentrated* when several countries, regardless of their size, make up quite significant shares in the total volume of production (Midelfart-Knavik et al., 2000). The industrial sector is *relatively concentrated* when one type of activity is different from those that are, on average, most prevalent in industrial production in countries. The neoclassical theory usually deals with relative concentration, new economic geography — with absolute concentration, new trade theory provides for both kinds (Haaland et al., 1999).

We believe that concentration reflects the distribution of specific economic activities in the geographical space, while *agglomeration* indicates the feasibility of entirely different types of activity in a common area. For example, ferrous and non-ferrous metallurgy in the Sverdlovsk Oblast is concentration; the concentration of enterprises of different industries in the Belgorod Oblast is agglomeration. Both concentration and agglomeration can occur in the same region, but agglomeration is a more general process as it usually affects several sectoral breakdowns. We believe that it is appropriate to claim that "the agglomeration process is the concentration of economic activity in the region (city) over time", but one cannot say that concentration is necessarily an agglomeration process.

2. The concept of agglomeration and its types. In view of the fact that among economists and geographers, the term "agglomeration" is associated with urban agglomerations (a certain type of settlement system consisting of several cities), we suggest to consider this scientific category in detail. Agglomeration — the clustering of economic activity, created and sustained by some sort of circular logic — occurs at many levels, from the local shopping districts that serve surrounding residential areas within cities to specialized economic regions like Silicon Valley (or the City of London) that serve the world market as a whole (Fujita et al., 1999, p. 1).

The term "agglomeration" was first intro-duced by Alfred Weber in 1905 to refer to the emerging mutual attraction between enterpri-ses located in the same area. Nowadays the economic literature clearly distinguishes bet-ween two types of agglomeration (depending on the emerging externalities) — the concentration in one place of enterprises of one type of activity and enterprises of different type of activity.

In the first case reference is commonly made to "localization economics" with endogenous effects from specialization (placement externalities) and occurring exogenous sources of additional benefits. Enterprises of the same type of activity, being located in one region, get the agglomeration effects from combined use of various objects — trade associations, educational institutions, etc. A. Marshall was the first to study this research area. He demonstrated that the interaction between enterprises in the same area lead to an increase in productivity of all production factors. Such agglomeration is estimated by concentration indicators.

In the second case, when enterprises of different types of economic activity prefer to be located in one geographical place, it is common to talk about urbanization economics. It is here that the term intersects with the "urban" agglomeration, which is more common in the Russian economic geography. The enterprises' benefits increase due to the concentration of economic activity and are linked to diversity. The key principle underlying the economic mechanism of agglomeration in the region is that three groups of factors are of great importance during production of a variety of consumer and intermediate goods: increasing returns at the level of an individual enterprise, transport costs and labor migration (and hence consumer migration). Enterprises receive agglomeration effects not only from a large number of suppliers and manufacturers, but also from using the advantages of banks, universities, developed labor market, etc.

There are three types of agglomeration effect (for companies). The first is the opportunity to share local facilities, services of suppliers of raw materials and intermediate goods, labor resources (Scotchmer, 2002;

Puga, 2010). The second — ample supply from suppliers of intermediate goods helps producers reduce transaction costs (Rosenthal, Strange, 2001). The third — united labor resources can reduce the possible variety of shocks (Overman, Puga, 2009; Combes, Duranton, 2006; Rosenthal, Strange, 2004). Agglomeration processes in the region are characterized by economic relations between producers, which weaken as distances between them increase (Fujita, Ogawa, 1982).

3. Research methodology. To analyze the concentration of certain economic activities in the regions we can use the traditional localization indicator:

$$LQ = \frac{\dfrac{E_{ij}}{E_i}}{\dfrac{E_j}{E}} = \frac{\dfrac{E_{ij}}{E_j}}{\dfrac{E_i}{E}}, \qquad (1)$$

where LQ — localization factor;

E_{ij} — number of employees in sector j in i-th region;

I_E — total employment in i-th region;

E_j — number of employees in sector j;

E — total number of employees in the country;

j — economic sector;

i — region.

The localization factor indicates how many times the concentration of a particular economic activity exceeds the national average. That is, the localization factor characterizes the region relative to profile of industrial production. Calculations of the indicator can be made not only in terms of the number of employees in the economy, but also in terms of output and value of fixed assets.

This factor is useful and is widely used in the development and implementation of the regional economic policy. Previously in the work (Rastvortseva & Cherepovskaya, 2013)

we proposed and tested the method with the use of the localization factor, which helps identify the potential clusters in the area. For example, in the Belgorod Oblast, five economic clusters have been experimentally identified: agro-industrial, mining, metallurgy, machinery and equipment, and construction.

Another methodological tool for analyzing concentration of economic activity is *Herfindahl−Hirschman index (HHI)*. To calculate it we determine industrial output, investment in fixed capital, and the number of people employed in the economy as initial indicators for which the assessment is performed:

$$HHI = \sum_{i=1}^{n} x^2 \; HHI = \sum_{i=1}^{n} x_i^2, \qquad (2)$$

where x_i − share of i-th region in the total population.

HHI can be used to estimate both geographical concentration (HHI_j^C), and regional specialization (HHI_i^S):

$$HHI_j^C = \sum_{i=1}^{n} \left(\frac{E_{ij}}{E_j} \right)^2, \qquad (3)$$

$$HHI_i^S = \sum_{j=1}^{m} \left(\frac{E_{ij}}{E_i} \right)^2, \qquad (4)$$

HHI is considered an *absolute measure of concentration or specialization*. The index increases as the degree of concentration or specialization increases, reaching its upper limit of 1 in the case where the j-th branch is concentrated in one region or i-th region specializes in only one branch. The main disadvantage of the index is the sensitivity of its lower limit to a number of observations: the lowest concentration level is $1/n$ (when all regions have equal shares in j-th industry), and the lowest specialization − $1/m$ (when all economic activities have equal shares in i-th area). This indicator has another important disadvantage as an absolute measure: large regions due to their high share have a significant impact on changes in concentration/ specialization (the index shifts towards larger regions).

The degree of concentration of economic activity in the region is estimated by the *Gini index* (G)):

$$G = 1 - 2 \sum_{i=1}^{k} dx_i \, dy_i^n + \sum_{i=1}^{k} dx_i \, dy_i , \qquad (5)$$

where dx_i − share of i-th group in the total population;

dy_i − share of i-th group in total indicator volume;

dy_i^n − accumulated share of the I-th group in the total volume of the trait.

The Gini index varies from 0 to 1.

Krugman Dissimilarity Index (KDI) is considered *a relative measure of concentration or specialization*. KDI estimates concentration by individual economic sectors (KDI_j^C) and specialization by region (KDI_j^S):

$$KDI_j^C = \sum_{i=1}^{n} \left| \frac{E_{ij}}{E_j} - \frac{E_i}{E} \right|, \qquad (6)$$

$$KDI_i^S = \sum_{j=1}^{m} \left| \frac{E_{ij}}{E_i} - \frac{E_j}{E} \right|. \qquad (7)$$

The relative index of Krugman specialization/concentration is used to compare one region/sector with the country's economy as a whole. The index value ranges from 0 (identical territorial/sectoral structures) to 2 (completely heterogeneous structures).

Concentration indices CR_0, CR_4, CR_5 indicate the share of employees in the industrial sector concentrated in three, four or five of largest regions by this indicator:

$$CR_{3j} = \sum_{i=1}^{3} \frac{E_{ij}}{E_j}, \qquad (8)$$

$$CR_{4j} = \sum_{i=1}^{4} \frac{E_{ij}}{E_j}, \qquad (9)$$

$$CR_{5j} = \sum_{i=1}^{5} \frac{E_{ij}}{E_j}, \qquad (10)$$

We conducted a research in 83 Russian regions (the Republic of Crimea and the city of Sevastopol were not included due to insufficient statistics). Data on the Arkhangelsk and Tyumen oblasts were taken separately excluding including autonomous districts. Autonomous districts were registered as separate constituent entities of the federation. The performance of geographical concentration in Russian regions by HHI and regional inequality by Gini index were determined for the period from 1990 to 2015. The study of geographical concentration of industrial production by type of activity according to HHI and KDI was conducted over the period from 2009 to 2015. Analysis of the specialization index is conducted for 2009-2015. Official data of the Federal State Statistics Service of Russia (www.gks.ru) were used as a source of information, this also included statistical digests "Russian regions. Socio-economic indicators" for 2002–2016 and the Unified Interdepartmental Information and Statistics System (EMISS) database.

The results of regions' agglomeration process analysis. The HHI performance was calculated by three indicators: industrial output, investment in fixed assets and number of people employed in the economy. The results for Russian regions in 1990–2015 are presented in *Figure 1*.

Figure 1. Performance of geographical concentration in Russian regions in 1990–2015, HHI
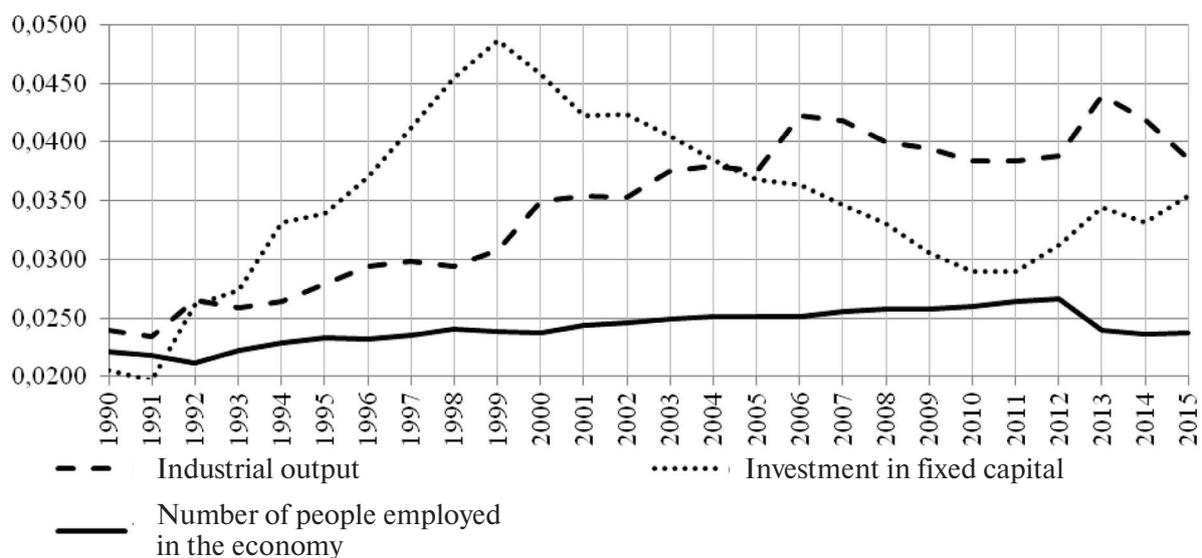
Source: calculated according to data from: the Unified Interdepartmental Information and Statistics System (EMISS). Available at: https://www.fedstat.ru

Figure 2. Performance of inequality of Russian regions in 1990–2015, Gini index

Source: calculated according to data from: the Unified Interdepartmental Information and Statistics System (EMISS). Available at: https://www.fedstat.ru

As can be seen in the figure, Russian regions have the highest concentration in terms of investment in fixed assets. Until 1999, the concentration index steadily increased to 0.0486, then until 2010 it had a downward trend to 0.029 and later it did not exceed the level of 0.0345 (2013).

The lowest concentration indicator, yet with a stable growing trend, occurs in terms of the number of people employed in the economy. We believe that due to the large country's territory, the Russian population is not characterized by high mobility. However, even low mobility leads to a gradual increase in the concentration of labor resources in certain regions, and hence to an increase in the socio-economic inequality. The exception is 2013, where HHI fell from 0.0266 to 0.0239 units.

Regions have a high degree of concentration in terms of industrial output. It is more responsive to the impacts of globalization factors: until 2006 its concentration degree in Russian regions had a stable upward trend, then it gradually decreased until 2010. HHI varies during the analyzed period (from the lowest value of 0.0234 in 1991 to the highest value of 0.0439 in 2013).

Let us consider the performance of the Gini index for the same indicators (*Fig. 2*).

The dynamics of inequality between Russian regions in terms of socio-economic indicators has a pattern similar to concentration. Gini index by number of people employed in the economy almost completely duplicates the trajectory of HHI performance, has a stable upward trend and is only inferior to the indicators of industrial output and investment. It may be noted that a slight decrease in the concentration of people employed in the economy in 2013 did not affect the positive trend in the growth of inequality between regions by indicator.

High concentration of investment in fixed assets in 1999 resulted in the maximum level of inter-regional disparities in 2000. The overall performance trajectory is similar, but the amplitude Gini index oscillation is somewhat less pronounced.

Similar conclusions can be drawn regarding the concentration and inequality of Russian regions in terms of industrial output. We can conclude that increased concentration leads to increased inter-regional inequality.

Let us consider the processes of concentration of economic activity in the industrial sector in detail. To do this we can assess the performance of the region's share in the number of people employed in the manufacturing industry. During the period from 2002 to 2014, the number totally reduced by 28.23%; the increase in the share took place in 38 regions of the country (of course, due to a decrease in other regions). The following regions are worth noting: the Moscow (its share increased by 1.37%), Novosibirsk oblasts (0.48%), Republic of Tatarstan (0.47%), the Belgorod (0.45%), Chelyabinsk (0.44%), Kaluga (0.42%), Kaliningrad (0.38%), Omsk (0.30%), Sverdlovsk (0.29%), Leningrad (0.28%), and Rostov oblasts (0.28%). In total, the share of the listed eleven regions in the total number of employees in the manufacturing industry increased by 5.16%, which definitely indicates the developing processes of industrial output concentration and, if the share of the region increases in several sectors of the economy – agglomeration.

The provisions of the economic theory indicate that the concentration of economic activity increases the overall resource use efficiency, provides additional benefits and generally has a positive impact on the economic development. But we must understand that increasing concentration leads to greater inter-

regional inequality, first in economic and later in social indicators. Regions less attractive for workers, investment and other resources, for the development of industrial production (and hence auxiliary activities), become economic recipients. The resulting costs of maintaining such territories reduce the benefits derived from the concentration of economic activity in the leading regions. That is why we believe that, in general, high concentration of economic activity in certain regions cannot have a positive impact on the development of the national economy and the social sphere. Taking into account the vast Russian territory and interregional differentiation in social and economic indicators it is necessary to monitor the emergence and development of agglomeration processes which may strengthen the existing imbalances.

It is important to understand which types of economic activity have a specific focus on individual territories, and which – on the development prospects of any region. The trend to concentrate is explained by two factors: additional profit due to the effect of scale and proximity to resources (minerals, highly skilled labor resources, etc.). We consider these activities on the example of the manufacturing industry. To do this, we calculate the performance of the absolute (HHI, *Fig. 3*) and relative (KDI, *Fig. 4*) indicators of geographical concentration (by number of employees in the industrial production sectors).

HHI estimates the absolute concentration of certain types of manufacturing. Traditionally, there is a trend to focus on certain areas of enterprises engaged in pulp and paper, publishing and printing, metallurgy, production of vehicles and equipment, chemical production. Food industry, wood processing and wood products manufacture, production of non-metal mineral products are evenly

Figure 3. Dynamics of geographical concentration of industrial output
by type of activity in Russian regions in 2009–2015, HHI

Source: calculated according to data from: the Unified Interdepartmental Information and Statistics System (EMISS).
Available at: https://www.fedstat.ru

Figure 4. Dynamics of geographical concentration of industrial output by
type of activity in Russian regions in 2009–2014, KDI
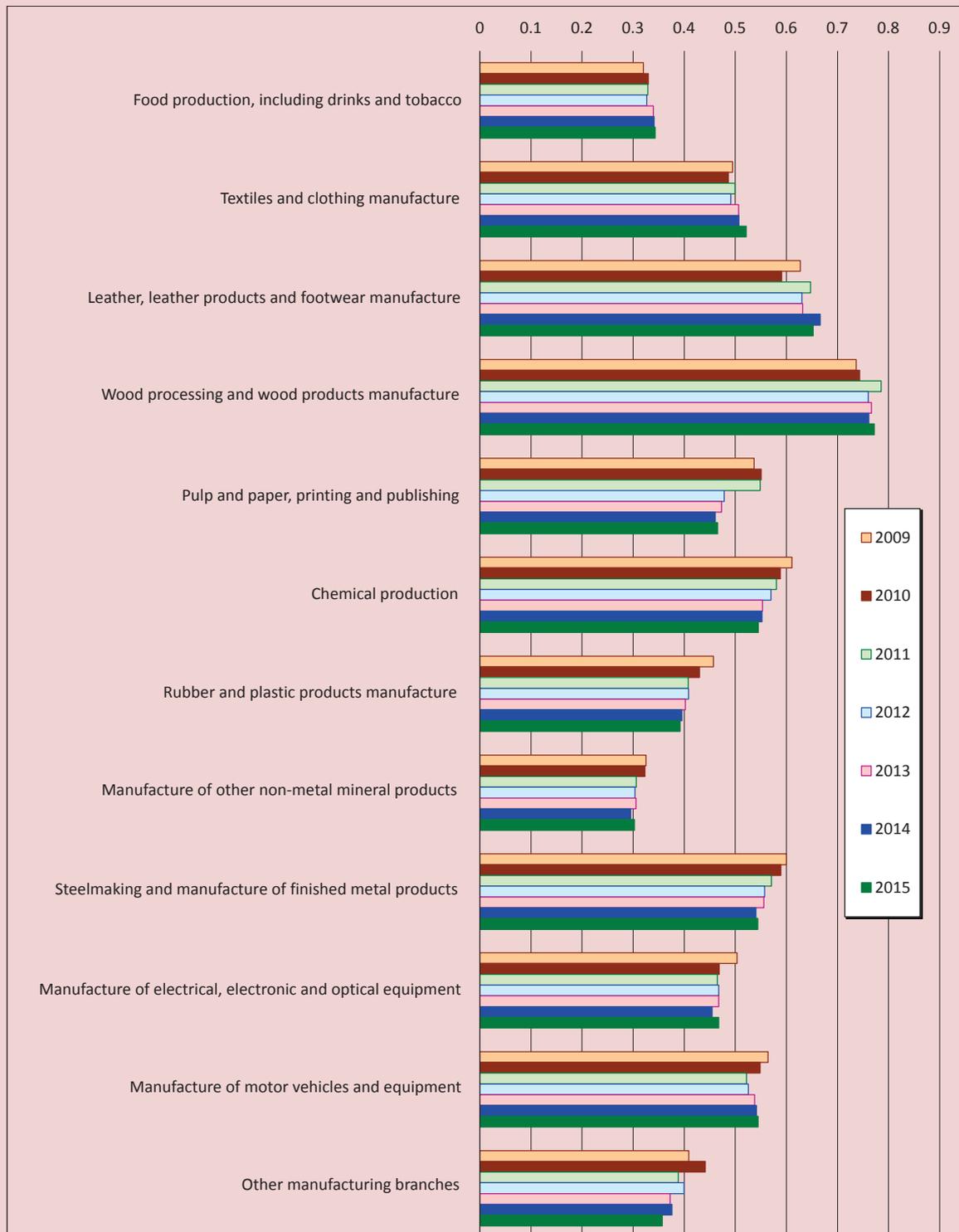
distributed among the country's regions. Similar conclusions can be drawn on the relative concentration index – KDI.

The geographical concentration of labor in *food production* is low: HHI – 0.023–0.026 units, KDI – 0.32–0.34 units. Note that in general, the number of employees in this sector is steadily decreasing in Russia. The recent decrease in concentration is explained by the weakening of the leading regions in 2009: Moscow (its share decreased from 7.46% in 2009 to 4.29% in 2015), the Krasnodar Oblast (from 6.15 to 5.72%), and Saint Petersburg (from 3.11 to 2.5%). It should be noted that the share in production in the Republic of Tatarstan, Altai Krai, and the Belgorod and Voronezh oblasts increased. The share of the Moscow Oblast did not change (average of 5.95%). The total number of people employed in food production in four regions (CR_4) amounted to nearly 14% in 2015, in three regions (CR_3) – almost 11%.

The absolute concentration in textiles and clothing manufacture is decreasing. HHI had its maximum value (0.037) in 2009, minimum (0.032) in 2012. KDI ranges within 0.49–0.52 and has a slight upward trend. It should be noted that 31.18% of people employed in textiles and clothing manufacturer are concentrated in five regions (CR_5). The sector's leaders are the Ivanovo (its share is slightly reducing) and Moscow (its share is increasing) oblasts. The share of the Rostov and Vladimir oblasts is increasing; the share of Moscow is decreasing.

The absolute concentration of leather, leather goods and footwear manufacture cannot be called high – 0.032–0.04, unlike KDI – 0.59–0.67. This is due to the fact that in 13 regions this economic sector is not represented at all and the share of other 40 regions does not exceed 1%. The sector's leaders in 2015 were Saint Petersburg (6.55%), Moscow (5.97%), the Tver (5.68%), Kirov (5.48%) and Moscow (5.34%) oblasts. Five regions account for about 29% of the total number of employees in the sector.

The highest degree of heterogeneity (at moderate concentration) in the industry occurs in wood processing and wood products manufacture (KDI– 0.74–0.79, HHI – 0.028–0.029). In recent years, five regions have accounted for about 25.4% of this economic sector. Regions with greater number of employees include the Kirov Oblast, Krasnoyarsk Krai, the Irkutsk, Vologda and Arkhangelsk oblasts.

Pulp and paper, printing and publishing demonstrate a downward trend in KDI: in 2009 it comprised 0.54 units, in 2015 – 0.47 units. The concentration is the highest: the average of 0.054 during the analyzed period. At the same time, more than a quarter of the employed are concentrated in Moscow, the Moscow Oblast and Saint Petersburg; five regions account for about 33%.

High concentration is observed in chemical production: KDI ranges from 0.54 to 0.61 units, HHI – 0.04–0.042. Five regions account for more than 36% of people employed in the industrial sector. The first place in the number of people employed in the chemical industry belongs to the Republic of Tatarstan (8.73%); in recent years, this share has been steadily increasing. A significant amount of activities is concentrated in Perm Krai, the Moscow Oblast, the Republic of Bashkortostan more than 7%, in the Samara and Moscow oblasts – 5.16 and 4.4% respectively.

Rubber and plastic products manufacture demonstrates a clear trend of industry dispersion. KDI decreases from 0.46 units in 2009 to 0.39 units in 2015; HHI – from 0.042 to 0.034 units. About 30% of people employed

in the sector work in five regions: the Moscow Oblast (about 10%), the Republic of Tatarstan (6.4% in 2015), Moscow (5.33%), the Nizhny Novgorod Oblast and in Saint Petersburg.

The lowest level of geographical concentration during the analyzed period is recorded in manufacture of other non-metal mineral products: KDI − 0.30−0.34 units, HHI − 0.26−0.29 unit. The share of five largest regions in terms of this indicator varies around 25%. These include the Moscow, Chelyabinsk, Sverdlovsk oblasts, Krasnodar Krai and the Republic of Bashkortostan.

In metallurgy, on the contrary, a high degree of concentration with its constant decline should be noted. More than 27% of employees work only in three regions of the country in this economic sector: the Sverdlovsk, Chelyabinsk and Moscow oblasts. More than 34% of all people employed in metallurgy account for five regions (including the Nizhny Novgorod and Kemerovo oblasts).

The low geographical concentration of electrical, electronic and optical equipment manufacture should be assessed positively. In 2015, five regions of the country amounted to 31% of the sector. These include Saint Petersburg (almost 9%), Moscow (about 8%), the Moscow (over 5%), Chelyabinsk (4.5%) and Sverdlovsk (4.15%) oblasts.

The total number of people employed in motor vehicles and equipment manufacture is decreasing. HHI is reduced from 0.044 to 0.038; KDI − from 0.56 to 0.54 units during

Figure 5. Mean value of the specialization HHI in the manufacturing sector by Russian regions in 2009–2014, index
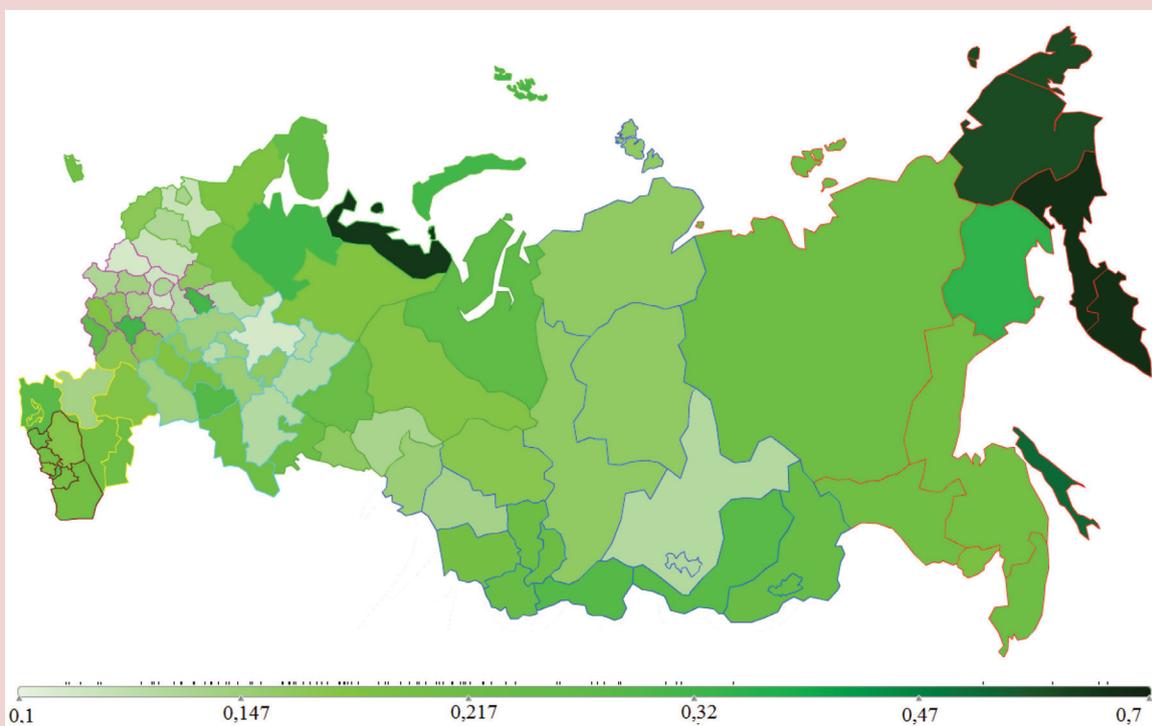
Source: calculated according to data from: the Unified Interdepartmental Information and Statistics System (EMISS). Available at: https://www.fedstat.ru

the analyzed period. In recent years, the leading positions of the Republic of Tatarstan, the Nizhny Novgorod Oblast and Saint Petersburg have been strengthened. The share of the first five territories (with a declining contribution of the Samara Oblast and Moscow) in 2015 amounted to 32.85 %, while about 24% of the employed of this sector work in the Republic of Tatarstan and the Samara and Nizhny Novgorod oblasts.

The "other manufacturing branches" sector has an average degree of concentration with the gradually decreasing number of employees.

In general, the geographical concentration by number of employees in the manufacturing industry is declining (from average of 0.039 in 2009 to 0.034 in 2015), as well as the degree of heterogeneity (from 0.52 to 0.49 units). The combination of this trend with an increase in concentration in industrial output (see Figure 2) indicates the differences in the levels of performance: the number of employees in the leading regions decreases while production output maintains or increases.

We see that the Moscow Oblast, Moscow and Saint Petersburg, the Nizhny Novgorod Oblast, the Republic of Tatarstan, Krasnodar and Perm krais, and the Sverdlovsk Oblast account for a significant share of employees in many sectors of the manufacturing industry. This is not surprising as most of the economically active population works in these regions.

We analyze the performance of industrial production specialization in Russian regions in 2002–2014 by HHI. The results of the analysis are presented in *Figure 5*.

The average value of specialization index in industrial sectors by region is 0.203–0.208. The regions with the highest level of specialization include Kamchatka Krai, Chukotka Autonomous Okrug, the Sakhalin, Magadan,

Ivanovo and Lipetsk oblasts. The low level of specialization is characteristic of the Kirov, Moscow, Tver, Leningrad, Smolensk oblasts, Moscow, republics of Chuvashia and Bashkortostan, the Kostroma and Irkutsk oblasts etc. It should be noted that the above mentioned regions of the Far East reach high index value due to a significant share of employees engaged in food production (DA), in the Ivanovo Oblast − in textiles and clothing manufacture (DB), in the Lipetsk Oblast − metallurgy and finished metal products manufacture (DJ). From 2002 to 2014, the number of regions with the level of specialization in the manufacturing industry above average included 28−32 territories; below average − 47−51.

For more in-depth study of regional specialization we previously analyzed (Rastvortseva et al., 2012) the correlation between of its level and indicators of socio-economic development: GRP per capita, labor productivity, average monthly nominal wages, unemployment level. Russian regions were divided into three groups − with a low level of specialization, mining regions with a high level of specialization, regions with a high level of specialization and a missing mining sector. It has been determined that narrow specialization in a certain sector of industry is only "affordable" to regions which ensure the development of their economy through mining. In other cases, deep specialization of the Russian regions is ineffective (Rastvortseva, Kuga, 2012).

Analysis of KDI indicates that, apart from the above mentioned regions, the Arkhangelsk oblast and Nenets Autonomous Okrug, Komi and Tuva republics, the Samara oblast, Republic of Karelia, some republics in the Caucasus, Altai Krai, the Jewish Autonomous Oblast, the Belgorod oblast are significantly different than the average national level.

Debate and conclusions. The development of the theory of economic activity concentration is now becoming particularly relevant. New factors have been identifies, which have a significant impact on the geographical concentration of economic activity and regional specialization: emergence of agglomeration effects from the location of production in one territory and increasing returns. The degree of dominance of any economic activity in the region is estimated by the indicators of specialization; the concentration or sparseness of a certain type of activity or resource is determined by concentration. The situation where concentration in the region is observed in several types of economic activity is called agglomeration.

To analyze the trends in concentration of economic activity in regions we use Herfindal—Hirschman and Krugman indicators of localization, concentration and specialization, Gini index, CR_3, CR_4, CR_5. In the course of the research we revealed high concentration of investments and industrial production in Russian regions, a stable upward trend in the number of labor resources. This situation leads to increased inter-regional inequality. In the manufacturing industry, a threefold reduction in the number of the employed in 2002—2014 took place. The trend to concentrate is indicated in pulp and paper, printing and publishing, metallurgy, motor vehicles and equipment manufacture. Regions with a high level of specialization include Kamchatka Krai, Chukotka Autonomous Okrug, the Sakhalin, Magadan, Ivanovo and Lipetsk oblasts.

The obtained results can be used in scientific research to analyze the concentration of economic activity, assess the development of agglomeration processes, and as recommendations for economic policy in the regions.

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