

Sectoral concentration and regional specialisation of Small and Medium Enterprises (SMEs) in Russia: Application of Krugman Index

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Abstract

The purpose of this study was to assess the current levels of sectoral concentration and regional specialisation of Small and Medium Enterprises (SMEs) in Russia using Krugman's Indexes of concentration and specialisation. The study used data from the official statistical observation of activities of all Russian SMEs for the year 2015, representing 82 Russian regions and 13 types of economic activity (sectors). A high level of SME concentration was observed in fishing, mining and quarrying and agricultural sectors. The concentration of SMEs in manufacturing is much higher than in the services sector. The regional specialisation of SMEs is relatively small in Russia. Specialisation is above the national average in the regions where agricultural SMEs dominate and in Moscow, where real estate SMEs are widely distributed. These results could be of interest to entrepreneurs when choosing the type of sectors to engage in and policymakers in promoting SMEs in particular economic sectors and regions of Russia.

Keywords: *Small and Medium Enterprises, Regional specialisation, sectoral concentration, Krugman Index*

Introduction

Small and medium-sized enterprises (SMEs) have developed in Russia since 1991. Before that date, in the USSR, economic activities were carried out only by state enterprises. In Russia, currently, there are 5.6 million SMEs, employing 18 million workers. SMEs produce 20% of Russia's Gross Domestic Product. Russia's development strategy for 2030 (Strategy for the Development of Small and Medium-sized Entrepreneurship, 2016) predicts a 40% increase in the share of Gross Domestic Product from SMEs and a 35% increase in the number of workers employed by SMEs. SMEs, as experience shows, is a major factor in regional development, especially in underdeveloped areas, and create the conditions for structural adjustment in an economy (Acs et al., 2008; Baumol, 2004; Decker et al., 2014). Thus, in Russia, currently there exists a significant need for accelerated development of SMEs. This can be facilitated by identifying economic activities and regions of Russia that might benefit most from SME activity. Therefore, in recent years, one of the most pressing problems in the development of the Russian economy and its regions (subjects), especially in terms of transformation processes, is the study of distribution models of enterprises and organizations' various types of economic activity.

The criteria that characterizes SMEs in Russia are specified in the Federal Law dated July 24, 2007, No.209-FZ "On development of small and medium entrepreneurship in the Russian Federation". The main criterion is number of employees. Based on this criterion small businesses shall not exceed 100 people, and medium enterprises range from 101 to 250 people. SMEs also include individual entrepreneurs.

This paper comprises of six sections. The literature review section synthesizes foreign and Russian studies on regional concentration and sectoral specialisation. In the third section, the paper describes indexes developed by Krugman for the evaluation of industry concentration and sectoral specialisation. This section also explains the data sources that were used in this paper. The paper also presents the results of the analyses conducted using the Krugman Indexes. The conclusion section summarizes the results, highlights implications of the results and proposes future research relating to the study.

Literature review

The issues of regional specialisation and industry concentration are explored by researchers in the context of analysing the process of economic convergence and its effects in different countries (Hallet, 2002; Cornett, 2002; Marelli, 2007; Ezcurra et al., 2006).

Isard (1960) published a seminal paper on the spatial location of production. He proposed an indicator of concentration level. Fujita et al. (1999) describe the problems of the spatial structure of the economy. Animitza et al. (2014) discuss various approaches to the processes of development of productive forces in time and space proposing two approaches. The first approach is based on the distribution of productive capacity according to geographic, economic, ethnographic, geopolitical, and other conditions. The second approach examines the distribution of productive capacity from the standpoint of economic activity.

Minakir and Demianenko (2010) examine the role of economic agents, which according to the authors determine the character, scale, and dynamics of regions' development. They explain the important role played by economic agents in interacting with various institutions.

Belov (2012) and Kazakov (2010) discuss methodological issues of modeling for processes of concentration and specialisation, as well as how analytical tools can be used.

Specific analyses of concentration and specialisation are published in several papers. Some studies (e.g., Rastvortseva et al., 2012; Rastvortseva & Kuga, 2012) discuss the concentration and specialisation of industrial production. Others present examples of analyses by regions and individual countries (e.g., Aiginger & Rossi-Hansberg, 2006; Kuroiwa, 2012; Midelfart-Knarvik et al., 2002; Goschin et al., 2009). Ezcurra & Arzo (2007) document the evolution of territorial disproportions in the activities of 39 regions of Central and Eastern Europe in the period from 1992 to 2001. Their results show an overall reduction in regional inequality over the study period. Suedekum (2006) provides an analysis of concentration and specialisation in Germany after its unification in 1990. Goschin et al. (2009) measured the concentration of industries and regional specialisation by the gross value added data. Mongelli et al. (2016) established that in European countries specialisation is high in the manufacturing enterprises and substantially lower in the case of services.

Moga and Antohi (2013) discuss issues of concentration and specialisation of agricultural production in Romania. Ma et al. (2014) examined the directions of regional specialisation of China's agricultural production for 2003-2011 and found that growing economic freedom, accompanied by intensified internal and external competition, has driven the regions in China to adjust agricultural production structures according to comparative advantages. Neagu and Neagu (2016) conclude that Romanian regions become less specialised, while industries become slightly more concentrated.

Palan (2010) compared nine specialisation indexes, discussing their properties, strengths and weaknesses. He explains that the relative specialisation measured by the Krugman Dissimilarity Index enables a comparison of regions, and it is the best among the indexes he compared. Krieger-Boden et al. (2008) provide an assessment of regional specialisation and concentration patterns in European countries based on Krugman's index for relative specialisation and concentration.

However, concentration and specialisation of SMEs in Russia have not been considered until recently in scientific publications, despite the significance of this topic. To promote the development of the SME sector in Russia, it is necessary to understand how SMEs are distributed among the regions of the country and types of economic activity that they focus on. So far, such an analysis has not been carried out. The purpose of the study is to assess the current levels of sectoral concentration and regional specialisation of SMEs in the developing market economy of Russia with the use of Krugman Indexes. Understanding regional and activity concentration of SMEs can help policy development in relation to the promotion and regulation of SME's and employment.

Research design

An analysis of regional specialisation of SMEs highlights the distribution of types economic activity that SMEs engage in within a given region, usually compared to the rest of the country. The sectoral concentration of SMEs reflects the distribution of a type of economic activity across different regions. A region is considered to be highly specialised if that region has a dominant share of SMEs working in one or few types of economic activity. High sectoral concentration SMEs corresponds to the cases where a given type of economic activity occurs in a small number of regions. A low sectoral concentration occurs when SMEs involved in a given type of activity shows a more or less equal distribution among the majority of the regions.

The methods of analysing regional specialisation and sectoral concentration to be used in a study depend on the purpose of the investigation, input data availability and specific properties of the indicators.

This study adopts the Krugman Dissimilarity Index for analysing regional specialisation and sectoral concentration of SMEs. As the Krugman's Concentration and Specialisation Indexes provides relative measures of the underlying constructs, they enable comparative evaluation of various regions and types of economic activity that SMEs engage in. The analyses are conducted using regional data separately for each type of economic activity.

Krugman (1991) created an index based on data on specialisation in four US regions and four large European countries for the analyses of regional concentration. This index can be used effectively for the comparative analysis of economic activities and regions. The Krugman index can be calculated on such indicators of SMEs as number of employees, number of SMEs, the volume of production and the value of investments and fixed assets.

In our calculations, we used the employment figures (number of employees) relating to SMEs, grouped by regions and industry sectors. The number of employees is a preferred indicator for the purpose of this study because it is less dependent on the socio-economic development and geographical location of the compared regions. On the other hand, the volume of production significantly depends on salary levels, which differ by regions. The value of fixed assets depends on the distances the SMEs' products need to be transported. This study tests whether significant differences exist in the distribution SMEs by regions and sectors due to regional specialisation and sectoral concentration.

The study uses data on the official statistical observation of activities in all Russian SMEs in 2015 (Federal Service of State Statistics, 2017). The database includes a large array of different information on the activities of businesses, collected every five years, and provides more accurate information than the annual sample surveys of SMEs. The study is based on data on 82 regions (subjects) of Russia and all types of economic activity (13) that are typical for SMEs.

The sample comprises SMEs involved in both the production of goods and services. It was found that the production of goods by SMEs is concentrated in the following types of economic activity:

- agriculture, hunting, and forestry (type 1);
- fishing, fish farming (type 2);
- mining and quarrying (type 3);
- manufacturing (type 4);
- production and distribution of electricity, gas and water (type 5).

The services performed by SMEs are of the following types:

- construction (type 6);
- wholesale and retail trade (type 7);
- hotels and restaurants (type 8);
- transport and communication (type 9);
- operations with real estate, rent (type 10);
- education (type 11);
- health and social work (type 12);
- other community, social and personal services (type 13).

This study uses Krugman Concentration Index (KDIC) to measure the level of SMEs concentration in types of economic activity and Krugman Specialisation Index (KDIS) to measure the level of specialisation of SMEs' type of economic activity within regions of Russia. The two indexes are defined as follows:

$$KDIC_j = \sum_{i=1}^{82} |s_{ij}^c - s_i| = \sum_{i=1}^{82} \left| \frac{z_{ij}}{z_j} - \frac{z_i}{z} \right|, \quad (1)$$

$$KDIS_i = \sum_{j=1}^{13} |s_{ij}^s - s_j| = \sum_{j=1}^{13} \left| \frac{z_{ij}}{z_i} - \frac{z_j}{z} \right|, \quad (2)$$

where, i - region (from 1 to 82);

j - type of economic activity (from 1 to 13);

s_{ij}^c - concentration ratio: the share of the region i in the total national employment in the type economic activity j ;

s_{ij}^s - specialisation ratio: the share of the type economic activity j in the total employment of region i ;

s_i - the share of the region i in the total national employment;

s_j - the share of the type economic activity j in the total national employment;

z_{ij} - employment in the region i for the type of economic activity j ;

z_i - total employment in the region i ;

z_j - national employment in type of economic activity j ;

z - total employment in Russian SMEs.

KDIC and KDIS are relative indicators and can be used for inter-sectoral and regional comparisons. The lowest values of KDIC and KDIS is zero and occurs in cases where the structures of sectoral

concentration and regional specialisation are identical to the mean value for the country. The highest values of the indexes is two.

Results

The calculation of KDIS concentration was carried out according to the formula (1). The results of this calculation are shown in Table 1.

Table 1. Concentration of SMEs by type of economic activity.

Number	Type of economic activity	KDIC
1	agriculture, hunting and forestry	0.54
2	fishing, fish farming	1.08
3	mining and quarrying	0.80
4	manufacturing	0.20
5	production and distribution of electricity, gas and water	0.53
6	construction	0.13
7	wholesale and retail trade	0.07
8	hotels and restaurants	0.13
9	transport and communication	0.14
10	operations with real estate, rent	0.21
11	education	0.26
12	health and social work	0.25
13	other community, social and personal services	0.16
	Average value	0.35

Source: Author.

The calculation of the KDIS was performed for each of the 82 regions of the country in accordance with the formula (2). Table 2 lists the ten largest and ten smallest values of the KDIS calculated for SMEs.

Table 2. Specialisation of SMEs by region

Region of Russia	Krugman specialisation index	Region of Russia	KDIS
Perm Krai	0.054	Kamchatka Krai	0.282
Tomsk region	0.062	Kabardin-Balkar Republic	0.312
Omsk region	0.067	Republic Sakha (Yakutia)	0.315
Chelyabinsk region	0.096	Tambov region	0.318
Samara region	0.096	Republic Altai	0.336
Nizhny Novgorod region	0.099	Moscow	0.359
Yaroslavl region	0.099	Republic Ingushetia	0.385
Novosibirsk region	0.099	Republic Dagestan	0.467
Rostov region	0.105	Chechen Republic	0.520
Arkhangelsk region	0.106	Republic Kalmykia	0.601

Source: Author.

The highest level of concentration of SMEs is found in fishing and fish farming, where the Krugman Concentration Index reached 1.08. Index values above the national average were observed in

agriculture, hunting and forestry, mining, manufacturing, production and distribution of electricity, gas and water. The sectors with high KDIC values relate mainly to the production of goods.

Krugman's concentration index values for nine types of activity were less than the national average. Eight of these nine types of activity belong to the service sector. The lowest value of the KDIC (0.07) is obtained for trade, which seems logical since this sector is most prevalent among SMEs in all regions.

SMEs, related to mining and quarrying, are prevalent in such regions of the country as Tyumen Oblast, the Republic of Bashkortostan and Yakutia. Manufacturing SMEs are concentrated in Moscow, Ivanovo, Kirov and Nizhny Novgorod regions, and the SMEs operating in agriculture and forestry are more concentrated in such regions as Tambov, Rostov, Orenburg, Saratov and Volgograd regions, Krasnodar and Stavropol territories, republics of Bashkortostan, Tatarstan, Dagestan and Udmurtia.

The greatest concentration of SMEs in production and distribution of electricity, gas and water is found in the regions located in Eastern Siberia and the Far East (e.g., Amur, Kemerovo and Irkutsk region, Zabaikal, Krasnoyarsk and Khabarovsk territory, Republic of Buryatia). Real estate SMEs are concentrated in Moscow and St. Petersburg. This can be explained by the fact that these regions are megacities.

There is less regional concentration of SMEs operating in sectors such as construction, wholesale and retail trade, hotels and restaurants, transport and communications, education, health and other community, social and personal services.

The lowest values of specialisation were found in the regions where the sectoral structure of SME economic activity is similar to the average sectoral structure of economic activity in the country. These regions are listed in the first column of table 2. The specialisation score becomes higher when the sectoral structure of SME economic activity significantly differs from the average sectoral structure in the country. According to column 4 of Table 2, the highest values of the KDIS are in the range of 0.28 to 0.60, highlighting that the levels of specialisation of SME economic activity in the regions in Russia are not very high. Even the highest value of 0.60, which was recorded for the Republic of Kalmykia is significantly lower than the maximum possible value of two. These results are consistent with the results of Marelli (2007).

Conclusion

The paper presents the results of analyses of the current levels of sectoral concentration and regional specialisation for SMEs using data on employment. The paper shows that the highest level of sectoral concentration is observed for fishing and fish farming industry. Significant concentrations are also seen among the SMEs engaged in mining, quarrying and agriculture. The sectoral concentration of SMEs in the sectors associated with commodity production is significantly higher than that of services. The lowest levels of sectoral concentration are found for SMEs engaged in trade.

The index values of the regional specialisation of SMEs are relatively small, as the sectoral structure of SMEs in most regions does not significantly differ from the average sectoral structure in Russia. This conclusion does not apply to regions with good climatic conditions, where agriculture is developed (the Republic of Ingushetia, Republic of Dagestan, Chechen Republic, Republic of Kalmykia, Republic of

Altai). There are relatively high KDIS in these regions. In addition, there is relatively high KDIS in the megapolis of Moscow where real estate SMEs are widely distributed.

The results of this study can be used to identify potential opportunities to increase SME participation and SME employment in particular regions and economic sectors in Russia. The findings can be useful for policymakers in devising policies to support small business development in various regions of Russia and different industry sectors. Policymakers should especially focus on development efforts in those sectors and regions where SMEs have not received sufficient advancement. Given the important role of SMEs in the Russian economy, the results of the study can help local government in allocating resources to specific regions and sectors within those regions. From a methodological perspective, this study demonstrates that Krugman Indexes of concentration and specialisation can be used to analyse SME activity in regions and types of economic activity.

The main limitation of this study is the use of the number of employees in SMEs to determine the sectoral concentration and regional specialisation. Future research could use the number of SMEs, the volume of production in SMEs, the value of investments on SMEs or cost of fixed assets of SMEs as proxies. Researchers could also study the change in concentration and specialisation of SME longitudinally.

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