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Innovation development and the emergence of fast-growing companies in Russian regions

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1. Analysis of the sectoral distribution of fast-growing companies

In this paper to determine the "gazelles" we use widely spread approach of Eurostat and OECD. According to their approach "gazelles" are those enterprises that demonstrated an average annual revenue growth of more than 20% within three years. In order to determine "gazelles" of the number of fast-growing companies, Eurostat and OECD impose additional requirements – company should exist not less than 5 years. This additional condition is necessary to ensure that by the time of the measurement companies already have some level of revenue and did not start "from scratch", when the growth rate is often very high.

In this study, to obtain data on the company's revenue we used "SPARK" (System for Professional Analysis of Markets and Companies) database, which accumulates accounting data of Russian companies.

We initially selected general population of companies that consisted of legal entities with a volume of sales of 60 million rubles to 1 billion rubles in 2012. This limitation arose from the fact that according to the Russian legislation, to small-sized and medium-sized businesses refer legal entities that have revenues of 60 million to 1 billion rubles (revenues of small businesses are in the range of 60 million rubles 400 million rubles, revenues of medium-sized companies are varying from 400 million rubles to 1 billion rubles). In domestic law, there is also an additional constraint on the number of employees in small and medium enterprises (small companies - up to 100 people in the middle-sized firms - up to 250 people), but in the database SPARK there is no relevant data, so this study was based on the revenue criteria as the most universal.

Guided by international approach of OECD-EU, we selected from companies registered no later than 2008 (the requirement of a five-year term of operation). This is due to the fact that the most recent data available on the company's revenue in the database at the time of our study (January-July 2013) were for 2012.

Further, from the number of companies older than 5 years we selected those organizations that over the past three years grew at an average annual rate of 20% per year in real terms. To do this, primary data on the companies' revenues for the 2007-2012 period were expressed in constant 2007 prices in order to exclude inflationary growth. To adjust for inflation we used industry price indices (published by Russian statistical bureau for NACE A-F sections) or data on the consumer price index (for NACE sections G-Q, for which there are no separate published price indices).

After that we calculated real geometrical-average growth rates (GAGR) of companies' revenues during the three years according to the formula 1:

$$R_{i,2009-2012} = \left(\sqrt[3]{\frac{\widetilde{TR}_{i,2012}}{\widetilde{TR}_{i,2008}}} - 1 \right) \quad (\text{Formula 1}),$$

where:

- $R_{i,2009-2012}$ – real geometrical-mean growth rate for company i during 2009-2012 years;
- $\widetilde{TR}_{i,2012}$ – revenue of company i in 2012, expressed in prices of 2007 year;
- $\widetilde{TR}_{i,2008}$ – revenue of company i in 2008, expressed in prices of 2007 year.

Thus, from the list of companies registered not earlier than five years ago, within each industry were selected "gazelles" whose average real growth rate of revenue were at least 20% ($R_{i,2009-2012} \geq 0.2$). Table 1 shows the absolute number of Russian "gazelles" and their share in the total number of companies in within different industries.

TABLE 1

Share of Russian "gazelles" within different industries of national economy

№	Industries	Number of "gazelles"	Share of "gazelles" in the total number of industry's firms
1	Manufacturing	3181	20%
2	Construction	3175	26%
3	Real estate, renting and business activities	2066	16%
4	Wholesale and retail trade	1716	29%
5	Transport and communications	1203	19%
6	Agriculture, hunting and forestry	733	17%
7	Financial activities	358	23%
8	Other services	338	14%
9	Production and distribution of electricity, gas and water	293	13%
10	Mining and quarrying	222	20%
11	Hotels and restaurants	175	14%
12	Fishing, fish farming	29	13%
	TOTAL	13 489	20%

Source: constructed by authors on the basis of SPARK data.

Noteworthy is the fact that on average during the period 2009-2012 years about 20% of domestic small and medium-sized businesses were fast growing "gazelle" companies, in other

words they had real revenue growth of at least 20% and have been registered no later than 2008. The greatest number of "gazelles" operates in the manufacturing sector (over 3000 organizations), representing 20% of the total number of small and medium-sized businesses in this industry. Also, a significant number of "gazelles" can be observed in the construction industry (3000 companies) and in "Real estate, renting and business activities" (over 2000 organizations).

Leader in the share of growing companies is the wholesale and retail trade. This industry has about 30% of organizations which are characterized by real average annual revenue growth of at least 20% for the period from 2009 to 2012 and were created and more than five years ago. Further we considered in more detail the structure of "gazelles" in terms of regions and industries.

Analysis of the sectoral and regional distribution of "gazelles" uncovers the following conclusions. Construction is the leading field of activity in terms of creating opportunities for growth companies. Expansion of the construction market, what is happening in recent years, entailed not only the growth of companies in this sphere, but also created opportunities for the development of a number of related activities in other sectors, such as the extraction of gravel, sand and clay (mining), manufacture of concrete, plaster and cement (manufacturing) activities in the field of architecture, design and engineering, purchase and sale of land (real estate transactions, renting and business activities).

Distribution "gazelles" in different regions within industries also varies. For instance, fast-growing companies in manufacturing and construction industries most evenly distributed among the different regions of the Russian Federation (decile ratios are 109 and 133 respectively). Average degree of differentiation of number of "gazelles" is typical for such areas, as transport and communications (decile is 306), agriculture (decile coefficient equal to 469) and real estate operations (decile coefficient equal to 280). The high degree of concentration of fast-growing companies in the Russian regions we observed in trade and repair (decile coefficient is more than 1000 times), as well as in financial performance, communal areas, mining, hotel and restaurant business, fisheries and other services (decile coefficient tends to infinity). More than half of fast-growing companies operating in the financial sector (54%) and other activities (52%) are concentrated in Moscow, Moscow region and St. Petersburg. Most growing companies engaged in activities related to fisheries are concentrated in the coastal areas of Russia - Murmansk, Sakhalin regions, Khabarovsk Krai and the Republic of Karelia, where located 55% of the companies, "gazelles" of the industry.

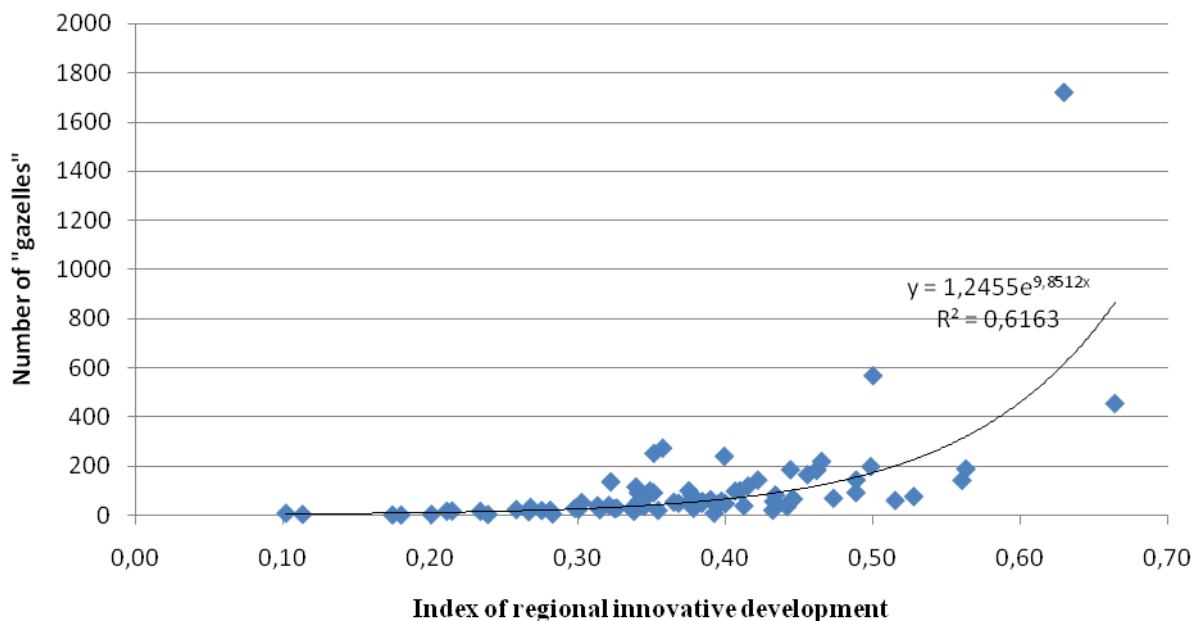
While in terms of the share of "gazelles" the leading sphere is trade, by the percentage of "super-gazelles" (average annual growth in revenue is not less than 100% during 2010 - 2012 years) leading sphere is the finances (about 9%) and the construction business (about 6%). On average in these areas about 4% of the companies were "super-gazelles". In this case, the lowest proportion of "super-gazelles" observed is in fishing (1.4%) and agriculture (2.1%).

2. Analysis of the regional distribution of fast-growing companies

Number of fast-growing companies can be associated with access to key resources - financial, intellectual etc., as well as with the general characteristics of the institutional environment. Almost all of these parameters are reflected in the index of innovative development of the regions. In this study we use the Rating of innovative regions of Russia for the purposes of monitoring and control (version 2013-2.0), developed by the Association of Innovative Regions of Russia (AIRR) and used by the Ministry of Economic Development of Russia to map the distribution of innovative capacity in the country. Figure 1 presents data on innovative development and number of "gazelles" in the Russian regions.

FIGURE 1

Index of regional innovative development and the number of "gazelles" in Russian regions



Source: authors' calculations based on SPARK and AIRR data

Nature of the distribution of data points in Figure 1 indicates the existence of a positive relationship between the number of "gazelles" and the level of innovation development in the region. We found that an exponential function has decent quality of approximation of this relationship (value reliability of this model is 62%) of the form (approximately):

$$y = 1,3e^{10x} \text{ (Formula 2),}$$

where y - is the number of "gazelles" in the region, and x - index of regional innovative development. Since x ranges from zero to one, then the average level of innovative development of the region (the index value is 0.37) should correspond to the number of "gazelles" approximately equal to the result of formula 2: $1.3 * 2,723,7$, which is 52.7. An example of an "average" region in terms of innovative development is the Kirov region (innovative development

index is 0.37), in which the authors have identified 49 "gazelles". Thus, the constructed model has good predictive power.

We were also interested in investigating what components of the index of regional innovative development have close correlation with the number of "gazelles" in the region. Table 2 reflects the correlation coefficients between the components of the index and the number of "gazelles" in the region.

TABLE 2

Correlations between indicators of regional innovative development index and the number of “gazelles” in regions

№	INDICATORS	CORRELATION
	PART I. R&D PERFORMANCE	0.54
I-1	Number of university and colleague students per 10 thousand population	0.45
I-2	Number of researches per 10 thousand population	0.59
I-3	Share of employees with higher education as a percentage of population at the working age	0.55
I-4	Number of PCT-applications per 1 mln. economically active population	0.56
I-5	Number of national patent application per 1 mln. economically active population	0.52
I-6	Number of articles published in journals included into the Web of Science base per number of researchers	0.03
I-7	Number of articles published in journals included into the Russian index for scientific quotation base per number of researchers	-0.21
I-8	Intramural R&D expenditures per regional GDP	0.39
I-9	Share of entrepreneurial intramural R&D expenditures	0.14
	PART II. INNOVATION ACTIVITY	0.43
II-1	Share of LME’s implementing technological innovations*	0.17
II-2	Share of LME’s implementing organizational and marketing innovations*	0.21
II-3	Share of small enterprises implementing technological innovations	0.16
II-4	Share of innovative production in LME’s output*	0.24
II-5	Share of new or significantly technological improved products in total output of LME’s*	0.32
II-6	Number of implemented inventions per population	0.35
II-7	Technology export revenues per regional GDP	0.33
II-8	Number of created advanced technologies per economically active population	0.26
II-9	LME’s expenditures on technological innovations per output	0.31
	PART III. SOCIAL AND ECONOMIC CONDITIONS FOR INNOVATIONS	0.30

III-1	Regional budget contribution in financing LME's expenditures on technological innovations*	0.06
III-2	Regional GDP per employee (excluding mining industries)	0.44
III-3	Share of high-tech and medium high-tech employment	0.09
III-4	Share of high-tech and medium high-tech output per regional industrial output (excluding mining industries)	0.04
III-5	Proportions of firms that use Internet	0.24
	REGIONAL INNOVATIVE DEVELOPMENT INDEX	0.52

Note: * LME is abbreviation for large and medium sized companies. Usage of data for LMEs is justified by the peculiarities of Russian innovation statistics which provides more detailed information about innovation performance of large and medium sized enterprises and lacks of sufficient information about small companies.

Source: authors calculations based on SPARK and AIRR data

The closest connection between the number of "gazelles" and indicators that reflects the development of research and development in the region (correlation coefficient is 0.54). Among all considered in Table 2 indicators number of "gazelles" most strongly correlates with the following variables:

- the number of researches per 10 thousand population (correlation coefficient is 0.59);
- the number of PCT-applications per 1 mln. economically active population (correlation is 0.56);
- the share of employees with higher education as a percentage of population at the working age (0.55);
- the number of national patent application per 1 mln. economically active population (0.52).

The above indicators characterize the size and quality of human capital in the region. Thus, the shares of researchers and the proportion of employed persons with higher education reflect the high quality of human resources in the region. The numbers of international and domestic patent applications reflect the impact of the activities of researchers, and hence the quality of their work effort. These results prove that the quality of human resources in the region is essential for the formation of "gazelles".

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