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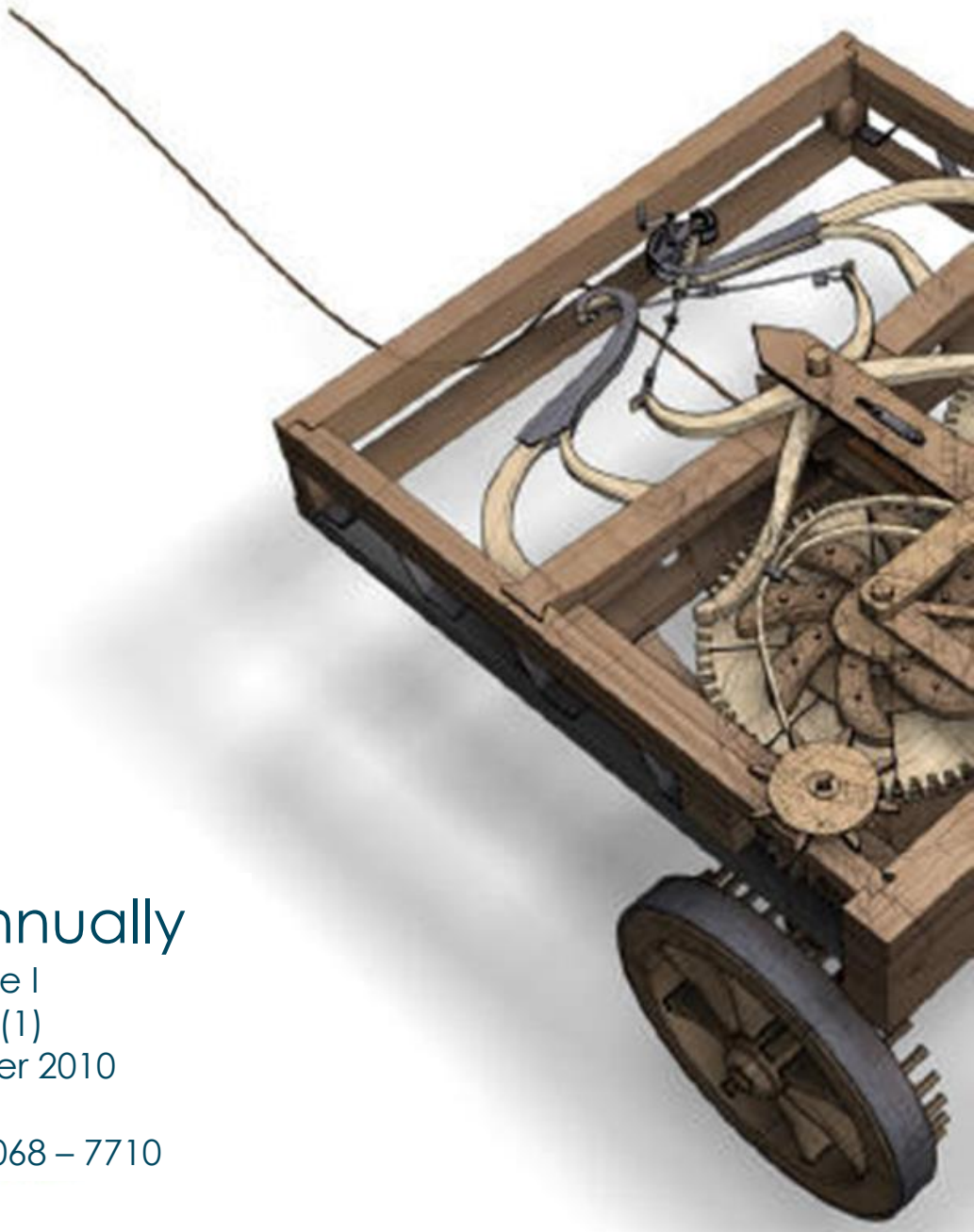

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DEFRAGMENTATION OF ECONOMIC GROWTH WITH A FOCUS ON DIVERSIFICATION: EVIDENCE FROM RUSSIAN ECONOMY[14]

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Abstract:

In this paper, we develop a comprehensive analysis of diversification issues for Russian economy. Assessing diversification for nine different variables, we show that choice of a variable affects the result much, and that, unlike a popular opinion, equiproportional economic diversity measures are still useful in economic analysis. Developing a simple defragmentation of economic growth, we account for labor productivity and labor availability separately, and show that these components depend on different factors. We discover some factors that are rarely studied. We argue that they can become a hard constraint for long-term economic growth.

JEL Classification: O18, O49, R11, R12, R15.

1. Introduction

Many years have passed since *Solow* (1956) introduced his influential model, which has become a starting point in modern theory of economic growth. Since then, theory of economic growth has improved much. Aghion, and Durlauf (2009) describe the evolution of this theory in the latest years, discussing the contributions of Lucas (1988), Romer (1986, 1990), Aghion, and Howitt (1992, 1998, 2006).[15] Aghion (2009) surveys recent attempts at examining the impact of education on economic growth.

Recent research studies the interrelationship between institutional quality and economic growth are: Barro (1996) shows that property rights and free markets affect growth much more than democracy. Acemoglu, Johnson, and Robinson (2001, 2004) consider that institutional quality is the fundamental driver of long-term economic growth. Glaeser, La Porta, Lopez de Silanes, and Shleifer (2004) disagree.[16]

Sachs, and Warner (1995, 1999 and 2001) find evidence that economic growth is negatively correlated with resource abundance. According to the commonly shared opinion, institutional quality is the main transmission channel. For details, see Gylfason (2001), Mehlum, Moene, and Torvick (2005), and Papyrakis, and Gerlagh (2004).

At the same time, there is various literature concerning cross-country growth regressions. The pioneers in these are Barro (1991, 1996), and Mankiw, Romer, and Weil (1992). Since then, as shown by Durlauf, and Quah (1999), more than ninety potential growth determinants have been proposed throughout the literature. Choosing the variables to be included in the analysis has become a real challenge.[17] Brock, and Durlauf (2000) therefore propose a methodology to account for model uncertainty in growth empirics.

We are also concerned with the fact that the evolution of economic growth theory brings us to disintegration, isolation of each theory. It is sometimes due to certain difficulties in defining the subject of the analysis. Desired economic outcomes can be defined in different ways, and can include, apart from growth, social and ecological parameters. The optimal development strategy in this case often depends on theoretical preferences. For instance, Lin (2010) compares "new" and "old" structural economics and shows that there are more differences than similarities in these two structural approaches. The former recommends changes

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[14] The views expressed in the article are those of the author and do not necessarily reflect the position of Center for Macroeconomic Analysis and Short-Term Forecasting or Institute of Economic Forecasting, RAS. Author's contact e-mail is the following: agni.research@gmail.com.

[15] Romer (1986), and Lucas (1988) propose a model of growth driven by technological knowledge and human capital. Romer (1990) introduces the product-variety paradigm (variety of products matters, not their improvement). Aghion, and Howitt (1992, 1998) argue that quality-improving innovations are at the heart of economic growth.

[16] "Our evidence suggests in contrast that the Lipset-Przeworski-Barro view of the world is more accurate: countries that emerge from poverty accumulate human and physical capital under dictatorships, and then, once they become richer, are increasingly likely to improve their institutions." (p. 27)

[17] Brock, and Durlauf (2000) explain: "This problem occurs because growth theories are open-ended. By open-endness, we refer to the idea that the validity of one causal theory of growth does not imply the falsity of another." (p. 6)

consistent with comparative advantages of a country (i.e., strictly accounts for economy's factor endowments), and the latter advocates developing advanced capital-intensive industries (i.e., considers advanced economies' structure as a standard).

Economic growth can be export-driven as well. Here, competitive advantages of a country in production of certain goods are crucial to be examined, since specialization historically origins from cross-country comparison. Note that, according to Rodrick (2009), export-driven economic growth is in fact driven by competitive advantages. The ability to produce goods that are useful for other countries stimulates exports, not vice versa.[18]

Gorodnichenko, Mendoza, and Tesar (2009) study the impact of trade on economic growth. They find evidence that the deep economic downturn in Finland in 1991-1993 (Finland's Great Depression) was triggered by the collapse of Finnish trade with the Soviet Union. Besides, they provide an interesting comparison between Finland's downturn and the downturn in transition economies of Eastern Europe. They find that Finland's macroeconomic dynamics during Great Depression mirrors those of the transition economies of Eastern Europe, though Finland did not face large institutional transformations.[19]

Hasan, and Toda (2004) describe the methodology used to measure export diversification. They calculate five export diversity measures for Bangladesh, Nepal and Malaysia. Additionally, they study an interesting empirical distinction between horizontal and vertical diversification.[20]

Wagner (2000), and Raj Sharma (2008) provide an extensive literature review on measuring diversification. Wagner (2000) introduces a classification of diversity measures, dividing them in four broad groups. Raj Sharma (2008) calculates two diversity indices for the US states for 1990, 2000 and 2006, and estimates their impact on economic stability.[21] He describes the shift-share analysis methodology and provides a cluster analysis for Hawaii. Smith, and Gibson (1988) show that indiscriminate diversification does not necessarily foster economic growth or stability.

Wagner (2000) describes a trade-off between specialization and diversification. The former is associated with economic growth, and the latter is associated with economic stability. Wagner (2000) considers that it is quite a difficult task to success in both stimulating economic growth and maintaining stability, since specialization and diversification are almost opposite measures.

In this paper, we revise theoretical and empirical research on economic diversification, and discuss what diversity measures should be applied to analyze modern Russian economy. Regional economic development is at the top of our attention: we find evidence that industrial diversification of a region's economy impacts its economic development.

It's not a common thing to examine an impact of diversification on economic growth, since there is no a diversity measure commonly accepted as best. Two problems are worth considering. The first is the absence of agreement on a standard of perfect diversity. The second is diversity indices' dependence on aggregation level (the number of industries included in diversity indices' calculations). Additionally, Raj Sharma (2008) shows that the main factor impacting diversity indices seems to be a region's economy size (in terms of GRP).[22]

To measure economic diversity, one should choose a standard of perfect diversity. National economy is usually considered as a standard for a region's economy[23] (a standard is also called a reference economy, or a base economy). However, it is a challenge to choose such a standard for national economy. Another problem

[18] It is true while we talk about long-term economic development. Of course, a drop in export taxes would cause an increase in production. However, this effect is substantially lower while considering long periods of time.

[19] "The trade shocks we observe in the data could lead to economic downturns in standard theoretical multi-sector models which are remarkably close to the size of downturns we observe in transition economies. This important finding suggests that alternative explanations such as institutional transformations could have had a smaller effect than thought before." (p. 28)

[20] They find that low-income countries need to develop vertical diversification first (that is, to create new innovative commodities). In the long-run, however, they have to stimulate horizontal diversification as well (that is, to alter the primary export mix). Thus they eliminate the volatility of global commodity prices (for details, see p. 54).

[21] An impact of diversity on economic stability was found to be insignificant. However, Kort (1981), Simon (1988), Izraeli, and Murphy (2003), and Trendle, and Shorney (2003) argue that industrial diversity reduces unemployment. Following the earlier work of Simon (1988), Mizuno, Mizutani, and Nakayama (2006) found evidence that diversity and economic stability are correlated positively (in Japanese economy), but diversity appears to be only one of many factors impacting unemployment instability. However, adding other variables makes the industrial diversity factor insignificant. In general, there is no theoretical consonance on the role of diversification.

[22] The impact of a region's economy size on diversity is positive. Although Russia is considered to be exposed to the resource curse (Luong, and Weinthal 2001, Ahrend 2005), for Russia this also holds true (see FIGURE I, FIGURE II).

[23] Of course, if a researcher is not satisfied by equiproportional diversity measures.

appears when one tries to reveal competitive advantages of a region in production of certain goods. The knowledge on a region's competitive advantages is incomplete, as it is quite hard to account for a region's trade with other countries and other regions of national economy.[24]

The paper is organized as follows. In Section II, we provide a brief guide on methodology and describe the data. In Section III, we discuss the literature on measuring diversification and calculate diversity indices for regions of Russian economy. In Section IV, we develop a simple defragmentation of economic growth. Then we analyze the impact of diversification on GRP per capita through labor productivity, using simple econometric techniques. Section V concludes.

2. Data and Methodology

Analyzing Russian economic development looks like a challenge. Frequent methodological changes in official statistical procedures make it hard to build long time-series.[25] In OKVED, the data[26] on shipment by industry is available only from 2005. The data on employment by industry is available from 1998, and the data on Gross Regional Product (GRP) by industry is available only from 2004.[27] To realize the dynamic incomparability of data, just look at FIGURE III.

Due to statistical difficulties outlined above, we do not estimate time series. We build cross section equations, documenting spatial distribution of various characteristics among regions. So, testing the data on unit root would be useless. However, to control for robustness of our results, we estimate the characteristics separately for every year from sample period (2006-2009).

We understand that the sample period outlined is rather geterogenous, and that it has to be divided into three sub-periods at least: 2006-2007 (rapid economic growth in Russia), 2008 (the beginning of economic crisis in Russia – it stroke in August-September 2008) and 2009 (crisis is in full strength). That's why it would be wise to analyze data for each year separately.[28]

There is a critical difference between standard conditions in which one analyzes economic diversification and those conditions that are in Russian economy. Most analysts focus on long-term period while studying diversification process. The data for the latest fifteen, twenty or more years is usually analyzed.[29] In Russia, despite a significant increase in the role of long-term forecasts for official decision-making, it is obviously impossible to forecast long-term economic growth, since there are simply no long-term data sets.

We specially treat a problem of choosing an industry aggregation level. The main difficulty is diversity indices' dependence on the number of industries in the sample. Diversity indices' sensitivity to the level of aggregation is calculated in the next Section.

To calculate diversity indices, we use variables from TABLE I with two-letter aggregation level, except wages and profits. So, we calculate diversity indices for nine different variables.

In our econometric analysis, we use three groups of variables: economic size indicators (TABLE I), economic effectiveness indicators (TABLE II), and social and institutional indicators (TABLE III).[30] Note that regression analysis considers only regional economic development.

[24] As mentioned by Artemyeva *et al.* (2010), a sound statistics on cross-regional trade in Russia is missed.

[25] In 2005, the Federal State Statistics Service (Russian official statistical board, also called Rosstat) introduced All-Russian Classification of Economic Activities (OKVED), instead of All-Union Classification of National Economy Industries (OKONH). OKVED is harmonized with Statistical Classification of Economic Activities in the European Community (NACE Rev. 1).

[26] The majority of data that we use in our analysis goes from the Central Statistical Database of Rosstat. It is worth noticing that Rosstat has significantly improved the availability and transparency of statistical services recently.

Henceforth, if no additional reference is provided, assume that we use the following source: *The Central Statistical Database of Rosstat* http://www.gks.ru/dbscripts/Cbsd/DBInet.cgi#1

[27] Moreover, the level of aggregation is quite low (one-letter): manufacturing do not disintegrate into sub-industries.

[28] However, we are not able to estimate econometric equations for 2009 due to the lack of data.

[29] Raj Sharma (2008) calculates diversity indices for 1990-2006, Hasan, and Toda (2004) – for 1975-2000.

[30] Classification is explained in details in Section IV, where a simple model for our analysis is presented.

3. Measuring Diversification

In this Section, we briefly discuss the literature on measuring diversification and calculate diversity indices for regions of Russian economy. Considering the aggregation level problem is of a particular interest for us.

Various ways to assess the level of diversification are described in the literature. Note that diversification is usually measured for a region, not for the national economy. Though, the same formulas could be used to assess the level of diversification in the national economy. Wagner (2000), and Raj Sharma (2008) provide a good review of diversity measures.

We follow the logics of Wagner (2000), who classified diversity measures into four groups: equiproportional, type of industries, portfolio, and input-output.

Equiproportional measures are traditional measures of economic diversity:

$$Entropy_j = \sum_{i=1}^{N} S_{ij} \ln\left(\frac{1}{S_{ij}}\right) = -\sum_{i=1}^{N} S_{ij} \ln\left(S_{ij}\right), \quad (1)$$

$$Herfindahl_j = \sum_{i=1}^{N} S_{ij}^2, \quad (2)$$

$$NAI_j = \sum_{i=1}^{N} \frac{\left(S_{ij} - S_j\right)^2}{S_j},^{31} \quad (3)$$

where:

- j – Region;
- i – Industry;
- N – Number of industries;
- S_{ij} – Industry's share of a region's economic activity;[32]
- S_j – Industry's share of economic activity in national economy.

Wagner (2000) criticizes this approach, since a standard of perfect diversification in these measures is equiproportional distribution. He finds several theoretical and empirical concerns on equiproportional diversity measures in the literature (see TABLE IV, TABLE V).

Wagner (2000) names several types of industry measures, but the most interesting for us is location quotient, as it is used to assess specialization and to calculate Hachman index:

$$LQ_{ij} = \frac{S_{ij}}{S_i}. \quad (4)$$

Raj Sharma (2008) describes Hachman index, which is very close to the NAI:

$$Hachman = \frac{1}{\sum_{i=1}^{N}\left[\left(S_{ij} \middle/ S_i\right) \times S_{ij}\right]} = \frac{1}{\sum_{i=1}^{N}\left[LQ_{ij} \times S_{ij}\right]}. \quad (5)$$

He also discusses dynamic shift-share analysis:

$$CHANGE = \sum_{i=1}^{N} E_i^{Reg} \cdot g^{US} + \sum_{i-1}^{N} E_i^{Reg}\left(g_i^{US} - g^{US}\right) + \sum_{i-1}^{N} E_i^{Reg}\left(g_i^{Reg} - g_i^{US}\right), \quad (6)$$

where:

- E_i^{Reg} – Labor force in an industry i in a region's economy (base year);

[31] NAI stands for "National averages index".

[32] Economic activity is a term to unite different variables of interest, such as employment, production, value added.

- g^{US} – Average pace of economic growth in national economy;
- g_i^{US} – Average pace of growth in industry i in national economy;
- g_i^{Reg} – Average pace of growth in industry i in a region's economy;
- $\sum_{i=1}^{N} E_i^{Reg} \cdot g^{US}$ – National growth effect;
- $\sum_{i-1}^{N} E_i^{Reg} \left(g_i^{US} - g^{US} \right)$ – Industrial mix effect;
- $\sum_{i-1}^{N} E_i^{Reg} \left(g_i^{Reg} - g_i^{US} \right)$ – Competitive share effect.[33]

We do not calculate portfolio diversity measure and an input-output diversity measure. It is shown in the literature that portfolio diversity measure does not assess diversification separately from stability.[34] So, it isn't accurate to consider it a factor of economic stability. However, unlike the majority of researchers, we are interested in the impact of economic diversity on economic growth, not on stability. Unfortunately, this is hard to estimate too, as we do not have long-term time series to calculate correlation.[35]

Input-output matrices, unfortunately, are not available for Russian economy since 2005.[36] These severe statistical limitations make it impossible to calculate this measure.

Apart from these measures, we also apply Variation coefficient which is commonly used to measure variation of a variable, and a simple version of Robin Hood index (or Hoover index), which stands for the value of the variable of interest needed to be redistributed in order to get an equiproportional distribution:

$$Variation_j = \frac{\sigma_j}{S_{ij}^{AVER}}, \tag{7}$$

$$Hoover_j = \frac{\sum_{i=1}^{N} E_i - E^{AVER}}{2}, \tag{8}$$

where:

- σ_j – Standard deviation of variable of interest in region j;
- S_{ij}^{AVER} – Average value of variable of interest in region j;
- E_i – Economic activity in industry i and region j;
- E^{AVER} – Average level of economic activity in region j.

To assess a region's diversity index sensitivity to the level of aggregation, we calculate the listed measures in four different levels of aggregation and nine different variables of interest.

Variables of interest are listed in TABLE I (two-letter aggregation level, except wages and profits). Levels of aggregation are the following:[37]

- One-letter industries; full range;

[33] Combined with location quotient (LQ), competitive share effect (CSE) is used for cluster analysis.

[34] See, for example, Sherwood-Call (1990), and Raj Sharma (2008).

[35] As Wagner, and Lau (1971) show, diversification reduces risk considerably only at the first stage of diversifying a portfolio. If two assets are perfectly correlated, diversification would not bring any gains. So, the more the number of assets is, the less benefits an additional increase in diversification will bring. Consequently, if we could calculate correlation indices between variable X in industry A and variable X in industry B, we would be able to use them as weights to assess diversification in terms of its benefits for stability.

[36] Rosstat will revive the publications only in 2015, according to the message at the official site.

[37] To be precise, we shouldn't name each of these four variants an aggregation level. In fact, only two first variants are aggregation levels, since in third and fourth variant number of industries is cut. However, it's convenient to name all these with a one word, as we want to vary the list of industries too.

- Two-letter industries; full range;
- Two-letter industries; agriculture, fishing, mining, manufacturing and energy;[38]
- Two-letter industries; mining, manufacturing and energy.

The procedure is as follows. First, we calculate diversity measures for all four levels of aggregation for nine variables. Then we estimate sensitivity to changes in aggregation levels and sensitivity to changes in indicator type.[39]

We rank Russian regions by the level of diversification[40] and look at the variation of these ranks by every diversity measure (for results, navigate to TABLE VI). We find no evidence that equiproportional diversity measures perform worse. Even more, we show that equiproportional diversity measures are still useful in economic analysis. Variation coefficient, Entropy index and Hoover index, which are all equiproportional measures, proved to be the most stable.

Hasan, and Toda (2004) provide a good review of export diversity measures. However, this review describes many measures that are used to assess diversification in employment or value added as well. And this is not surprising, as diversification is a solid concept. Of course, there are some special measures in this review, but they are useful considering long periods of time.[41]

4. Growth Issues

We start with building a cross-indicator portrait for every region by documenting a set of important characteristics in a radar chart. This proves to be a powerful and simple technique to identify major issues at a glance.

Russia is divided into seven Federal Districts. We present radar charts in a separate figure for each district.[42] For results, see APPENDIX I. For notation of the variables, see TABLES I–III.

Then we provide the analysis of industrial specialization in Russian regions. We slightly modify the methodology applied by Raj Sharma (2008). We also calculate LQ and CSE for each region, but we facilitate constraints on CSE due to crisis effects.[43] Cross-specialization matrices by industry and region are presented in APPENDIX II.[44]

Then we develop a small and very simple defragmentation of economic growth (in a static version). In mathematics, it is often necessary to reformulate the problem in order to solve it. We do the same in quite a

[38] Here, we exclude services, such as construction, wholesale and retail trade, hotels and restaurants, transport and warehousing, finance and insurance, real estate, scientific research, educational services, health care and so on. Thus we try to assess diversification in the real sector of economy. The problem here is correlation between services and manufacturing – for example, between construction and manufacturing of construction materials. Moreover, some advanced statistics is available only for manufacturing (for instance, some surveys concerning expectations). Third, services are mostly non-tradable. However, the role of services in export diversification has been emphasized in some recent research. See, for example, Brenton, Newfarmer, and Walkenhorst (2009) to learn that tourism can be useful in understanding tastes of people from other countries (thus it enhances competitiveness).

[39] Usually, employment is used as the variable of interest, since data on employment is published earlier than other data, and since employment is measured in physical volumes, not in dollars. However, it is doubtful that there is an objective need to deflate Gross Regional Product or shipment, as we have a diversity index as a result. If we don't deflate such variables, we assess diversification of income, in fact. If we do deflate them, we assess diversification of production, but we do not account for changes in quality of products (quality is usually assessed through prices).

To get an example of sensitivity analysis, look at FIGURE IV. For every region, we construct a 9x4 table and use it to calculate an average rank (in the table, nine indicators and four levels of aggregation are listed). We build the table for every indicator type (six indicator types are available).

[40] The ranking is presented in TABLE VII.

[41] Measuring export diversification is a potential area of interest for us, as we state in Section V, but this is coupled with a set of difficulties, since classifications for exports and production are not harmonized, and since this requires accounting for many additional variables.

[42] As an example of how useful this technique could be, we also compare Moscow City and Moscow Oblast.

[43] Standard constraints do not consider an industry a growing base industry if an average location quotient (LQ) is less than one or an average growth pace of competitive share effect (CSE) is less than zero. We slightly modify the methodology due to crisis effects and admit that, for a growing base industry, an average LQ and an average growth pace of CSE during 2006-2009 for employment and 2006-2008 for other variables plus their maximum value for the same period should be more than one or zero, respectively. Why is this necessary? If there is a sharp crisis drop in industry A in 2009, but in 2006-2008 this industry followed a good growth pass, an analyst applying standard approach can exclude this industry from the list of perspective ones, though it is may be not so wise.

[44] To explore several example four-quadrant graphs, look at Figures B.1–B.6 in APPENDIX II.

simple way, with our first equation looking obvious and thus even a bit confusing. We even do not account for capital at this stage of our analysis.[45] We start with the following equation:

$$Y = L \times p\,, \tag{9}$$

where:

- Y – Value added or production;
- L – Employment;
- p – Labor productivity (value added or production divided by employment).

Then we rewrite equation (9) in the following ways:

$$y = l \times p = e \times f \times p\,, \tag{10}$$

$$\ln\left(\frac{y_t}{y_{t-1}}\right) = \ln\left(\frac{l_t}{l_{t-1}}\right) + \ln\left(\frac{p_t}{p_{t-1}}\right) = \ln\left(\frac{e_t}{e_{t-1}}\right) + \ln\left(\frac{f_t}{f_{t-1}}\right) + \ln\left(\frac{p_t}{p_{t-1}}\right),[46] \tag{11}$$

where:

- y – Value added or production per unit of population (not labor force);
- l – Employment per unit of population (fraction of population working);
- e – Employment per unit of labor force;
- f – Labor force per unit of population.

Equation (10) is a simple defragmentation of GRP per capita, and equation (11) is a simple defragmentation of economic growth. Labor productivity is a component that accounts mainly for pure economic effects.[47] Labor availability (fraction of population working) consists of two indicators: labor force per unit of population (demographic effects), and employment per unit of labor force (household's economic behavior). However, we treat it as a solid indicator, as labor force can be potentially extended by retired people: if market conditions are favorable, many of them are likely to start working hard again. So, demographic factors do not necessarily reflect economic incentives.

We tested the dependence of these components on different variables available, estimating econometric equations for each year separately. The results[48] are clustered in TABLES VIII–X.

Several things are worth noticing here. First, we found an evidence of an educational drain in Russian economy (TABLE IX). By educational drain, we mean negative effects of education on labor productivity. We interpret this using the work of Jones (2010), who showed that education takes a lot of time and efforts, and thus reduces the amounts of scientific research.[49] Education is also competing with companies for providing occupation for most effective people.

Second, we calculate an impact of each factor on model values of labor productivity and labor availability.[50] Foreign direct investment is an interesting variable from this perspective, as it has a great dispersion

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[45] The reasons to start with equation (9) are the following: 1) We do not have long-term series for Russian industrial structure; 2) We try to separate pure economic effects from social and institutional determinants.

[46] It is quite obvious that the weights are the following:

$$\chi = \frac{l_{t-1}}{l_{t-1} + p_{t-1}}\,,\ \chi_1 = \frac{e_{t-1}}{e_{t-1} + f_{t-1} + p_{t-1}}\,,\ \chi_2 = \frac{f_{t-1}}{e_{t-1} + f_{t-1} + p_{t-1}}\,,\ \varphi = \frac{p_{t-1}}{l_{t-1} + p_{t-1}}\,.$$

[47] Of course, it is not exactly so. Investment, no doubt, depends on some institutional characteristics of the economy. In their recent study, Caselli, and Feyrer (2007) argued: "Developing countries are not starved of capital because of credit-market frictions. Rather, the proximate causes of low capital-labor ratios in developing countries are that these countries have low levels of complementary factors, they are inefficient users of such factors." (p. 565-566). So, investment covers some factors that couldn't be measured directly.

[48] We use simple OLS in our econometric analysis and estimate cross sections due to data restrictions.

[49] He states: "As foundational knowledge expands, innovators may naturally extend their training phases, resulting in a delayed start to the active innovative career. Such a delay may be particularly consequential if raw innovative potential is greatest when young." (p. 5)

[50] The methodology is simple. For each data point (i.e., for each region), we sum the absolute values of coefficients multiplied by the absolute values of independent variables, and add the absolute value of an intercept. This sum is the full

of impact: for one region, it can account for 50-70% of the result, and for the other region it cannot account less than for 10%. A region's diversity rank has a strong and stable impact on labor productivity.[51] The share of households' income from property proved to be a very strong variable. It is a good proxy for institutional characteristics of a region. And two variables – the share of investment in fixed capital financed by loans and the share of students in population – have a negative impact. The latter was discussed above, and the former, we admit, is connected with financial stability of an enterprise.

Third, we failed to build such a strong equation for labor productivity as we managed to for labor availability (TABLE X). The only variable that is significant for both dependent variables is the share of households' income from property (but it is a minor variable here). The availability of pre-school centers and the fraction of children studying dominate in the equation. It is easy to interpret this result, as parents who have to sit with their children at home due to the absence of a pre-school center work much less or completely refuse to work. Another variable – the average propensity to consume – has a negative impact on labor availability. This is not striking, since consumption takes time, and since there are fewer incentives to work if you already can afford yourself a good consumption level.

It's also interesting to look at short-term tendencies. First, the impact of FDI improves fast during latest years, and the share of households' income from property does the same. Second, the impact of diversification is declining, but it is the strongest variable for every year in sample. It is difficult to identify some other tendencies, as the period is very short.[52]

So, our results show that decomposing economic growth into several dependent variables is a useful approach. It can shed some light on consumption, technological and institutional effects (if to treat average propensity to consume as reflecting behavior of a household, diversification as a technological phenomenon, and income from property as a proxy for institutions).[53]

Regretfully, there is the lack of time series on many variables considered here. So, we can't estimate economic growth directly. We can only build cross sections and look at the stability of our results. In fact, we decompose GRP per capita, but it is not tricky to decompose economic growth if the data is present. In years, the research potential of our approach is going to improve.

5. A Simple Computational Example

In this Section, we build a simple computational model to explore important effects that are lying behind the regression results.[54] Suppose that an individual during one period can only work or look after his child. For simplicity, each individual has one child. Wage of an individual is exogenously determined over the periods: the first individual is the poorest (with the wage of only 10 coins), the second individual obtain 30 coins, the third – 50 coins, and so on. The last has an enormous wage – 190 coins. There are only ten individuals in the economy, with the average wage of 100 coins.

There are only ten kindergartens in the economy in the first period. After a child is placed in a kindergarten, it becomes overloaded, and no any child can be placed in this kindergarten in the same period. In the next period, individuals make the same choice again. Note that individual always want to place his child in a kindergarten. In the first period, all children are placed there, since there are ten kindergartens in the economy. However, in the second period the number of kindergartens decreases to nine, in the third period – to eight, in the fourth period – to seven. This number holds constant then, up to the last (tenth) period. Nevertheless, some other

---

result. A ratio of the absolute value of each coefficient multiplied by the absolute value of the independent variable to the full result is an impact of each variable. To calculate aggregate impact for all regions, we apply a simple average.

[51] We tried seventy variants of diversity indices: combinations of nine different variables and six types of diversity indices, an average from different variables for each type of diversity indices, and an average from different types of diversity indices for each variable. We found that an aggregate diversity measure (a diversity ranking) performs very well, and few other variants can compete with it. So, we finally use diversity ranking as independent variable.

[52] However, our analysis provides a very stable result. Coefficients change slightly from year to year. We don't find evidence that there is a critical difference between years. May be, it is so due to the length of the period. But for us it is desirable to think that it is due to fundamental characteristics of our equations, which cover core incentives.

[53] Note that our analysis covers only short-term tendencies. Of course, education has strong lasting effects on labor productivity, but in a short-term it drains the resources. Average propensity to consume may have positive long-term effects, but in a short-term it reduces incentives to work. So, it is hard to draw serious policy implications from these findings, though an important result is showing that building social infrastructure, such as pre-school centers, is not a net loss. It can be considered as a perspective investment in economic growth.

[54] The model can be easily constructed in MS Excel.

changes occur in the seventh period: the government succeeds in preventing corruption in kindergartens, and this success holds up to the last period.

There are two principally different regimes: a regime with corruption and a regime without corruption. In the first regime, the poorest fail to place their children in a kindergarten, since the richest pay a bribe to have a priority. The poorest therefore have to sit with their children, losing all their wages. In the second regime, each individual has a random rate of luck, and only seven individuals with the best rate of luck place their children in a kindergarten. Others fail to do this and lose their wages. To realize what really happens, look at FIGURE V.[55]

The red line denotes the situation when there are only half of kindergartens left. The green line (before the red dot) denotes the situation when there are seven kindergartens functioning. It is easy to see that it is better for average outcomes to have five kindergartens and an unrestricted corruption, than to have seven kindergartens and no corruption at all. It is better for the economy as well, not only for individuals, as wages correspond much with labor productivity. This result is striking. It clearly shows that every policy should be conducted with caution: in the case with kindergartens, fighting corruption without increasing the number of kindergartens is not growth-enhancing. Moreover, it leads to a sharp drop in labor productivity. Note that such an outcome is a result of agents' heterogeneity. If all individuals in the economy get equal wages, corruption is no more helpful for economic growth.

6. Conclusion

As it is stressed in Brock, and Durlauf (2000), modern theory of economic growth tends to be openended. Here, we examined only a little piece of the subject. Our attention was focused on empirical analysis of diversification. We calculated diversity indices for Russian regions for nine different variables, accounting for levels of aggregation. We showed that standard measures of economic diversity are still useful in economic analysis, as their sensitivity to aggregation level is relatively low.

Diversification issues have been strangely isolated from economic growth theory. They are usually examined only in regional or land economics.[56] Nevertheless, this technique helps us to understand economic ties among regions that transform a set of separated regions into the united national economy. Second, the right way to construct a diversified economy, in our opinion, is realizing and step-by-step stimulating comparative advantages of every region. Thus, by a set of short-term policy measures, as Wagner (2000) importantly notes, a policy-maker can attain long-term diversification without comparative advantages' bias (i.e., without imposing hard restrains on national leaders, even if they specialize on primary products).

In this research, we developed a very simple defragmentation of economic growth. Labor productivity and labor availability are the two components of economic growth, and they depend on different factors. Regressing economic growth on one or another indicator does not always make much sense. We showed that economic growth is decomposed, and that it is necessary to analyze each of the components separately.

However, there is a huge area for future research. It is interesting to analyze diversification of production in connection with diversification of exports. Doing this, it is good to account for trade openness as a proxy for the level of democracy and distance to technological frontier as a proxy for technological level of an industry, as in Aghion, Alesina, and Trebbi (2007). We expect to extract very useful information from this type of analysis.

This was largely an empirical exercise, without sound theoretical ground. Nevertheless, we showed the importance of some factors that are rarely studied. We built a small computational model showing that bribery in kindergartens can be growth-enhancing. Due to space limitations, we were not able to construct such models for every factor identified in reduced-form equations or to construct a general equilibrium model incorporating these effects. We see this as a potential fruitful area for further research.

The second potential effect that is worth incorporating is educational drain. The problem is that people accumulate human capital not only when they are children, as assumed, for instance, in Galor (2005), but also when they are able to work and to produce goods instead of consuming educational services and thus reducing the amount of resources available at the moment.

This should be a separate model due to the importance of the problem: education, as argued by Lucas (1988) and the followers, fosters long-term economic growth, but there is evidence that it reduces economic

[55] Ten experiments with the same parameters were conducted. The lines after the red dot are ten potential paths of an average wage in the model economy. The principal feature is that they are never higher than the green line.

[56] The recent paper of Cuberes, and Jerzmanowski (2009) is one of the pleasant exceptions. In their model, the level of democracy determines diversification, since lower barriers to entry for new firms in democracies induce industrial structure to become more diversified.

outcomes in the short-term. It is easy to recommend that you may stimulate education and technological progress in order to promote growth. But a reasonable question still holds: what are the costs?

APPENDIX I

Here, we present a cross-indicator portrait for every Federal District (Figures A.1–A.21). We are able to provide such a portrait for every region, but due to space limitations we present a portrait for two regions – Moscow City and Moscow Oblast (Figures A.22–A.24).

Value of an indicator cannot be lower than zero and greater than ten. We normalized all the variables to get convenient graphs. For each indicator, ten stands for the maximum value of this indicator (where regions are data points). Zero stands for the minimum value of the indicator, not for the absence of value. We use the following formula to calculate the rank:

$$Rank = \frac{x_j - x_{\min}}{x_{\max} - x_{\min}} \times 10, \tag{12}$$

where:

- x_j – Value of a variable for region j;
- $x_{\min}$ – Minimum value of a variable;
- $x_{\max}$ – Minimum value of a variable.

Note that the greater rank doesn't necessarily mean the "best" performance of an indicator. We do not normatively rank the variables. We simply take statistical data and work with it. Each indicator may have its own (unknown in our research) "normal values".

In our analysis, we extensively use Microsoft Excel to work with huge volumes of data and construct our tables and graphs. During this research, we managed to effectively standardize the data on regional economic performance. We are going to use this database in our future research, and we are ready to provide some additional information on request (graphs for other regions of Russian economy, raw data by nine variables used to calculate diversification, etc.).

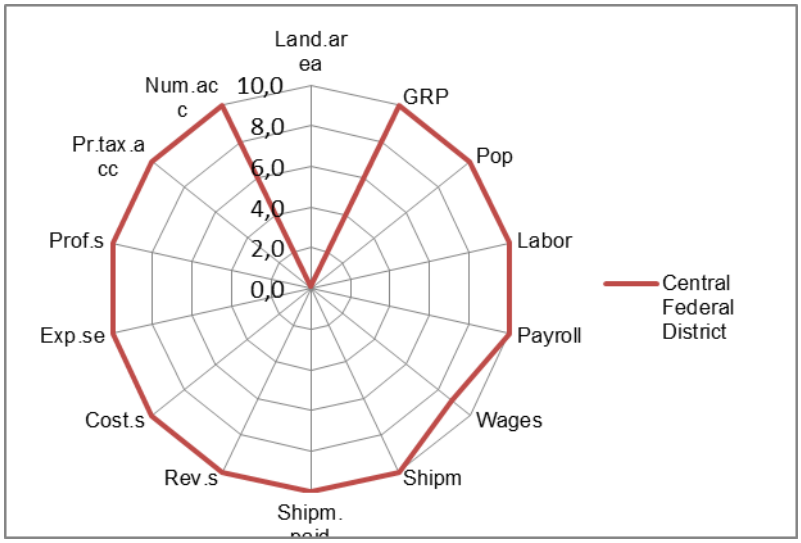

Figure A.1. Central Federal District (2008, Economic Size Indicators)

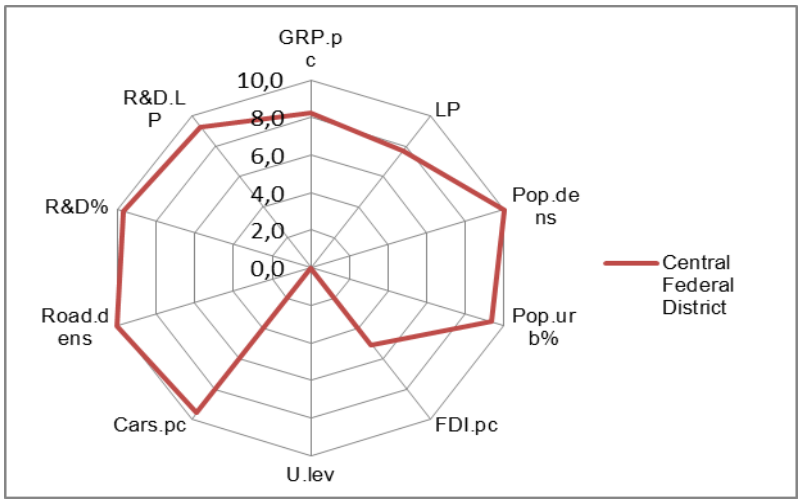

Figure A.2. Central Federal District (2008, Economic Effectiveness Indicators)

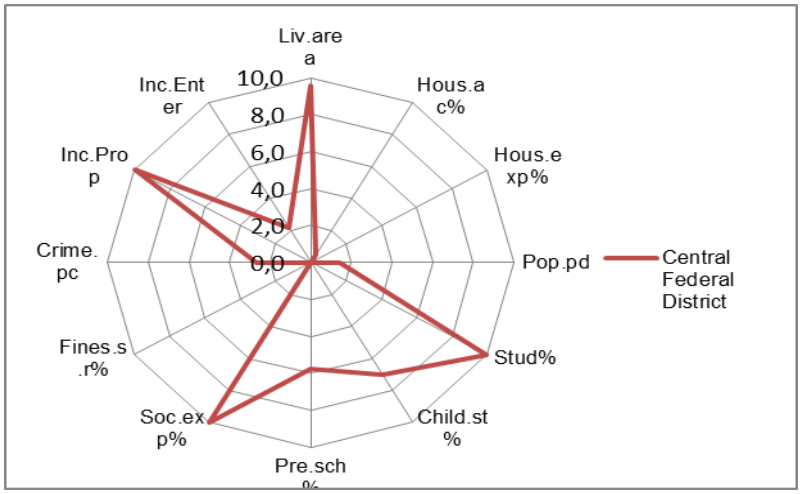

Figure A.3. Central Federal District (2008, Social and Institutional Indicators)

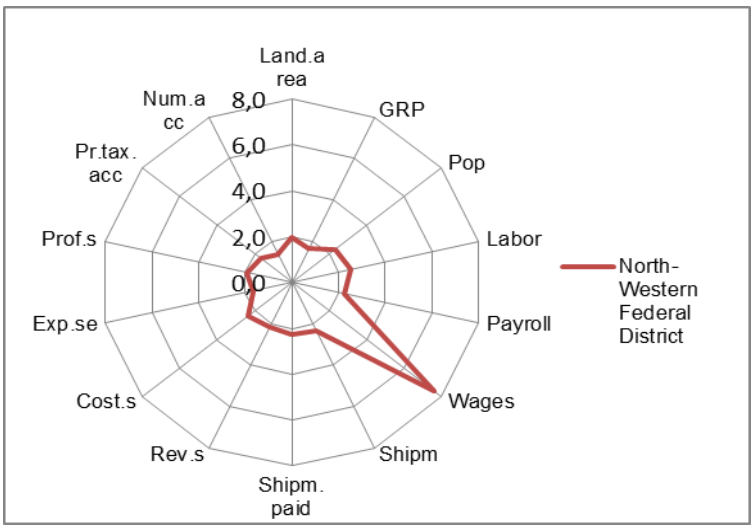

Figure A.4. North-Western Federal District (2008, Economic Size Indicators)

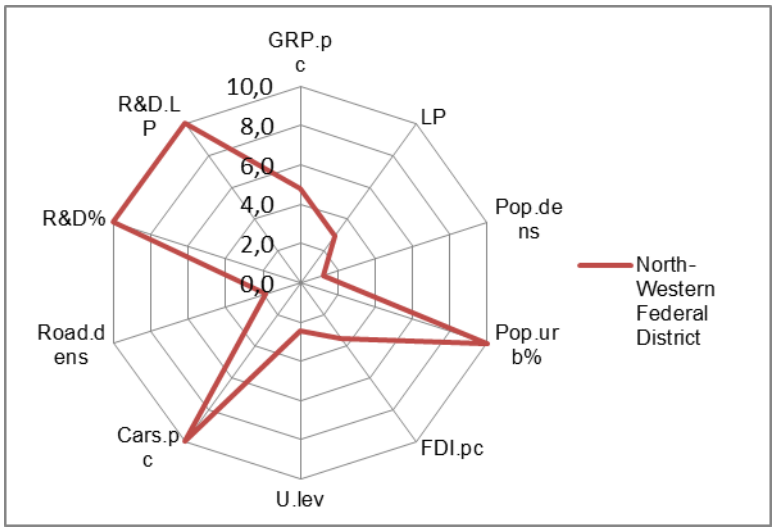

Figure A.5. North-Western District (2008, Economic Effectiveness Indicators)

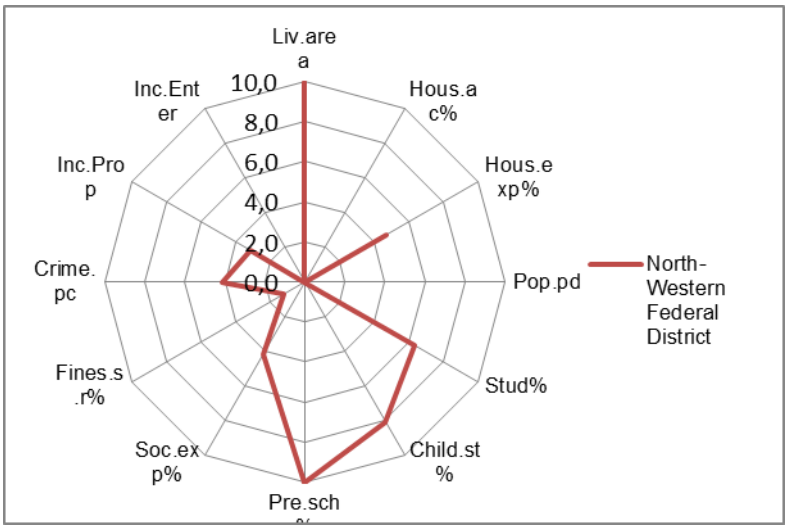

Figure A.6. North-Western Federal District (2008, Social and Institutional Indicators)

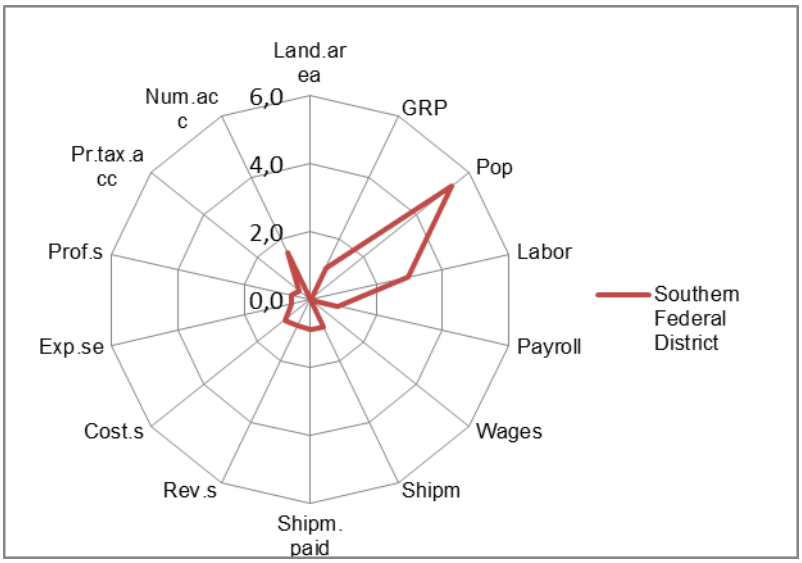

Figure A.7. Southern Federal District (2008, Economic Size Indicators)

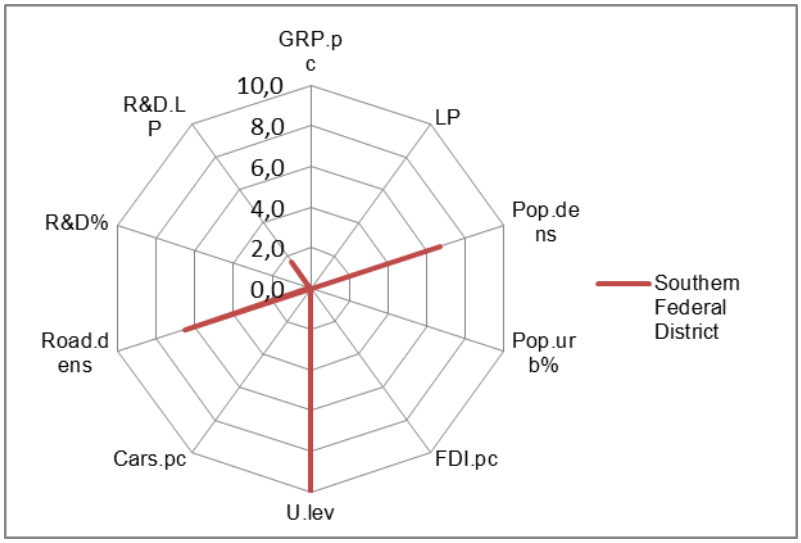

Figure A.8. Southern Federal District (2008, Economic Effectiveness Indicators)

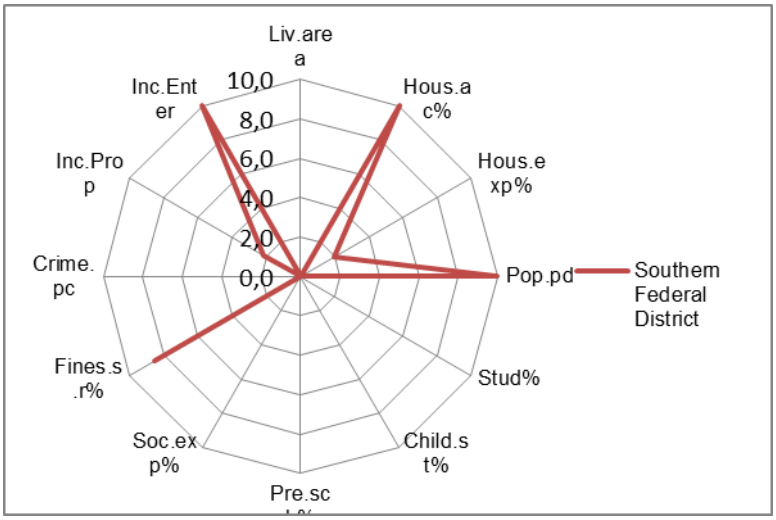

Figure A.9. Southern Federal District (2008, Social and Institutional Indicators)

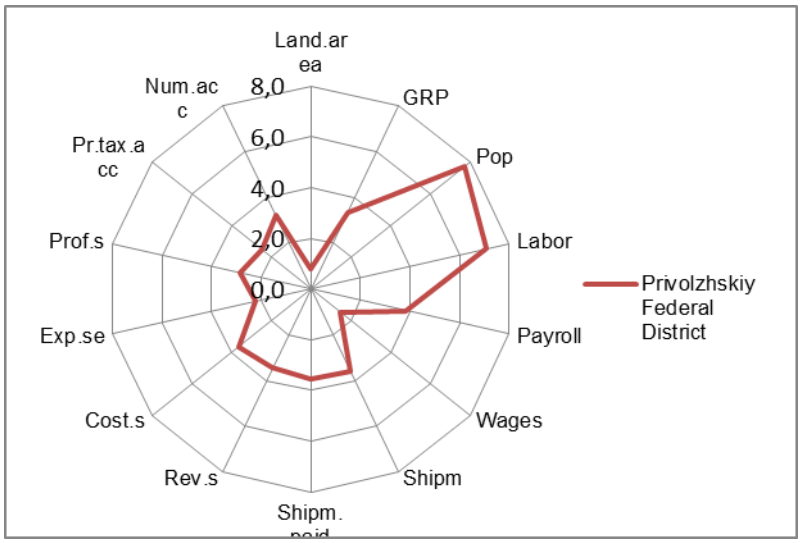

Figure A.10. Privolzhskiy Federal District (2008, Economic Size Indicators)

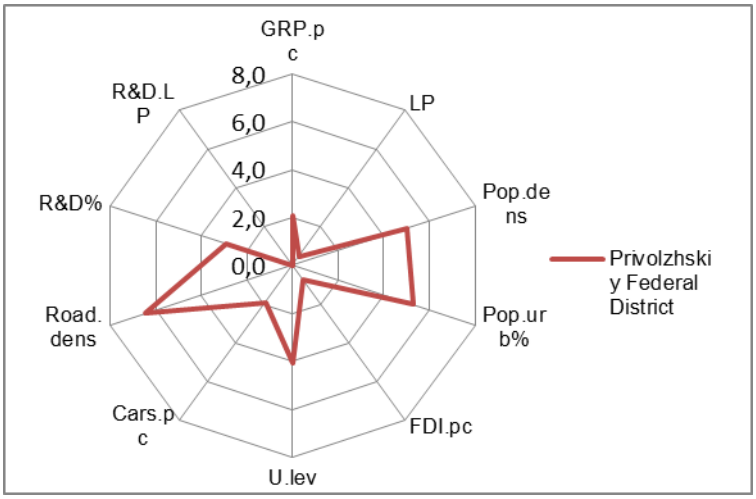

Figure A.11. Privolzhskiy Federal District (2008, Economic Effectiveness Indicators)

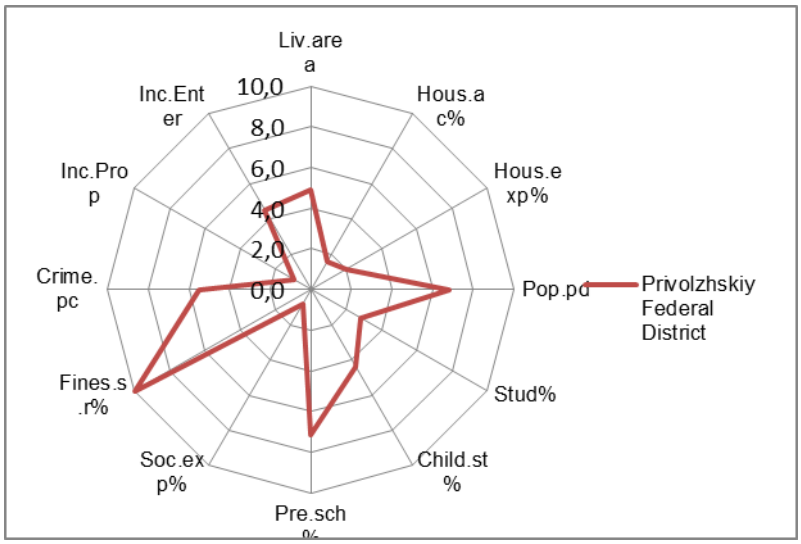

Figure A.12. Privolzhskiy Federal District (2008, Social and Institutional Indicators)

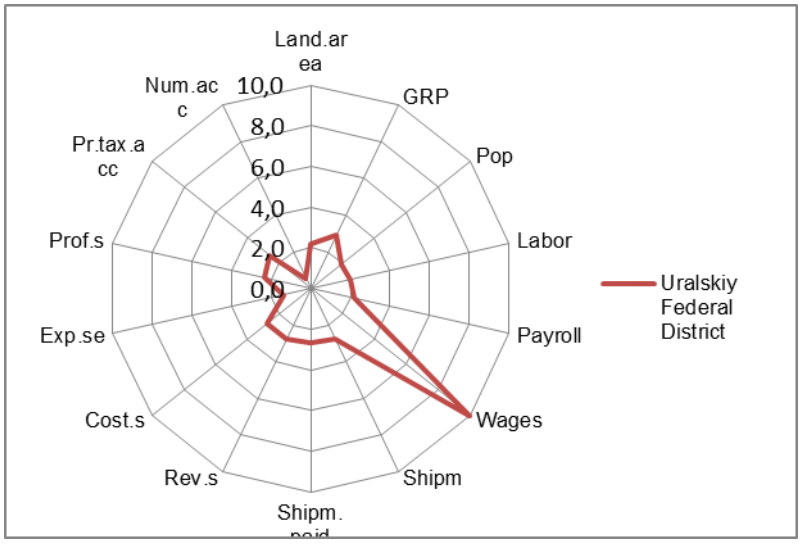

Figure A.13. Uralskiy Federal District (2008, Economic Size Indicators)

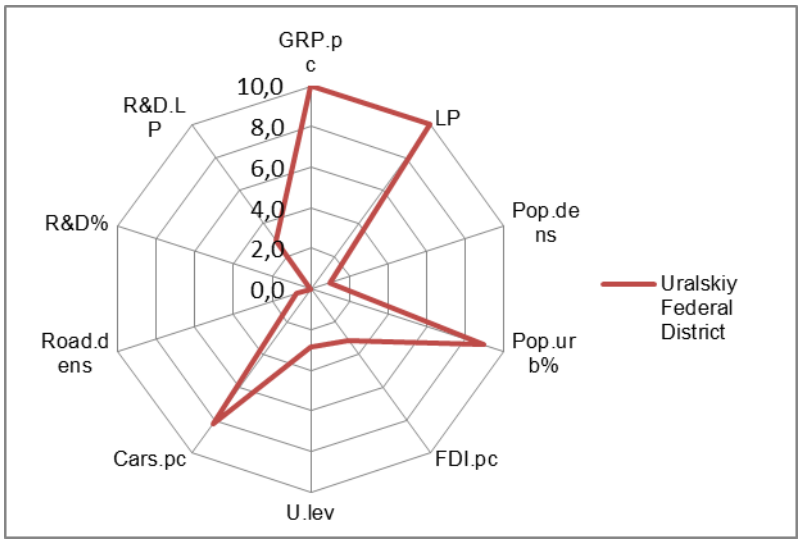

Figure A.14. Uralskiy Federal District (2008, Economic Effectiveness Indicators)

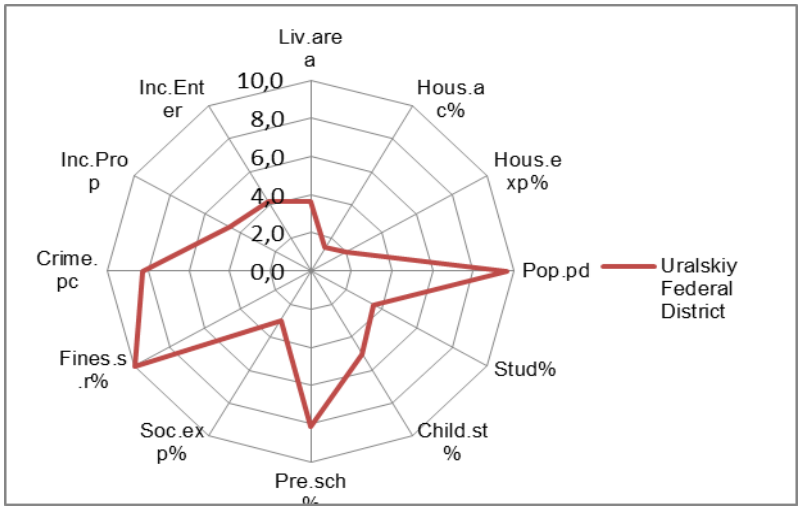

Figure A.15. Uralskiy Federal District (2008, Social and Institutional Indicators)

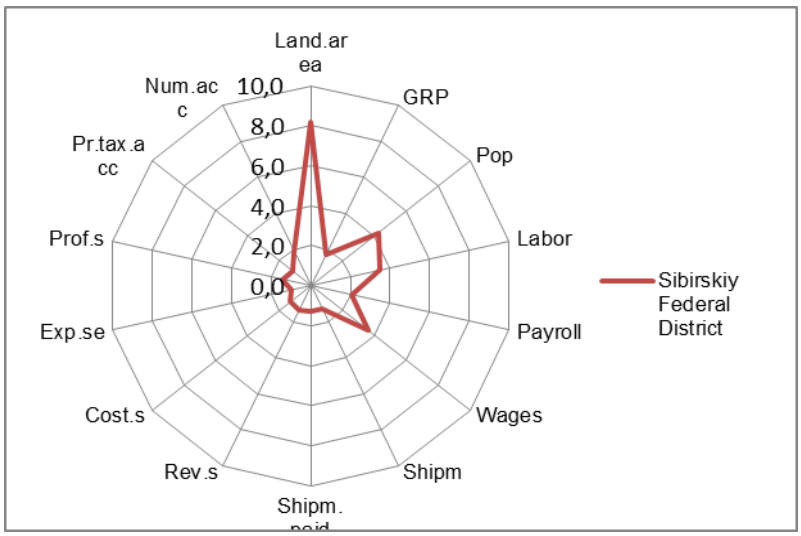

Figure A.16. Sibirskiy Federal District (2008, Economic Size Indicators)

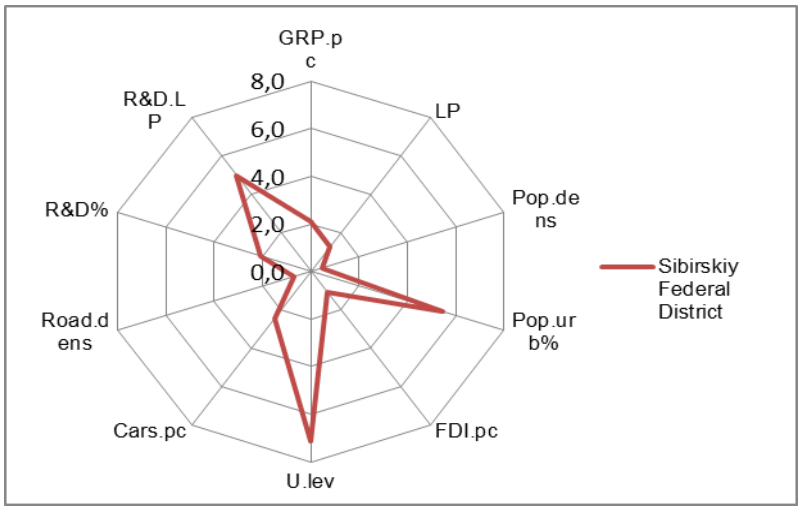

Figure A.17. Sibirskiy Federal District (2008, Economic Effectiveness Indicators)

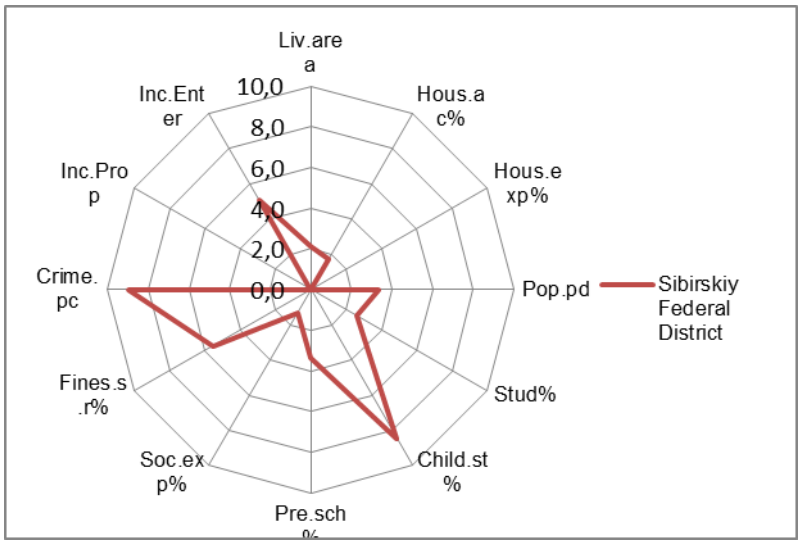

Figure A.18. Sibirskiy Federal District (2008, Social and Institutional Indicators)

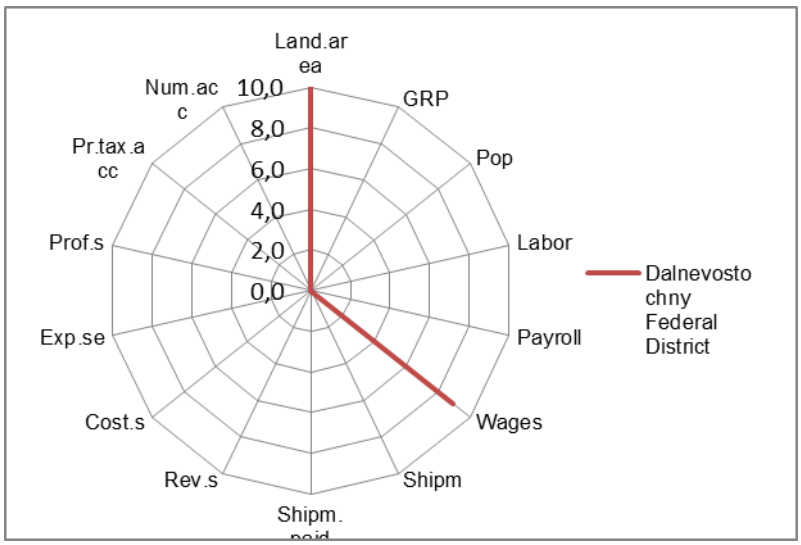

Figure A.19. Dalnevostochny Federal District (2008, Economic Size Indicators)

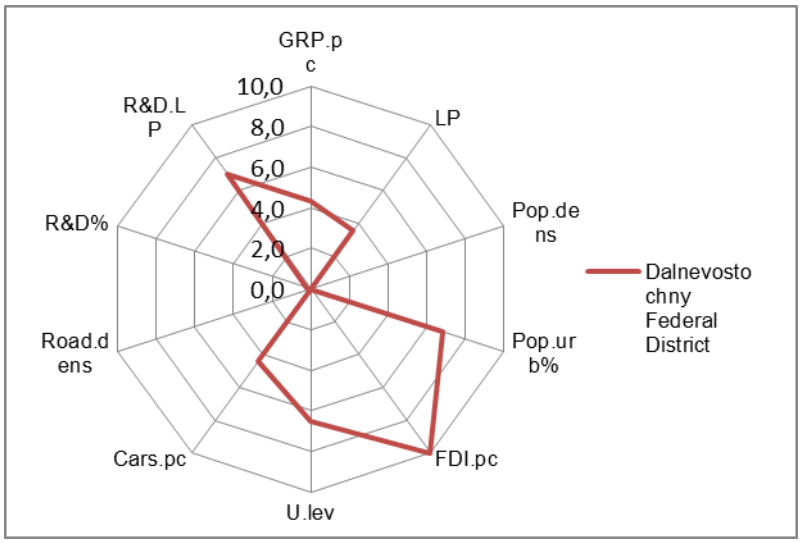

Figure A.20. Dalnevostochny Federal District (2008, Economic Effectiveness Indicators)

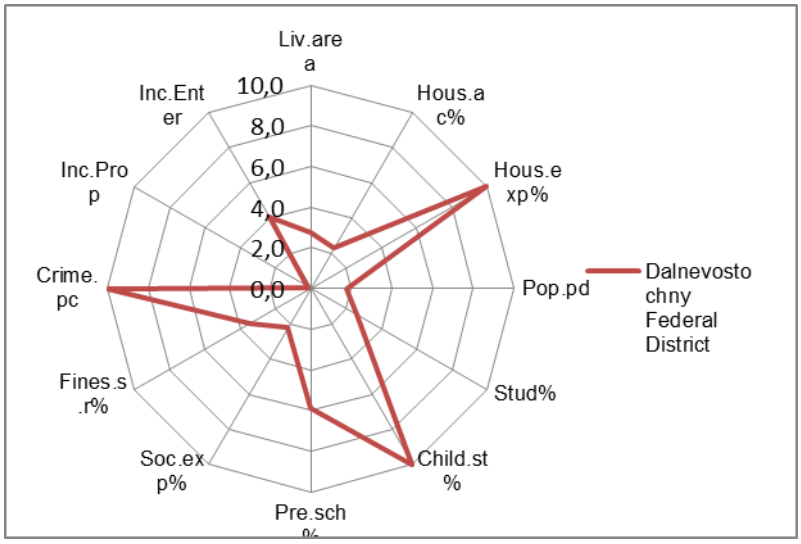

Figure A.21. Dalnevostochny Federal District (2008, Social and Institutional Indicators)

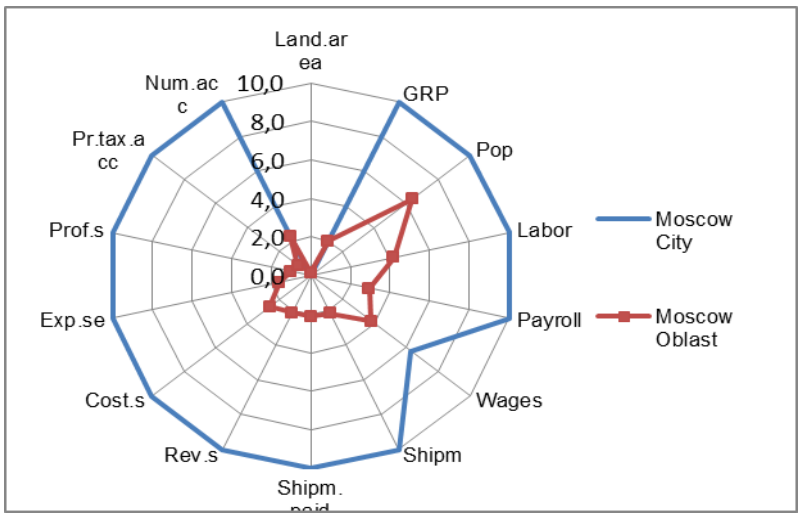

Figure A.22. Moscow City and Moscow Oblast (2008, Economic Size Indicators)

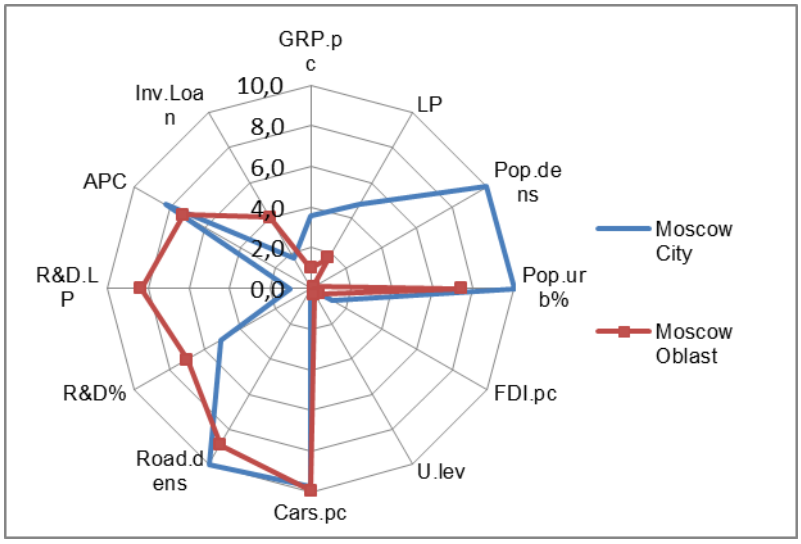

Figure A.23. Moscow City and Moscow Oblast (2008, Economic Effectiveness Indicators)

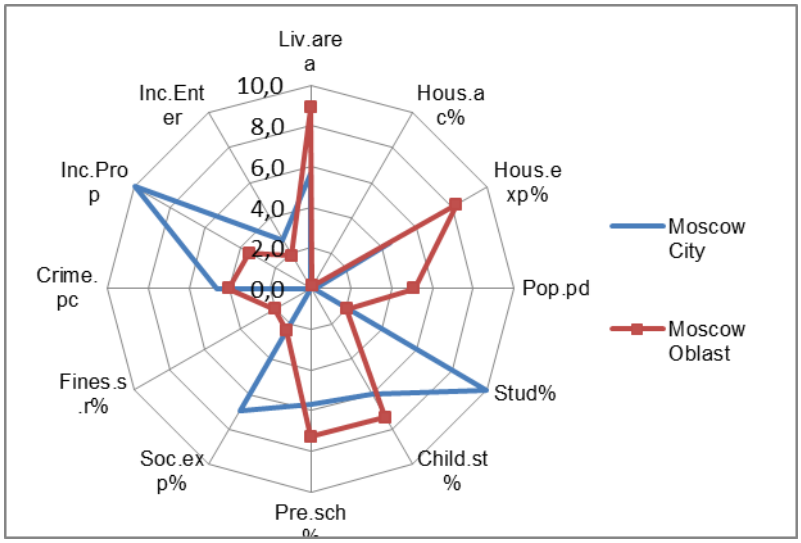

Figure A.24. Moscow City and Moscow Oblast (2008, Social and Institutional Indicators)

APPENDIX II

Here, we provide cross-specialization matrices for three variables: employment, shipment and labor productivity (TABLES B.1–B.3). We also describe OKVED in TABLE B.4.

The methodology is the following. First, we calculate location quotients for every industry and every region by years and indicators (employment and shipment). We use equation (4) to do it. We get a location quotient for labor productivity as a ratio of the one for shipment to the one for employment. Note that we calculate labor productivity for regressions in a different way: we divide value added by employment. However, tables in this Appendix are illustrative and do not influence our core results.

Second, we calculate competitive share effects, using the third part of equation (6). In Raj Sharma (2008), the role of competitive share effect is emphasized: "a positive competitive share effect implies the region's economic performance is superior to the national average." (p. 7).

Then we simply combine both indicators in a four-quadrant graph and take those industries that go in the upper-right quadrant. As an example, we present four-quadrant graphs for Republic of Tatarstan for 2008 (FIGURES B.1–B.3). We are able to construct such graphs for every region for 2006, 2007, 2008, and the average. For employment, it is already possible for 2009.

Finally, we combine the result into cross-specialization matrices. These are our technical invention to simultaneously facilitate the analysis of industrial specialization for Russian regions and regional specialization for

Russian industries. Since we do not attempt to examine industries separately in this research, we don't use these tables in our analysis. However, it is right to make them public, since they look like a very powerful instrument for regional research.

The methodology applied here was described by Raj Sharma (2008). Our invention is only applying it to Russian economy and introducing cross-specialization matrices.

Table B.1. Cross-Specialization Matrix for Employment

Region	A	B	CA	CB	DA	DB	DC	DD	DE	DF	DG	DH	DI	DJ	DK	DL	DM	DN	E	F	G	H	I	J	K	L	M	N	O
Republic of Tatarstan	4						5				1	2			8		3			6				9			7		
Saratov Oblast	4									6			5			1			2								3		
Irkutsk Oblast				3				2		1	4								6							7	5	8	
Rostov Oblast	2					1							6	3			4		5				8					7	
Republic of Bashkortostan			3	4						1	2				6		5				7								
Nizhniy Novgorod Oblast							2					3		1		4													
Perm Kray					7		1	2				4	5				3	8								6			
Novosibirsk Oblast						5							2			1							4	3		6			7
Yaroslavl Oblast						3	2		8	1			5		4							7							6
Udmurtskaya Republic	2		3					4					7			1		5								6		
Samara Oblast										2	3						1					7	4	5	6				
Omsk Oblast	1				3										4	6							7					2	5
Chuvash Republic					6	1	2						4			3						5							
Moscow Oblast					6	4		11			5	2	3		7	8		1	13		1	9	12						
Leningrad Oblast	5			6	9	11		4	2	1	7		3					1		8									
Republic of Mariy El					4			1		6		1			5	2		3				7				8			9
Tver Oblast					7		1	2				4	5				3	8								6			
Smolensk Oblast	6				7	1	8	1			9	5	2			3			4				11						
Volgograd Oblast	4				8								3	1	2					5	1		6				9	7	
Voronezh Oblast	1										2						5	4			3							6	
Ryazan Oblast							1			2			3		7		5									6	4		
Kirov Oblast							1											2	3										
Bryansk Oblast						2	1		6								4	3									5		
Penza Oblast	2				3			4								1													
Kaluga Oblast	1				9	11	2	7	3			12	4	6	5	1	8												
Vladimir Oblast					7	1	2	3				5			4			6	9			8				1			
Republic of Mordoviya	1				3								2																
Khabarovsk Kray		1								2							3			7	6		4			5			
Krasnodarskiy Kray					1								4							6		2	5					3	7

Ulyanovsk Oblast	7					4		3					6			2	1	5										
Kursk Oblast					2	3	1																			4		
Saint Petersburg City																					3	2	4	5	1			6
Novgorod Oblast					2			1	3										4			6				5			7
Tula Oblast					3	7	1		8			4	6	2		5												
Altayskiy Kray	1				2							3															4	
Oryol Oblast						1							3		2													
Krasnoyarsk Kray	5			1				2						4	3								6				8	7
Kurgan Oblast	2										4			5	1				6							3			7
Kaliningrad Oblast		2			3	8		7	4								6	1						9		5			
Moscow City							4		2			6				7				5	3			1					
Astrakhan Oblast			6							1							4		5							2		3	
Tomsk Oblast			1		3			2											6	7		5	8				4		
Republic of Adygeya					4			1	2																		3	5	
Sverdlovsk Oblast								3							1	2			5		6	4							
Kostroma Oblast	5					3	4	1							9			2								6	8		7
Belgorod Oblast	5			1	2								3	4	7														6
Kemerovo Oblast															2				1				3						
Primorskiy Kray				3													2									1			
Arkhangelsk Oblast	5	1	3														2		4										
Republic of Buryatiya		4		1													2		5							3		6	7
Pskov Oblast	6				4	2	1	7					5			3		9	8										
Tambov Oblast						3	1									2													
Chelyabinsk Oblast				1									3		2			4									5		
Orenburg Oblast			4	1						2				3	6					8			9				7	5	
Republic of Kareliya		1																					2			3			4
Republic of Khakasiya														2												1	3		4
Republic of Northern Osetiya – Alaniya																			4							1	2	3	
Stavropol Kray	1				2							3															4		
Kabardino-Balkarskaya Republic						2													5							4	1	3	
Jewish Autonomous Oblast						7							2					3	4	8						1		6	5
Zabaykalskiy Kray																			4							1	3	2	
Republic of Altay	2			3																						1	4	6	5
Republic of Dagestan	2																									4	1	3	
Republic of Komi								1	2														3						

Karachaevo - Cerkesskaya Republic					2								4						5							1	3	6	7
Ivanovo Oblast						1									3			2								4	5		
Vologda Oblast					3				6		2				1											4	5		
Amur Oblast	6			1															2	3						4		5	
Murmansk Oblast				1															2			4							3
Lipetsk Oblast	4			7	2								6	1	3													5	8
Kamchatskiy Kray		1		3	4														2				5				7	6	
Chechenskaya Republic																													
Republic of Tyva	5			1																						3		2	4
Sakhalin Oblast					2														4	1		6	5		7	3		8	
Republic of Sakha (Yakutiya)		5	2	1																						3			4
Republic of Kalmikiya																										1			
Tumen Oblast			1																4	2		5	3						
Republic of Ingushetiya																										1	2	3	4
Magadan Oblast																			2							1			
Chukotskiy Autonomous Okrug	5			1															2				4			3			6
Khanty-Mansiyskiy Autonomous Okrug - Yugra			1							2									5	3		6	4						
Yamalo-Neneckiy Autonomous Okrug		1																	3				2		4				
Neneckiy Autonomous Okrug	6	2	1																8	4		3	5						7

Note. Figures denote ranks of an industry in a region's economic activity (only growing base industries have a rank different from zero).

OKVED codes are disclosed in TABLE B.4.

Table B.2. Cross-Specialization Matrix for Shipment

Region	*A*	*B*	*CA*	*CB*	*DA*	*DB*	*DC*	*DD*	*DE*	*DF*	*DG*	*DH*	*DI*	*DJ*	*DK*	*DL*	*DM*	*DN*	*E*	*F*	*G*	*H*	*I*	*J*	*K*	*L*	*M*	*N*	*O*
Republic of Tatarstan	3											1					2			4									
Saratov Oblast	1				5						3							6	2	8							4	7	
Irkutsk Oblast				1													3		4	7			2			6		5	
Rostov Oblast	2				5	1	3						1				4	6		7		11				9	8	12	
Republic of Bashkortostan			3	5									4		1				6								2		
Nizhniy Novgorod Oblast							3		5	1		2		4						6									
Perm Kray					8		1		1			7	9			4	2		3				6			5			

Novosibirsk Oblast					1							5	6			3									2		4		
Yaroslavl Oblast					2				7						4	1		6	5				3						
Udmurtska ya Republic	4		2		6											1	3	5								7			
Samara Oblast																1						3	2						
Omsk Oblast					2							1														4		3	
Chuvash Republic					4	1							6			2	3	7										5	
Moscow Oblast					5		14	6	11			1	2		3	7		4	13	9	12	8				15	16	1	
Leningrad Oblast					2			4	1		5	6					8	9	7	3									
Republic of Mariy El					7	4	1	1		6						2		5		8						3			9
Tver Oblast					8		1		1			7	9			4	2		3				6			5			
Smolensk Oblast								4			5	2				1	7						9			3	6	8	
Volgograd Oblast	2					6				1		4	3		5										7				
Voronezh Oblast	1				3						2		5		1	7		9	6				11				4		8
Ryazan Oblast	2				6	4							3		7	1	8	9									5		
Kirov Oblast						4					1					5		2				6						3	
Bryansk Oblast					7	5	1	2	1			11			6	13	3		12			9	8			4			
Penza Oblast					5		2	4							1	3		8		1						7	6	9	11
Kaluga Oblast					4	7		5				9	6	1		1	3	2	11	8									
Vladimir Oblast					3		4	6			12	2			1			7	8					5		9	11	1	
Republic of Mordoviya	2				4								1		8			3	7	6						5			
Khabarovs k Kray																	1			2									
Krasnodars kiy Kray	1				3								7							5		2	4			8	9	6	
Ulyanovsk Oblast						1		3										2	4				5					6	
Kursk Oblast	2			1	3																						4		
Saint Petersburg City							6	1	12				8		3	1			13	9	11	5	7		4				2
Novgorod Oblast					3			1			2				4				5							6	7		
Tula Oblast					2	4	1		5			11		3		6			9						7		1	8	
Altayskiy Kray	1				3	7		4				2					5				6								
Oryol Oblast	2				3	1														5			4						
Krasnoyars k Kray	8			4				1					5		2			3	7							6			
Kurgan Oblast	1				1										2		3	7		9		8	5			4		6	
Kaliningrad Oblast	11				4	3									1	1	2	5		7							6	8	9
Moscow City									2	3															4				1
Astrakhan Oblast	7	2				9	4				1		6				3			5		8					1		
Tomsk Oblast					1								2							3								4	
Republic of Adygeya	1				3			4	2											5									

Sverdlovsk Oblast				1											2	3			6							5	4	
Kostroma Oblast							3	1							4		5	2					6					
Belgorod Oblast	3			1	2								5	4				6		7								
Kemerovo Oblast			2										5	1								3			4			
Primorskiy Kray					3														2		4						1	
Arkhangelsk Oblast		1	2														4			3			6		5			
Republic of Buryatiya																	1					3			2			
Pskov Oblast						3	2	1							5	1		7	9			8			4		6	
Tambov Oblast	1				4	3									6	2				5	7							
Chelyabinsk Oblast	5												3	1	4		6	2										
Orenburg Oblast	3		1	2										4					5									
Republic of Kareliya		1													4										2		3	
Republic of Khakasiya	8			5										2	7				1						3	4	6	
Republic of Northern Osetiya – Alaniya	1													4					6	5					2	3		
Stavropol Kray	1				3	7		4				2					5				6							
Kabardino-Balkarskaya Republic					3																	4			1		2	
Jewish Autonomous Oblast								5					3					8	7	6			1		2		4	
Zabaykalskiy Kray				5																6			2		1	4	3	
Republic of Altay	1			7															4	3		5			2			6
Republic of Dagestan																				2	6	1			4	3	5	
Republic of Komi			1																3						2			
Karachaevo-Cerkesskaya Republic	1			6		7						2							5							4	3	
Ivanovo Oblast						1		2							3			8				7			4	5		6
Vologda Oblast		4									2			1	3													
Amur Oblast				1																3					2			
Murmansk Oblast		1		2																					3		4	
Lipetsk Oblast	3				2								4	1														
Kamchatskiy Kray		1		3																					2			
Chechenskaya Republic	4																			2					1	3	5	
Republic of Tyva	3																								2	1		
Sakhalin Oblast			1																									
Republic of Sakha (Yakutiya)																				1					2			
Republic of Kalmikiya	1																								2			
Tumen Oblast																				1								
Republic of Ingushetiya																				3			5		1	2	4	
Magadan Oblast		1																							2			

Chukotskiy Autonomous Okrug				1															2							3			
Khanty-Mansiyskiy Autonomous Okrug - Yugra																													
Yamalo-Neneckiy Autonomous Okrug																				1									
Neneckiy Autonomous Okrug		3	1																	2									

Note. Figures denote ranks of an industry in a region's economic activity (only growing base industries have a rank different from zero).

OKVED codes are disclosed in TABLE B.4.

Table B.3. Cross-Specialization Matrix for Labor Productivity

Region	*A*	*B*	*CA*	*CB*	*DA*	*DB*	*DC*	*DD*	*DE*	*DF*	*DG*	*DH*	*DI*	*DJ*	*DK*	*DL*	*DM*	*DN*	*E*	*F*	*G*	*H*	*I*	*J*	*K*	*L*	*M*	*N*	*O*
Republic of Tatarstan	5		4									2					1			3									
Saratov Oblast	1										2								3										
Irkutsk Oblast	6													3		2	1	7		4			5					8	
Rostov Oblast	2				6	1	3										4	7		5									
Republic of Bashkortostan	1																												
Nizhniy Novgorod Oblast										1																			
Perm Kray							1										2		3				4						
Novosibirsk Oblast			1									2															3		
Yaroslavl Oblast					2											1			4				3						
Udmurtskaya Republic			2														1												
Samara Oblast	3					4										2		1									5		
Omsk Oblast					1							2																	
Chuvash Republic																1	2												
Moscow Oblast					4		8		7	1		5			3	12	15		13	1	14	11		2			9	6	
Leningrad Oblast								6			4	2							3	1								5	
Republic of Mariy El																													
Tver Oblast							1										2		3				4						
Smolensk Oblast																													
Volgograd Oblast	2		1							3																			
Voronezh Oblast																													
Ryazan Oblast																													
Kirov Oblast		2					1				3																		
Bryansk Oblast		1																											
Penza Oblast										1																			
Kaluga Oblast					1												2												
Vladimir Oblast																								1					
Republic of Mordoviya													1					2											
Khabarovsk Kray																												1	

Krasnodarskiy Kray	1						4												5		3	2					
Ulyanovsk Oblast																											
Kursk Oblast				1					2																		
Saint Petersburg City						7	8	2				11	6		5	4		9	1				1			3		
Novgorod Oblast					5			1	3		2				4												
Tula Oblast					1																						
Altayskiy Kray																											
Oryol Oblast																											
Krasnoyarsk Kray	6											3		2		5	1		4					7			
Kurgan Oblast	1																										
Kaliningrad Oblast	3		1			4								5		2									6	7	
Moscow City		15				9		14	12	1	11		3		5		16		2				6		13	8	7	1	4
Astrakhan Oblast	3					2					1		5				4										
Tomsk Oblast	2			1																						4	3
Republic of Adygeya	1		2									3															
Sverdlovsk Oblast													2													1	
Kostroma Oblast							3	1						2			4										
Belgorod Oblast	4			2	3												1										
Kemerovo Oblast	2	1										4	3														
Primorskiy Kray		1										2														3	
Arkhangelsk Oblast			3						1			4		5			7		2					6			
Republic of Buryatiya																					2	1					
Pskov Oblast																											
Tambov Oblast	3																		1	2							
Chelyabinsk Oblast	3						4			1							2										
Orenburg Oblast			1								2																
Republic of Kareliya		4		1										2										3		5	
Republic of Khakasiya																		1									
Republic of Northern Osetiya – Alaniya	1										2								4	3							
Stavropol Kray																											
Kabardino-Balkarskaya Republic										2					1				4		3						
Jewish Autonomous Oblast								3			1											2				4	
Zabaykalskiy Kray															3				2		1						
Republic of Altay																			1								
Republic of Dagestan	4																		2	3	1	5					
Republic of Komi						2	7			3				1				5	8	4					6			
Karachaevo-Cerkesskaya	2					3											1										

Republic																											
Ivanovo Oblast							1																				
Vologda Oblast		1								3			2														
Amur Oblast																				1							
Murmansk Oblast		2		8		3						7		5			1							9	6	4	
Lipetsk Oblast					3					5	4		2				1										
Kamchatskiy Kray		4			7	6						5		3	1									2			
Chechenskaya Republic																											
Republic of Tyva	3						4					1			2										5		
Sakhalin Oblast		14	5	4	15	17		2		1		8	1		3	6				13	11			16	12	9	7	
Republic of Sakha (Yakutiya)				2				7		1		6						3		4						5		
Republic of Kalmikiya																				1							
Tumen Oblast	5																		6	4		3		1	2			
Republic of Ingushetiya																		4		1	3	5				2			
Magadan Oblast	4	1				7		6							5			2								3			
Chukotskiy Autonomous Okrug		3		4															2							1			
Khanty-Mansiyskiy Autonomous Okrug - Yugra	5																2	6			4	7		1	3				
Yamalo-Neneckiy Autonomous Okrug			5	6															4	1		2					3		
Neneckiy Autonomous Okrug			5				9							4					8	1		6	7				3	2	

Note. Figures denote ranks of an industry in a region's economic activity (only growing base industries have a rank different from zero).

OKVED codes are disclosed in TABLE B.4.

Table B.4. OKVED (Two-Letter Level of Aggregation)

A	AGRICULTURE, HUNTING AND FORESTRY
B	FISHING; FISH HATCHERIES; FISH FARMS AND RELATED SERVICES
CA	MINING AND QUARRYING OF ENERGY PRODUCING MATERIALS
CB	MINING AND QUARRYING EXCEPT ENERGY PRODUCING MATERIALS
DA	FOOD PRODUCTS, BEVERAGES AND TOBACCO
DB	TEXTILES AND TEXTILE PRODUCTS
DC	LEATHER, LEATHER PRODUCTS AND FOOTWEAR
DD	WOOD AND PRODUCTS OF WOOD AND CORK
DE	PULP, PAPER, PAPER PRODUCTS, PRINTING AND PUBLISHING
DF	COKE, REFINED PETROLEUM PRODUCTS AND NUCLEAR FUEL
DG	CHEMICALS AND CHEMICAL PRODUCTS
DH	RUBBER AND PLASTICS PRODUCTS
DI	OTHER NON-METALLIC MINERAL PRODUCTS
DJ	BASIC METALS AND FABRICATED METAL PRODUCTS
DK	MACHINERY AND EQUIPMENT, N.E.C.
DL	ELECTRICAL AND OPTICAL EQUIPMENT
DM	TRANSPORT EQUIPMENT
DN	MANUFACTURING NEC; RECYCLING
E	ELECTRICITY GAS AND WATER SUPPLY

F	CONSTRUCTION
G	WHOLESALE AND RETAIL TRADE; RESTAURANTS AND HOTELS
H	HOTELS AND RESTAURANTS
I	TRANSPORT STORAGE AND COMMUNICATIONS
J	FINANCIAL INTERMEDIATION
K	REAL ESTATE, RENTING AND BUSINESS ACTIVITIES
L	PUBLIC ADMINISTRATION AND DEFENCE COMPULSORY SOCIAL SECURITY
M	EDUCATION
N	HEALTH AND SOCIAL WORK
O	OTHER COMMUNITY SOCIAL AND PERSONAL SERVICE ACTIVITIES

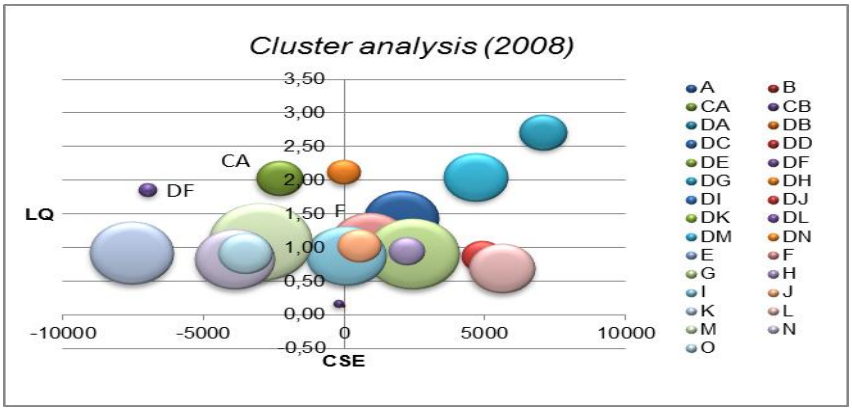

Figure B.1. Republic of Tatarstan (Employment)

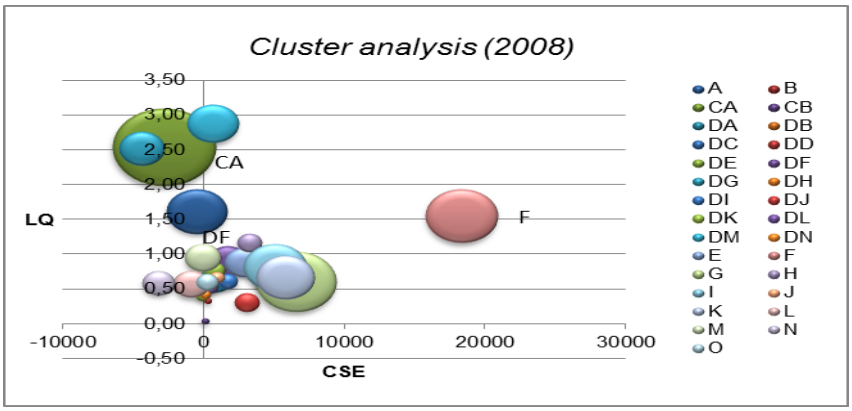

Figure B.2. Republic of Tatarstan (Shipment)

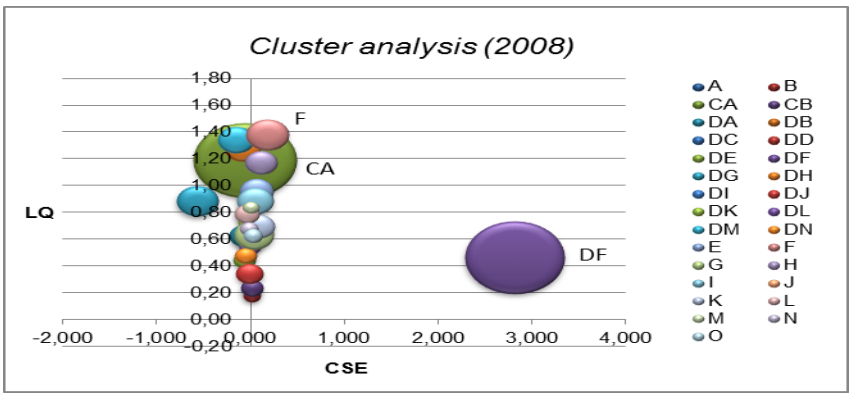

Figure B.3. Republic of Tatarstan (Labor Productivity)

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Table I. Economic Size Indicators

Variable	Measure	Period	Description	Aggregation
Land.area	Thousand square KM	stable	A region's land area	Aggregate
GRP	Million rubles	1996-2008	Gross Regional Product	One-letter
Pop	Thousand people	1990-2008	Permanent population	Aggregate
Inv	Million rubles	2005-2009	Investment	Aggregate
FDI	Million USD	2003-2008	Foreign Direct Investment	Aggregate
R&D	Million rubles	2001-2008	R&D value	Aggregate
Exp.R&D	Million rubles	2001-2008	Internal expenses on R&D	Aggregate
Labor	Million people	1998-2009	Permanent labor force	Two-letter
Payroll	Million rubles	2004-2009	Payroll of permanent labor force	Two-letter
Wages	Thousand rubles per month	2004-2009	An average monthly wage	Two-letter
Shipm	Million rubles	2005-2009	Shipment of goods and services	Two-letter
Shipm.paid	Million rubles	2005-2009	Fraction of shipment paid	Two-letter
Rev.s	Million rubles	2005-2009	Revenues from sales	Two-letter
Cost.s	Million rubles	2005-2009	Cost from sales	Two-letter
Exp.se	Million rubles	2005-2009	Selling and executive expenses	Two-letter
Prof.s	Million rubles	2005-2009	Profit (loss) from sales	Two-letter
Pr.tax.acc	Million rubles	2003-2009	Profit tax (accounts)	Two-letter
Num.acc	Items	2003-2009	Number of companies (accounts)	Two-letter

Note. “Accounts” denote data that is provided to Rosstat by enterprises in their accounts. So, this data is not fully comparable with other data due to possible differences in sample size.

Table II. Economic Effectiveness Indicators

Variable	Measure	Period	Description	Aggregation
GRP.pc	Rubles	1996-2008	Gross Regional Product per capita	Aggregate
LP	Rubles per worker	1996-2008	Labor productivity	Aggregate
Pop.dens	People per square KM	1990-2008	Population density	Aggregate
Pop.urb%	%	1990-2008	Fraction of urban population	Aggregate
FDI.pc	USD	2003-2009	Foreign Direct Investment per capita	Aggregate
U.lev	%	1992-2009	Level of unemployment	Aggregate
Cars.pc	Items per thousand people	1999-2008	Cars per capita	Aggregate
Road.dens	KM per thousand KM of land	1999-2008	Road density	Aggregate
R&D%	%	2001-2008	R&D value as a fraction in GRP	Aggregate
R&D.LP	Rubles per worker	2001-2008	Labor productivity in R&D	Aggregate
APC	%	2000-2008	Average propensity to consume	Aggregate
Inv.Loan	%	2005-2009	Investment financed by loans	Aggregate

Table III. Social and Institutional Indicators

Variable	Measure	Period	Description	Aggregation
Liv.area	Square meters per person	2000-2008	Living area	Aggregate
Hous.ac%	Items per million square meters	2000-2008	Housing accidents per living area	Aggregate
Hous.exp%	%	1999-2008	Housing expenses as a fraction of income	Aggregate
Pop.pd	People per doctor	1997-2008	Population per doctor	Aggregate
Stud%	%	2000-2008	Fraction of students in population	Aggregate
Child.st%	%	2000-2008	Fraction of children studying	Aggregate
Pre.sch%	%	2000-2008	Pre-school centers availability	Aggregate
Soc.exp%	Rubles per person	2006-2009	Planned social expenses per capita	Aggregate
Fines.s.r%	%	2000-2009	Fraction of fines paid	Aggregate
Crime.pc	Items per thousand people	1990-2008	Registered crimes per capita	Aggregate
Inc.Prop	%	2000-2008	Fraction of income from property	Aggregate
Inc.Enter	%	2000-2008	Fraction of income from entrepreneurship	Aggregate

Table IV. Theoretical Concerns on Equiproportional Diversity Measures

References	Extractions from Wagner (2000), p. 6
Conroy (1974 and 1975)	"selection of an equal distribution of activities across sectors as the reference point for diversity is not based on any a priori rationale, and is indeed, quite arbitrary"
Brown and Pheasant (1985)	
Wagner and Deller (1998)	"these measures do not account for any form of interindustry linkages, and the number of industry sectors is usually fixed and not allowed to vary by region"
Bahl et al. (1971) and Conroy	"perhaps equality in the distribution of activities is not the key, but rather the specialization in specific industries that tend to be “inherently” stable"

Table V. Empirical Concerns on Equiproportional Diversity Measures

References	Extractions from Wagner (2000), p. 6
Wasylenko and Erickson (1978)	"regions defined as highly specialized by the entropy approach, were, in fact, characterized by relative economic stability"
Kort (1981)	"policy results were sensitive to the specific entropy measure used"
Attaran (1987)	"more specialized regions experienced greater economic growth and there was little relationship between these levels of diversity and unemployment"
Kort (1981)	"part of the empirical shortfall might be due to factors, other than diversity, that influence stability and have tended to be ignored in empirical estimation"
Smith and Gibson (1987)	
Malizia and Ke (1993)	"the empirical literature has been lax regarding modeling the relevant economic regions"

Table VI. Diversity Indices' Sensitivity to the Level of Aggregation

Activities	Entropy	Hachman	NAI	HHI	Variation	Hoover	*Sensitivity*
Costs	0.195	0.319	0.395	0.323	0.225	0.087	*0.257*
Shipment	0.204	0.344	0.401	0.323	0.204	0.086	*0.260*
Shipment paid	0.202	0.345	0.407	0.318	0.207	0.085	*0.261*
Expenses	0.220	0.348	0.418	0.286	0.264	0.080	*0.270*
Revenues	0.204	0.363	0.437	0.347	0.191	0.092	*0.272*
Payroll	0.147	0.228	0.529	0.320	0.317	0.208	*0.292*
Labor	0.127	0.224	0.622	0.303	0.289	0.202	*0.294*
Profit tax	0.234	0.511	0.488	0.306	0.194	0.085	*0.303*
Number of firms	0.137	0.197	0.545	0.399	0.383	0.251	*0.319*
Sensitivity	*0.186*	*0.320*	*0.471*	*0.325*	*0.253*	*0.131*	*0.281*
Sensitivity rank	*2*	*4*	*6*	*5*	*3*	*1*	

Note. We assess sensitivity calculating variation coefficients for every diversity measure.

Table VII. Ranking of Russian Regions by the Level of Diversification

Size	*Region*	*Entropy*	*Hachman*	*NAI*	*HHI*	*Variation*	*Hoover*	*Ranking*
7	Republic of Tatarstan	18.7	12.3	12.0	21.7	18.3	18.9	**17.0**
25	Saratov Oblast	22.2	8.5	8.6	24.6	29.5	20.8	**19.0**
19	Irkutsk Oblast	16.6	20.4	20.4	18.4	25.1	14.0	**19.1**
16	Rostov Oblast	23.2	9.2	8.9	26.0	28.4	23.7	**19.9**
9	Republic of Bashkortostan	23.6	14.1	13.9	26.6	23.6	27.2	**21.5**
15	Nizhniy Novgorod Oblast	31.1	7.9	7.9	27.4	26.3	32.8	**22.2**
14	Perm Kray	22.1	20.7	19.9	24.8	22.5	25.9	**22.7**
18	Novosibirsk Oblast	27.6	5.6	4.6	32.9	37.4	28.1	**22.7**
40	Yaroslavl Oblast	20.8	21.1	20.8	25.4	29.1	19.1	**22.7**
38	Udmurtskaya Republic	30.6	12.8	12.1	31.6	28.9	29.3	**24.2**
12	Samara Oblast	25.0	25.0	24.8	26.4	25.6	21.4	**24.7**
23	Omsk Oblast	32.0	17.6	17.0	28.0	26.6	33.6	**25.8**
47	Chuvash Republic	24.9	25.9	25.4	25.4	29.7	28.0	**26.6**
4	Moscow Oblast	30.9	19.3	19.3	34.2	31.3	25.8	**26.8**
22	Leningrad Oblast	21.8	39.0	39.5	24.1	22.4	16.2	**27.2**
71	Republic of Mariy El	26.4	28.3	28.4	26.8	28.9	24.4	**27.2**
43	Tver Oblast	22.4	31.8	31.5	26.8	28.1	23.1	**27.3**
59	Smolensk Oblast	22.0	36.9	36.8	26.1	26.7	19.1	**27.9**
20	Volgograd Oblast	35.4	15.7	16.1	36.1	33.4	32.3	**28.2**
32	Voronezh Oblast	33.5	16.4	16.0	34.0	35.9	34.1	**28.3**
51	Ryazan Oblast	24.8	34.8	34.9	24.9	25.9	27.3	**28.8**
50	Kirov Oblast	22.3	36.7	36.4	27.1	30.7	20.2	**28.9**
56	Bryansk Oblast	34.1	25.4	25.5	32.9	36.0	37.3	**31.8**
53	Penza Oblast	31.6	32.3	31.8	32.6	31.9	35.7	**32.6**
48	Kaluga Oblast	30.5	41.3	41.6	31.0	27.5	28.0	**33.3**
45	Vladimir Oblast	32.2	36.6	36.4	33.6	31.9	30.2	**33.5**
64	Republic of Mordoviya	31.0	45.4	46.0	26.8	26.9	27.6	**33.9**
34	Khabarovsk Kray	35.1	30.7	31.1	35.1	40.8	31.0	**34.0**
8	Krasnodarskiy Kray	37.8	23.2	23.8	40.1	41.2	37.9	**34.0**
49	Ulyanovsk Oblast	32.8	38.3	37.9	34.7	32.9	29.7	**34.4**
46	Kursk Oblast	26.7	48.4	48.3	27.6	25.7	31.8	**34.8**
5	Saint Petersburg City	44.3	19.9	20.3	43.2	38.8	43.0	**34.9**
61	Novgorod Oblast	28.8	49.5	49.6	28.6	26.9	26.5	**35.0**
39	Tula Oblast	37.0	30.7	30.1	32.9	34.4	46.6	**35.3**
35	Altayskiy Kray	38.7	26.4	26.8	42.0	41.9	39.9	**36.0**
63	Oryol Oblast	41.5	33.9	33.9	38.0	37.7	38.4	**37.2**
10	Krasnoyarsk Kray	38.5	35.0	34.1	42.9	43.1	36.9	**38.4**
62	Kurgan Oblast	40.9	31.3	31.2	40.5	45.1	43.1	**38.7**

Size	Region	Entropy	Hachman	NAI	HHI	Variation	Hoover	Ranking
44	Kaliningrad Oblast	36.8	45.6	45.9	36.9	30.6	39.3	**39.2**
1	Moscow City	48.0	21.7	22.4	48.7	51.6	43.6	**39.3**
52	Astrakhan Oblast	40.3	35.6	35.6	41.6	42.8	41.4	**39.5**
37	Tomsk Oblast	43.2	32.1	31.2	45.1	43.3	42.4	**39.6**
76	Republic of Adygeya	36.1	45.1	44.9	39.2	40.1	36.6	**40.3**
6	Sverdlovsk Oblast	42.7	34.9	34.7	47.8	45.3	37.3	**40.5**
67	Kostroma Oblast	26.9	66.2	66.3	29.1	31.1	25.6	**40.9**
27	Belgorod Oblast	39.0	53.4	53.5	33.3	28.4	42.9	**41.7**
17	Kemerovo Oblast	48.2	35.4	35.8	46.1	43.1	50.1	**43.1**
26	Primorskiy Kray	33.6	55.9	56.2	37.7	42.2	34.7	**43.4**
30	Arkhangelsk Oblast	42.7	48.5	49.2	42.6	39.3	40.0	**43.7**
57	Republic of Buryatiya	41.5	49.2	49.3	41.6	41.6	40.8	**44.0**
70	Pskov Oblast	44.4	44.6	44.5	43.2	40.6	49.3	**44.4**
58	Tambov Oblast	48.8	38.6	38.7	45.7	47.2	49.6	**44.7**
13	Chelyabinsk Oblast	46.7	42.7	42.6	51.0	46.9	39.1	**44.8**
21	Orenburg Oblast	48.5	39.0	39.2	51.1	47.4	46.9	**45.4**
60	Republic of Kareliya	36.1	64.5	64.7	34.1	34.8	38.7	**45.5**
69	Republic of Khakasiya	46.1	47.3	47.3	47.4	43.8	44.3	**46.0**
74	Republic of Northern Osetiya – Alaniya	51.4	37.5	38.8	47.0	48.4	53.3	**46.1**
33	Stavropol Kray	48.0	40.3	40.6	47.0	53.0	49.6	**46.4**
73	Kabardino-Balkarskaya Republic	51.2	44.6	44.8	48.0	52.0	54.6	**49.2**
79	Jewish Autonomous Oblast	42.3	68.9	69.0	45.1	41.6	39.3	**51.0**
54	Zabaykalskiy Kray	53.1	49.1	49.2	49.4	52.5	57.4	**51.8**
83	Republic of Altay	53.5	61.4	61.6	47.9	46.9	55.4	**54.5**
42	Republic of Dagestan	61.0	45.3	45.4	56.7	60.7	61.8	**55.1**
31	Republic of Komi	58.2	53.3	53.6	57.0	52.5	57.8	**55.4**
77	Karachaevo-Cerkesskaya Republic	58.3	52.0	52.2	55.6	58.1	58.4	**55.8**
66	Ivanovo Oblast	47.5	66.9	66.8	50.5	56.6	48.8	**56.2**
29	Vologda Oblast	59.4	56.6	56.0	61.1	55.5	56.3	**57.5**
55	Amur Oblast	54.5	64.7	65.0	51.1	55.0	54.6	**57.5**
41	Murmansk Oblast	51.6	75.5	76.4	46.9	47.8	54.0	**58.7**
36	Lipetsk Oblast	63.5	57.5	57.6	62.0	55.8	61.4	**59.6**
68	Kamchatskiy Kray	52.1	76.0	79.3	48.1	49.2	53.6	**59.7**
72	Chechenskaya Republic	65.4	53.3	53.4	64.4	64.5	69.7	**61.8**
80	Republic of Tyva	62.1	69.6	69.7	56.6	63.1	61.1	**63.7**
24	Sakhalin Oblast	62.4	68.4	68.5	66.8	61.5	58.6	**64.4**
28	Republic of Sakha (Yakutiya)	60.0	75.3	75.8	59.6	57.4	60.5	**64.8**
81	Republic of Kalmikiya	65.8	62.8	62.9	63.1	65.9	68.6	**64.9**
2	Tumen Oblast	66.1	65.3	65.2	68.1	64.7	64.3	**65.6**
82	Republic of Ingushetiya	73.4	61.8	63.1	67.8	67.4	73.2	**67.8**
75	Magadan Oblast	63.1	79.6	80.4	61.7	61.8	63.3	**68.3**
78	Chukotskiy Autonomous Okrug	69.0	77.7	79.4	70.1	65.5	70.6	**72.1**
3	Khanty-Mansiyskiy Autonomous Okrug - Yugra	73.6	70.6	70.8	74.7	71.3	75.0	**72.7**
11	Yamalo-Neneckiy Autonomous Okrug	75.5	69.6	69.8	73.4	71.7	77.8	**73.0**
65	Neneckiy Autonomous Okrug	76.3	74.2	74.3	75.2	72.3	76.3	**74.8**

Note. Size is GRP 2008 rank of a region.

Table VIII. Factors of Labor Productivity

2006	FDI.pc	div.Rank	Inv.Loan	Inc.Prop	Intercept
coeff.	0.132	7.978	-812.541	4,316.583	-74.370
st.err.	0.036	1.378	347.632	768.670	57.310
R-sq.	0.55				
prob.	.000	.000	.022	.000	.198
impact	3%	46%	11%	31%	10%
min	0%	19%	0%	0%	4%
max	58%	89%	40%	64%	16%

2007	FDI.pc	div.Rank	Inv.Loan	Inc.Prop	Intercept
coeff.	0.227	8.620	-924.116	5,795.075	-62.719
st.err.	0.034	1.391	340.905	925.085	57.732
R-sq.	0.67				
prob.	.000	.000	.008	.000	.280
impact	5%	43%	12%	33%	7%
min	0%	16%	0%	0%	3%
max	70%	90%	36%	62%	12%

2008	FDI.pc	div.Rank	Inv.Loan	Inc.Prop	Intercept
coeff.	0.279	8.023	-833.378	9,181.888	-24.800
st.err.	0.026	1.180	249.854	936.430	47.445
R-sq.	0.81				
prob.	.000	.000	.001	.000	.602
impact	9%	39%	11%	38%	3%
min	0%	16%	0%	0%	1%
max	70%	95%	31%	70%	5%

Table IX. Factors of Labor Productivity (with Educational Drain)

2006	FDI.pc	div.Rank	Inv.Loan	Inc.Prop	Stud%	Intercept
coeff.	0.123	9.219	-480.647	5,898.131	-5,300.261	-22.610
st.err.	0.034	1.382	350.320	899.217	1,727.776	57.463
R-sq.	0.59					
prob.	.001	.000	.173	.000	.003	.695
impact	2%	39%	5%	30%	22%	2%
min	0%	17%	0%	0%	0%	1%
max	50%	82%	21%	63%	38%	4%

2007	FDI.pc	div.Rank	Inv.Loan	Inc.Prop	Stud%	Intercept
coeff.	0.222	9.756	-613.141	7,857.812	-5,736.655	-4.639
st.err.	0.032	1.358	335.167	1,060.319	1,661.144	57.202
R-sq.	0.70					
prob.	.000	.000	.071	.000	.001	.936
impact	4%	36%	6%	33%	22%	0%
min	0%	14%	0%	0%	0%	0%
max	64%	85%	21%	65%	36%	1%

2008	FDI.pc	div.Rank	Inv.Loan	Inc.Prop	Stud%	Intercept
coeff.	0.260	8.962	-580.119	10,760.346	-3,742.672	12.802
st.err.	0.026	1.187	257.578	1,064.772	1,333.046	47.732
R-sq.	0.82					
prob.	.000	.000	.027	.000	.006	.789
impact	6%	35%	6%	35%	15%	1%
min	0%	13%	0%	0%	0%	0%
max	66%	84%	18%	62%	28%	2%

Table X. Factors of Labor Availability

2006	Inc.Prop	APC	Pre.sch%	Child.st%	Pop.urb%	Intercept
coeff.	0.658	-0.291	0.354	0.219	0.140	-0.002
st.err.	0.174	0.045	0.052	0.047	0.059	0.012
R-sq.	0.90					
prob.	.000	.000	.000	.000	.019	.842
impact	5%	26%	29%	26%	13%	0%
min	0%	0%	8%	21%	7%	0%
max	17%	38%	44%	72%	19%	1%

2007	Inc.Prop	APC	Pre.sch%	Child.st%	Pop.urb%	Intercept
coeff.	0.856	-0.287	0.346	0.209	0.143	-0.002
st.err.	0.211	0.044	0.054	0.047	0.059	0.012
R-sq.	0.90					
prob.	.000	.000	.000	.000	.017	.862
impact	6%	26%	29%	25%	14%	0%
min	0%	0%	9%	21%	7%	0%
max	20%	39%	44%	70%	19%	1%

2008	Inc.Prop	APC	Pre.sch%	Child.st%	Pop.urb%	Intercept
coeff.	1.311	-0.244	0.365	0.179	0.116	-0.003
st.err.	0.260	0.041	0.055	0.045	0.059	0.012
R-sq.	0.90					
prob.	.000	.000	.000	.000	.053	.799
impact	7%	24%	33%	24%	12%	0%
min	0%	0%	11%	18%	6%	0%
max	24%	39%	47%	66%	18%	1%

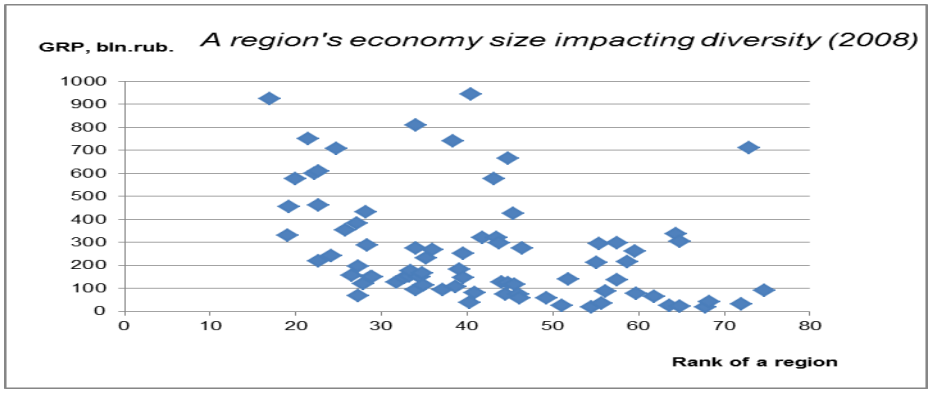

Figure I. GRP and Economic Diversity by Regions

Source: Central Statistical Database of Rosstat, author's calculations.

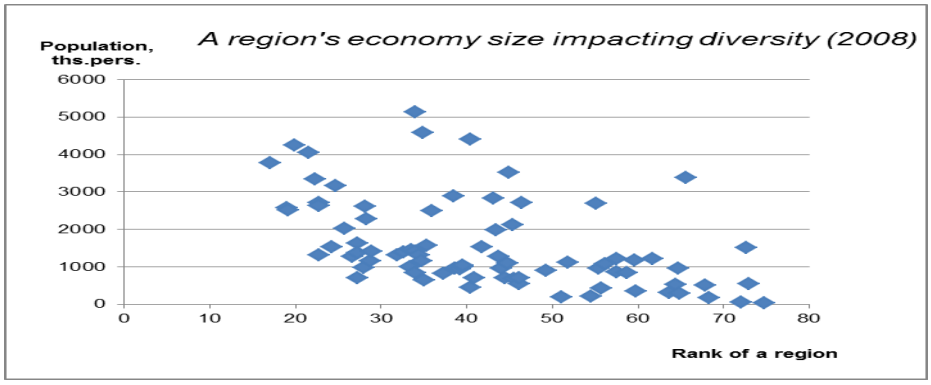

Figure II. Population and Economic Diversity by Regions

Note. For each type of diversity indices, we calculate average from different variables. They are presented in TABLE VII. Final ranking is a simple average from those.

Source: Central Statistical Database of Rosstat, author's calculations.

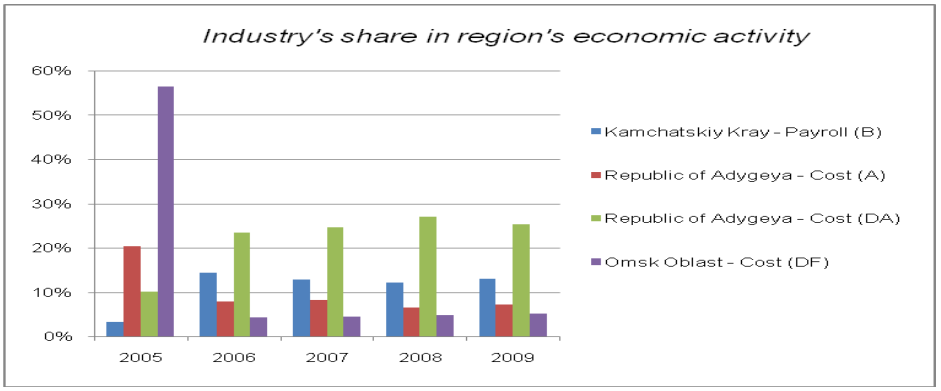

Figure III. Dynamic Incomparability of Data (2005 and 2006)

Source: Central Statistical Database of Rosstat, author's calculations.

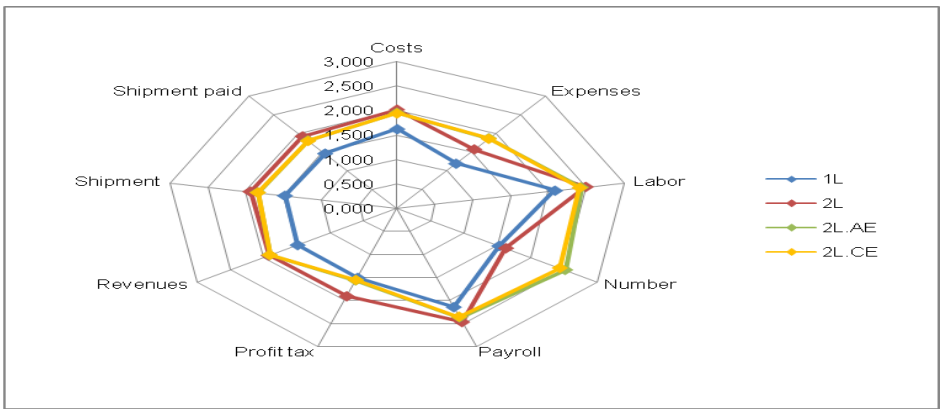

Figure IV. Sensitivity Analysis for Moscow City (2009, Entropy Index)

Source: Central Statistical Database of Rosstat, author's calculations.

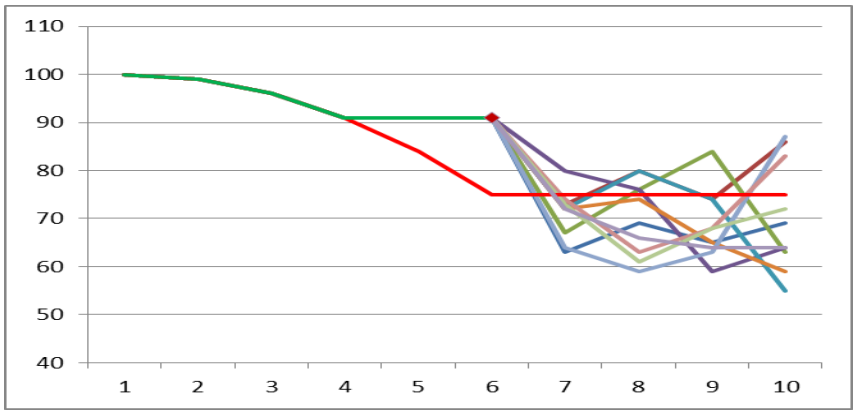

Figure V. Dynamics in a Simple "Kindergarten Economy"

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