

Statistical analysis of the integration activity of industrial enterprises as a basis for development of Russian regions

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Abstract. The article investigates the integration activity of industrial structures in the regions of Russia. The monitoring of the current legal system of the Russian Federation carried out in the area of statistics and compiling statistical databases on mergers and acquisitions showed the absence of formal executive authority dealing with the compiling collections of information on the integration activity at the regional level. In this connection, the data of Russian information and analytical agencies made the information research base. As research tools we used methods of analysis of structural changes, methods of analysis of economic differentiation and concentration, methods of non-parametric statistics. The article shows the close relationship between social and economic development of the subjects of Russia and integrated business structures functioning on its territory. An investigation of the integration activity structure and dynamics in the subjects of the Russian Federation based on statistical data revealed the increasing heterogeneity of the integration activity of business structures in the regions of Russia. The research results are of practical importance, since they can be used to improve existing federal programs aimed at evening-out disproportions in the social and economic development of Russian regions.

Introduction

Issues relating to the problems and prospects of economic integration in the contemporary world can be attributed to debatable issues. At the same time, the world practice shows that the large companies form the aggregate supply and demand, determine the most important prerequisites for winning in the competition [1]. The integration of production on global scales at the level of modern business structures is inherently a market phenomenon. It acts as a competitive strategy and at once is a manifestation of a self-organizing system in the market competitive environment. At the same time, as M. Lubatkin points out, there is a bilateral interaction. On the one hand, integration processes may affect the market formation; on the other hand, the integration is a reaction to the market [2].

It is effectually to start the study of the integration activity of business structures in the regions of Russia with the specification describing its fundamental categories. A further empirical analysis is impossible without this methodological step. The term "economic integration" appeared in the works of German and Swedish economists in the 1930s, but today the general integration theory has not yet been created. Theoretical schools, focusing attention on specific aspects of the integration process, give different definitions to the integration as an economic phenomenon. Therefore, traditionally there are different approaches to the interpretation of the key categories characterizing the

integration process. According to one of the most capacious definitions that are presented in Great Dictionary of Economics of A. B. Borisov, integration (from Latin integer - whole) is the association of economic subjects, their cooperative extension, and the development of relationships between them. At the same time, economic integration takes place both at the level of national economies of the whole countries and between business structures.

Thus, according to authors V. L. Bersenov, S. G. Vazhenin, and A. I. Tatarin, despite the multiplicity of integration types they result in two options, depending on the subject composition of participants:

- territorial (interstate, interregional) integration initiated by central and local administrative authorities;
- industrial integration initiated by enterprises and organizations - the subjects of business (economic) activity [3].

In this connection, economic integration in this article refers to industrial integration, which is realized by business structures through the mechanism for executing integration transactions.

According to the synergetic paradigm describing the development of complex systems, evolutionary processes are based on the property of these systems to regulate the internal structure by strengthening the relationship between the structural elements. The application of this attitude to the investigation of the industrial integration process allows us to define the concept of integration activity as economic activity of

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business entities aimed at providing extension and enhancement of interaction, relationships, and cooperation towards the fuller use by economic entities of their competitive advantages and obtain a synergistic effect from the merger.

Historically, the investigation of specific features in the development of Russia's corporate integrated business structures, problems of social and economic development of Russian regions are carried out largely independently from each other; different scientists, experts and various research and analytical structures are engaged in it. Therefore, despite the fact that a number of research studies of the integration activity of economic entities at the level of the Russian economy have been recently published (I. G. Vladimirova, YU. V. Ignatishin, S. V. Gvardin, M. M. Musatova, N. B. Rudyk and others), the analysis of the integration activity of business structures in Russian regions largely disregards. The integration activity of business structures in Russian regions deserves study that is more intent. In addition, integration transactions at the level of regions are of particular interest to the analysis, since the largest vertically integrated structures are donors of the budget of roughly a quarter of all regions of Russia.

Integration transactions have a significant influence on the economic entity's internal corporate environment. This, in turn, begins to affect the external institutional environment, consisting of economic, social, and political constituents of a particular region where integration projects are implemented [4]. For this reason, business structures affect social and economic development of the region transforming the structure and system of the regional budget, as well as indicators of its strategic development, in general, through the mechanism of the implementation of integration transactions.

Due to the specific features of historical and economic formation of the Russian Federation, economic globalization leads to disproportions in the development of its territories resulting in the concentration of financial control levers and an excessive accumulation of capital assets in a limited number of regions and its lack in others [5]. In terms of territorial aspect, the problem of increased separation of regions appears and, consequently, a conflict of interests between "leading" and "lagging" subjects of the Russian Federation emerges.

Thus, the problem of investigating the differentiation of regional differences in social and economic indicators, including the integration activity of economic entities, becomes of special importance for Russia. Moreover, investigation in this area should be based on comparable statistics, since only in this case continuity research can be carried out.

1 Review of sources of statistical information relating to the integration activity of business structures

When monitoring existing Russian legislation in the field of statistics and compilation of statistical databases it

should be noted that, there is currently no federal law that gives a single concept of statistics on mergers and acquisitions, order and principles of formation of statistical databases on the integration activity. The rules governing integration transactions are distributed in various normative legal acts of the Russian Federation.

The fact that there is no formal executive body that is entrusted with a comprehensive compilation of information on integration activities in Russia confirms also and the lack of a single state policy in the field of official statistical accounting for mergers and acquisitions. At the same time, the author thinks that the statistical information system of the integration activity of business structures in the regions of Russia generally seems to be a necessary element of the information system of the state. This provides the government, ministries, organizations, and the public with official data on transactions related to transferring ownership of assets and capital from one owner to another.

It is necessary to solve organizational tasks related to the collection and processing of data on mergers and acquisitions in the regional context in order to improve statistics in the field of the integration activity of business structures:

- the improvement of normative and legal acts of the Russian Federation governing the collection and processing of statistical data on integration transactions of economic entities;
- the enhancement of international cooperation within the framework of statistics on mergers and acquisitions due to greater integration of Russia into the process of data exchange on M&A transactions;
- the improvement of data sources by using surveys of head offices of integrated business structures as a source of information on the integration activity.

The implementation of the recommendations reviewed would significantly improve the quality of Russian statistics on integration activities of economic entities both in the regional and federal context due to full coverage of accurate real-time data, and actual level of detail.

In this situation, various information and analytical agencies are engaged in data collection on integration activities of economic entities in the Russian Federation. Information agencies take into account transactions in which the purchaser and (or) the company acquired are Russian, that is the companies doing main business in the regions of the Russian Federation [6,7]. They publish data that indicate the lower bound of cost and quantitative volume of integration transactions and in many cases they are contradictory since their collection are based on various guidelines; disclosure of share package value (shares) in the majority of transactions is not acceptable, so the use of experts may be necessary to estimate it.

The expert and analytical group M&A-Intelligence (agency Mergers and Acquisitions from the second half of 2013) and ReDeal Group are the most authoritative analytical agencies in Russia engaged in the monitoring of Russian market for corporate control.

Agency Mergers and Acquisitions (Russian M&A-agency) in addition to collection and collation of

information on the integration activity of business structures provides in-depth research of the market for corporate control in Russia. The database is updating with daily frequency. Moreover, the journal of Mergers and Acquisitions agency is currently the only Russian analytical edition that is entirely devoted to mergers and acquisitions, business and capital centralization, corporate control; it highlights the problems of legal and illegal market of M&A, the problems associated with protection from corporate takeovers.

The data of analytical group ReDeal Group, established in 2004, may serve the information base for practical analysis of mergers and acquisitions. In 2011, there was the merger of ReDeal Group and Cbonds Information Agency. The database of analytical group ReDeal Group is updated daily and contains information on more than 10400 of integration transactions amounting to more than 620 billion dollars USA.

A database of integration activities of economic entities in the regions of the Russian Federation for the period from 2003 to 2014 was compiled based on statistical data of the analytical group M&A-Intelligence, and allows you to receive the following information:

- the date of settlement of the integration transaction;
- the object of merger and acquisition transaction;
- the amount of merger and acquisition transaction;
- sectoral affiliation of the integration transaction;
- territorial location of the object of the M&A transaction;
- the purchaser;
- territorial location of the purchaser in the M&A transaction.

2 The results of statistical investigations of the integration activity of business structures in the regional context

If we analyse the contribution of each federal district to a national amount of merger and acquisition transactions concluded in 2014 that the Central and Volga Federal District are leading and Southern and North Caucasus Federal District are outsiders. The main share in the number of integration transactions, concluded by the Central federal district comprising 18 subjects, belongs to Moscow (93.08% of the total M&A transactions in this district). Moscow is leading in the number of merger and acquisition transactions concluded and planned in financial, trade, metallurgy, construction, and transport sectors. A significant proportion of transactions is with foreign participation [8].

The maximum share in the number of M&A transactions concluded by the Northwest Federal District comprising 11 regions belongs to St. Petersburg (77.85%), Novgorod region (6.95%), and the Pskov region (6.78%). St. Petersburg is characterized by the

integration activity primarily in the financial and food sectors. There is a little volume of large transactions concluded, small and medium businesses are the most popular among investors.

In order to study the mobility of structural changes of the integration activity of regions in the federal context we will analyse structural changes according to the terms "the number of merger and acquisition transactions concluded." An analysis of the relative linear structural change with a permanent comparison base shows that the structural changes in all federal districts of Russia for the period from 2003 to 2014 are characterized as large structural changes. The distribution of federal districts in 2014 according to the value of the linear structural change with a permanent comparison base (2003) is shown in Figure 1.

An analysis of Figure 1 reveals that the Southern and Far Eastern Federal Districts are characterized by the largest structural changes in the quantitative volume of the market for corporate control as in the case of cost volume of the regional M&A market.

This may be explained by the fact that in the federal districts there are many production assets both being stuck in bankruptcy and subject to sale and dynamic and attractive to investors.

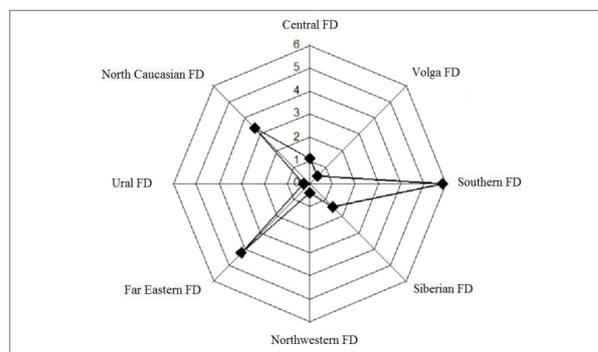


Fig. 1. Linear relative structural changes (basic) in quantitative volume of the M&A market in the context of federal districts.

The smallest structural changes in the quantitative volume of the merger and acquisition market describe the Ural and Northwest federal districts. The dynamic changes in the linear coefficient of absolute structural changes in the Ural Federal District for the period from 2003 to 2014 allowed us to reveal the sharp increase in this rate accounting for 2009, when 28 integration transactions were concluded of 3.955 billion dollars of the total sum. Chelyabinsk region made the main contribution concluded 13 transactions amounting 2837.70 million dollars, most of which falls on metallurgy industry.

The dynamic changes in the linear coefficient of absolute structural changes in the North-West Federal District for the period from 2003 to 2014, calculated by the number of merger and acquisition transactions, allowed us to draw conclusion that the sharp increase in this rate accounts for 2010. It was the year, when 51 integration transactions were concluded with a total value of 3.305 billion dollars. Vologda region and St. Petersburg made the main contribution. The transactions

of metallurgical holding Severstal OJSC were the most significant in 2010 in Vologda region.

To avoid cancellation of different specific weight changes of individual elements by sign in the total [9,10] quadratic relative structural changes have been calculated in the structure of the number of M&A transactions and cost value of M&A market in the federal section in 2014 to the crisis of 2009. An analysis of the data shows that all of the federal districts of Russia reduced their integration activity because of the financial crisis. At the same time, the structure of the merger and acquisition market in terms of "cost volume of the M&A market" has undergone more significant changes than the structure of the market in terms of "the number of M&A transactions" in 6 of 8 federal districts.

Many foreign researchers noted the impact of macroeconomic factors on mergers and acquisitions. For example, Wu Changqi, Xie Ningling [11] argued that merger and acquisition transactions are dependent on the external environment that is on such factors as economic growth (crisis), the degree of competition, political and economic changes. Some researchers emphasize the importance of non-economic factors namely political, legal, and others [12].

Thus, in 2008-2009 in implementing large-scale one-off strategic mega transactions (worth over 1000 million dollars) there was a significant amount of might-have-been transactions costing less than 100 million dollars USA, which were agreed before the financial crisis:

- the purchase of a controlling interest of Kyivstar. Es. Em. CJSC by Vimpel-Communications OJSC for 9999 million dollars;
- the buy-out by AFC System OJSC of 8.3% of the shares of Bashkirnefteprodukt OJSC, 51.5% of the shares of Bashneft, 59.1% of the shares of Novoil OJSC, 43.4% of the shares of Ufaneftekhim OJSC, 52.97% of the shares of Ufaorgsintez and 48.15% of the shares of Ufimsky Refinery Plant OJSC for 2500 million dollars;
- the buy-out by the Deposit Insurance Agency of 30% of the shares of Rostelecom from the bank KIT Finance for 230 roubles per 1 share. The total amount (package consisted of 218,600,000 ordinary shares) DIA spent was 1580 million dollars;
- the purchase by VTB Bank OJSC of the territory of the Moscow Stud Farm for 2400 million dollars;
- the purchase by Rostelecom OJSC of 25% + 1 share of Svyazinvest OJSC and 100% of shares of Sky Link CJSC for 1560 million dollars.

During the crisis, Russian business structures have significantly reduced the scope of export expansion and focused on the domestic market in order to solve the problems of debts and restructuring of its assets. Residents sat on the fence, and determined if the gap between asking price expectations and sales price expectations reduced or eliminated, and, in connection with those, they were in no hurry to get access to the regional markets [13].

Less significant changes for the period from 2009 to 2014 in the structure of the M&A market took place in the North-West Federal District. Maximum decrease in terms of "cost volume of the M&A market" was

observed in the Far East Federal District, and in terms of "the number of M&A transactions" was in the Siberian Federal District.

To confirm the hypothesis of a significant divergence of mergers and acquisitions of corporate structures in the Russian regions we consider dynamics of changes in the coefficients of the inequality of the integration activity, calculated in terms of "cost volume of merger and acquisition market" for quintile (20 per cent) groups of regions for 2003-2014. The fifth quintile group (leading regions) includes such subjects as Moscow, Moscow region, St. Petersburg, Yamalo-Nenets Autonomous District, Republic of Tatarstan, Chelyabinsk region, and others. In general, the data in Table 4 provide the vision of the concentration process of the integration activity of business structures in the subjects of the Russian Federation.

In the period from 2003 to 2014, the share of the fourth quintile group remained relatively constant. At the same time, there was a decrease in the share of the first, second and third quintile groups - from 7.39% to 5.76%; that is to say, it declined by 1.28 times for 10 years under study. The most significant decrease was in the share of the least integration activity of the first quintile group of regions - from 1.27% to 0.60%, that is it decreased by 2.12 times. At the same time, the share of the most active integration of the fifth quintile group increased by 1.03 times.

Along with the terms the "share of quintile group in the total value of cost value of the M&A market", it is advisable to use special factors, which comprehensively characterize the phenomenon under consideration, in order to analyse the concentration by regional groups. The index of concentration (Gini coefficient) is among these special parameters.

The calculation of the Gini coefficient is based on building the Lorenz curve that characterizes the cumulative characteristic under study depending on cumulative elements. The more the Lorenz curve deviates from a diagonal line, the greater is the degree of inequality in distribution of the integration activities together with analysable subjects of the Russian Federation. This degree of inequality in distribution is expressed as the ratio between the area of the figure, enclosed by the diagonal of the square and the Lorenz curve, to the area of the triangle equal to 0.5. This ratio is defined as the Gini coefficient (factor) [14].

According to the approach of V. A. Litvinov, the Gini coefficient, determining the deviation degree in actual distribution of the existing integration activity from the line of their possible equal distribution and comprehensively characterizing the integration process of activity concentration in groups of subjects of the Russian Federation only indirectly reflects the actual concentration in the narrow sense of the word, that is an intention to "pull" the entire integration activity of economic entities in one region [15].

With all that said, they suggested to use the Herfindahl index when analysing the concentration in the study of regional integration activity of business structures:

$$K = \sum_{i=1}^5 d_i^2 \quad (1)$$

where d_i is the proportion of each group of regions in the total value of the M&A market.

This index varies from 0 to 1. In contrast to the Gini coefficient, the Herfindahl index is an indicator of "direct action" and is indifferent to the line of theoretically possible equal distribution [16]. In other words, the Herfindahl index takes the unequal distribution of the integration activity as an axiom, and its changes reflect the changes in the existing proportions between groups, that is, the ratio of the proportion of individual groups of regions in the total value of cost value of the merger and acquisition market. At a given (constant) number of groups, the increased Herfindahl index in the current period compared with that for the base period directly indicates the increased concentration; that is the increased concentration of the integration activities of business structures in any single group of regions.

In the analysed period from 2003 to 2014, the Gini coefficient showed high values, exhibiting unequal distribution of the integration activity of the subjects of the Russian Federation. The highest value of the Gini coefficient accounts for 2007 ($G_{2007}=0.92$), the lowest value accounts for 2011 ($G_{2011}=0.74$). In the period from 2003 to 2014 the Herfindahl index did not fall below a value equal to $K_{2005}=0.76$ that indicates high concentrated integration activity (in 2014, there has been an increased concentration of activity on the integration of 7.58% compared to 2013).

The Gini coefficient and the Herfindahl index when characterizing the concentrated integration activity of economic entities by the regions of the Russian Federation indirectly reflect the overall differentiation measure of M&A-activity in Russian regions. However, we should not confuse concentration as the centralization of something with a differentiation as the distinction (difference) of parts of the whole. We define differentiation, above all, as different varying characteristic (the volume of total value of the M&A regional market) as a weighted value in the outermost groups. Consequently, the Gini coefficient and the Herfindahl index cannot be directly used to characterize the different integration activity, and therefore, it is necessary to apply special indicators such as quantile differentiation coefficients when studying it.

The decile differentiation coefficient is the ratio of the value of the regional volume of merger and acquisition market, higher and lower of which 10%, respectively, of the most and least integration active Russian regions are located [17]. The resulting decile differentiation coefficient equal to the ratio of the 9th and 1st deciles made $D_{2014}=168$ in 2014, that is, the minimum cost volume of the market for corporate control of 10 % of the most integration active subjects exceeds the maximum cost volume of M&A market of the less integration active regions of the Russian Federation over 168 times.

Thus, the Russian economy is characterized by deformed spatial structure of the integration activity of business structures in the regions. Both state and regional development policy in the field of the integration activity does not have enough influence to even out imbalances in the distribution of the ways for implementing integration projects. All this shows the need of activation policy in the field of the integration activity of the Russian business structures in the regions of the Russian Federation. One of the tools to achieve this goal is the adoption of approved documents at the regional level, which are relevant to international best practices (in particular, the Code of Good Practices on Fiscal Transparency, the Code of Good Practices on Transparency in Financial Policy, Regional Resources Management Guidelines, and others).

Business structures are an inherent part of economic development in modern conditions. They work in virtually all sectors of the economy and implement their projects in a significant number of regions [18]. At the same time, interregional differentiation manifests itself in the distribution of the number of enterprises and organizations (according to the state registration), which directly affect the integration activity.

The Central Federal District (40.76% of the total Russian enterprises and organizations) is the main leader, where Moscow (64.35%) and the Moscow Region (11.84%) make the great contribution. In 2014, they accounted 76.19% of all enterprises and organizations in the region. This is followed by the Volga and North-West Federal District (15.08% and 12.32% of the total Russian number, respectively), where the Republic of Tatarstan (14.66%), Samara region (13.95%) and St. Petersburg (57.9%) made the largest contribution.

Consolidated budget revenues consist of corporate profit tax, personal income taxes, property tax, and grant revenues. Tax payments of Russian holdings contribute significantly to the formation of the main economic indicators of the national economy and the individual territorial units. Let us analyse the statistical relationship between the amount of mergers and acquisitions of Russian business structures and tax contribution by the Federal Districts based on nonparametric statistics.

The use of the most appropriate rank correlation methods, in particular Spearman's rank correlation coefficient, is effectual in studying the relationship of quantitative characteristics by nonparametric statistic methods [19, 20]:

$$\rho = 1 - \frac{6 \sum_{i=1}^n (d_w - d_c)^2}{n^3 - n} \quad (2)$$

where n is a number of observations; d_w is the Federal District rank abreast of the amount of M&A transactions by the Federal Districts; d_c is the Federal District rank among the tax contribution by the Federal Districts.

The power of Spearman's rank correlation coefficient is inferior to the power of parametric correlation coefficient; however, taking into account the relatively small quantity of observations, this method gives results

that are more accurate. This coefficient varies from -1 to 1. The closer its absolute value to one, the closer is relationship between characteristics. According to available data for 2014, Spearman's rank correlation coefficient is equal to 0.7823 that indicates the presence of a well-established and direct relationship between the amount M&A transactions and tax contribution (a significant p-value <0,05).

Thus, we can conclude that the integration activity of the Russian business structures is one of the key factors that influence the formation of the vector, trends, and strategies for economic development of the regions of the Russian Federation. Reduced differences in economic development create favourable conditions for the development of an internal market and optimization of social and economic transformations while differential aggravation hinders carrying out a unified policy in institutional reforms and forming common national market and increases the threat of regional crises and interregional conflicts.

Conclusions

Thus, on the one hand, integration processes of business structures reach significant proportions; on the other hand, the role of the state (the region) as an active subject of the economic impact is often reduced to the monitoring of the dynamics of macroeconomic indicators. The imperfection and divergence of the legal system in Russia are of particular importance in this process, resulting in the state inability to form the necessary basis for property relations as a fundamental element in the search for sustainable development at all levels, including regional.

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