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Assessment and Analysis of the Cost of Debt Changes after Domestic Russian Mergers and Acquisitions

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ABSTRACT

The study analyzes the impact of domestic Russian mergers and acquisitions on the cost of debt for companies involved in deals. The author systematized the existing findings in this area in developed and emerging markets. The methodology developed by the author for analyzing the impact of mergers and acquisitions on the cost of debt considers the specifics of the Russian market and can be used in conditions of limited information about non-public companies. The estimation of the cost of debt is based on synthetic credit ratings of the companies involved in the deal and the corresponding yield spreads between corporate and government bonds. The methodology was tested on a sample of 73 domestic deals completed in 2014–2016. Random effects model with robust standard errors was used to test the significance of factors affecting the cost of debt. This research makes several practical contributions. First, in the studied sample, deals lead to an increase of the cost of debt by 3,1% within a year after the deal. Second, significant factors affecting the change in the cost of debt after domestic Russian mergers and acquisitions were identified. The cost of debt is reduced by the purchase of large companies during the period of economic growth. There is a significant impact of the deal value on the increase of the cost of debt. Company management, academic researchers and experts can use research results to assess potential deals of mergers and acquisitions on emerging markets. The developed methodology can be applied to mergers and acquisitions in other countries to analyze the features of these markets.

Keywords: mergers and acquisitions; synergy; credit rating; risk premium; corporate bonds; risk-free interest rate; cost of debt; strategy

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INTRODUCTION

Mergers and acquisitions are important strategic decisions for companies. A large number of assets is involved in deals annually: in 2018, the global M&A market reached $ 4.1 trillion1.

In 2015–2018, the Russian M&A market was characterized by stagnation. Adopted in March 2014, the economic sanctions against Russia led to a decrease in deals initiated from abroad and to a decrease in domestic activity in the market due to the limited access to capital for many Russian companies. Low oil prices and ruble devaluation at the end of 2014 further limited activity in this market.

The value of 652 M&A deals recorded in 2018 in Russia stood at $ 51.7 billion, down 3 times on the figure for 2012 in value terms. The market has traditionally been dominated by domestic deals, which accounted for 65% of the market

[1] Morgan J.P. 2019 Global M&A Outlook. URL: https://www.jpmorgan.com/jpmpdf/1320746694177.pdf (accessed on 02.04.2019).

in value terms in 2018[2]. Many M&A initiatives were postponed due to uncertainty about the future development of the economy.

In this context, the analysis of the prospects of potential transactions and, when possible, a more accurate assessment of possible synergy became very important in the Russian market. Today, there are virtually no studies analyzing domestic Russian mergers and acquisitions involving non-public companies to identify synergies.

Therefore, the issue of developing tools for empirical analysis of domestic Russian transactions, considering the specifics of the national M&A market and applicable in conditions of limited information about companies is of interest.

This study is focused on developing such tools and testing them on a sample of 73 domestic deals completed in 2014–2016 to assess the factors affecting the synergy through lower costs of debt.

DEFINITIONS

Definitions of mergers and acquisitions are widely represented in the literature. Contrary to Anglo-Saxon law and foreign scientific literature, this concept has different meanings in Russian law.

According to foreign authors, the merger is when one of the companies involved in the transaction ceases to exist, and the acquisition is when the target company can continue as a subsidiary [1, p. 23–28; 2, p. 5–7; 3, p. 924, 925].

In Russian law, a merger is one of the five forms of reorganization under the Civil Code, and there is no such a term as "acquisition"[3]. Here, a merger corresponds to what is called "consolidation" in foreign literature, when a new company is the result of a deal[4].

This study determines mergers and acquisitions based on control over the investee. Control refers to the right, received as a result of a transaction, to determine the financial and operational policies of a company in order to derive benefits from its activities[5].

Owning more than 50% of the target company's shares after the transaction was sufficient for control. The analysis of control in a buyout was conducted according to the Guide to the International Financial Reporting Standard (IFRS) 10 "Consolidated Financial Statements".

In general, it was assumed that owning 40–50% the target company's shares was sufficient for control with high diversification of the shares of the remaining shareholders, but insufficient for control with two or three other large shareholders with a total share larger than the considered block of shares. The transaction was excluded from further analysis if there was no information on the share capital structure.

The target company can be liquidated as a result of a transaction with the consolidation of assets and liabilities or saved as a subsidiary of the acquirer.

Most authors generally define synergy as an additional cost created as a result of a business consolidation and inaccessible to companies separately [1, p. 44; 2, p. 25].

For the purposes of this study, synergy was defined as the reduction in the cost of debt of the consolidated company after the transaction compared to the consolidated indicators of the companies separately before the transaction.

This approach to determine M&As and synergies allows analyzing transactions involving non-public companies that prevail in the Russian market in quantitative and value terms.

PREVIOUS STUDY

M&As may be motivated by seek to reduce the cost of capital and to increase the value of a consolidated company.

The cost of debt is a source to reduce the weighted average cost of capital. The reduction

[2] KPMG. M&A market in Russia in 2018. URL: https://assets.kpmg/content/dam/kpmg/ru/pdf/2019/02/ru-ru-ma-survey-feb-2018.pdf (accessed on 02.04.2019).

[3] Civil Code of the Russian Federation (Part 1) No. 51-FZ as of November 30, 1994 (updated on December 29, 2017). P. 57.

[4] Federal Law N 208-FZ of December 26, 1995 on Joint-stock companies (updated on 07.03.2018). P. 16.

[5] International Financial Reporting Standards (IFRS) 10 "Consolidated Financial Statements" (enacted in the Russian Federation by Order No. 217n) (updated on 27.06.2016). P. 7.

in the cost of debt in the result of the transaction may happen for several reasons: access to new, cheaper sources of debt financing, consolidation of the company, improved financial stability of the company, etc.

The cost of debt generally depends on three variables:

- Risk-free rate as the lower bound of the cost of debt for all companies. If the risk-free rate increases, the cost of debt for all companies increases.
- Company default risk. For high-risk companies, the cost of debt is higher.
- Tax benefits due to the need to pay interest on taxable profits. Tax benefits increase with increasing tax rates.

The literature uses several methods to assess the cost of debt, depending on the characteristics of debt financing companies.

For companies issuing long-term and liquid bonds in the debt market, the estimated yield to maturity of such bonds can be used as the company's cost of debt.

Companies with illiquid bonds in circulation are usually subject to rating. For such companies, the cost of debt can be estimated by the default spreads associated with credit ratings.

For companies with no credit rating, there are two ways to estimate the cost of debt. First, if the information is available, one can use the history and parameters of the company's bank (and other financial institutions) debt. Second, one can assign a synthetic rating according to the financial data of the company, evaluate the default spread and calculate the cost of debt.

Table 1 shows the methods to estimate the cost of debt in a number of recent empirical studies. Depending on the databases, research objects and countries, the authors apply all of the methods to estimate the cost of debt described above.

In the literature on synergies in M&As, authors usually distinguish three main groups of factors for creating and destructing synergies: macroeconomic factors, characteristics of the deal and characteristics of the companies involved in the deal.

Macroeconomic factors include the dynamics of real gross domestic product (GDP) in the country of the deal, the state of the main sectors at the national and global levels, inflation, the national currency, interest rate changes and other variables.

Improving macroeconomic conditions may lead to an increase in the M&A market. For example, work [10] showed a positive correlation between the country's GDP growth rate and the volume of international M&As three years before and after the 2008 global economic crisis. Most of the selected 26 countries observed correlation, including developing countries such as Brazil, India, Malaysia and Russia.

In some studies, macroeconomic factors may be insignificant for the success of transactions. Study [11] analyzed 132 mergers and acquisitions involving banks in Asia and Latin America between 1998 and 2009. It demonstrated that the influence of inflation and the GDP growth rate in the country of the acquiring company is insignificant for the accumulated excess return on its shares.

The characteristics of the transaction include the attitude of companies to the transaction, the nature of integration, nationality, size of the transaction and other parameters.

The attitude of companies to the transaction can be hostile or friendly. Usually hostile transactions involve an additional premium to the market price of the target company compared to friendly transactions, which reduces the synergy of the transaction. On the other hand, hostile transactions are meant to reach significant goals, from which management expects high synergy.

The second factor in synergy creation may be the nature of integration. Horizontal transactions can create synergies by gaining greater market share (strengthening market power) and economies of scale. Vertical transactions are aimed at strengthening control over the value chain, and synergy arises from the reduction in the cost of products or services.

Studies show that both types of transactions can lead to synergies. Work [12] studied a sample of 259 horizontal and vertical transactions in

Table 1

Recent empirical studies on debt valuation

Study	Valuation method	Country	Industry	Year
[4]	Information on bank debt	USA	All industries except banks	1990–2004
[5]	Credit rating and corresponding default spread	All countries	All industries	1973–1998
[6]	Yield to maturity of traded bonds	EU	Companies with state participation in all sectors	2001–2009
[7]	Yield to maturity of traded bonds	USA	All industries except banks and regulated industries	2002–2007
[8]	Yield to maturity of traded bonds	All countries	All industries except banks	1988–2006
[9]	Information on bank debt	28 countries in the world	All industries, except banks and state companies	2005–2012

Source: author's analysis based on the referenced studies.

the US mining and manufacturing industries in 1963–1978. After antitrust authorities reviewed the horizontal transactions6, the excess return accumulated over the month on the shares of the acquiring company was 2.45%. At the same time, there is no statistically significant difference between excess returns in horizontal and vertical transactions left unattended by antitrust authorities.

The impact of the transaction nationality on synergy attracts much attention of academic and practice-oriented research. Transactions can be national (domestic) and international (cross-border). International transactions can occur in companies in developed or developing countries. There are mixed transactions when one company is located in a developed country, and the other — in a developing one. Work [13] reviews the recent studies of this issue.

In most studies, increasing size of the transaction is associated with synergy destruction. For example, work [14] noted a negative correlation between the size of the transaction and the company's operational efficiency after the transaction. This may be due to systematic overpayment when acquiring large companies.

The characteristics of the companies participating in the transaction include transaction cost, size of the acquiring company (asset value), financial results, business legal structure, ownership concentration, type of ownership and other parameters.

The academic literature offers different opinions about the impact of the company size on synergy creation. According to one hypothesis, acquiring a large company can create conditions for economies of scale and other types of synergies. On the other hand, large deals can destroy synergies due to complex integration of a large company into a common business system.

In empirical studies, the size of the companies participating in a transaction is often presented as the relative transaction cost or the ratio of the transaction cost to the market value of the acquiring company (or the book value of its assets for non-public companies). Exemplified by 271 acquisitions of more than $ 100 million

[6] The United States Federal Trade Commission or the United States Department of Justice Antitrust Division.

in 1971–1982, study [15] described a positive correlation between the relative transaction cost and the share of subsequent downsizing transactions. The risk of unsuccessful integration and a subsequent sale of the asset rises if the transaction cost increases relatively to the value of the acquiring company.

Asymmetric information between the parties has a significant impact on the decision whether to conduct the transaction, as well as its results. Transactions can be successful for the acquirer when they have the most complete information about the target (public target company) and disclose a minimum of information about themselves (private acquiring company).

The high equity ownership concentration of the acquiring company has a positive effect on synergy creation due to the mitigation of agency conflict between managers and owners of widely held companies. Providing a sample of 228 M&As in India in 1995–2004, the authors of study [16] showed that a high ownership concentration in acquiring companies contributes to synergy creation after their transactions.

In developing countries, government participation in companies' equity can contribute to synergy creation through greater administrative influence on the market. On a sample of 1,148 transactions in China in 1998–2003, study [17] demonstrated that for the Chinese market, the share of state ownership in the capital of the target company is a significant factor in synergy creation.

RESEARCH HYPOTHESES

The analysis of synergy in M&As resulted in five hypotheses below.

To test the influence of macroeconomic factors on the cost of debt in domestic Russian transactions, the study uses GDP growth in the Russian Federation in constant prices.

This variable was used to test *hypothesis 1 (GDP growth)*: *economic growth helps reduce the cost of debt in domestic Russian transactions.*

The data on the real GDP growth rate were received from the website of the Federal State Statistics Service of the Russian Federation.

To check the effect of transaction characteristics on the cost of debt in domestic transactions, the study used companies belonging to the same industry (dummy variable) and transaction size (natural logarithm of transaction cost in millions of dollars).

A dummy variable equals to 1 if the transaction is horizontal (both companies operate in the same industry) and to 0 for other industries. Belonging both companies to the same industry was determined by the two-digit OKVED code in the SPARK database in the section "Main activity type".

These variables are used to test two hypotheses about the influence of macroeconomic factors on the cost of debt:

Hypothesis 2 (type of transaction): the cost of debt after a transaction between companies within one industry reduces more than after a transaction between companies from different industries.

Hypothesis 3 (transaction size): larger transactions lead to an increase in the cost of debt (hypothesis of overpayment compared to the fair cost of the target).

The data on the transaction size were received from the Mergermarket database, the data on the revenue of the companies — from their financial statements or from the SPARK database.

Two variables are used to study the significance of the characteristics of companies on the cost of debt in domestic transactions: the target size (natural logarithm of the book value of the assets) and the share of the largest shareholder in the capital of the acquirer. These variables are used to test two hypotheses about the effect of company characteristics on the cost of debt:

Hypothesis 4 (target size): acquisition of larger companies contributes to lower cost of debt.

Hypothesis 5 (acquirer's agency conflict): a high ownership concentration in the share capital of the acquiring company helps reduce the cost of debt.

The data on the size of assets, publicity and state participation were received from the financial statements of the companies or from the SPARK database.

Table 2

Research hypothesis

Hypothesis	Variable	Expected impact	Study
1. Economic growth contributes to synergy creation	Real GDP growth in the Russian Federation	+	[11]
2. Synergy in transactions between companies within one industry is higher than in transactions between companies from different industries	Dummy for transaction type	+	[12]
3. Larger transactions lead to the destruction of synergy (hypothesis of overpayment for the target)	Natural logarithm of the transaction cost	–	[14]
4. Acquiring larger companies contributes to synergy creation	Natural logarithm of the value of the target's assets	+	[15]
5. High ownership concentration in the share capital of the acquiring company contributes to synergy creation	Share of the largest shareholder in the capital of the acquirer	+	[16]

Source: author's analysis.

Table 2 systematized the hypotheses for empirical research, proxy variables for an econometric model, anticipated impact, and the key studies for each hypothesis.

SAMPLE

The information for the sample was collected from several commercial databases (Mergermarket, SPARK-Interfax, Bloomberg), open government data (Rosstat, the Central Bank of the Russian Federation), as well as unstructured information from the websites of the companies participating in the transaction, rating and information agencies.

The primary data on domestic Russian M&As completed from January 1, 2014 to December 31, 2016 were collected from Mergermarket.

The Mergermarket database contains information about the dates of the announcement and completion of the transaction, names and industries of the companies participating in the transaction, transaction characteristics (public or private, cross-border or domestic, mergers or acquisitions), payment method and transaction cost, a brief description of the transaction and links to primary sources of information.

The general population includes 309 completed domestic transactions in the reporting period. Transactions between companies in regulated sectors and the financial sector were excluded from the general population due to the peculiarities of reporting and profitability in these sectors.

Next, the data on the financial indicators of the companies participating in the transaction were collected from the SPARK-Interfax and Bloomberg databases. The financial data used in the analysis included: revenue, operating profit, general costs for ordinary activities and interest payable. The annual profit and loss statement of the companies were the primary source of financial information for the SPARK-Interfax and Bloomberg databases.

The sample included the financial indicators of the companies for seven years: three years before the transaction was completed, the year the transaction was completed and three years after its completion. If during the seven years one of

Table 3

Excluded transactions and the final sample

Reasons for excluding transactions	Number of transactions
General population	309
No required financial statements	59
Transaction does not change the proprietary shareholder	57
Transaction between companies in the financial industries	43
Value of target assets less than 5% of acquirer's assets	24
Transaction between companies in regulated industries	15
Cross-border transaction	14
The acquirer ceased operations within a year after the transaction	9
Transaction is the acquisition of individual assets	6
Other reasons (duplicates, lack of information about the acquirer, etc.)	9
Final sample	73
Change in controlling shareholder	50
Consolidation	23

Source: author's analysis.

the companies or both of them participated in another M&A transaction, ceased operations or did not publish the financial statement necessary for the analysis, the author reduced the period to obtain comparable data.

The considered period cannot be less than three years (a year before the transaction, the year of the transaction and the year after the transaction). Synergy was assumed to appear within no longer than three years after the transaction is completed.

The transactions were also excluded if the book value of the assets of the target company in the year the transaction was completed amounted to less than 5% of the acquirer's assets. Following studies [18] and [19], it was assumed that the transaction has a significant impact on the acquirer's financial statement only under this condition.

Table 3 provides the details of all reasons for excluding transactions from the general population when collecting data.

In the final sample, the author separated the transactions that were a change in the controlling shareholder and did not imply the integration of activities of individual companies. This group includes transactions initiated by private individuals, investment companies and large diversified holdings.

The final sample contains 73 transactions that occurred in total for 3 to 7 years, as well as 446 individual observations. *Table 4* provides descriptive statistics on the main indicators of companies participating in the transactions included in the final sample, in the year of the transaction.

Assets, revenue and profitability of target companies and acquiring companies vary significantly. On average, acquiring companies are 16 times larger in assets and 8 times larger in revenues than target companies are.

ASSESSING COST OF DEBT

The cost of debt assessment in the study is based on synthetic credit ratings of participating companies and the corresponding yield spreads between corporate and government bonds.

Table 4

Descriptive statistics for companies in the final sample (in the year of the transaction)

Indicator (mln rubles)	Number	Average	Median	Min	Max	Standard deviation
Target companies						
Assets	73	28 173	6343	102	456 457	63 483
Revenue	73	24 507	4770	28	475 542	65 488
Operating profit	73	1472	246	–9179	59 175	7878
Percentage to be paid	73	969	125	0	12 499	2122
Operating cash flow	68	979	221	–29 252	50 735	8467
Acquirers						
Assets	23	468 808	20 681	1480	9 953 401	2 067 987
Revenue	23	191 824	13 386	0	3 930 140	815 416
Operating profit	23	3212	1023	–9678	34 481	7827
Percentage to be paid	23	16 385	319	0	358 112	74 502
Operating cash flow	22	–4808	86	–128 566	16 708	28 101

Source: author's analysis.

In the context of the depreciation of the ruble and sanctions against the Russian Federation, the tables of correspondence of debt coverage ratios and yield spreads, based on data from developed markets[7], may not be applicable to domestic Russian transactions, especially to the ones completed after 2014.

To solve this problem, the author compiled a similar table only for Russian public companies according to their financial statements for 2017, credit ratings, bond yields and default spreads (risk premiums) on February 20, 2019. A risk premium refers to the difference between yield to maturity of corporate bonds and zero coupon yield of government bonds of the Russian Federation with the same duration indicators.

Compiling the table and applying the obtained data to assess the cost of debt by non-public companies includes three stages.

The first stage determines the risk-free debt rate according to the yield on government bonds of the Russian Federation. The values of the yield curve on the last business day of each month were received from the website of the Central Bank of the Russian Federation[8] for the period from January 1, 2012 to February 20, 2019. The data on the website are based on the parametric model of the zero coupon yield curve of the Moscow Exchange[9]. *Table 5* presents the results.

The second stage forms a database linking the actual credit ratings of companies, interest coverage ratios and risk premiums. As in the sample of mergers and acquisitions, financial institutions and companies from regulated industries were not included in the database.

The yield to maturity and duration database is based on bond issues by companies with an ACRA national rating (Analytical Credit Rating Agency). The agency was established on Novem-

[7] For example, URL: http://pages.stern.nyu.edu/~adamodar/New_Home_Page/valquestions/syntrating.htm (accessed on 20.02.2019).

[8] The website of the Central Bank of the Russian Federation. URL: https://www.cbr.ru/hd_base/zcyc_params/ (accessed on 20.02.2019).

[9] The website of the Moscow Exchange. URL: https://www.moex.com/a3642 (accessed on 20.02.2019).

Table 5

Government bond zero coupon yield curve (average per year), %

Years to maturity	0.25	0.50	0.75	1.00	2.00	3.00	5.00	7.00	10.00	15.00	20.00	30.00
2012	6.0	6.2	6.3	6.4	6.8	7.1	7.5	7.8	8.0	8.3	8.5	8.7
2013	5.8	5.9	5.9	6.0	6.2	6.3	6.7	7.1	7.5	8.0	8.3	8.8
2014	8.0	8.3	8.5	8.6	9.2	9.5	9.6	9.6	9.6	9.5	9.5	9.4
2015	10.5	10.8	11.1	11.2	11.5	11.6	11.5	11.4	11.1	10.7	10.4	9.9
2016	9.5	9.5	9.4	9.4	9.2	9.1	8.9	8.8	8.8	8.8	8.8	8.9
2017	8.2	8.1	8.1	8.0	7.9	7.8	7.7	7.7	7.8	8.1	8.3	8.8
2018	6.8	6.8	6.9	7.0	7.2	7.4	7.6	7.8	8.0	8.2	8.3	8.6

Source: author's calculations based on the Central Bank of the Russian Federation data https://www.cbr.ru/hd_base/zcyc_params/ (accessed on 25.11.19).

ber 20, 2015. The list of its shareholders includes 27 major Russian companies and financial institutions each holding a share of 3.7% of its share capital, which totals over RUB 3 bln10.

The choice of a national rating agency instead of an international agency is due to the need to obtain ratings considering the specifics of the Russian market and the formation of a wider sample, especially among companies without an international investment rating.

The risk premium is estimated for each credit rating according to the yield curve of government bonds of the Russian Federation and corporate bond issues. To calculate the risk premium, they use the data on the yield of government bonds of the Russian Federation with the closest duration to the corresponding issue of corporate bonds. If there are several bond issues with the same rating, the risk premium for the credit rating is defined as a simple average value between all relevant bond issues.

The interest coverage ratio corresponding to the credit rating and default spread is calculated according to the consolidated annual financial statements of the company for 2017, compiled in accordance with international financial reporting standards.

$$\text{Interest coverage ratio} = \frac{\text{Operating profit}}{\text{Interest payable}}. \quad (1)$$

Formed at the second stage, the database includes 54 bond issues in circulation with market data on yield to maturity on February 20, 2019, organized by 13 companies with ACRA credit ratings and financial statement according to international standards for 2017. *Table 6* shows the relationship between credit ratings, interest coverage ratios and risk premiums.

The third stage assesses the cost of debt of the companies participating in the transaction. The interest coverage ratio before the transaction is calculated for companies considering the data of both companies separately and for the consolidated company after the transaction.

$$\text{Interest coverage ratio}_{i,t} = \\ = \frac{\text{Operating profit}_{iacquirer,t} + \text{Operating profit}_{i_{target},t}}{\text{Interest payable}_{i_{acquirer},t} + \text{Interest payable}_{i_{target},t}}. \quad (2)$$

The interest coverage ratio after the transaction is calculated according to the data of the consolidated company.

[10] The website of the Analytical Credit Rating Agency (ACRA). URL: https://www.acra-ratings.ru/about (accessed on 20.02.2019).

Table 6

Relationship between corporate credit ratings, interest coverage ratios and risk premiums in Russia

ACRA credit rating	Companies in the sample	Outstanding bond issues	Average debt coverage ratio	Spread to risk-free return (risk premium)
AAA	PJSC Gazprom JSC Russian Railways PJSC Gazprom Neft FSUE Russian Post	18	4.56	0.72%
AA	JSC Federal Passenger Company PJSC MegaFon PJSC Rostelecom	13	3.94	0.84%
A	LLC Tape PJSC KAMAZ	7	2.11	0.93%
BBB	JSC Garant-Invest Commercial Real Estate PJSC PIK Group JSC Avangard-Agro JSC Samolet Group	16	1.64	3.06%

Source: author's analysis.

$$\text{Interest coverage ratio}_{i,t} = \\ = \frac{\text{operating profit}_{i_{consolidated\ company},t}}{\text{interest payable}_{i_{consolidated\ company},t}}, \quad (3)$$

where i — is the transaction index; t — is the index of the observation year. For the transactions where the acquiring company does not publish consolidated financial statements, consolidation was carried out according to the financial statements of both companies.

Each calculated interest coverage ratio was assigned a corresponding risk premium based on the actual data from the second stage of the assessment.

Risk premiums for companies with credit ratings below the investment level were extrapolated based on actual data by a polynomial trend line of the third degree (*Fig. 1*).

CCC credit rating and the corresponding risk premium of 14.0% was assigned to companies with interest coverage ratio of less than 0.5%. Companies with the interest coverage ratio of more than 4.56% got AAA credit rating and the risk premium of 0.7%. The risk premium for companies with the interest coverage ratio of 0.5%-4.56% was calculated according to the formula in *Fig. 1*.

The cost of debt of a company was calculated for each year as the total of the average yield of three-year government bonds of the Russian Federation for the corresponding year and the estimated risk premium of the company.

HYPOTHESIS TESTING

The object of econometric analysis was an unbalanced data panel $\{y_{it}, x_{it}\}$, where y is the cost of debt; x — is possible factors of cost change; i is the M&A index; t — is the time index (years of monitoring companies before and after the transaction).

A random effects model was used to assess the significance of factors changing the cost of debt. The choice of this model is associated with the presence of time-invariant variables and was confirmed by the Breusch-Pagan and Hausman tests.

Due to the presence of heteroscedasticity, the model was evaluated with robust standard errors of the coefficients to obtain effective and consistent estimates of the coefficients. The Stata 15 program was used for the evaluation.

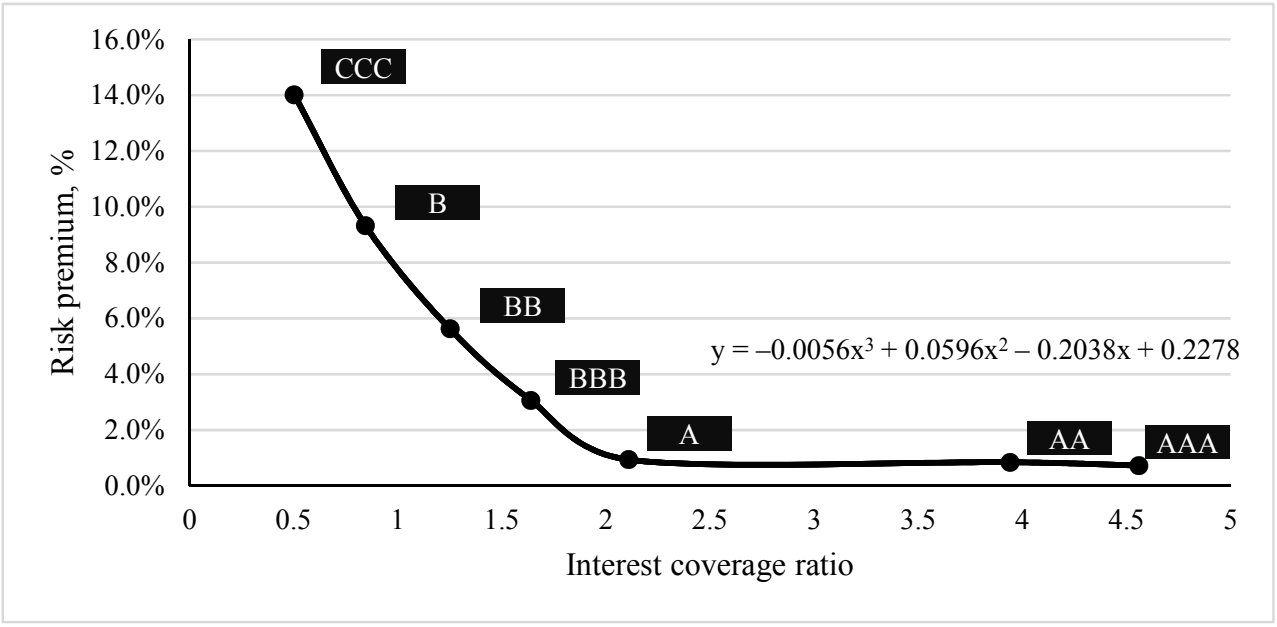

Fig. 1. **Dependence of risk premium on interest coverage ratio in Russia**

Source: author's analysis.

The general model equation is as follows:

$$cost\_of\_debt_{it} = \alpha + hypothesis_{it}\beta_1 + control_{it}\beta_2 + u_i + \varepsilon_{it}, \quad (4)$$

where *cost_of_debt* — is the estimation of the average cost of debt for the companies participating in the transaction; *hypothesis* — is a set of indicators to test hypotheses (factors changing the cost of debt); *control* — is a set of benchmarks.

The stability of the results was tested in two ways.

First, the basic model was evaluated separately with three groups of control variables: transaction characteristics, target and acquirer. The control characteristic of the transaction includes the equity share of the target after the transaction. The control characteristics of the target and the acquirer include operating cash flow, capital costs and the correlation of cash flows of companies. For the acquirer, the effect of the asset value, the presence of a foreign shareholder and the state in the equity capital was tested additionally.

Second, the basic model was evaluated separately, according to the observations only a year after the transaction was completed. The result helps determine the presence of a significant structural change in the data after the transaction, which affects the conclusions from the model evaluation for the entire observation period.

RESULTS

Fig. 2 shows the dynamics of the cost of debt over seven years of monitoring companies. *Table 7* presents average, median, minimum and maximum values of the cost of debt and the number of observations.

Almost all the companies in the sample have a low interest coverage ratio. In the transaction year, the average risk premium is 5.1%. According to the proposed methodology, it corresponds to the BB speculative credit rating. The estimated average cost of debt for the entire sample per transaction year is 15.9%.

Transactions lead to an increase in the cost of debt in the short term (in the year of the transaction and one year after), but after two years there is a tendency to a reduction in the cost of debt. Three years after the transaction, the cost of debt for the consolidated company returns to the level observed in the period prior to the transaction.

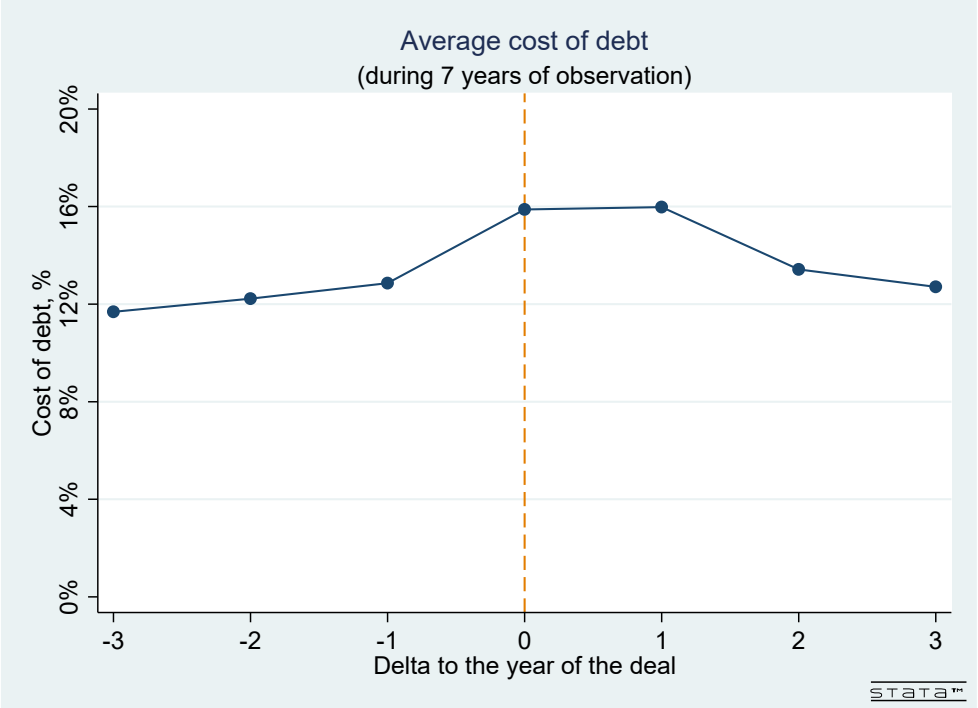

Fig. 2. **Average cost of debt for companies engaged in transactions during the entire research period**

Source: author's analysis.

Table 7

Descriptive statistics for the cost of debt for every year

Delta to the year of the transaction, years	Number of observations	Average, %	Median, %	Min, %	Max, %
–3	62	11.7	8.2	6.9	21.1
–2	68	12.2	9.6	6.6	23.5
–1	73	12.9	10.2	6.5	25.6
0	73	15.9	12.3	9.4	25.6
1	73	16.0	12.4	8.5	25.6
2	62	13.4	9.8	8.1	23.1
3	35	12.7	8.6	8.0	21.8

Source: author's analysis.

Table 8 presents the results of econometric testing.

The results demonstrate that acquiring large companies during the period of economic growth contributes to lower cost of debt. A 1% increase in the value of the target's assets leads to a reduction in the cost of debt by 0.8% according to the basic model. A 1% increase in the real GDP growth rate leads to a reduction in the cost of debt by 1.2%.

Transaction cost is associated with the destruction of synergy. A 1% increase in transaction cost leads to a 2.7% increase in the cost of debt after the transaction. The negative effect from increasing the transaction cost by 1% is 3.4 times higher than the positive effect

Table 8

Coefficient estimation results for the model

Variable	(1) Baseline model	(2) Baseline model after transaction	(3) First group of control variables	(4) Second group of control variables	(5) Third group of control variables
Basic model parameters					
GDP growth rate	−1.235*** (0.250)	−0.977*** (0.125)	−1.235*** (0.250)	−1.241*** (0.223)	−1.362*** (0.348)
Horizontal transaction	−0.005 (0.012)	−0.004 (0.015)	−0.003 (0.013)	−0.008 (0.011)	−0.015*** (0.004)
Natural logarithm of transaction cost	0.027*** (0.004)	0.036*** (0.006)	0.028*** (0.003)	0.028*** (0.003)	0.027*** (0.002)
Natural logarithm of the target's asset value	−0.008* (0.004)	−0.012* (0.007)	−0.009** (0.004)	−0.007* (0.005)	−0.013*** (0.005)
Ownership concentration in the acquirer's capital	0.053 (0.042)	0.051 (0.043)	0.051 (0.044)	0.070* (0.039)	0.129*** (0.017)
Control characteristics of the transaction					
Share in the capital of the target after the transaction	–	–	−0.020 (0.032)	–	–
Control characteristics of the target					
Natural logarithm of the operating cash flow of the target	–	–	–	−0.003 (0.003)	–
Natural logarithm of the capital costs of the target	–	–	–	0.002 (0.002)	–
Control characteristics of the acquirer					
Natural logarithm of the acquirer's asset value	–	–	–	–	0.021*** (0.007)
Natural logarithm of the acquirer's operating cash flow	–	–	–	–	−0.009* (0.005)
Natural logarithm of the acquirer's capital costs	–	–	–	–	−0.008*** (0.002)
The state in the acquirer's capital	–	–	–	–	−0.005 (0.005)
Foreign shareholder in the acquirer's capital	–	–	–	–	0.012*** (0.003)
Cash flow correlation	–	–	–	–	−0.016** (0.006)
Control variables	Not included	Not included	Included	Included	Included
Constant	0.027 (0.053)	0.030 (0.061)	0.053 (0.066)	0.012 (0.052)	−0.092*** (0.024)
Number of observations	446	243	446	446	446
Number of transactions	73	73	73	73	73
Statistical significance test (chi-square)	0.0000	0.0000	0.0000	0.0000	0.0000
Coefficient of determination	0.593	0.777	0.597	0.606	0.880

Source: author's analysis.

Note: Heteroscedasticity — robust standard errors are in brackets. The significance level of the regression parameters: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

from increasing the target's asset value by 1%, which may indicate that the acquirers overpay for the transaction in the context of lower cost of debt.

The ownership concentration in the acquirer's capital and the transaction type are not significant in the basic model.

To verify the stability of the results, the author additionally tested the basic model for observations after the transaction completion and three modifications of the model with control variables: with the transaction characteristics, with the characteristics of the target and with the characteristics of the acquirer.

Verification of the stability of the results confirms most of the estimates obtained in the basic model. In all control models, the GDP growth rate of the Russian Federation, the value of target assets and the transaction cost are significant with a level of at least 10% without changing the sign of the coefficient.

In the model modification with the transaction characteristics, the impact of the correlation of the free cash flows of the target and the acquirer on the cost of debt was also checked. This is due to the assumption that improved financial stability may occur after a transaction between companies with a negative correlation of cash flows. Testing confirms the presence of a significant inverse relationship between the correlation of cash flows and the cost of debt.

CONCLUSIONS

The result of the study was the assessment of the significance of factors changing the cost of debt after domestic Russian M&As by the proposed method. The object of the study was Russian companies directly involved in M&As in Russia in 2014–2016.

The author generalized the previous study results regarding the M&A impact on the cost of debt.

Based on existing studies, the author proposed an approach to estimating the cost of debt considering the Russian specifics and estimated the cost of debt over seven years of monitoring the companies participating in the transaction. He developed an econometric random effects model and assessed the significance of factors changing the cost of debt.

Besides the scientific results, the study developed a number of practical recommendations. Acquiring large companies during a period of economic growth contributes to the reduction of the cost of debt. There is a significant effect of transaction cost on the increase in the cost of debt.

The developed methodology can be applied to M&As in other countries to analyze the specifics of these markets. Another direction for the study development may be to improve the model describing the relationship between the interest coverage ratio and the cost of debt for companies with speculative credit ratings.

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