Dependence of the Capital Structure of Russian Transport Companies on the Type of Transport Used

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Abstract—the purpose of the study is to assess the impact of sales profitability level on the formation of the structure and the weighted average cost of capital of companies in the transport industry of Russia, depending on the type of transport used. The research methodology is based on financial analysis, correlation and regression analysis. The research base included data on 33 Russian companies.

For the purpose of the study, all companies was divided into groups: road transport; railway transport; water transport; and companies that work in partnership with transport companies.

For selected company groups hypothesis testing on the dependence of funding sources weight of ROS and the weighted average cost of capital from cost of sales was carried out. The impact of return on sales on capital structure decisions has been partially proven; a strong relationship between the two hypotheses has been found for two groups of companies. The most significant factor reflecting the level of influence on the capital structure was the level of profitability.

The originality of this research consists in assessing the impact of sales profitability level for the formation of the structure and weighted average cost of capital of companies in the transport industry

Keywords: capital structure, weighted average cost of capital, return on sales, financial analysis, correlation and regression analysis, the transport industry

I. INTRODUCTION

The transport industry plays an important role in the development of the country's economy. At the same time, capital structure management is an important task in any enterprise, regardless of the industry. An incorrect decision on the funding sources share can significantly affect the creditworthiness of the company, the level of risk of insolvency, financial stability and opportunities for its further development. For the company to be successful in the short and long term, it is necessary to analyze the current and future capital structure, calculate various risks and opportunities in order to maintain market share and maintain its own competitiveness

A. Problem statement

This research is devoted to the study of 33 Russian transport companies. The sample of the companies was formed with the perspective the greatest contribution of these companies in the GDP of the country and considering occurrence data of companies in different ratings that characterize the most successful. Companies engaged in the road transportation of goods, rail, water transport, as well as companies that do not have their own vehicles for the transportation of goods and carry out their activities on the basis of stable partnerships with companies that have their own vehicles, which allows them to create effective logistics systems that take into account all the features of the cargo.

The financial statements of the companies included in the sample were taken for the period from 2013 to 2017. The choice of the period is justified by the period of existence of the studied companies, limited to a period of 5-6 years, which did not allow to collect data for earlier periods of time; the complexity of obtaining financial reporting data for later periods; the inclusion of most of the studied companies in various ratings of subjects of the transport industry in Russia.

It was found that, despite the affiliation of all the studied companies to the same industry, the financial results of companies of different groups (engaged in road transport; engaged in rail transport; engaged in water transport;

providing logistics services) differ significantly. There was a problem to identify the relationship between the results of financial and economic activities of each group of companies in the transport industry with the structure and weighted average cost of capital.

B. Hypotheses

The following hypotheses were formulated for transport companies in the framework of the study:

- Hypothesis 1. The share of funding sources depends on the profitability of sales.

It is known that at a low level of revenue and, accordingly, profit, the company may not have enough own funds to cover current expenses. In this case, the company is forced to increase short-term debt capital, for example, in the form of a Bank loan, or deferred payments, that is, an increase in accounts payable in the structure of liabilities. Since most of the companies in the sample are Limited Liability Companies, it is unlikely that the costs will be covered by capital gains (contributions from the founders) and therefore was not considered in the analysis.

The profit of companies in the context of division into groups is formed under the influence of various factors. Only some of these factors the company can control-fully or partially. Therefore, in addition to identifying the dependence of the funding sources share on the profitability of sales it is necessary to identify how much this dependence is stronger in a specific group of companies (companies were divided into groups by types of transport used).

- Hypothesis 2. The weighted average cost of capital depends on the return on sales.

This hypothesis follows from the first hypothesis, since the change in the shares of financing sources, provided that the cost of equity and debt capital differ, directly affects the weighted average cost of capital.

C. Literature review

In the financial management theory, capital is the most important element of a company's activity, since its composition and structure determine its present and future development. The theory of capital structure is widely discussed in the scientific literature. Thus, the author from China Lanli Zhao presented an analysis of the works of financial scientists on the structure of capital as economic thought develops [1]. The scientist showed that the modern theory of capital structure uses the achievements of game theory and information economy, and the analysis of capital structure is based on the theory of Agency costs, the theory of signal transmission and the theory of higher-order Finance. Lanli Zhao also highlighted the macro, industry, corporate and institutional levels at which scientists consider the factors that affect the capital structure.

Modern corporate Finance is based on the theory of valuation of the company's capital. The weighted average cost of capital is presented in a number of fundamental works on corporate Finance by foreign scientists Richard a Brealey,

Stewart C Myers, Franklin Allen [2], A. Damodaran [3], S. Benninga [4], and others.

Based on the fundamental works of scientists devoted to the study of the structure of capital, modern authors set new challenges. Thus, Pablo Fernandez investigated the optimal capital structure with two examples-Harvard business school and Damodaran [5]. Murray Z. Frank and Tao Shen empirically found that the weighted average cost of capital is important for corporate investment, and the form of impact depends on how the cost of capital is measured. The Authors identified cases of incorrect use of the weighted average cost of capital formula and incorrect calculations of values for it [6].

Most of the research on capital structure has been done on the example of companies from developed countries. However, recently there are more works that explore companies operating in emerging markets. For example, scientists from Egypt M. Fayez, A. A. Ragab and M. Moustafasoliman studied the factors related to the ownership structure and affecting the capital structure on the example of 50 largest non-financial companies registered on the Egyptian stock exchange in the period from 2012 to 2017 [7]. The hypotheses put forward by the authors explaining the relationship between the structure of property and the structure of capital were partially confirmed. The impact of the company's age and size was also partially confirmed.

There are a number of works by Russian authors devoted to the problem of choosing the optimal ratio between own and borrowed sources of financing. Of particular interest is the monograph edited by Ivashkovskaya [8]. The authors of the monograph studied companies in the emerging markets of Brazil, Russia, India, China and South Africa and identified the factors that determine the choice of financing sources by companies in emerging markets. In this paper, we used a methodology for constructing a linear regression, where the indicator of the capital structure was used as a dependent variable, and the factors that influence the capital structure of the company were taken as independent variables.

Elena Makeeva and Tatiana Kozenkova [9] and Yevgeny Ilyukhin [10] are devoted to the problems of the impact of taxation on the capital structure of Russian companies. Elena Makeeva and Tatiana Kozenkova studied the impact of taxation on the capital structure of Russian companies using the Graham model. They proved that it is more appropriate to include an effective tax rate in the model, rather than using a marginal tax rate, since it is more applicable to Russian companies. Yevgeny Ilyukhin conducted an empirical analysis based on panel data from Russian private (not listed), non-financial and non-state companies. He proved that taxation has a significant impact on a firm's financial leverage (negative in terms of long-term debt and positive in terms of equity), and also found that the smallest and largest firms are much more responsive to effective tax rates.

M. S. Kokoreva and N. S. Nikiforov presented the results of a study of the capital structure of companies operating in emerging capital markets, taking into account the business cycles of the economy [11]. Using data from 581 companies from BRICS countries for 2002-2014, the authors found that

the target capital structure is created under the influence of one set of factors, both during periods of economic growth and during periods of recession. The authors found that the speed of adaptation to the target capital structure depends on the stage of the business cycle of the economy, and that the direction of influence of the determinants of the speed of adaptation varies depending on the state of the economy, whether it is in a state of economic growth or decline.

I. Kokoreva and M. Ivanova investigated the riddle of zero debt in emerging markets, using a sample of firms from Eastern Europe during 2000-2013 [12]. The results obtained by the authors are consistent with previous studies of firms from developed markets. The article proves that firms experiencing financial constraints do not use debt as a result of credit rationing, while financially unfettered firms deliberately avoid debt in order to maintain financial flexibility and avoid incentives for underinvestment. The authors also concluded that firms that strategically avoid debt perform better financially than firms with leverage. The study of the problem of choosing zero debt was continued in the work of D. V. Iliasov and M. S. Kokoreva [13]. In a sample of companies from 21 countries with emerging capital markets for the period from 2010 to 2015, the authors observed that the choice of capital structure policy is primarily driven by the motive of financial flexibility. As a second motive, the authors identified financial constraints. The paper reveals that the main determinants of the choice of zero debt are growth opportunities, business risk, profitability of the company and the availability of the company's funds. The authors found that intra-corporate factors are more important when choosing zero debt than macroeconomic conditions.

E. A. Fedorova, E. Yu. Persidskaya investigated the influence of internal factors on the capital structure at different stages of the life cycle of Russian companies [14]. The authors used the multiple regression method to identify internal factors affecting the capital structure of Russian public companies in nine industries: mining, industry, electricity and gas supply, construction, wholesale and retail trade, transport, agriculture, real estate operations and telecommunications. The authors established the influence of the company size and the level of return on assets on the capital structure of public companies at the stages of growth and decline. It was also found that such determinants as the short-term tax shield, the liquidity ratio and the level of business risk were significant for the Russian market.

Problems and features of the development of the transport system of the Russian Federation are analyzed in the works of V. I. Prusova, V. V. Beznovskaya, V. V. Prozumentova [15], Yu. S. Kozlova [16], R. R. Latypova, V. V. Yushkova, A. N. Kirillov [17]. The authors conclude that it is necessary to introduce innovative technologies in the transport industry.

V. N. Filina proposed to combine market instruments of transport development with mechanisms of state regulation in order to develop the transport industry, taking into account the system-forming role of transport in the economy, geopolitics, and social sphere of the country and regions [18]. The development of the domestic transport industry is promoted by modernization projects of the transport complex restructuring,

implemented in accordance with the Transport strategy of Russia for the period up to 2030 [19]. The government has developed a number of measures that require significant investment in the development of the transport industry [20].

II. METHODS

The research results are based on General scientific methods of analysis and synthesis, methods of financial analysis and statistical methods of research.

To confirm the hypotheses formulated in the work, correlation and regression analysis was used, which allowed to establish the relationship between the results of financial and economic activity of the transport industry company and the capital structure, as well as the weighted average cost of capital. Correlation and regression analysis were carried out using the program "IBM SPSS Statistics".

III. RESULTS

At the beginning of the study, it was assumed that, despite the affiliation of all the companies studied to the same industry, the financial results of their activities will differ by group, since each group of companies has its own factors. As factors it is possible to allocate a condition and extent of highways and the Railways, congestion and development of ports, etc. This assumption as a whole was confirmed by the coefficient analysis which has shown various sizes of key financial indicators, and also differences in tendencies and regularities of their development.

For companies of each of the four groups, the transport industry was studied the following parameters: the proportion of equity capital, short-term and long-term liabilities, accounts payable, deferred revenue, sales profitability level, net profit profitability level, financial leverage effect, weighted average cost of capital. The coefficients of financial leverage, autonomy, financial stability and maneuverability were also calculated.

The analysis showed that for all groups of companies the indicators differ from the industry average. For road transport companies, the differences were in sources of financing; a higher value of profitability and weighted average cost of capital compared to the industry average, and lower values of non-current assets compared to the industry average.

By contrast, railway transport companies showed a low level of profitability, but showed growth in all financial indicators.

Companies engaged in transportation by sea, showed higher values for most indicators compared with the industry average, which allowed us to conclude about the high level of efficiency of the companies of this group.

The peculiarity of the companies providing logistics services was that they had the amount of borrowed capital several times more than their own capital. The positive value of the maneuverability coefficient indicated small shares of non-current assets, which is explained by the fact that companies do not use their own fixed assets for transportation of goods.

In General, the analysis concluded that the industry is in decline, as many key indicators of companies were at low levels. It is important to understand that the development of the transport industry is associated not only with the effective management of companies ' resources, their flexibility and ability to respond to market changes in a timely manner. First of all, the development of the transport industry depends on the measures carried out by the state aimed at stabilizing and stimulating companies and their activities within the framework of significant state programs according to "The Concept of long-term socio-economic development of the Russian Federation for the period up to 2020" and "Transport strategy of the Russian Federation for the period up to 2030" [20].

When testing Hypothesis 1 on the dependence of the share of financing sources on the sales profitability, the correlation and regression analysis assessed the capital structure by means of financial leverage, that is, the ratio of borrowed capital to own. Return on sales for the analysis was calculated on net profit, as it was necessary to take into account the amount of funds that the company at the end of the period will be able to use for their own needs or reinvest. Thus, it was expected to establish the following relationship: the lower the level of profitability, the greater the need for the company is in borrowed capital.

Since Hypothesis 2 on the dependence of the weighted average cost of capital on return on sales follows from Hypothesis 1, provided Hypothesis 1 is confirmed, it was expected that correlation and regression analysis will show how the change in the level of profitability subsequently affects the weighted average cost of capital of the company. The analysis of this hypothesis is also carried out in the context of groups of companies.

Since the analyzed data are the values of financial coefficients for a certain period of time, the Pearson coefficient was chosen as a measure of the linear relationship between variables to determine how proportional the variability of indicators is.

As a result of the correlation analysis using the program "IBM SPSS Statistics" Pearson correlation coefficients of profitability of sales and financial leverage were calculated for each group of companies studied, which were summarized in a common table (TABLE I). TABLE I uses special notations. The following names correspond to the numbers of groups of companies: "1" - "carrying out road transport"; "2" - carrying out rail transport; "3"- "carrying out water transport"; "4" - "providing logistics services". Pearson correlation coefficient of profitability of sales and financial leverage is denoted by Kcorr (ROS), R2-coefficient of determination, F-f-statistics:

A. *Conclusions on the first group*

Pearson's correlation coefficient shows 8.6%, which suggests that the change in the financial leverage ratio is very weakly dependent on changes in the profitability of sales in relation to companies engaged in transportation by road.

Since the presence of a relationship between the variables selected for the study is a prerequisite for the regression

analysis, then in relation to this group of companies, the regression analysis will not be presented, since the relationship revealed by the results of the correlation analysis is very low.

TABLE I.   TEST RESULTS HYPOTHESES 1

Group number	Statistical indicators		
	Kcorr (ROS)	*R2*	*F*
1	0.086	0.007	0.022
2	-0.382	0.146	0.511
3	-0.12	0.014	0.044
4	-0.358	0.128	0.440

B. *Conclusions on the second group*

The value of the correlation coefficient is more significant, compared to the first group, the relationship between the indicators is really doing. The negative value of the correlation coefficient indicates an inverse relationship between the indicators: the lower the profitability ratio, the higher the financial leverage. This confirms the hypothesis, since at a low level of profit, obviously, there is an increase in debt capital.

Since the correlation analysis revealed the relationship between the indicators (although not very strong), in this case a regression analysis should be carried out to obtain a more accurate idea of the relationship of these indicators.

The results of the regression analysis show a weak dependence. The significance of the regression model is higher than the accepted level of error probability (5%). In General, it is impossible to conclude that this regression can be accepted as significant, and therefore, even if there is a correlation based on the results of correlation analysis, there is no accurate confirmation of the reliability of this relationship.

C. *Conclusions on the third group*

The correlation coefficient shows the expected negative relationship between the coefficients, but the closeness of this relationship, as in the first group of companies, is extremely weak, and therefore no regression analysis was conducted for this group of companies.

D. *Conclusions on the fourth group*

The correlation coefficient also demonstrates a negative relationship between the indicators, which is strong enough for regression analysis for this group of coefficients.

Despite the fact that the correlation coefficient has taken a relatively high value, the coefficient of determination is quite low, and the significance of the results of this analysis, on the contrary, is much higher than the acceptable level, in connection with which it is not possible to make an unambiguous conclusion about the relationship between the indicators for this group of companies.

Despite the fact that the regression analysis did not show significant results, Hypothesis 2 was tested for the companies that demonstrated the highest value of the correlation

coefficient. Since Hypothesis 2 follows from the first hypothesis, the groups of companies for which the calculated tightness of communication was close to zero were not analyzed to test Hypothesis 2.

Hypothesis 2 was also tested using IBM SPSS Statistics. As a result, Pearson correlation coefficients of return on sales and weighted average cost of capital were calculated for the second and fourth groups of studied companies, which were summarized in a common table (TABLE 2). TABLE 2 uses special notations. Numbers of groups of companies correspond to the following names "2" - Carrying out railway transportation; "4" - "providing logistics services". Pearson correlation coefficient of return on sales and weighted average cost of capital denoted by Kcorr (WACC), R2-coefficient of determination, F-f-statistics.

TABLE I.   TEST RESULTS HYPOTHESES 2

Group number	Statistical indicators		
	Kcorr(WACC)	*R2*	*F*
2	0.691	0.477	2.739
4	0.487	0.238	0.935

In relation to these groups of companies, Hypothesis 2 is confirmed, since the correlation coefficient shows a fairly strong direct dependence of these coefficients (especially for a group of companies engaged in transportation by rail), that is, the growth of profitability provokes an increase in the weighted average cost of capital.

The value of the coefficient of determination is such that it can be taken into account in relation to the second group of companies. At the same time, the level of significance in relation to the second group of companies, although above the acceptable level, is significantly lower than other values of significance that were obtained in the course of the study. This suggests that with a certain improvement in the initial data (sample expansion, increase in the time range, etc.), this hypothesis will be confirmed in accordance with all significant indicators characterizing the relationship.

IV. CONCLUSION

Thus, the formulated hypotheses were confirmed only partially, the base formed for the study requires some improvements, but for two groups of companies there is a relatively strong relationship with respect to both hypotheses, which is confirmed by the values of correlation coefficients, and in the future, with some changes in the initial data taken for analysis, will also be confirmed by regression analysis.

The results of the analysis clearly demonstrate that, despite the affiliation of companies in the sample to one industry, the specifics of their activities differ significantly depending on the type of transport used. First of all, this suggests that industry averages will not be able to give an accurate picture of the situation of the industry and its condition, and their application for further research is possible only under certain assumptions.

The results of the correlation analysis can provide significant information about the objects under study, as well as give an idea in which direction further research should be carried out, what methods should be applied in order to the most complete and accurate study of the objects of study.

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