

St. Petersburg University  
Graduate School of Management  
Master in Corporate Finance Program

**IMPACT OF CAPITAL STRUCTURE ON THE VALUE OF LISTED RUSSIAN  
COMPANIES**

Master's Thesis by the 2<sup>nd</sup> year student Concentration  
Master in Corporate Finance  
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ЗАЯВЛЕНИЕ О САМОСТОЯТЕЛЬНОМ ХАРАКТЕРЕ ВЫПОЛНЕНИЯ  
ВЫПУСКНОЙ КВАЛИФИКАЦИОННОЙ РАБОТЫ

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## АННОТАЦИЯ

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Описание цели, задач и основных результатов	<p>Цель исследования заключается в определении взаимоотношений между структурой капитала, представленной бухгалтерскими показателями долговой нагрузки, и капитализацией компании, основываясь на анализе данных публичных российских компаний.</p> <p>Для достижения цели были построены четыре основные модели, проверяющие взаимоотношения между бухгалтерскими (Рентабельность активов и Рентабельность собственного капитала), рыночными (Прибыль на акцию и Tobin's Q) показателями стоимости компании и бухгалтерскими показателями долговой нагрузки (отношение долга к собственному капиталу (D/E), отношение долга к общей сумме активов (debt-to-total assets), отношение долга к EBITDA (debt-to-EBITDA)) и показателями долгосрочной долговой нагрузки (отношение долгосрочных обязательств к общей сумме активов (long-term debt-to-total assets), отношение долгосрочных обязательств к EBITDA (long-term debt-to-EBITDA)). Также были построены три дополнительные модели, проверяющие влияние отраслевого фактора, на примере трех индустрий: нефтегазовая отрасль, розничная продажа и отрасль обеспечения электроэнергией.</p> <p>Исследование проведено на выборке из 38 российских компаний, представленных на Московской бирже и включенных в расчет Индекса Московской биржи. Данные рассчитаны за период с 2015 по 2019 года по полугодиям.</p> <p>Результаты исследования показывают, что отношения между показателем долга к общей сумме активов и показателем долгосрочной долговой нагрузки к EBITDA и Рентабельностью активов, Рентабельностью собственного капитала и Прибылью на акцию являются значимыми и имеют обратно пропорциональную зависимость, в то время как результаты для Tobin's Q не значимы.</p> <p>Кроме того, результатами подтверждено, что отраслевой фактор влияет на взаимосвязь между структурой капитала и стоимостью компании, поскольку результаты показывают, что в трех</p>

	<p>различных отраслях взаимосвязь значима и обратно пропорциональна, но с различными показателями структуры капитала.</p> <p>Результаты исследования могут применяться разными пользователями, такими как финансовые менеджеры, акционеры, кредиторы и инвесторы.</p>
Ключевые слова	<p>Структура капитала, финансовый и бухгалтерский леверидж, долговое финансирование, долгосрочное долговое финансирование, финансовые результаты деятельности, стоимость компании, финансовые решения</p>

## ABSTRACT

Master Student's Name	Kruglova Valeriia
Master Thesis Title	Impact of Capital Structure on the Value of Listed Russian Companies
Educational Program	Master in Corporate Finance
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Year	2021
Academic Advisor's Name	Alexander V. Bukhvalov, Professor, Department of Finance and Accounting
Description of the goal, tasks and main results	<p>The research goal is to determine the relationship between capital structure considered in terms of accounting debt ratios and a company's valuation based on the analysis of listed Russian companies.</p> <p>To achieve this purpose four models are verified testing the relationship between two accounting (ROA and ROE) and two market measures (EPS and Tobin's Q) of company's valuation and accounting value of leverage: debt (D/E, debt-to-total assets, debt-to-EBITDA) and long-term debt ratios (long-term debt-to-total assets, long-term debt-to-EBITDA). Also, three additional models are tested to determine industry impact by analyzing the relationships in three distinct industries: Oil and gas, retail and electric utilities.</p> <p>The research is conducted based on the data of 38 listed on Moscow Stock Exchange and included in IMOEX Russian companies observed semi-annually over the period of 5 years (2015-2019).</p> <p>The results of the research state that the relationship between debt-to-total assets and long-term debt-to-EBITDA ratios and ROA, ROE and EPS are significant and negative, while the results for Tobin's Q are not significant. Also, the industry factor is confirmed to have influence on the relationship between capital structure and firm's value, as the findings state that in three distinct industries the relationships are significant and negative but with distinct measures of capital structure. The results of the study can be employed by different users, such as financial managers, shareholders, debt providers and investors.</p>
Keywords	Capital structure, accounting and financial leverage, debt financing, long-term debt financing, financial performance, company's value, financial decision-making

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## INTRODUCTION

The combination of debt and equity in capital structure is a central aspect in a process of corporate financial policies development. The specific amount of debt and equity stated on a company's Balance sheet can influence its cash flows, risks and earnings leading to changes in corporate performance and value. For this reason, since the middle of the last century capital structure has become a crucially important topic for financial managers and decision-makers.

According to financial theory, the main purpose of an organization is to increase a shareholders' value. In that case, the main concern of company's managers in relation to capital structure is to create such a proportion of equity and debt that maximizes value of a company. This means that the capital structure could be considered as an intrinsic tool of a company's value management.

In general, the impact of capital structure can be evaluated by means of leverage ratios. They are divided into financial leverage ratios (market value) and book leverage ratios (accounting value) (Ferris, Hanousek, Shamshur, & Tresl, 2018). Many researchers in their studies apply financial leverage measures ((Titman, Hovakimian, & Opler, 2001), (FAMA & FRENCH, 1998), (Welch, 2004), (LEARY & ROBERTS, 2005)) and accounting leverage ratios ((ROBERTS & SUFI, 2009), (Cai & Zhang, 2011), (DeAngelo, DeAngelo, & Whited, 2011), (DeANGELO & ROLL, 2015)). For the current research analysis, the accounting measures of leverage are applied as, in comparison to financial (market) leverage, they bring specific benefits.

The topic importance for both academic and practical areas is undebatable. Therefore, by means of this study **the following research gap** can be filled.

Despite the existence of high number of various research papers devoted to the relationships between capital structure and corporate value, since the release of the fundamental study on the topic - Modigliani and Miller theorem - the discussions are still in process.

Many research papers show opposing empirical results due to specifics of the market, industries, economic environment and other aspects, as well as they focus more on the analysis of financial leverage ratios. And yet, the application of accounting measures in the research in comparison to financial leverage brings specific benefits, such as less time-consuming valuation based on the accounting data which is easy to obtain; more usefulness for short-term financial decisions, as financial leverage is used only for long-term perspective; possibility of the management by financial decision-makers, while financial leverage is predetermined by market forces.

This lack of clear and precise studies leads to the problem that the existing results on the topic are controversial and there is no clear answer of the impact of capital structure on the value of a firm.

Furthermore, the topic is extremely popular to examine on emerging markets and in developing countries. However, the current research studies on the issue in Russia are limited. This



means that the paper can broaden the analysis of the question on the Russian market and construct the basics for the further research. In all points mentioned above, the clear gap is presented. Therefore, the analysis of the issue based on the public financial data of listed Russian companies is necessary.

**The research goal of the paper** is to determine the relationship between capital structure considered in terms of accounting debt ratios and a company's valuation based on the analysis of listed Russian companies.

The research paper aims to address two main points, including the following:

- to provide an insight into the question and specifics of the capital structure in general by analyzing the existing literature and empirical studies;
- to evaluate the possible impact of the capital structure of the largest Russian public companies on a company's value.

Therefore, to achieve the main goal, the following research questions are outlined:

- How do debt and long-term debt ratios affect the accounting measures of company's value of Russian companies? Is this influence significant and positive or negative or not significant?
- How do the debt and long-term debt ratios affect the market measures of company's value of Russian companies? Is this influence significant and positive or negative or not significant?
- Does the industry factor influence on the relationship between capital structure and company's valuation in Russia? Do the relationships differ from one industry to another?

In an attempt to provide answers to these questions, the research sample is built, the possible metrics are chosen and analyzed. The study critically evaluates the relationship between capital structure represented by the accounting debt measures and corporate valuation of listed on Moscow Stock Exchange companies in Russia over the period from 2015 to 2019, and examines the relationships in three different industries to check if they have distinct specifics.

The **following research problems** are stated:

- To divide the empirical studies on the topic into various groups, according to the development of the economies and markets, and to examine them, in order to construct the basics for the research analysis and to identify if there are country/market specifics of such relationships;
- To test four main hypotheses based on the general sample examining the relationships between five accounting leverage ratios and ROA, ROE, Tobin's Q and EPS;
- To test three additional hypotheses on the samples consisting of companies belonging to three distinct industries: Oil and gas, Retail and Electric utilities, in order to check the industry impact;
- To analyze the results and to make the conclusions and to provide managerial applications and recommendations based on the findings.

The various sources of theoretical studies are applied and analyzed for the purpose of this research paper. They include academic papers, periodical journals, electronic articles, statistics from different information agencies, annual reports of the companies and databases information.

The research structure is the following: introduction, three main chapters on theoretical part, methodological part and models result, conclusion, references and appendix.

In the first chapter, the main theoretical aspects on the capital structure issue are presented, as well as the main theories on capital structure and main empirical studies are examined. Also, the main accounting and market measures of firm's performance are described.

In the second chapter, the methodology of the research paper is described together with the variables applied for the analysis and formulation of the key hypotheses.

In the third chapter, the results of the models are presented and summarized, and the recommendations and managerial applications along with limitations and further research suggestions are presented.

## **CHAPTER 1. THEORETICAL FRAMEWORK ON CAPITAL STRUCTURE AND LITERATURE REVIEW**

### **1.1. Analysis of theoretical framework and the main theories of capital structure**

This subchapter aims to present the literature review on the capital structure and its ratios, as well as to examine the basic theories on capital structure and to choose one as the leading for the research purpose.

Capital structure represents a fundamental issue in the financial literature for both financial and nonfinancial industries and companies. The capital structure choice and its influence on the results and success is critical for the company's management. The relationship between valuation and capital structure remains the major topic in the distinct financial literature sources.

The capital structure decision is important for a firm's functioning, as unsuccessful or unreasonable decisions may lead to financial problems and fails in firms operations, the capital structure may have a serious impact on the funds sourcing, on the cost of capital, as well as on the liquidity level and investor's return (Bajaj, Kashiramka, & Singh, 2020).

The main purpose of the management in financing decisions is to set such capital structure level and proportion that maximizes a company's value (Ereotis, Vasiliou, & Ventoura-Neokosmidi, 2007). Although there are many research studies stating the optimal capital structure or analyzing the impact of debt-equity mix on a firm's value, it is impossible to identify the particular debt and equity level application and its influence on company's valuation (Ereotis, Vasiliou, & Ventoura-Neokosmidi, 2007).

Capital structure implies various sources available to a firm to finance its activities. A company can finance its functioning by either equity or debt, or a mixture of the both (Olaniyi, Elelu, & Abdusalam, 2015).

Capital structure includes sources that a company uses to finance its operations. In general, if there is a need for the additional capital, company may refer to two main way of financing available for the firms: debt financing and equity financing. So, the options are either borrow funds or to issue equity and sell it to investors. According to (Brealey & Myers, 2017), these particular decisions are referred as the capital structure decisions.

The equity capital is the initial funds which owners of the business use to start a business. In case of additional equity issuance, the options are limited. They include the additional equity issuance distributed among the current owners or the attraction of the new investors, such as, for example, business angels, venture capitalists, private equity firms, institutional investors and corporate investors, as well as by first issuing of shares through an initial public offering (Buigut & Soi, 2013).

The debt capital presents more varied range of sources, such as bank or corporate loans, debentures and bonds. The main concerns of debt issuance are connected with the specific debt

covenants fixed by the lender and obligations to pay interest and principal amount (Buigut & Soi, 2013).

As the capital structure can be presented as a mix of debt and equity financing, it is necessary to consider the specifics of both types of financing. According to (Damodaran, 2015), the main characteristics of debt financing include the following:

- the opportunity to attract big amounts in a relatively short time frame;
- lower costs of maintenance, however, obligations to pay interests and priority in case of bankruptcy;
- tax deductions;
- inability for debtholders to control and manage the company's functioning;
- finite maturity;
- high priority in liquidation.

According to (Damodaran, 2015), the main characteristics of equity financing include the following:

- less amount of financing could be attracted, but it requires a longer period of time;
- unlimited time of use;
- residual claims on cash flows;
- lowest priority in liquidation;
- no interest payments and no tax deductions;
- give rights to control the company.

Both types of financing possess their own advantages and drawbacks, as well as both debt and equity can be presented in various forms. Equity types of financing may include the owner's equity, venture capital and private equity, common stock, warrants and contingent value rights. Debt financing firms include bank debt and loans, bonds and leases. The third option is the hybrid securities, such as convertible debt, preferred stock and option-linked bonds.

As the debt financing plays an important role in the company's financing decisions, the capital structure is often presented and measured by the leverage or debt ratios. The debt increase/decrease of shareholder's return according to the overall economic and financial changes creates the leverage. According to (Dobbins, 1993), leverage is the extent to which a company is applying debt funding to finance its activities. Financial leverage is a specific concept which describes the amount of debt used to finance activities and obtain additional assets in order to increase the return on equity (Gharaibeh, 2015). When companies use more debt than equity in their capital structures, they can be considered as high leveraged firms.

There are two types of leverage according to their valuation method: book or accounting leverage ratio and financial or market value of leverage. According to (Ferris, Hanousek, Shamshur,

& Tresl, 2018), the accounting leverage measure is calculated as the ratio of total amount of book value of debt to total book value of assets, while financial leverage measure is calculated as the ratio of market value of debt to market value of total assets.

Although both these ratios are economically significant and strongly correlated (Bessler, Drobetz, & Kazemih, 2011), they have some important differences. They include the following points:

- the book value of leverage can be actively managed and controlled by a company's financial managers by managing working capital, equity and other liabilities, on the contrary to the financial leverage, which is determined by market forces;
- the ratios have distinct interpretations;
- they reflect distinct aspects of assets and financing management by different companies;
- they behave differently both across industries and over the business cycle;
- book value ratios can be controlled by the regulatory requirements, for instance, the Basel regulations refer to the ratios of capital at book value in banking (Adrian, Boyarchenko, & Song Shin, 2015);
- Market leverage is more volatile than the accounting value of leverage (Ferris, Hanousek, Shamshur, & Tresl, 2018).

However, as aforementioned in the introduction, for purpose of this research only accounting measures are considered and applied, as they bring specific benefits for the research results and practical managerial applications.

Based on the analysis of academic papers and empirical studies, the main accounting leverage or debt ratios include debt-to-equity, debt-to-total assets, long-term debt-to-total assets, times-interest earned, cash coverage, debt-to-EBITDA and long-term debt-to-EBITDA.

One of the most important measures is debt-to-equity measure. It measures the ability of a company to cover both short-term and long-term debt with the equity amount in case of economic distress or bankruptcy probability. This ratio may indicate either the situation of the economic downturn or the application of the conservative financial policies/low debt capacity by presenting if a firm is using more debt or equity (Shab, Eskola, & Lyulyu, 2014).

The next ratio is debt-to-total assets ratio. It is also known as the solvency ratio that indicates the proportion of assets financed with debt (Iqbal & Usman, 2018). The further extent of this ratio is measured by long-term debt-to-total assets ratio which presents the proportion of assets financed with long-term debt in particular.

Another measure is the extent to which interest obligations are covered by earnings. It is interest coverage ratio measured as earnings before interest and taxes to interest payments. According to (Ji, 2017), the cash based coverage ratio is useful financial ratio to judge the relationship between

accounting information and stock price, as it excludes the manager's discretionary accruals and it indicates the real cash inflow of a firm.

The debt-to-EBITDA or long-term debt/EBITDA ratio are focused on the analysis of the ability of the firm to pay out its debt or long-term debt based on the current earnings level.

The analysis of the main accounting leverage ratios is important for further model development and research development, as based on this analysis and on the empirical studies, the key measures will be chosen for the purposes of this paper. In the table below, the summary on the main debt ratios is provided.

Table 1.1.1. Description of the main leverage ratios. Source: prepared by the author, based on the literature review

The ratio	Formula	Authors stated the significance of an indicator
Debt ratio or Debt-to-equity ratio	$\frac{\text{Total debt}}{\text{Shareholder's equity}}$	(Buigut & Soi, 2013); (Drake & Fabozzi, 2010); (Pandey & Chotigeat, 2004)
Debt-to-total assets ratio	$\frac{\text{Debt}}{\text{Total assets}}$	(Abor, 2005); (Drake & Fabozzi, 2010); (Pandey & Chotigeat, 2004)
Long-term debt-to-total assets ratio	$\frac{\text{Long - term debt}}{\text{Total assets}}$	(Appiah, Gyimah, & Abdul-Razak, 2020); (Cole, Yan, & Hemley, 2015); (Pandey & Chotigeat, 2004); (Yegon, Cheruiyot, & Sang, 2014)
Times-interest earned	$\frac{\text{EBIT}}{\text{Interest payment}}$	(Brealey & Myers, 2017),
Cash coverage	$\frac{\text{EBIT} + \text{depreciation}}{\text{Interest payment}}$	(Brealey & Myers, 2017), (Ji, 2017)
Debt-to-EBITDA	$\frac{\text{Total debt}}{\text{EBITDA}}$	(Kisgen, 2006)
Long-term debt-to-EBITDA	$\frac{\text{Long - term debt}}{\text{EBITDA}}$	(Kisgen, 2006)

The next important aspect to review in the various sources is related to the capital structure theories analysis and the interconnection between capitals structure and a company's value analysis from the theoretical perspective.

According to (Muzir, 2011), there are three main approaches in relation to the interconnection among capital structure, cost of capital and a firm's value which explain capital structure decision. These approaches include net profit approach, operating income approach, and traditional approach.

The net profit approach states that a company's value can be increased with changes in capital structure and net profit is distributed among shareholders when there are no taxes, but this approach states that these relationships are not direct. The next is the operating income approach. It states that a company's value is not influenced by capital structure decisions directly or indirectly. The final approach stating the direct relationship between value and capital structure is the traditional approach which implies that with decrease in debt level a company's value can be increased to a certain point at which the cost of capital is minimized.

The capital structure theory in general asserts that the particular sources of funds exist and, in order to obtain these funds, organizations need to adapt specific strategies for being able to maintain the necessary amount of assets or to provide the investment on projects (Hashemi Tilehnoei & Shivaraj, 2014).

The challenge of choosing the convenient proportion of debt and equity leads to the question of capital structure and its influence on performance and value. The issue stems from the release of the fundamental research by Modigliani and Miller's. This research attracted attention to the topic and since that time many research studies have considered the topic of capital structure decisions. Through the time more and more theories on the topic have appeared considering the question from different perspectives. In the table below, the observation on the main capital structure theories is presented.

Table 1.1.2. Evolution of capital structure theories. Source: prepared by the author based on the literature review

Theory	Authors	Contribution
The theory of irrelevance	Modigliani and Miller (1958)	The capital structure does not have impact on a company's value.
The theory of relevance	Modigliani and Miller (1963)	The firms using debt in their capital structure have tax shield.
Trade-off theory	Kraus and Litzenberger (1973)	The firms can borrow to the point at which the tax benefit from additional debt equals to the cost of financial distress.
Agency theory	Jensen and Meckling (1976)	The conflict between shareholders and management affects the capital structure.
Signaling theory	Ross (1977)	The issuance of additional debt signals of the better company's performance.

Pecking order theory	Myers and Majluf (1984)	The managers use special order of financing sources.
Stakeholder theory	Titman (1984)	The managers form capital structure taking into account interest of non-financial stakeholders.
Financial contracting theory	Harris and Raviv (1990)	The model implies that the investors provide funds to receive cash allocation in in forms of return in the future.
Market timing theory	Baker and Wugler (2002)	The equity in capital structure is issued when the prices are high.

Despite the fact that all the theories stated above are concerned with the same aspect of capital structure influence on firm performance, yet each theory implies its own distinct approach to these interconnections.

Among the all the theories stated above, Modigliani-Miller theorem and Signaling theory state the positive relationship between leverage and firm performance, while Market timing, Agency, Trade-off and Pecking order state the negative relationship (Dao & Ta, 2020).

Despite the inconsistency of the Modigliani – Miller theorem and despite the fact that the assumptions impose the restrictions on the area of applicability of the derived conclusions, their contribution presented the important basics to the development of the entire industry of academic research (ИБРАГИМОВ, 2009). The main contribution is probably connected to the fact that the authors pointed to the arbitrage way of thinking as the most fundamental tool for obtaining results in the financial economy (Rubinstein, 2003).

(FAMA & FRENCH, 1998) analyzed the relationship among taxes, financing decisions, and the firm's value and made conclusions that the debt did not concede tax benefits. They implied that with higher leverage agency problem arises leading to a negative relationship between leverage and profitability.

Another theory is Stakeholder theory by (Titman, The effects of capital structure on a firm's liquidation decision, 1984). It does not confirm the positive or negative relationships between capital structure and firm performance, although it helps to identify if a company can lower or higher level of indebtedness. This theory is applicable cross-sectionally.

The Financial contracting theory by (Harris & Raviv, 1990) describes that the relationship between investors awareness of a company's financial situation and capitals structure exists and it influences on the debt levels.



For the purpose of the current research, the Market timing is applied as the leading theory of the capital structure. It asserts that the managers in the process of capital structure formation use both types of financing according to their conditions, applicability and specific time period.

The theory affirms that the capital structure is represented as the cumulative results of previous efforts to determine specific time on the equity market. The conclusions of (BAKER & WURGLER, 2002) state that If companies attract funds with high market value, they tend to have low level of leverage, while for companies raising funds with lower prices the situation is reverse.

According to the theory, if both debt and equity financing conditions are not beneficial, it is better to defer the financing decision, otherwise companies could raise funds which they do not require (Ayuba, Bambale, & Aminu Ibrahim, 2019). In case of Market timing theory, managers try to obtain benefits from the market conditions relevant for the debt issuance to make debt covenants less strict (Jahanzeb, Hafiz, & Karami, 2014).

There are two underlying assumptions of the theory which include:

- Rational managers do not tend to rearrange leverage level due to the asymmetry on the market.
- The management is certain about the arranging of specific timing towards equity market (Setyawan, 2011).

There are two versions of market timing of equity leading to the similar capital structure dynamics. The first involves rational managers and investors and costs selection that vary across firms or across time, while the second one involves irrational investors and time-varying mispricing (BAKER & WURGLER, 2002).

Analyzing all the theories mentioned above in terms of their applicability to current research, it is necessary to conclude that among all the theories stating the company's performance dependence on the capital structure there is no unified solution on the positiveness or negativeness of these relationships. The classical Modigliani-Miller theorem states that there are no relationships at all, while some other theories assert the positive or negative connections.

Also, some more recent theories consider the topic from other perspectives, for example, behavioral one, and they should be included as well, because they can help to construct the overall picture on the theoretical backgrounds, and moreover, to draw conclusions and develop recommendations.

Summarizing the aforementioned information, the main points are the following. As the capital structure is a mix between debt and equity, for the managers it is important to consider which source to use and how to maintain such a capital structure which increases a company's value. Both types of financing possess their own advantages and drawbacks, as well as both debt and equity can be presented in various forms. For current research, between both types of leverage accounting values of debt ratios are chosen.

The main measures of capital structure are represented by debt/leverage ratios, such as debt-to-equity, debt-to-total assets, long-term debt-to-total assets, cash coverage and others. The main theories on capital structure include Modigliani-Miller theorem, trade-off theory, pecking order theory and market timing. The leading one for the purpose of this research is Market timing theory.

## **1.2. The company's performance and valuation measures**

In this subchapter the literature review on key performance and valuation measures is presented. As in the research the main concern is the analysis of the relationship between capital structure and financial performance and valuation of the company, it is necessary to analyze key indicators of a company's corporate valuation.

According to (Hoopers, Madsen, & Walker, 2003), a company's performance is one of the most important and central topics in management research because it is in the core study of organizations. The necessity of the performance and valuation measurement application cannot be argued because for the managers this measures help to identify the level of effective usage of the resources (Al-Matari, Al-Swidi, & Bt Fadzil, 2014).

According to financial theory, the main objectives of any company is to maximize the shareholders' wealth and to meet the investors' expectations. In that case, financial performance and valuation measures indicate how much revenue company may generate from its business activities and how company is considered attractive for external investments.

The company's value means the economic measure of the performance reflecting the worth of the business the efficiency of resources uses. It describes a business propensity to grow translated into investors' propensity to invest (Ayuba, Bambale, & Aminu Ibrahim, 2019).

The financial performance indicators are generally divided into two groups of measures according to the internal or external valuation of the company's success. These groups include accounting-based measures of profitability or market-based measures (Gentry & Shen, 2010).

The various research papers state that accounting measures are considered as reflections of past or short-term financial performance, and market measures as reflections of future or long-term financial performance (Hoskisson, Hitt, & Wan, 1999).

The firm valuation measures are connected with the managers' ability to maximize the shareholders' value from the external perspective, for instance, from investors point of view, while the financial performance measures are referred from managerial point of view. A company's value represents future cash flows of the firm, while the financial performance reflects past historical data. From this position, it can be concluded that the financial performance is a cumulative outcome of accounting measures related to the past earnings and, in that case, it could not capture the expectations about the future results of a firm (Ayuba, Bambale, & Aminu Ibrahim, 2019).

The main accounting measures include such indicators as Return on assets, Return on equity and Return on sales (Gentry & Shen, 2010). Some authors also include additional indicators, such as Return on investment (LUCA, 2014) and Economic value added (Brealey & Myers, 2017) and others, for instance, Earnings per share (Bao Vuong, Thi Quynh Vu , & Mitra , 2017) and (Shab, Eskola, & Lyulyu, 2014). In the table below the main accounting-based measures are presented.

Table 1.2.1. Accounting-based measures of financial performance. Source: prepared by the author

Ratio	Description
Return on assets (ROA)	This ratio measures the profitability of a company by analyzing the assets ability and efficiency to generate earnings.
Return on equity (ROE)	The ratio represents the total return on equity capital and it measures the firm's ability to generate earnings from equity.
Return on sales (ROS)	This ratio represents a company's operational efficiency. It shows how much operational profit is generated from the unit of sales.
Return on investment (ROI)	This ratio is calculated as the proportion of the after-tax operating income to the net book value of assets.
Economic value added (EVA)	This ratio is calculated based on the residual income by deducting the cost of capital adjusted for the investment from the income earned.

Among all the accounting ratios the most applicable in terms of the analysis of the relationships between capital structure and financial performance are Return on equity and Return on assets. They are widely used in the empirical studies on the topic in different countries and regions. Below in the table the authors applying ROA and ROE in the research are presented.

Table 1.2.2. Accounting-based measures used in empirical analysis. Source: prepared by the author

Ratio	The authors
Return on assets (ROA)	(Bao Vuong, Thi Quynh Vu , & Mitra , 2017), (Cole, Yan, & Hemley, 2015), (Ebaid, 2009), (LUCA, 2014), (Nassar, 2016), (Olaniyi, Elelu, & Abdusalam, 2015), (Shab, Eskola, & Lyulyu, 2014), (Vätavu, 2015)
Return on equity (ROE)	(Bao Vuong, Thi Quynh Vu , & Mitra , 2017), (Ebaid, 2009), (LUCA, 2014), (Nassar, 2016), (Olaniyi, Elelu, & Abdusalam, 2015), (Shab, Eskola, & Lyulyu, 2014), (Vätavu, 2015)

The main market measures include such indicators as Tobin's Q, Stock price and Price-earnings ratio (Gentry & Shen, 2010). In the table below the main market-based measures are presented.

Table 1.2.3. Market-based measures of financial performance. Source: prepared by the author

Ratio	Description
Stock price	This ratio reflects a market value that external investors are ready to invest in a company's stock.
Tobin's Q	This ratio presents the relationship between market and intrinsic value of the company. It can indicate business over/undervaluation.
Price-earnings ratio	This ratio compares the company's share price and earnings per share.
Market-to-book value of equity	The ratio compares a company's market value of equity to its book value.
Earnings per share (EPS)	This ratio presents how much money is generated per each share which is a used to estimate corporate value.

Among all the market ratios the most applicable in terms of the analysis of the relationships between capital structure and financial performance is Tobin's Q and Earnings per share, they are used in the most papers on the topic. The Tobin's Q coefficient equals to the relation of market capitalization to total book value of assets. If it is more than 1, it implies that the market value of the firm is more than the replacement cost of its assets (Shab, Eskola, & Lyulyu, 2014). Below in the table the authors applying Tobin's Q in the research are presented.

Table 1.2.4. Accounting-based measures used in empirical analysis. Source: prepared by the author

Ratio	The authors
Tobin's Q	(Bao Vuong, Thi Quynh Vu , & Mitra , 2017), (Ebaid, 2009), (LUCA, 2014), (Shab, Eskola, & Lyulyu, 2014), (Zeitun & Gang Tianb, 2007), (Weill, 2008)

The prevalence of market-based measures in many research analyses can be explained by the debate on the advantages and disadvantages of application of both accounting and market measures. Although both types of measures are widely used and proved to be valid, they are still discussed in terms of their influence on management, as well as their interrelations are still in question.

According to (Brealey & Myers, 2017), the accounting measures of a company's performance reflects how effective the resources are managed. The accounting indicators are able to represent important performance dimensions for the managers; however, they have some serious flaws (Hopwood, 1972).

The accounting measures do not include all the relevant dimensions of managerial performance, as accountants or managers are struggling to develop comprehensive measures and standards. As the aforementioned, the accounting measures are focused on the short-term

performance while the managerial performance is often concerned with more long-term considerations. Moreover, the accounting measures can be manipulated by the managers.

On the other hand, market-based measures bring certain number of advantages. The market measures reflect all relevant information, they are not limited to a single aspect of firm performance. Market indicators integrate the historic profitability and past growth together with the expected stock market developments (Selvam, Gayathri, Vasanth, & Marxiaoli, 2016). For the shareholders, such indicators are even more important, as they evaluate the position of the company on the market and the level of shareholder's value, if it is fairly priced, over or underpriced.

Concluding the aforementioned, the main performance measures are divided into two groups widely used in various empirical studies. Although the accounting indicators are applied with high frequency in different studies, they still have some serious flaws. Therefore, the prevalence of the market indicators, among which the most applicable is Tobin's Q, is justifiable.

Summarizing the aforementioned information, the measures of a company's valuation include accounting and market measures. Among accounting measures for the purpose of this research ROA and ROE are chosen, while among market measures Tobin's Q and EPS are chosen.

### **1.3. Analysis of empirical studies on capital structure**

This subchapter aims to present the analysis of various empirical studies on the topic examining the relationships in different countries and on different markets. On this stage it is important to analyze the theoretical and empirical studies on the relationship between company's capital structure and its performance and value measures.

Many researchers highlight the importance of country and market specifics. According to (Demirguc-Kunt & Maksimovic, 1999), the factor of a country's development is crucial, as there are the institutional differences between developed and developing markets which can explain the variation in debt usage.

The empirical studies on the topic are quite wide-ranging and can be classified according to the different criteria, such as studies of countries of different capitalistic model (Anglo-Saxon or Continental), countries with different economic development and maturity, or research findings stating positive, negative or no significant relationships.

Many empirical research papers state that country specifics have both direct and indirect impact on the capital structure in general and on the measures of leverage in particular, based on the article of (Venanzi, 2017). As the main focus of this research is based on the Russian companies, the main criteria for the empirical studies classification is the classification in accordance with the model (Anglo-Saxon or Continental) and economic maturity, in order to understand the specifics of each group of countries and if they could be applied to the Russian market.

Therefore, the main groups of studies are the following:

- Studies of the Anglo-Saxon countries;
- Studies of Continental developed European economies;
- Studies of Nordic countries;
- Studies of eastern European economies;
- Studies of other countries and economies.

### *1.3.1. Analysis of empirical studies of the Anglo-Saxon model countries*

The first group of research papers include the analysis of the United states of America and the United Kingdom belonging to Anglo-Saxon group.

The research paper by (Olaniyi, Elelu, & Abdusalam, 2015) analyzes how the capital structure influences on the performance of selected firms in US in different time periods. The authors apply multiple regression model. The return on equity, return on assets, price per share, earnings per share and Tobin's Q are used as performance measures. Debt to Equity ratio is used as capital structure measure and firm size as control variable. The analysis is conducted on the sample of 200 listed companies from 10 sectors in the US Stock Exchange.

The study results are mixed and they state that the impact of capital structure on corporate performance depends on the type of performance used and is period related. Higher levels of debt-to-equity ratio have negative significant relationship with ROA before and after the crisis, but a positive significant relationship exist between DE and ROA in the post crisis period. Other variables show insignificant relationship. Generally, the results of the research state that capital structure is not a major determinant of corporate performance for US companies.

Another empirical study by (Gill, Biger, & Mathur, The Effect of Capital Structure on Profitability: Evidence from the United States, 2011) also examines the effect of capital structure on profitability of the American service and manufacturing firms. The authors analyze the sample of 272 American firms listed on New York Stock Exchange for a period of 3 years from 2005 – 2007. The main methods include correlation and regression analyses. The main performance measure is return on equity and capital structure ratios include short-term debt/long-term debt/total debt-to-total assets ratios.

The research results show a positive relationship between short-term debt to total assets and profitability and total debt to total assets and profitability for both industries, while positive long-term debt to total assets and profitability for manufacturing industry.

The next research by (Cole, Yan, & Hemley, 2015) determines the relationship between capital structure and firm performance of U.S. firms in the Industrial, Healthcare, and Energy Sectors.

The main capital ratio measure is long-term debt-to-total assets ratio, while performance measure is presented by share price, profit margin, operating return and ROA.

The results state that capital structure has a negative relationship with return on assets and operating return in all three sectors, which can be connected with alternative financing, while the relationship between profit margin and capital structure differs from sector to sector, as capital structure ratios positively influence on profit margin in the Industrial Sector, negative influence on profit margin in the Energy Sector, and no relationship in the Healthcare sector.

Another research in this group includes the study by (Bao Vuong, Thi Quynh Vu , & Mitra , 2017) examining the relationship between capital structure and corporate valuation in United Kingdom. The data of 739 largest listed on London Stock Exchange companies is analyzed over the period of 10 years (from 2006 to 2015). The research paper applies four main measures, such as ROE, ROA, Tobin's Q and EPS as dependent variables, while long-term and short-term ratios are applied as independent variables, as well as two control variables are included: growth rate of total assets and size.

The results state that corporate measures, such as ROA, ROE and Tobin's Q have negative relationship with long-term debt in most of studied industries, whereas short-term debt has no significant impact on these ratios, as well as EPS has no relationship with debt ratios. Moreover, size and growth bring benefit for companies' performance, except for Tobin's Q. Finally, the global financial crisis factor does not have an effect on the relationship between debt ratios and corporate valuation indicators.

Summarizing studies of this group, the long-term debt-to-total assets has negative influence on ROA, ROE and Tobin's Q ratios, while short-term debt-to-total assets has different results in different countries and industries. Debt-to-equity ratio has a negative influence on ROA in USA before and after crisis, positive impact in post crisis period.

### *1.3.2. Analysis of empirical studies of the Continental model countries*

The second group of research papers include the analysis of developed European countries belonging to Continental group.

The research by (Margaritis & Psillaki , 2010) examines the relationship between capital structure, ownership structure and performance using a sample of French manufacturing firms. The authors apply non-parametric data analysis methods to construct the industry's 'best practice' frontier and measure firm efficiency as the distance from that frontier. They examine how more efficient firms choose the proportion of debt in their capital structure. They also use the regression analysis to test the effect of efficiency on leverage. The research results state that there is positive influence of leverage ratios on company's profitability and efficiency.

The next research by (Hariem & Turgut , 2019) examines the relationship between firm performance and capital structure in Germany. The study analyzes the non-financial firms listed in Germany during the period 1993–2016. The authors state that more than 60% of German non-financial firms are highly levered compare to similar countries. The results state that there is a positive relationship between firm performance and capital structure.

The study by (LUCA, 2014) analyzes the research on the relationship between capital structure and economic performance of Italian large, medium and small firms in manufacturing and service industry listed in Italian Stock Exchange over the period of 5 years (from 2007 to 2011). The capital structure ratios include debt-, long-term debt -and short-term debt-to-total assets, while performance measures are represented by return on equity, return on assets and return on investment. Also, three control variables are included: sales growth, industry and firm size.

The results state that there is a significant relationship between economic performance of the firm and its financial debt but with significant influence of size and industry. In the medium manufacturing firms the relationship between ROE and capital structure ratios, ROA and total and short-term financial debt to total assets, ROI and short-term financial debt to total assets are significant and positive. In the large service firms the relationships between ROA and total financial debt to total assets, ROI and long-term financial debt to total assets relationship are positive. But in the large manufacturing firms the relationships between ROE, ROA and short-term financial debt to total assets in the large and small service firms between ROI and short-term financial debt to total assets are negative.

The next research by (Weill, 2008) examines the relationship between leverage and corporate performance in European economies. The author implements a specific method of analysis which is a frontier efficiency technique used to measure performance of medium-sized firms from seven European countries. The author considers debt-to-equity as a capital structure ratio, while two control variables are added: size and industry. The results assume that the relationship between leverage ratios and corporate performance measures varies across countries. This conclusion also confirms the significance of institutional factors on this interrelation. A positive and significant relationship between leverage and efficiency in France, Germany, Belgium is found, while a negative and significant one in Italy and Spain is presented. Finally, the relationship is not significant in Portugal.

Summarizing studies of this group, the country and industry have significant influence on the relationship between capital structure and a company's performance. That is why in all research papers the industry and country specifics were included, as well as sales growth and size as control variables.



### *1.3.3. Analysis of empirical studies of Nordic countries*

The third group include the analysis of Nordic countries empirical studies.

The paper by (Shab, Eskola, & Lyulyu, 2014) analyzes the effect of capital structure on financial and non-financial performance and the risks of the firms in Finland. For research purposes the data of 50 largest Finnish public firms listed at the Helsinki stock exchange are analyzed for the period 2011–2017. The capital structure ratios include debt-to-market value of equity and debt-to-equity. The valuation measures include investments in innovations, intangibility ratio, Tobin's Q, systematic risk, total risk, EPS, ROA, ROE, P/E.

The results state that debt ratios influence mostly the accounting, market, and hybrid measures and this impact is significant and negative. On the other hand, the effect of capitals structure on the nonfinancial measures is insignificant.

The next research study by (Abildgren, Niels Strøger Hansen, Moselund Jensen, Strøm Kristoffersen, & Skakoun, 2014) considers the relationships between corporate capital structure and productivity, profitability and access to finance. The authors analyze the topic based on Danish industry-level and firm- level accounting data from the period 2000-2011.

The results of the study state that the overall capital structure has no significant impact on profitability or productivity, neither at an industry level nor at a firm level. The authors also compared the corporate capital structure in Denmark with other EU countries based on aggregated financial accounts statistics. In general, the patterns of Danish companies are similar to the patterns in the other European countries.

Summarizing studies of this group, the results are quite different, as in one country the capital structure has a significant impact, while in another country there is no significant relationships.

### *1.3.4. Analysis of empirical studies of eastern European countries*

The research by (Valaskova, Siekelova, Lancov, Lazaroiu, & Olah, 2019) studies the effect of the capital structure on the cost of capital of Slovak enterprises and suggests an effective way of financial decision-making. The data is based on the information from Bratislava Stock Exchange. Due to the underdeveloped capital market of Slovakia, the authors makes the analysis based on the data of 17 companies operating on the Slovak market over the period from 2013 to 2017. The method is the Pearson correlation coefficient, regression analysis and Mann-Whitney U-test. The authors applies debt-to-equity ratio, cost of capital and size.

The results state that there is an indirect relationship between the capital structure, the cost of capital and the size of the company. The resaerch shows that growing volume of debt may result in a decline in the corporate costs of capital.

The research by (Vătavu, 2015) examines the relationship between capital structure and financial performance based on the data of 196 Romanian companies listed on the Bucharest Stock Exchange related to the manufacturing sector. Time period is 8 years (2003-2010). The capital structure measures involve long-term debt, short-term debt, total debt and total equity, while performance measures involve return on assets and return on equity.

The research results state that performance in Romanian companies is higher when they avoid debt and operate based on equity. Moreover, the relationship between ROE and ROA and equity is positive, while the relationships between total debt and short-term and with ROA and ROE are negative.

The research by (Norvaisiene, 2012) analyzes the relationship between capital structure and financial performance based on the financial indicators of Lithuanian, Latvian and Estonian listed non-financial companies published in the annual reports over the period of 2002 – 2011. Data of 70 companies were used in this research: 28 Lithuanian companies, 14 Estonian companies, and 28 Latvian companies. The measures of capital structure include long-term debt ratio, short-term debt ratio, debt ratio, non-financial debt ratio, and performance measures include operating profit margin, net profit margin, return on equity, return on assets, liquidity ratio, capital asset turnover and total asset turnover was performed.

The research results state that the higher financial indebtedness level affects negatively the profitability ratios of companies in the Baltic countries, as well as all debt ratios have reverse correlation with liquidity ratios. The additional points are that in Baltic countries the influence of the debt ratios on the efficiency of asset management is ambivalent. On one hand, the level debt has a negative impact on capital asset turnover and total asset turnover, but, on the other hand, non-financial debt has positive correlation with turnover ratios.

The research by (RADEVIĆ , LEKPEK , & SILJKOV, 2013) examines changes on the financial markets of Serbia in the global financial crisis, through the analysis of changes of the companies included in the BELEX 15, the Belgrade Stock Exchange index in 2008, 2009 and 2010.

The study considers the changes in the profitability of companies included into the index, as well impact of financial leverage on profitability and changes in share prices of these companies. The main performance measures are ROA and ROE, while degree of financial leverage is used as leverage measure.

Summarizing studies of this group, the results show that in most cases the debt measures have a negative influence on the company's financial performance.

### *1.3.5. Analysis of empirical studies of other countries and economies*

The research by (Nassar, 2016) questions the impact of capital structure on the financial performance of 136 industrial companies listed on Istanbul Stock Exchange for the period of 8 years from 2005-2012. The main method used is a multiple regression model presented by the main dependent variables, such as return on asset, return on equity and earning per share, and by independent variable, such as debt ratio. The outcomes assert that there is a negative significant relationship between capital structure and a company's performance.

In the study by (Ebaid, 2009) the author presents the analysis of the relationship based only on accounting-based ratios, namely ROA, ROE and gross margin in order to evaluate a pool of 64 companies that listed on Egyptian stock market. The findings of the research show that there is a weak negative relationship between leverage and ROA, but all other leverage ratios have no significant influence on ROE and Gross margin.

The research by (Narang, 2018) examines the interrelation between capital structure and the performance of listed Indian companies. The performance is measured by return on assets, return on equity and earnings per share, while the measures of capital structure include long term debt to assets ratio, short term debt to assets ratio and total debt to assets ratio. The results of the study state a positive relationship between the ratios of capital structure and firm performance.

The research by (Zeitun & Gang Tianb, 2007) examines the effect of capital structure on corporate performance by analyzing the sample of 167 Jordanian companies over the period of 15 years (1989-2003). The results state that capital structure has a negative impact on companies accounting and market-based performance measures. However, they also found that the short-term debt-to-total assets has a significantly positive effect on the market performance measure Tobin's Q.

The research by (Minh Ha & Minh Tai, 2017) analyses the impact of capital structure on cash holdings and the impact of capital structure and cash holdings on the value of firms listed on the Ho Chi Minh stock exchange (HOSE). With data from the financial statements of 105 firms listed on HOSE since 2009-2014 and using the generalized least square method, results show that cash holdings are positively related to the firm value, but short-term debt is negatively related to firm value. Moreover, the relationship between long-term debt and a company's value is not statistically significant, but at the same time the relationships between short and long-term debt and cash holdings are negative.

The next research by (Lixin & Lin, 2016) explains the relationship between the debt financing and market value of more than 200 Chinese real estate companies, which are all listed on Shanghai Stock Exchange and Shenzhen Stock Exchange between 2002 and 2007. The authors conduct an empirical study resulting in the following conclusions. Firstly, on average in the corporate debt takes relatively big proportion, more than half, of total assets of real-estate listing companies. Moreover,

the overall rate of debt financing can improve the company's market value. Furthermore, authors find that long-term borrowing and commercial credit financing have positive correlation with the company's market value.

Summarizing studies of the group on developing markets, the results vary across countries and industries showing both positive and negative relationships, as well as some results vary even across ratios.

In conclusion the purpose of this subchapter was to analyze studies on the topic in various countries and industries and to find the differences and common features. The findings vary across each group and country specifics, as well as industry and firm size, play an important role in defining the relationship between capital structure and a company's performance and valuation. This subchapter also constructs the base for the further empirical analysis, as the main measures and techniques are analyzed.

## CHAPTER 2. RESEARCH METHODOLOGY AND MODELS DESCRIPTION

### 2.1. Methodology of the research

This subchapter analyzes the main methods which can be applied for the models' designing and research development and construct the methodology of the study.

In order to achieve the main goal of the research, wide range of tools is applicable. The research methods include data collection and sample development, data analysis involving different instruments, such as correlation analysis, regression analysis and graphical analysis.

Based on the analysis of empirical studies, the main model applied is the regression analysis. In the table below, the key regression types applied for the analysis are presented

Table 2.1.1- The analysis of the main models applied for the capital structure influence examination. Source: prepared by the author based on the review of empirical studies

Model	Specifications	Data type	Authors
Simple regression model	-	-	(Cole, Yan, & Hemley, 2015)
Multiple regression model	Pooled ordinary least squares model	Balanced/Unbalanced panel data	(Shab, Eskola, & Lyulyu, 2014); (Gill, Biger, & Mathur, The Effect of Capital Structure on Profitability: Evidence from the United States, 2011)
	Random effects model	Balanced/Unbalanced panel data	(Zeitun & Gang Tianb, 2007); (Bao Vuong, Thi Quynh Vu , & Mitra , 2017); (Ayuba, Bambale, & Aminu Ibrahim, 2019)
	Fixed effects model	Balanced/Unbalanced panel data	(Minh Ha & Minh Tai, 2017); (Vätavu, 2015)
	Generalized least squares model	Balanced/Unbalanced panel data	(Minh Ha & Minh Tai, 2017)

For the purpose of estimation of the influence of factors and its significance the main instrument that is applied is the regression analysis, in particular multiple regression models defining the dependence of the valuation variable on the debt ratios. The data is analyzed using descriptive statistics, correlation and multiple regression.

In the study the main type of data applied is panel data, as there is a sample of companies observed over the particular time periods. The estimation models in the research apply the panel data

to identify if there is a correlation between the unobservable heterogeneity of each company in every specified period and other control variables of the model (Bao Vuong, Thi Quynh Vu , & Mitra , 2017). The panel data can be balanced and unbalanced. The balanced panel data implies that all factors are observed equally in each time period and there is no lack of data in any period, while unbalanced panel data implies that some time periods some factors in some time periods could be omitted.

In case of this research with panel data analysis, the simple regression model is not applicable, as there are various independent variables which impact on company's performance and value will be examined. For the purpose of the estimation of panel data the following models could be used:

- pooled model;
- fixed effects model;
- random effects model (Carter, Griffiths, & Lim, 2011).

A pooled model is the one where the data on different units is pooled together providing no individual distinctions that might lead to different coefficients. The intercept and the slope coefficients are constant across time and objects, and the error term captures differences over time and objects. For an equation with two explanatory variables  $x_2$  and  $x_3$ , a pooled model can be written as

$$y_{it} = \beta_1 + \beta_2 x_{2it} + \beta_3 x_{3it} + e_{it}.$$

The least squares estimator, when applied to a pooled model, is referred to as pooled least squares. The data for different units is pooled together, and the equation is estimated using least squares.

The fixed effects model implies that coefficients  $(\beta_1, \beta_2, \beta_3)$  can be different for each unit. All differences between units, referred to as individual heterogeneity, are supposed to be captured by the intercept. The slope coefficients are constant but the intercept varies over objects. A model with these features is called a fixed effects model. It can be written as

$$y_{it} = \beta_1 + \beta_{2i} x_{2it} + \beta_{3i} x_{3it} + e_{it}.$$

In the random effects model, it is assumed that all individual differences are captured by the intercept parameters, but it is also supposed that the units in the sample were randomly selected, and therefore the individual distinctions can be referred as random rather than fixed. The slope coefficients are constant but the intercept varies over objects and time. It can be written as

$$y_{it} = (\beta_1 + u_1) + \beta_2 x_{2it} + \beta_3 x_{3it} + e_{it}.$$

In order to properly choose a model for each specific case there are specific tests (Carter, Griffiths, & Lim, 2011). The first test is F-test. It is applied to find the preferred model between fixed effects and pooled OLS. The null hypothesis assumes that both observed and unobserved fixed effects

equal to zero. Therefore, if the null hypothesis is rejected, the significant fixed effects are identified and fixed effects model is applied in the case.

The second test is Breusch-Pagan test. If there is no significant existence of fixed effects in the data, test helps to determine whether there are random effects present or not. According to the null hypothesis, variance of the random effects is zero. Therefore, if the null hypothesis is rejected, the significant random effects are identified and preferred over pooled OLS model.

The third test is Hausman test. It is applied when there is a possibility that both random effects and fixed effects are present in the data and it is necessary to choose which one is better. The null hypothesis states that models' errors are not correlated with regressors, so, if the null hypothesis is rejected, the fixed effects model should be chosen.

Summarizing the aforementioned, the main instrument of the research analysis is multiple regression model. The models are tested on the panel data of Russian public companies. All necessary tests are conducted in order to identify the best fitting model between pooled OLS, fixed effects and random effects models.

## **2.2. Variables description**

This subchapter analyzes possible dependent and independent variables which can be applied for the analysis, as well as states the key ones. Moreover, the possible control variables are scrutinized.

Based on the literature review and on the analysis of the main empirical studies on the topic, the key dependent and independent variables are chosen, according to the criteria of their fitness to research purposes and the division on accounting and market measures.

As aforementioned, the research is focused on the analysis of the impact of accounting leverage measures rather than financial ratios, as they bring specific benefits to the research. These ratios are based on the calculations of the accounting data from open public statements, such as balance sheet, income statement and others, therefore, they are relatively easy to calculate and interpret, as well as they are useful in the analysis for the further managerial applications.

These indicators include debt-to equity, debt-to-total assets, long-term debt-to-total assets, times-interest earned, cash coverage, debt-to-EBITDA and long-term debt-to-EBITDA. For the purpose of this research, the list of five debt ratios is developed and the measures include general ratios, such as debt-to equity, debt-to-total assets, long-term debt-to-total assets and equity-to-total assets, and more specific ones, such as debt-to-EBITDA and long-term debt-to-EBITDA.

In the sample, the measures are calculated in Russian rubles based on the data of the financial statements of the companies of different industries. The table with the description of the main independent variables is presented below and in the Appendix.

Table 2.2.1 - The description of the independent variables. Source: prepared by the author

Ratio	Name in the sample	Formula	Unit measures
Debt-to-equity	DE	Total debt/Total equity	Percentage
Debt-to-total assets	DTA	Total debt/Total assets	Percentage
Long-term debt-to-total assets (Solvency ratio)	LTDTA	Long-term debt/Total assets	Percentage
Debt-to-EBITDA	DEBITDA	Debt/EBITDA	Percentage
Long-term debt-to-EBITDA	LTDEBITDA	Long-term debt/EBITDA	Percentage

In relation to dependent variables, in the research papers, the main dependent variables of a company's valuation measures are presented by the accounting measures, such as Return on assets, Return on equity, Earnings per share calculated from financial statements of the companies, while share price is considered the market measure of a company's performance (Abor, 2005). Tobin's Q and Price-earnings ratio measurements are also used by some studies which are a mix of market performance and accounting measurement (Nassar, 2016).

Table 2.2.2 - The description of the dependent variables. Source: prepared by the author

Ratio	Type of measure	Name in the sample	Formula	Unit measures
Return on assets	Accounting measure	ROA	Net income/Total assets	Rubble-to-rubble or percentage
Return on equity	Accounting measure	ROE	Net income/Equity	Rubble-to-rubble or percentage
Earnings per share	Market measure	EPS	(Net income – Preferred dividends)/End of period shares outstanding	Rubbles
Tobin's Q	Market	TobinsQ	Market capitalization/Book value of assets	Percentage

So, according to the analysis of empirical studies, the main indicators chosen as dependent variables are Return on assets, Return on equity, Tobin's Q and Earning-per-share.

In the sample, these measures are calculated based on the data of financial statements of the companies in different industries. The table with the description of the main independent variables is presented in the table below and in the Appendix.



The capitalization is calculated based on the historical data of the company's stock performance over the specified period of time. The price of stock is based on the volume weighted average price. The volume weighted average price is a trading benchmark used by traders that gives the average price a security has traded at throughout the day, based on both volume and price (Mitchella, Białkowskib, & Tompaidis, 2020).

Although some variables are not directly related to the debt or performance and valuation measure, they still could significantly influence companies' decision on capital structure and have strong impact on the results of the research.

Thus, in the research it is necessary to include some independent variables that aim to isolate potential biases and control their effect on company's valuation. Such variables increase the accuracy of the research, and they help to obtain more reliable results. Such variables may involve various measures, but based on the analysis of the literature review they usually involve size and growth (Abor, 2005).

These factors are presented by the factors affecting capital structure of a company. A relative growth rate can decrease distortions which appeared due to noncomparable structural characteristics of industries (Elliott, 1972). In relation to growth rate, the financial requirements of growing firms are relatively high and they cannot be met from internal sources, hence, companies need to apply external sources, mostly debt financing.

Another control variable is size. The size of a company is considered as control variable because the larger companies have more benefits from the economies of scale which reduces their long-run average cost. They have better purchase ability than smaller companies and, therefore, they can negotiate better credit terms and apply more debt financing. The models include two control variables. The description of control variables is presented below.

Table 2.2.1- Description of the control variables. Source: prepared by the author

Variable	Description	Formula
Size	The scale of a company's operations and turnover, could be evaluated by amount of sales or by number of assets.	$Ln(Total\ sales)$
Growth	It is the annual percentage change on the sales amount of the company.	$\frac{(Sales_n - Sales_{n-1})}{Sales_{n-1}}$

Summarizing the aforementioned information, the main dependent, independent and control variables are chosen, based on the literature review. The independent variables include debt-to equity, debt-to-total assets, long-term debt-to-total assets, debt-to-EBITDA and long-term debt-to-EBITDA ratios. The dependent variables include 2 accounting and 2 market measures, such as ROA, ROE, Tobin's Q and EPS. The research also considers two control variables including size and growth.

### 2.3. Models' design and hypotheses statement

This subchapter aims to describe two groups of hypotheses, including four main hypotheses on the general sample and three additional hypotheses on the sample of three industries. The models are specified for each hypothesis.

The first group of hypotheses is verifying the relationship between the independent variables and accounting measures of the financial performance. As the research is addressing Market timing theory, hence, the hypothesis should be consistent with this theory. As it states the negative correlation, the hypotheses are asserted in the following way and the models are described below. In the models all independent variables are presented by two groups of variables: one hypothesis tests the impact of accounting debt ratios and another one tests the impact of accounting long-term debt ratios. Each hypothesis checks either two accounting or two market measure of valuation.

**H1: The relationship between debt ratios and accounting measures of company's valuation (ROE and ROA) is statistically significant and negative**

$$ROA = \beta_1 + \beta_2 DE_{it} + \beta_3 DTA_{it} + \beta_4 ETA_{it} + \beta_5 DEBITDA_{it} + \beta_6 Size_{it} + \beta_7 Growth_{it} + e_{it}$$

where  $\beta_1, \beta_2, \beta_3, \beta_4$  are coefficients,  $e_{it}$  is the error term,

$$ROE = \beta_1 + \beta_2 DE_{it} + \beta_3 DTA_{it} + \beta_4 ETA_{it} + \beta_5 DEBITDA_{it} + \beta_6 Size_{it} + \beta_7 Growth_{it} + e_{it}$$

where  $\beta_1, \beta_2, \beta_3, \beta_4$  are coefficients,  $e_{it}$  is the error term.

**H2: The relationship between long-term debt ratios and accounting measures of company's valuation (ROE and ROA) is statistically significant and negative**

$$ROA = \beta_1 + \beta_2 LTDTA_{it} + \beta_3 LTDEBITDA_{it} + \beta_4 Size_{it} + \beta_5 Growth_{it} + e_{it}$$

where  $\beta_1, \beta_2, \beta_3, \beta_4$  are coefficients,  $e_{it}$  is the error term,

$$ROE = \beta_1 + \beta_2 LTDTA_{it} + \beta_3 LTDEBITDA_{it} + \beta_4 Size_{it} + \beta_5 Growth_{it} + e_{it}$$

where  $\beta_1, \beta_2, \beta_3, \beta_4$  are coefficients,  $e_{it}$  is the error term.

The second group of hypotheses is verifying the relationship between the independent variables and market measures of the financial performance. The hypotheses are asserted in the following way the models are described below:

**H3: The relationship between debt ratios and market measures of company's valuation (Tobin's Q and EPS) is statistically significant and negative**

$$\text{Tobin's Q} = \beta_1 + \beta_2 DE_{it} + \beta_3 DTA_{it} + \beta_4 ETA_{it} + \beta_5 DEBITDA_{it} + \beta_6 Size_{it} + \beta_7 Growth_{it} + e_{it}$$

where  $\beta_1, \beta_2, \beta_3, \beta_4$  are coefficients,  $e_{it}$  is the error term,

$$\text{EPS} = \beta_1 + \beta_2 DE_{it} + \beta_3 DTA_{it} + \beta_4 ETA_{it} + \beta_5 DEBITDA_{it} + \beta_6 Size_{it} + \beta_7 Growth_{it} + e_{it}$$

where  $\beta_1, \beta_2, \beta_3, \beta_4$  are coefficients,  $e_{it}$  is the error term.

**H4: The relationship between long-term debt ratios and market measures of company's valuation (Tobin's Q and EPS) is statistically significant and negative**

$$\text{Tobin's Q} = \beta_1 + \beta_2 LTDTA_{it} + \beta_3 LTDEBITDA_{it} + \beta_4 Size_{it} + \beta_5 Growth_{it} + e_{it}$$

where  $\beta_1, \beta_2, \beta_3, \beta_4$  are coefficients,  $e_{it}$  is the error term,

$$EPS = \beta_1 + \beta_2 LTDTA_{it} + \beta_3 LTDEBITDA_{it} + \beta_4 Size_{it} + \beta_5 Growth_{it} + e_{it}$$

where  $\beta_1, \beta_2, \beta_3, \beta_4$  are coefficients,  $e_{it}$  is the error term.

Finally, the last group of hypotheses is connected with the industry factor. As companies in different industries could have distinct level of indebtedness and their own specifics of capital management, this effect may also influence on the specifics of the relationships.

The many empirical studies highlight the industry factor importance. According to (Kayo & Kimura, 2011), the industry factor affects the capital structure determinants and the relationship between debt ratios and a company's performance. According to (Korajczyk & Levy, 2002), macroeconomic conditions and industry factor directly and significantly affect capital structure choice and firm valuation.

According to (Booth, Aivazian, & Demircug-Kun, 2002) companies on the developed markets typically have more long-term debt and, thus, tend to have higher long-term debt to total debt ratios compared to companies on emerging markets. According to (Bistrova, Lace, & Peleckie, 2011), companies in the countries and economies with high inflation rate usually tend to use less debt financing and rely more on equity financing, as well as such companies refer more to short-term debt financing rather than long-term debt.

Considering the example of oil and gas industry, the authors (Restrepo, Uribe, & Manotas, 2020) indicates that the use of debt and equity varies across time period and, hence, the leverage ratios do not have stability. However, the firms in oil and gas industry tend to refer more to the long-term debt, rather than short-term one.

The results of the research by (Li & Islam, 2019) state that industry-specific factors are important in terms of corporate capital structure formation. For instance, companies in economically significant industries tend to be more leveraged than companies in other industries. In particular, leverage ratio is positively related to GDP contribution of industry, as companies in economically important industries borrow more due to the fact that they have better credit allocation and government support.

According to the data of (О производстве и использовании валового внутреннего продукта (ВВП) за 2020 год, 2020), the main economically significant industries with the highest contribution to GDP in Russia in 2020 include the following industries:

- Metallurgy and Manufacturing – 14.8%
- **Retail – 13.1%**
- **Oil and Gas – 9.8%**
- Public administration and military security – 8.6%.

On the other hand, the industries with the lowest contribution to GDP are the following:

- **Electric utilities – 2.6%**
- Cultural and entertainment activities – 0.9%
- Other services – 0.6%
- Water maintenance – 0.5%.

In that case, there could be a difference in the relationship between capital structure ratios and a company's value between economically significant and non-significant industries. Therefore, the following group of hypotheses is testing the relationship in different industries, comparing the results in order to identify the possible specifics of the industry effect.

In that case, the following hypotheses test the relationship in some particular industries checking both the significance and the reverse causality in various industries and comparing the specifics of such relationships in distinct industries.

**H5.a: The relationship between capital structure ratios and accounting and market measures of a company's value is statistically significant and negative in Oil and Gas industry**

$$ROA = \beta_1 + \beta_2 DE_{it} + \beta_3 DTA_{it} + \beta_4 ETA_{it} + \beta_5 DEBITDA_{it} + \beta_6 Size_{it} + \beta_7 Growth_{it} + e_{it}$$

where  $\beta_1, \beta_2, \beta_3, \beta_4$  are coefficients,  $e_{it}$  is the error term,

$$ROE = \beta_1 + \beta_2 DE_{it} + \beta_3 DTA_{it} + \beta_4 ETA_{it} + \beta_5 DEBITDA_{it} + \beta_6 Size_{it} + \beta_7 Growth_{it} + e_{it}$$

where  $\beta_1, \beta_2, \beta_3, \beta_4$  are coefficients,  $e_{it}$  is the error term,

$$ROA = \beta_1 + \beta_2 LTDTA_{it} + \beta_3 LTDEBITDA_{it} + \beta_4 Size_{it} + \beta_5 Growth_{it} + e_{it}$$

where  $\beta_1, \beta_2, \beta_3, \beta_4$  are coefficients,  $e_{it}$  is the error term,

$$ROE = \beta_1 + \beta_2 LTDTA_{it} + \beta_3 LTDEBITDA_{it} + \beta_4 Size_{it} + \beta_5 Growth_{it} + e_{it}$$

where  $\beta_1, \beta_2, \beta_3, \beta_4$  are coefficients,  $e_{it}$  is the error term,

$$\text{Tobin's } Q = \beta_1 + \beta_2 DE_{it} + \beta_3 DTA_{it} + \beta_4 ETA_{it} + \beta_5 DEBITDA_{it} + \beta_6 Size_{it} + \beta_7 Growth_{it} + e_{it}$$

where  $\beta_1, \beta_2, \beta_3, \beta_4$  are coefficients,  $e_{it}$  is the error term,

$$EPS = \beta_1 + \beta_2 DE_{it} + \beta_3 DTA_{it} + \beta_4 ETA_{it} + \beta_5 DEBITDA_{it} + \beta_6 Size_{it} + \beta_7 Growth_{it} + e_{it}$$

where  $\beta_1, \beta_2, \beta_3, \beta_4$  are coefficients,  $e_{it}$  is the error term,

$$\text{Tobin's } Q = \beta_1 + \beta_2 LTDTA_{it} + \beta_3 LTDEBITDA_{it} + \beta_4 Size_{it} + \beta_5 Growth_{it} + e_{it}$$

where  $\beta_1, \beta_2, \beta_3, \beta_4$  are coefficients,  $e_{it}$  is the error term,

$$EPS = \beta_1 + \beta_2 LTDTA_{it} + \beta_3 LTDEBITDA_{it} + \beta_4 Size_{it} + \beta_5 Growth_{it} + e_{it}$$

where  $\beta_1, \beta_2, \beta_3, \beta_4$  are coefficients,  $e_{it}$  is the error term.

The aforementioned models are the same for the other two hypotheses in this group.

**H5.b: The relationship between capital structure ratios and accounting and market measures of a company's value is statistically significant and negative in Retail industry**

**H5.c: The relationship between capital structure ratios and accounting and market measures of a company's value is statistically significant and negative in Electric utilities industry**

Based on the aforementioned information, the following group of hypotheses testing the industry effect and aimed to check the relationship between various debt ratios and measures of the performance in three different industries: Retail, Oil and Gas and Electric utilities (including both economically significant and non-significant industries).

Summarizing the aforementioned information, based on the literature review and on the analysis of empirical studies, the main 5 hypotheses are formulated testing both general sample and data of distinct industries to test the industry effect.

In conclusion the purpose of this subchapter was to formulate the main methodology applied for the purpose of this research and to choose main instruments and variables to test. It also constructs the basics for the model testing and states the main hypotheses. This subchapter also describes the group of hypotheses testing the industry effect.

## CHAPTER 3. RESEARCH FINDINGS AND APPLICATIONS

### 3.1. Sample selection and description

This subchapter aims to present the basic criteria of a sample selection, as well as to list the key industries and companies which are included in the sample.

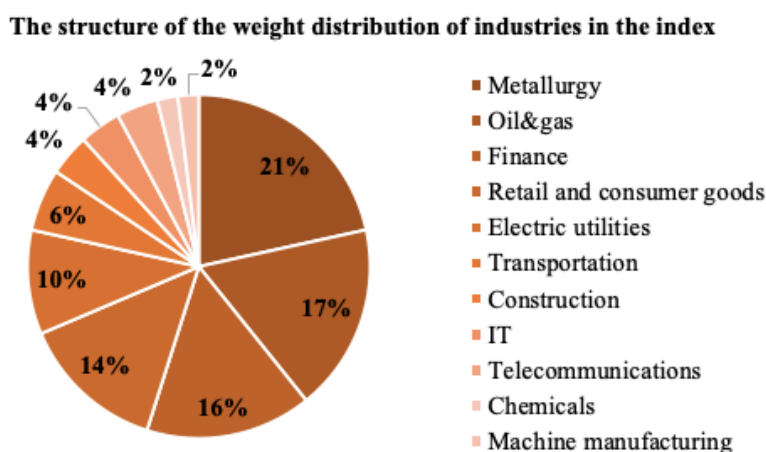
The analysis of the research is focused on the examining the relationship between capital structure and a company's value based on the sample of listed Russian companies as they disclose their financial reports and other important information necessary for conducting the analysis.

The sample of companies is chosen according to the established criteria based on the literature review and analysis of empirical studies. First and the most important point is the listing on Moscow Stock Exchange. Secondly, companies should be included in the calculation of Moscow Stock Exchange index (IMOEX) as this sample of companies represents the benchmarks with the high liquid stock.

According to the data of (Moscow Stock Exchange statistics, 2021), on the 01.04.2021, the total number of listed Russian companies with shares outstanding on Moscow stock exchange is 189 companies of different industries. However, the index calculation includes only 41 companies of different industries. Based on the analysis of the companies in the IMOEX, the industries and number of companies they include are presented in the Appendix.

Among all presented industries, the biggest number of companies is presented by the Metallurgy, Oil and gas and Financial industries. However, the financial and consulting companies will be excluded from the sample, as their characteristics are different and they do not have the typical debt and equity representation in their capital structure (Zeitun & Gang Tianb, 2007). Among other industries presented, there are also Electric utilities and Retail and consumer goods with 5 and 7 companies respectively. On the graph below the structure of the weight distribution of industries in the index is presented.

Figure 3.1.1- The structure of the weight distribution of industries in the IMOEX. Source: prepared by the author



The other Russian stock exchange index is index of RTS (IRTS). It includes 42 companies, most of which are the same as for the IMOEX, although it includes some other entities as well. For example, from IRTS the retail company Lenta Ltd. will be included into the sample.

In order to include more companies for other industries which are not represented in both indices to approximately equate the share distribution of each industry, it is possible to refer to industrial indices or additional criteria.

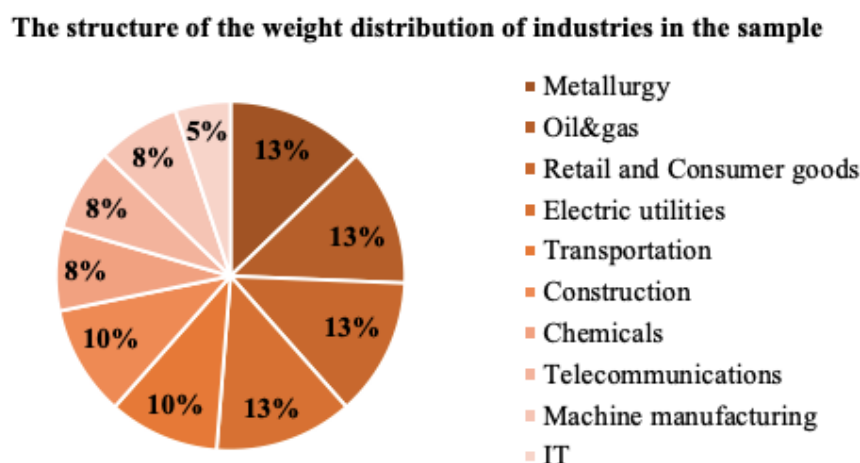
The Moscow Stock Exchange sector indices include the following:

- MICEXO&G. This index is related to the Oil and gas industry. It includes 11 companies, among which Gazprom, Lukoil, Rosneft and NOVATEK are accounted for the highest percentage of revenues in comparison to all others.
- MICEXPWR. This index is related to the Electric utilities industry. It includes 18 companies, among which FGS UES, Rus Hydro and Inter RAO are accounted for the highest percentage of revenues in comparison to all others.
- MICEXTLC. This index is related to the Telecommunications industry. It includes 4 companies, among which MTS is accounted for the highest percentage of revenue in comparison to all others.
- MICEXM&M. This index is related to the Metallurgy and mining industry. It includes 13 companies, among which Alrosa, Nornickel and Severstal are accounted for the highest percentage of revenues in comparison to all others.
- MICEXMNF. This index is related to the Machine manufacturing. It includes 4 companies, among which UWGN PJSC is accounted for the highest percentage of revenue in comparison to all others.
- MICEXFNL. This index is related to the Financial industry. It includes 9 companies, among which Sberbank, VTB bank and Moscow Stock Exchange are accounted for the highest percentage of revenues in comparison to all others.
- MICEXCGS. This index is related to the Retail and consumer goods industry. It includes 12 companies, among which Magnit and X5 Retail Group are accounted for the highest percentage of revenues in comparison to all others.
- MICEXCHM. This index is related to the Chemical industry. It includes 6 companies, among which Phos Agro is accounted for the highest percentage of revenue in comparison to all others.
- MICEXTRN. This index is related to the Transportation industry. It includes 6 companies, among which Aeroflot and Globaltrans investment are accounted for the highest percentage of revenues in comparison to all others.

Therefore, the final sample will consist of the companies from IMOEX, IRTS and industrial indices in approximately equal numbers in order to reach the equal distribution in the sample. However, some industries are represented by smaller number of companies, such as, for example, Construction, Information technology and Machine manufacturing.

Hence, the final list of companies consists of 38 companies from 10 industries (table is presented in the Appendix).

Figure 3.1.2- The structure of the weight distribution of industries in the sample. Source: prepared by the author



So, in the final sample, the number of companies in each industry also varies as in the IMOEX index, although the smaller number of companies is taken from Metallurgy, Oil and Gas and Electric utilities. The industrial indices are used to extend the other industries, such as Transportation, Construction and Machine manufacturing.

Summarizing the aforementioned information, the sample consists of 38 largest Russian companies which are included into the calculation of the Moscow Stock Exchange or industrial indices. The sample includes companies of 10 different industries including 2-5 firms.

### 3.2. Descriptive statistics and correlation analysis

This subchapter aims to describe the descriptive statistics of the sample data analysis, as well as to present the correlation analysis.

For the purposes of this research the panel data is applied, as the study implies the analysis of observations on different companies over various time periods. In case of the research the panel data is observed over the period from 2015 to 2019 semiannually, so there are 10 half-year periods of observations of 38 listed Russian companies of different industries mentioned in the previous subchapter. The total number of companies-periods is 380.



The time period excludes 2020 due to possible lack of data and variables and the period of 5 years excludes the potential biases of previous time periods (2007-2008 crisis and post-crisis periods and 2014 crisis on currency and credit market), as well as it provides with certainty in the presence of all the necessary information.

The data is collected from the various sources, such as Thomson Reuters Eikon Database, official financial statements of the companies, Moscow Stock Exchange statistics and Yahoo Finance. The ratios are calculated by the author and expressed in the relative values, except Earning-per-share, it is calculated in Russian rubles.

In order to construct more accurate model, the descriptive statistics and correlation analysis before the estimation of the regression should be evaluated. Based on the preliminary sample, the following descriptive statistics is constructed using STATA software.

Table 3.2.1 -Descriptive statistics of the main variables. Source: prepared by the author based on the results from STATA software

Variable	Mean	SD	Min	Max
DE	1.523505	1.651030	0.062587	9.416496
DTA	0.508079	0.224165	0.058900	1.435903
LTDTA	0.278041	0.151876	0.000033	0.774828
DEBITDA	6.047086	5.307546	0.232374	28.61233
LTDEBITDA	3.255092	2.904658	0.000339	16.14842
ROA	0.066877	0.073669	-0.331849	0.429972
ROE	0.156091	0.201565	-1.483248	1.571705
Tobin's Q	0.122635	0.486298	0.000021	4.454833
EPS	107.6816	234.1243	-802.3801	2376.109
Size	11.76256	1.317433	7.109062	15.92259
Growth	0.564768	1.166011	-0.969255	4.153672

In the table above the descriptive statistics with the main information about all variables are presented. The general number of observations is 380 for the 38 companies from 2015 to 2019 semiannually. For each variable the minimum, maximum and mean values are calculated, as well as standard deviation.

For debt-to-equity ratio the minimum value is 0.0626 which means that debt accounts for only 6.26% of equity. In relation to the maximum value, debt-to-equity ratio has relatively high ratio meaning 9.416 which means that debt amount is more than 9 times higher than equity. This high value of ratio is connected to the high amount of debt capital on the company's balance sheet, however, it is not possible to assert that this trend is related to some particular industry specifics, as such high values of ratios belong to different companies of distinct industries.

Comparing debt-to-total assets ratio and long-term debt-ratio, there is a difference between the mean values, it implies that there are higher amounts of short-term debt on the balances of some

companies. As the mean value for debt ratio is more than 50%, this implies that most listed Russian companies are highly geared indicating that they use more debt than equity capital.

In relation to EBITDA indicators, debt-to-EBITDA ratio and long-term debt-to-EBITDA maximum values are 28.61 and 16.15 respectively. They indicate that the debt amount of some companies exceeds their EBITDA in almost 29 and 17 times.

For the accounting measures the minimum values for return on assets and return on equity are negative due to the losses reported on the income statements of some companies. The maximum values are 0.43 and 1.57 for ROA and ROE respectively, this means that on 1 ruble of total assets 0.43 rubles of net income is generated, while on 1 ruble of equity 1.57 rubles of net income are generated.

In relation to the market measures of financial performance and valuation, the mean value of Tobin's Q measure is 0.12. This means that the cost to replace assets is greater than the value of the stock implying that the stock is undervalued since average Tobin's Q is less than 1 (Copeland & Weston, 2005). The maximum and minimum Tobin's Q are 4.45 and 0.00002 respectively. In general, Tobin's Q levels on the Russian market are relatively low.

In relation to control variables, the mean value for the size and for the growth are 11.76 and 0.565 respectively, while maximum values are 15.92 and 4.15 respectively and minimum values are 7.11 and -0.969 respectively.

In order to examine the pair-wise association between dependent variable and independent variables and to identify the direction and the degree of the relationship, correlation analysis is conducted. As a rule, the correlation coefficients between 0 and 0.30 shows a weak correlation, from 0.30 to 0.70 a moderate correlation, and between 0.70 and 1.0 an elevated correlation.

Table 3.2.2 - Correlation analysis for the accounting measures. Source: prepared by the author based on the results from STATA software

	DE	DTA	LTDTA	DEBITDA	LTDEBITDA	ROA	ROE
DE	1						
DTA	0.6298	1					
LTDTA	0.4276	0.5380	1				
DEBITDA	0.3218	0.3419	0.1024	1			
LTDEBITDA	0.1575	0.2675	0.3564	0.8089	1		
ROA	-0.0974	-0.3562	-0.0305	-0.4747	-0.4231	1	
ROE	0.0275	0.1692	0.2105	-0.3852	-0.2876	0.6362	1

In the table above it is seen the correlation coefficients for the accounting measures which ranges from -1 to +1. This implies that when the relationship is positive, direct relationship exist which shows increase-increase relationship. However, when the relationship is negative, indirect relationship exist which shows increase-decrease relationship.

There are many variables that have negative correlations with one another. Specifically, return on assets has a negative correlations with all leverage ratios, except long-term debt-to-total assets ratio, while return on equity has a negative correlation only with debt-to-EBITDA and long-term debt-to-EBITDA and a positive and weak correlation with debt-to-equity ratio, debt-to-total assets ratio and long-term debt-to-total assets ratio.

Table 3.2.3 - Correlation analysis for the market measures. Source: prepared by the author based on the results from STATA software

	DE	DTA	LTDTA	DEBITDA	LTDEBITDA	Tobin's Q
DE	1					
DTA	0.6298	1				
LTDTA	0.4276	0.5380	1			
DEBITDA	0.3218	0.3419	0.1024	1		
LTDEBITDA	0.1575	0.2675	0.3564	0.8089	1	
Tobin's Q	-0.0946	-0.1194	-0.0391	-0.0906	-0.0628	1
EPS	-0.0316	0.0129	0.1149	-0.2640	-0.1773	-0.0354

The next table is the correlation coefficients for market measures of company's performance. Tobin's Q has the negative correlations with all the leverage ratios, while Earnings per share has positive and weak correlations with debt-to-total assets ratio and long-term debt-to-total assets ratio.

Table 3.2.4 - Correlation analysis for control variables. Source: prepared by the author based on the results from STATA software

	DE	DTA	LTDTA	DEB	LTDEB	ROA	ROE	EPS	Q
Size	0.0331	0.0527	0.1213	-0.2934	-0.1767	0.2606	0.3001	-0.1517	0.1512
Growth	-0.1103	-0.1528	-0.0127	-0.2925	-0.2590	0.2959	0.1429	0.0690	-0.1064

The table above presents the correlation coefficients for control variables. Both size and growth do not have strong positive correlation with any factors, while size only has positive medium correlations with ROE, weak with ROA and Tobin's Q and negative one with EPS. The growth measure has positive weak correlations with ROA, ROE and EPS, while negative correlation with only Tobin's Q.

Summarizing the aforementioned information, the general statistics and correlation analysis are presented and the correlation between dependent and independent variables are confirmed.

### 3.3. Research design and models' testing

In this subsection each model is analyzed and the results are presented separately for each hypothesis. The final part of this subsection presents the overall results summarized from the findings of each model.

Before the designing of a particular regression model and before the analyzing of the results, it is necessary to conduct the tests indicating which specific type of model should be applied: pooled

OLS model, fixed effects or random effects models. As it was mentioned in the previous chapter, the three main tests can be used to identify which particular regression type is applied in case of each model. Therefore, the first step of the analysis is to conduct tests and check the type to apply for each hypothesis. Firstly, the F-test is conducted in order to check if pooled OLS model or Fixed effects model should be applied. The hypotheses are set in the following way:

*H0: Pooled OLS model is applied*

*H1: Fixed effects model is applied.*

In this case, if the results of F-test show that null hypothesis is rejected with 5% level of significance, then Fixed effects model is applicable. The next step is to conduct the test to decide whether to apply Random effects or Fixed effects models. The Hausman test is used and the hypotheses are set in the following way:

*H0: Random effects model is applied*

*H1: Fixed effects model is applied.*

In this case, if the results of the test show that null hypothesis is accepted with 5% level of significance, then Random effects model is applicable. The last test is Breusch-Pagan test and it can be conducted to check the applicability of Random effects or Pooled OLS models.

*H0: Pooled OLS model is applied*

*H1: Random effects model is applied.*

Based on the aforementioned information, the different types of models for each hypothesis are constructed and tested and the results are presented in the table below.

Table 3.3.1 - Summary of the tests conducted for the main hypotheses. Source: prepared by the author

Hypothesis	Model	F-test	Hausman	Breusch-Pagan	The best fitting model
<i>Hypothesis 1</i>	ROA-Debt ratios	Rejected	Rejected	Rejected	Fixed effects
	ROE-Debt ratios	Rejected	Rejected	Rejected	Fixed effects
<i>Hypothesis 2</i>	ROA-Long-term debt ratios	Rejected	Rejected	Rejected	Fixed effects
	ROE-Long-term debt ratios	Rejected	Accepted	Rejected	Random effects
<i>Hypothesis 3</i>	Tobin's Q-Debt ratios	Rejected	Accepted	Rejected	Random effects
	EPS-Debt ratios	Rejected	Rejected	Rejected	Fixed effects
<i>Hypothesis 4</i>	Tobin's Q-Long-term debt ratios	Rejected	Accepted	Rejected	Random effects
	EPS-Long-term debt ratios	Rejected	Accepted	Rejected	Fixed effects

After the tests are conducted and the models are defined, the models could be run and analyzed. The results for the hypotheses testing are presented below.

**H1: The relationship between debt ratios and accounting measures of financial performance (ROE and ROA) is statistically significant and negative**

The first hypothesis is testing the relationships between debt ratios and the accounting measures of financial performance and value: Return on assets and Return on equity. The results are presented in the table below.

Table 3.3.2 - Summary of relationships between accounting measures and debt ratios. Source: prepared by the author based on the results from STATA software

	ROA	ROE
DE	0.0020019	0.018962
DTA	-0.172748*	-0.2743481*
DEBITDA	-0.000839	-0.0032176
Size	0.0256798*	0.0585397*
Growth	0.0070801*	0.0033786
Cons.	-0.153939*	-0.4200163*
R-squared	0.244	0.042
Prob>F	0.000	0.000

\*\*\* $p < 10\%$ , \*\* $p < 5\%$ , \* $p < 1\%$

The first metric to analyze is R-squared, and for ROA model R-squared overall is 0.244. This means that the model explains 24% of all observed variations. Although R-squared is an important indicator, if it is very close to 100%, especially for time series data, it can indicate significant time patterns in the errors. That is why the low meaning of R-squared does not necessarily imply the low explanatory power of the model and that may identify that the model avoids unnecessary noises and multicollinearity (Ford, 2015).

In case of ROA model, the F-test results state the overall significance of the model. In terms of coefficients significance, with 1% level of significance debt-to-total assets ratio is significant and the coefficient is negative which means that with increase in total debt level return on assets decreases, as well as size and growth are significant for the model but with the positive sign which means that with increases in size or sales growth ROA increases as well. The Wooldridge test is used to test the presence of autocorrelation and the results state the absence, as well as Modified Wald test states the absence of heteroskedasticity.

In case of ROE model, the F-test results state the overall significance of the model. In terms of coefficients significance, with 1% level of significance debt-to-total assets ratio is significant and the coefficient is negative which means that with increase in total debt level return on assets decreases. In relation to control variables, size is significant for the model but with the positive sign which means that with increases in size ROE increases as well. The Wooldridge test states the absence of autocorrelation, as well as Modified Wald test states the absence of heteroskedasticity.

**H2: The relationship between long-term debt ratios and accounting measures of financial performance (ROE and ROA) is statistically significant and negative**

The second hypothesis is verifying the relationships between long-term debt ratios and accounting measures of financial performance and value. The results are presented in the table below.

Table 3.3.3 - Summary of relationships between accounting measures and long-term debt ratios.

Source: prepared by the author based on the results from STATA software

	ROA	ROE
LTDTA	-0.0329407	-0.1688136
LTDEBITDA	-0.0026703***	-0.0078821**
Size	0.0233800*	0.0551239*
Growth	0.0074465**	0.0021766
Cons.	-0.1984112*	-0.5255148*
R-squared	0.141	0.162
Prob>F/Prob>chi2	0.000	0.000

\*\*\* $p < 10\%$ , \*\* $p < 5\%$ , \* $p < 1\%$

For ROA model the F-test results state the overall significance of the model and R-squared equals to 14%. In terms of coefficients significance, with 5% level of significance long-term debt-to-EBITDA is significant and the coefficient is negative. In relation to control variables, size is significant for the model but with the positive sign.

For ROE model Wald test indicates the overall significance of the model, and overall R-squared is 16.2%. In terms of coefficients significance, with 5% level of significance long-term debt-to-EBITDA is significant and the coefficient is negative, while size is significant with 1% level of significance.

**H3: The relationship between debt ratios and market measures of financial performance (Tobin's Q and EPS) is statistically significant and negative**

The third hypothesis is testing the relationships between debt ratios and a market measure of financial performance and valuation: Tobin's Q and EPS. The results are presented in the table below.

In case of Tobin's Q analysis, Wald test indicates the overall insignificance of the model, and overall R-squared is 3.4%. In terms of coefficients significance, with 10% level of significance debt-to-EBITDA is significant, while size is significant with 5% level of significance.

For Earnings per share model F-test indicates the overall significance and overall R-squared is 3.1%. In terms of coefficients significance, with 10% level of significance debt-to-total assets is significant, while size and growth are significant with 1% level of significance. The Wooldridge test states the absence of autocorrelation, as well as Modified Wald test states the absence of heteroskedasticity.

Table 3.3.4 - Summary of relationships between market measures and debt ratios. Source: prepared by the author based on the results from STATA software

	Tobin's Q	EPS
DE	-0.0046654	-1.41438
DTA	0.1671143	-1.79466***
DEBITDA	-0.0093748***	-0.3945152
Size	-0.0724608**	1.98642*
Growth	0.0157056	-1.49485*
Cons.	0.9373341**	-7.4638*
R-squared	0.0342	0.0313
Prob>chi2/Prob>F	0.302	0.000

\*\*\* $p < 10\%$ , \*\* $p < 5\%$ , \* $p < 1\%$

**H4: The relationship between long-term debt ratios and market measures of financial performance (Tobin's Q and EPS) is statistically significant and negative**

The fourth hypothesis is testing the relationships between long-term debt ratios and a market measure of performance and valuation: Tobin's Q and EPS. The results are presented in the table below.

Table 3.3.5 - Summary of relationships between market measures and long-term debt ratios. Source: prepared by the author based on the results from STATA software

	Tobin's Q	EPS
LTDTA	0.2924198	1.79095
LTDEBITDA	-0.012199	-1.688893***
Size	-0.061209**	1.89685*
Growth	0.0143372	-1.212385
Cons.	0.7863795**	-1.242405*
R-squared	0.0305	0.0558
Prob>chi2/Prob>F	0.288	0.000

\*\*\* $p < 10\%$ , \*\* $p < 5\%$ , \* $p < 1\%$

For Tobin's Q model Wald test indicates the overall insignificance of the model. In terms of coefficients significance, with 5% level of significance only size is significant, that is why the further tests are not conducted, as the overall significance of the model is not confirmed.

For EPS model analysis F-test indicates the overall significance of the model and overall R-squared is 5.6%. In terms of coefficients significance, with 10% level of significance long-term debt-to-EBITDA, while size and growth are significant with 1% level of significance.

The next group of hypotheses is testing the relationship between capital structure ratios and the financial performance measure in Oil and Gas, Retail and Electric utilities industries, as a part of the analysis testing the industry factor impact. For the additional hypothesis testing the industry impact on the relationship between capitals structure and a company's value the aforementioned tests were conducted, in order to identify the best fitted model in each case.

In order to investigate and determine the differences between industry specifics, the models for all dependent variables for two economically significant industries, Oil and Gas and Retail, and

not significant industries, including Electric utilities. The results summarizing each model identified are presented below.

Table 3.3.6 - Summary of the tests conducted for the fifth hypotheses. Source: prepared by the author

Hypothesis	Model	F-test	Hausman	Breusch-Pagan	The best fitting model
<b>Oil and Gas</b>	ROA-Debt ratios	Rejected	Rejected	Rejected	Fixed effects
	ROE-Debt ratios	Rejected	Rejected	Rejected	Fixed effects
	ROA-Long-term debt ratios	Rejected	Rejected	Rejected	Fixed effects
	ROE-Long-term debt ratios	Rejected	Accepted	Rejected	Random effects
	Tobin's Q-Debt ratios	Rejected	Accepted	Rejected	Random effects
	EPS-Debt ratios	Rejected	Rejected	Rejected	Fixed effects
	Tobin's Q-Long-term debt ratios	Rejected	Accepted	Rejected	Random effects
	EPS-Long-term debt ratios	Rejected	Accepted	Rejected	Fixed effects
<b>Retail</b>	ROA-Debt ratios	Accepted	Rejected	Rejected	Pooled OLS
	ROE-Debt ratios	Rejected	Accepted	Rejected	Fixed effects
	ROA-Long-term debt ratios	Rejected	Accepted	Rejected	Random effects
	ROE-Long-term debt ratios	Accepted	Rejected	Rejected	Pooled OLS
	Tobin's Q-Debt ratios	Rejected	Accepted	Rejected	Fixed effects
	EPS-Debt ratios	Rejected	Accepted	Rejected	Random effects
	Tobin's Q-Long-term debt ratios	Rejected	Accepted	Rejected	Fixed effects
	EPS-Long-term debt ratios	Rejected	Accepted	Rejected	Fixed effects
<b>Electric utilities</b>	ROA-Debt ratios	Accepted	Rejected	Rejected	Pooled OLS
	ROE-Debt ratios	Rejected	Accepted	Rejected	Fixed effects
	ROA-Long-term debt ratios	Rejected	Accepted	Rejected	Random effects
	ROE-Long-term debt ratios	Rejected	Accepted	Rejected	Fixed effects
	Tobin's Q-Debt ratios	Rejected	Accepted	Rejected	Random effects
	EPS-Debt ratios	Rejected	Accepted	Rejected	Random effects
	Tobin's Q-Long-term debt ratios	Accepted	Rejected	Rejected	Pooled OLS
	EPS-Long-term debt ratios	Rejected	Accepted	Rejected	Fixed effects



The first group of models is testing the relationships and its impact in Oil and Gas industry analyzing the data of 5 various companies both private or part/full state ownership over period of 5 years. The detailed description is presented below.

**H5.a: The relationship between capital structure ratios and accounting and market measures of a company's value is statistically significant and negative in Oil and Gas industry**

Table 3.3.7 - Summary of relationships between performance measures and debt ratios in Oil and Gas industry. Source: prepared by the author based on the results from STATA software

	ROA	ROE	Tobin's Q	EPS
DE	-0.026211	-0.061985	0.079695	-1.05311
DTA	-0.1327789	0.521482	0.582695	-1.96161
DEBITDA	-0.0020966	-0.0043718***	-0.077759	0.573432
Size	-0.0089876	-0.0152434	0.104532	2.14893**
Growth	0.0262969**	0.0364108**	-0.102451	-4.80143**
Cons.	0.252417**	0.3375452**	-1.363851	-1.86743**
R-squared	0.1921	0.246	0.006	0.019
Prob>F/Prob>chi2	0.000	0.000	0.7153	0.002

\*\*\* $p < 10\%$ , \*\* $p < 5\%$ , \* $p < 1\%$

The significance test results state that all models, except for Tobin's Q model, are statistically significant. For ROA model the relationship with growth variable is significant and positive, as well as the situation is the same for ROE and EPS. Among debt ratios, the only significant relationship is presented between ROE and debt-to-EBITDA ratio.

Table 3.3.8 - Summary of relationships between performance measures and long-term debt ratios in Oil and Gas industry. Source: prepared by the author based on the results from STATA software

	ROA	ROE	Tobin's Q	EPS
LTDTA	-0.1388752**	-0.0513125	0.2219609	-1.55396
LTDEBITDA	-0.0046851***	-0.0523315***	-0.0200572	-1.910268**
Size	0.00323854	0.0477288	0.0106244	-1.840097**
Growth	0.0145431***	0.018388**	-0.0807602	-2.93588***
Cons.	0.0744399	-0.49731**	-0.487027	3.98087***
R-squared	0.1923	0.0378	0.0745	0.1497
Prob>F/Prob>chi2	0.0009	0.0005	0.4598	0.0048

\*\*\* $p < 10\%$ , \*\* $p < 5\%$ , \* $p < 1\%$

In relation to long-term ratios, the significance test results state that all models, except for Tobin's Q model, are statistically significant. For ROA, ROE and EPS the relationship with long-term debt-to-EBITDA ratio is statistically significant with 5 and 10% level of significance and negative. For ROA, long-term debt ratio is also statistically significant with 5% level of significance and negative.

Comparing the results between two groups of debt ratios, the main identified point is that the long-term debt ratios have more influence on the accounting measures of a company's value in Oil and Gas industry than debt ratios in general.

The next group of models is testing the relationships and its impact in Retail industry analyzing the data of 5 various private companies over period of 5 years. The detailed description is presented below.

**H5.b: The relationship between capital structure ratios and accounting and market measures of a company's value is statistically significant and negative in Retail industry**

Table 3.3.9 - Summary of relationships between performance measures and debt ratios in Retail industry. Source: prepared by the author based on the results from STATA software

	ROA	ROE	Tobin's Q	EPS
DE	0.0009823	-0.0190363	0.0051678	1.879315
DTA	-0.0899308	0.0214149	-0.077395***	-1.57806*
DEBITDA	-0.0020518**	-0.0053858***	-0.000062	-0.573432
Size	-0.003027	0.0152434	-0.067107	2.237006*
Growth	0.0242156	0.0033387**	0.0000736	1.101473
Cons.	0.1210261***	-0.2054339	0.1469423**	-1.91857
R-squared	0.2614	0.0425	0.2314	0.1882
Prob>F/Prob>chi2	0.001	0.005	0.3552	0.002

\*\*\* $p < 10\%$ , \*\* $p < 5\%$ , \* $p < 1\%$

The test results state the significance of all models, except for Tobin's Q model. For accounting measures, the relationship with debt-to-EBITDA is significant and negative, while for EPS the significant relationship is with debt-to-total assets ratio.

Table 3.3.10 - Summary of relationships between performance measures and long-term debt ratios in Retail industry. Source: prepared by the author based on the results from STATA software

	ROA	ROE	Tobin's Q	EPS
LTDTA	-0.0473161	-0.2754158**	-0.043764	-1.580567***
LTDEBITDA	-0.0031211	-0.0088961	0.0012313	-1.785632
Size	0.0025067	-0.0011743	-0.001743	1.1175634*
Growth	0.0091345	0.087831***	0.0024616	2.773314
Cons.	0.325547	0.1424248	0.0539161	-1.986797*
R-squared	0.2118	0.2457	0.1072	0.1598
Prob>F/Prob>chi2	0.0000	0.0000	0.3495	0.0001

\*\*\* $p < 10\%$ , \*\* $p < 5\%$ , \* $p < 1\%$

The test results state the significance of all models, except for Tobin's Q model. For ROE and EPS, the relationship with long-term debt-to-total assets is significant and negative, while for ROA the significant relationship with long-term debt ratios is not confirmed.

**H5.c: The relationship between capital structure ratios and accounting and market measures of a company's value is statistically significant and negative in Electric utilities industry**

For Electric utilities industries, the models are confirmed to be significant for ROA, ROE and Tobin's Q. The relationship with debt-to-total assets ratio is significant with 1% level of significance and negative, while the relationship between debt-to-equity and accounting measures is significant and positive.

Table 3.3.11 - Summary of relationships between performance measures and debt ratios in Electric utilities industry. Source: prepared by the author based on the results from STATA software

	ROA	ROE	Tobin's Q	EPS
DE	0.0085875**	0.0511178**	0.0016682	-0.0764241
DTA	-0.3190052*	-0.4122663*	-0.0983951*	1.3171702
DEBITDA	-0.0027102	-0.0043591***	0.0003501	-0.9314905
Size	0.0155752***	0.0218161***	0.0014183	3.797829**
Growth	-0.0032108	-0.0053646	0.0024624	2.328011
Cons.	0.0169496***	-0.0525517	0.0308267	-1.91857
R-squared	0.3067	0.2304	0.3323	0.1176
Prob>F/Prob>chi2	0.0002	0.0000	0.0000	0.3379

\*\*\* $p < 10\%$ , \*\* $p < 5\%$ , \* $p < 1\%$

Table 3.3.12 - Summary of relationships between performance measures and long-term debt ratios in Electric utilities industry. Source: prepared by the author based on the results from STATA software

	ROA	ROE	Tobin's Q	EPS
LTDTA	-0.0640162	-1.2933443*	-0.0529767**	-1.356438
LTDEBITDA	-0.0094502**	-0.0040641	-0.0003863	0.0133899
Size	0.0005327	0.0278945	-0.0023545	-0.2991373
Growth	0.0011499	-0.000876	0.003829**	1.366378**
Cons.	0.0895642	-0.0475995	0.0575933**	1.956926
R-squared	0.2630	0.1664	0.2610	0.1032
Prob>F/Prob>chi2	0.0000	0.0000	0.0000	0.2865

\*\*\* $p < 10\%$ , \*\* $p < 5\%$ , \* $p < 1\%$

In relation to long-term debt ratios, the significant models include ROA, ROE and Tobin's Q. The relationships between both ROE and Tobin's Q and debt-to equity is significant and negative, while for ROA the relationship with long-term debt-to-EBITDA is significant and negative.

Summarizing the results of this subchapter, it can be concluded that all necessary tests have been conducted, on order to identify the best fitting model for each case, as well as all models are run and results are considered. This subchapter is crucial for the finalization of the results which are presented in the following part.

### 3.4. Results and findings

In this subchapter the main results for each hypothesis in particular and for the overall sample are summarized. In case of the overall sample the results state that the relationship between debt-to-total assets ratio and all accounting measures of financial performance is significant and negative. In relation to market measures the relationship is insignificant. Moreover, long-term debt-to-EBITDA influences significantly and negatively all measures of performance, except Tobin's Q. The tables summarizing the results of all the models are presented below.

Table 3.4.1- Summary of the overall findings. Source: prepared by the author

Measure	Debt ratios	Long-term debt ratios
ROA	Significant negative relationships between ROA and Debt-to-total assets	Significant negative relationships between ROA and Long-term debt-to-EBITDA
ROE	Significant negative relationships between ROE and Debt-to-total assets	Significant negative relationships between ROE and Long-term debt-to-EBITDA
EPS	Significant negative relationships between EPS and Debt-to-total assets	Significant negative relationships between ROE and Long-term debt-to-EBITDA
Tobin's Q	Insignificant relationships	Insignificant relationships

In relation to the fifth hypothesis and the industry factor influence, the main identified aspects are expressed in the following points. For economically significant industries Tobin's Q models are not significant, while for Electric utilities – non-economically significant one - the model is significant. For Oil and Gas industry the long-term debt ratios have impact on all variables, while the relationships with debt ratios and all dependent variables are not confirmed to be significant. On the other hand, the situation in other economically significant industry – Retail – is the opposite. The relationship between debt ratios and all independent variables, except for Tobin's Q, are significant, while in relation to long-term debt ratios the relationship is significant only for ROE and EPS.

For Electric utilities industry the relationship between ROA, ROE and Tobin's Q and debt ratio is significant and negative, however the accounting measures and debt-to-equity measures have significant and positive relationships. The relationships between both ROE and Tobin's Q and debt-to equity is significant and negative, while for ROA the relationship with long-term debt-to-EBITDA is significant and negative. The results of the analysis for all industries are presented in the table below.

Table 3.4.2- Summary of the findings for Oil and Gas industry. Source: prepared by the author

Measure	Debt ratios	Long-term debt ratios
ROA	No significant relationships between ROA and debt ratios	Significant negative relationships between ROA and Long-term debt-to-EBITDA and long-term debt-to-total assets
ROE	Significant negative relationships between ROE and Debt-to-EBITDA	Significant negative relationships between ROE and Long-term debt-to-EBITDA
EPS	No significant relationships between EPS and debt ratios	Significant negative relationships between EPS and Long-term debt-to-EBITDA
Tobin's Q	Insignificant relationships	Insignificant relationships

Table 3.4.3- Summary of the findings for Retail industry. Source: prepared by the author

Measure	Debt ratios	Long-term debt ratios
ROA	Significant negative relationships between ROA and Debt-to-EBITDA	No significant relationships between ROA and long-term debt ratios
ROE	Significant negative relationships between ROE and Debt-to-EBITDA	Significant negative relationships between ROE and Long-term debt-to-total assets
EPS	Significant negative relationships between EPS and Debt-to-total assets	Significant negative relationships between EPS and Long-term debt-to-total assets
Tobin's Q	Insignificant relationships	Insignificant relationships

Table 3.4.4- Summary of the findings for Electric utilities. Source: prepared by the author

Measure	Debt ratios	Long-term debt ratios
ROA	Significant negative relationships between ROA and Debt-to-total assets and positive relationship with Debt-to-equity	Significant negative relationships between ROA and Long-term debt-to-EBITDA
ROE	Significant negative relationships between ROE and Debt-to-total assets and positive relationships with Debt-to-equity	Significant negative relationships between ROE and Long-term debt-to-total assets
EPS	Insignificant relationships	Insignificant relationships
Tobin's Q	Significant negative relationships between EPS and Debt-to-total assets	Significant negative relationships between Tobin's Q and Long-term debt-to-total assets

Summarizing the aforementioned findings, 3 hypotheses out of 5 are accepted. The results for the first hypothesis state that the relationships between all chosen accounting measures of performance (Return on assets, Return on equity and Earnings per share) and debt-to-total assets ratio are significant and negative which means that with the higher level of indebtedness the ratio is higher and it decreases ROA, ROE and EPS.

The results for the second hypothesis state that the relationships between accounting measures of performance and long-term debt-to-EBITDA ratio are significant and negative which means that if the level of indebtedness is high and EBITDA is relatively low in comparison, a company's return on assets, return on equity and earnings per share can decrease. The results for the third and fourth hypotheses state that the relationships between Tobin's Q and debt and long-term debt measures are insignificant. The results for the last group of hypotheses state that indeed the relationship between capital structure and value measures in distinct industries is significant and negative, although the

relationships vary across industries, as in each industry various debt ratios have more influence than others.

Table 3.4.5 - Summary of the hypotheses' analysis. Source: prepared by the author

Hypothesis	Status	Results
Hypothesis 1	Accepted	The relationship between debt ratios and accounting measures of valuation is significant and negative.
Hypothesis 2	Accepted	The relationship between long-term debt ratios and accounting measures of valuation is significant and negative.
Hypothesis 3	Rejected	The relationship between debt ratios and both market measures is not confirmed to be significant, only for EPS.
Hypothesis 4	Rejected	The relationship between long-term debt ratios and both market measures is not confirmed to be significant, only for EPS.
Hypothesis 5. a, c	Accepted	The relationship between debt and long-term debt ratios and accounting and market measures in distinct industries is significant and negative.

Summarizing the aforementioned information, all findings are presented and three hypotheses are accepted. For market measures the relationship is insignificant, while for all accounting measures the relationships are significant and negative. This subchapter presents the basic for the further development of research applications and recommendations.

### 3.5. Applications and recommendations

This subchapter describes the main contributions of the current study, as well as the main managerial applications, recommendations and possible limitations.

The contributions of this research to the topic of the capital structure influence on corporate valuation are expressed in the following points:

- the research paper highlights the importance of relationship between capital structure represented by accounting measures of leverage and company's overall valuation measures, including both accounting and market measures based on the data of Russian companies;
- it broadens the current limited empirical studies on the topic in Russia and provides insights into the issue of capital structure for the largest and the most liquid companies on Moscow Stock Exchange;
- it provides the results which can be applied for the evaluation of financing decisions for managers and decision-makers and also confirms the importance of correct debt policies and debt management for capital structure development within organization.

The main conclusion made throughout the research is that the significant and negative relationships between accounting and market measures and debt ratios do exist. This negative relationships on the Russian market could be explained by the following points:

- inefficiency of Russian market for corporate control;
- problems and complications in debt funding;
- high growth potential of developing markets;
- high interest rates for debt financing attraction;
- shifting profits from the country to offshores (Ilyukhin, 2015).

Also, according to (Wang & Song, 2013), the possible explanation of the negative relationship can be connected to the fact that the government can support companies in the economically important industries and in that case shareholders do not play significant role to constraint the debt which could lead to the excessive investment and influence profitability and value. Following from this main finding the key applications are formulated. These conclusions and applications can be useful for

- the financial managers and potential financial decision-makers, as they can refer to the research results in their decision-making process;
- shareholders, as they analyze the current state of an organization corporate value and its dependence on the debt levels;
- lenders, as they can control and monitor the situation with debt in a company's capital structure and its impact on performance and, according to the current financial state, implement additional covenants;
- investors, as they can control and monitor the situation with debt in a company's capital structure and its impact on performance and value before making investment decisions.

The application of these results includes the following. Firstly, **managers of Russian companies in different industries can use the results of the research in a process of capital structure formation.** As the paper considers accounting values of debt ratios, the conclusions are practically oriented because these indicators can be actively managed and controlled, in comparison to market values.

In particular, the results state that companies have strong negative relationship with a debt level ratio and a ratio of debt amount to EBITDA in all industries. It means that **managers should consider and limit the level of indebtedness**, as well as compare the debt level to EBITDA, to such extent that these indicators do not negatively impact a company's value.

The next application is that in all industries the relationships are significant and negative, although **in distinct industries various measures have different impact.** Therefore, the important aspect is **to consider the industry specifics and take them into account.** For instance, for Oil and Gas industry it is important to consider the amount of long-term debt, while for Electric utilities

industry debt-to-equity level can have positive correlation with accounting measures of a company's value.

This application can be considered as **basics for the further research and more deep analysis of the particular industry specifics** and their influence on the relationship. Also, in case of industry or sector in many empirical studies the further research of the topic includes the analysis of a capital structure determinants (Kyereboah-Coleman, 2007).

According to the research findings, the relationship between capital and company's performance are found to be significant and negative which means that the higher debt levels decrease a company's value. Therefore, the general recommendations for the managers could be the following.

**First and foremost**, it is crucially important to implement active management of book leverage. It is necessary to evaluate and to control the acceptable level of debt, decreasing or increasing it depending on the changes in the economic environment and other factors.

The general recommendations for financial managers in the case **also include** the employment of a proper utilization and management system of the debt capital, the ability of companies to attract huge inflows of debt may be contingent on their ability to manage debt properly to boost their creditworthiness.

**In some cases**, it is even more important to decrease the acceptable amount of debt which can be achieved by focusing on the factors shaping the capitals structure, such as accounts payable turnover and inventory turnover, for example. **As an alternative**, it is essential to consider all financing options and refer more to equity financing.

**Moreover**, this can be achieved by implementing proper forecasting system of the demand, budgeting and other aspects and by developing and constantly elaborating the credit policy of a company, which includes the credit relationship with suppliers and customers, working capital management and other important aspects, by negotiating better terms of payment with suppliers. The agreement on the more favorable conditions of payment with suppliers, such as a longer credit period, for instance, could increase the average accounts payable, thus, increasing the accounts payable turnover.

**The other measures** include the development and improvement of the budgeting processes, as well as the provision of the stricter control for the budget performance.

However, despite the fact that the results of the research are important, they are limited in some ways.

- The results are only applicable to the Russian market and to specifics of Russian companies;
- The research is limited in the number of variables applied, as there are many other performance measures applicable to the research purposes, for instance, Return on capital employed, Return on investment, Price-earnings ratio, Market-to-book value etc.;



- The sample size of the research is limited, as the this paper only considers small number of companies belonging to various industries, hence, the results of the paper can be applied only to companies similar to the ones included in this paper (Gill & Obradovich, 2012).

This subchapter constructs the models and analyzes the results and findings. All hypotheses are tested on the general sample and on the data of particular industries. The results are identified and analyzed and, based on the obtained data, the main applications, research contributions and limitations are formulated.

## CONCLUSION

In the research the main goal is to determine the relationship between capital structure presented by accounting debt measures and a company's value based on the data of listed Russian companies included into IMOEX calculation. The goal of the study is achieved, and the results confirm that the relationships between capital structure ratios and Return on equity, Return on assets and Earnings per share are significant and negative.

In the introduction the main research problems and questions are outlined. Four main research problems were analyzed and accomplished in the research. In the paper the general review of literature and of the existing theories on the capital structure is presented. The research results are consistent with Market timing theory by (BAKER & WURGLER, 2002). Also, different empirical studies on the topic were divided into five group, according to the market or economy's development, and examined. The studies' results are contradictive, and yet on developing markets the interrelation between capital structure and valuation is inverse.

The paper also provides responses to the aforementioned questions by testing the main group of four hypotheses and the additional one verifying industry impact. The answers to these questions are formulated in the third chapter, although the second chapter contains the methodology and hypotheses description necessary for the research conduction. The outcomes explain that both debt and long-term debt measures have significant and negative correlation with both accounting measures and with Earnings per share, while the models for Tobin's Q are insignificant.

Furthermore, the research provides an answer to the third question by testing the industry factor importance. This test is conducted by examining the relationship between capital structure ratios and a company's value measures in economically significant industries according to the contribution to GDP, such as Oil and Gas and Retail, and in non-economically significant industries, such as Electric utilities. The results state that the relationships are significant and negative in distinct industries, however various industries have their own specifics of such relationships.

All objectives are accomplished, main application of the research results, contributions, recommendations and limitations are formulated, as well as all necessary references are outlined and presented at the end of the paper together with five pages of Appendix.

The main contributions of this research to the topic are that the research paper highlights the importance of relationship between the proportion of debt and equity financing on company's overall results in Russia; it broadens the current limited empirical studies on the topic in Russia; it provides the results which can be applied for the evaluation of financing decisions for managers and decision-makers.

Also, the following applications are identified. Firstly, largest public Russian companies indeed have strong negative relationship between their valuation metrics and debt ratio and debt

comparing to EBITDA in all industries. In that case, for the managers it is crucially important to consider and limit the level of indebtedness to such extent that it does not negatively impact a company's value. The next application is that the industry factor is significant on the Russian market and in distinct industries various measures have different impact. The results of the research can be found important by different groups of users, most importantly by financial managers and decision-makers.

The possible limitations of the research are the application of the results only to the Russian market, limited number of variables applied, the application of the results only to the largest and the most liquid companies listed on Moscow Stock Exchange, so the limited sample size.

The study findings can be applied for further research papers. The analysis can be broadened by including the higher number of companies for more extended period of time or by focusing on the analysis of the specific industry or companies of specific size (for example, analysis of the relationship in small and medium size entities).

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## APPENDIX

Table 1 - The description of the independent variables chosen for the research purpose. Source: prepared by the author

Ratio	Name in sample	Description	Formula
Debt-to-equity	DE	This ratio presents whether a company finances its operations with more debt or equity sources. The measure reflects the company's ability to cover all debt in case of critical business conditions.	Total debt/Total equity
Debt-to-total assets	DTA	This ratio presents the proportion of total debt to overall amount of assets. It can reflect a company's financial stability and potential risks for investors: high ratio level means higher degree of leverage and higher risk.	Total debt/Total assets
Long-term debt-to-total assets (Solvency ratio)	LTDTA	This ratio presents the proportion of long-term debt to total assets, and it also reflects a firm's financial conditions and stability.	Long-term debt/Total assets
Debt-to-EBITDA	DEBITDA	This ratio measures the amount of company's debt in comparison to its income before covering interest, taxes, depreciation, and amortization expenses. It presents a company's ability to repay its debt amount with actual cash flow.	Debt/EBITDA
Long-term debt-to-EBITDA	LTDEBITDA	It shows the ability of a company to repay the long-term debt with actual cash flow received.	Long-term debt/EBITDA

Table 2 - The description of the dependent variables chosen for the research purpose. Source: prepared by the author

Ratio	Type measure	Name in the sample	Description	Formula
Return on assets	Accounting measure	ROA	It is a measure of a company's profitability and valuation comparing a company's earnings to its total asset amount. This ratio presents the efficiency of assets usage generating earnings.	$\text{Net income} / \text{Total assets}$
Return on equity	Accounting measure	ROE	It is a measure of a company's profitability and valuation comparing a company's equity to its total asset amount. The ratio represents a company's ability to generate earnings from equity investments.	$\text{Net income} / \text{Equity}$
Earnings per share	Market measure	EPS	It is measured by dividing a company's earnings by the number of shares outstanding. It is applied in corporate valuation metrics and presents the amount of profit generated per each share.	$(\text{Net income} - \text{Preferred dividends}) / \text{End of period shares outstanding}$
Tobin's Q	Market measure	Tobin's Q	It presents the relationship between a company's intrinsic value and market valuation. It can indicate under/overvaluation of a business.	$\text{Market capitalization} / \text{Book value of assets}$

Table 3 – The industries included in the IMOEX

Industry	Number of companies
Chemicals	1
Construction	2
Electric utilities	5
Finance	8
Information technology	2
Machine manufacturing	1
Metallurgy	1
Oil and gas	9
Retail and consumer goods	7
Telecommunications	2
Transportation	3
Total	41

Table 4 - The companies and the industries presented in the sample. Source: prepared by the author

Industry	Companies	Number
Chemicals	1.Phos Agro PJSC 2.Nizhnekamskneftekhim PJSC 3.Acron PJSC	3
Construction	1.PIK Group PJSC 2.LSR Group PJSC 3.Etalon group Plc 4.Ingrad Ltd	4
Electric utilities	1.Inter RAO PJSC 2.RusHydro PJSC 3.FGS UES PJSC 4.ROSSETI PJSC 5.Unipro PJSC	5
Information technology	1.Yandex N.V. 2.Mail.ru Group Limited	2
Machine manufacturing	1.UWGN PJSC 2.KAMAZ JSC	2
Metallurgy	1.NORILSK NICKEL PJSC 2.NLMK PJSC 3.Severstal PJSC 4.Polymetal International PLC 5.ALROSA PJSC	5
Oil and gas	1.Gazprom PJSC 2.Lukoil PJSC 3.Rosneft PJSC 4.NOVATEK JCS 5.TATNEFT PJSC	5
Retail and consumer goods	1.Magnit PJSC 2.M video PJSC 3.Lenta Ltd 4.X5 Retail group N.V. 5.ROS AGRO PLC	5
Telecommunications	1.MTS PJSC	3

	2.Rostelecom PJSC 3.Megafon PJSC	
Transportation	1.Aeroflot PJSC 2.UTair PJSC 3.Globaltrans investment PLC 4.Transcontainer PJSC	4
<b>Total</b>		3