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VYTAUTAS MAGNUS UNIVERSITY  
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MYKOLAS ROMERIS UNIVERSITY

Kristina  
PULEIKIENĖ

# Assessment of the Impact of Capital Structure on Business Value in the Maritime Sector Companies

**SUMMARY OF DOCTORAL DISSERTATION**

Social Sciences,  
Economics (S 004)

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*I dedicate it to my beloved father Dalius Steponavičius,  
who gave 40 years of his life to the Sea  
and never came back from it...*

## INTRODUCTION

**Relevance of the topic.** The global world and individual countries which are influenced by the economic and financial crises, as well as pandemics, that occur in one way or another have a major impact on business and its performance. Declining consumption, disrupted settlements, limited or unavailable sources of finance and other economic and financial reasons may cause business failures. Efficient and rational financial management is crucial for companies to survive and operate successfully under various conditions of the economic cycle, especially in the times of a crisis. It can be argued that, under modern conditions of market economy, making economically sound decisions about the structure of funding sources is one of the most important tasks for business companies, since the formation of a capital structure establishes the company's ability to maximize its return, manage risks effectively, and operate successfully in a competitive environment to meet the needs of a wide range of stakeholders. In this way, by ensuring prosperity, stability and sustainability, the company is able to achieve one of its main goals: to maximize value for the shareholders. Financial stability and insolvency risks are related to the borrowed capital, its size and changes in the capital structure of a company.

When addressing various issues related to corporate ownership, there is a need for the establishment of the business value. Company managers, investors and other stakeholders seek to answer the question of which capital structure to choose in order to guarantee the company's profitable and long-term activities and thus maximize the business value. Therefore, choosing a capital structure that maximizes the business value with minimal leveraged capital costs becomes a pressing problem under the current market conditions, and the capital

structure research remains significant in today's business world. The maximization of the business value is relevant for many stakeholders related to the company who in the scientific literature are primarily named as company owners, stakeholders, creditors, and other investors. Throughout the last decade, more and more research has been conducted to show that the activities of companies also have an interest in the society whose attitude to the reputation created by the company can affect the business value.

The maritime sector is strategically important and economically significant for any country. Companies in this sector make a significant socio-economic contribution across the entire state. When forming the capital structure in the companies of the maritime sector, certain exceptions are encountered, since the operation of these companies requires a large amount of borrowed capital. An increase of the business value of maritime sector companies has a positive meaning both nationally and internationally.

**Scientific problem and the level of its investigation.** The earliest studies of capital structure appeared in the second half of the 20<sup>th</sup> century. D. Durand (1952), F. Modigliani and M.M. Miller (1958, 1963), and G. Donaldson (1961) are considered the forerunners who paid the most attention to the cost of debt and equity capital. Their followers, while conducting further research, sought to determine which theories of the capital structure best reflect what determines the formation of the capital structure in companies (Jensen and Meckling, 1976; Myers and Majluf, 1984; Jensen and Smith, 1984; De Angelo and Masulis, 1980; Fama and French, 2002; Baker and Wurgler, 2002). Empirical research was primarily conducted in US companies (Leary and Roberts, 2005; Frank and Goyal, 2003; Shyam-Sunder and Myers, 1999; and others). Later, with the expansion of capital markets and the increasing availability of the financial data of companies, the number of studies on the capital structure in companies in the European countries (Adair and Adaskou, 2015; Arvanitis et al., 2012; Serrasqueiro and Caetano, 2012; and others) and companies in Asia as well as in other countries/regions (Afolabi et al., 2019; Abdallah and

Ismail, 2017; Adenugba et al., 2016; Matemilola et al., 2014; Al-Taani, 2013; and others) increased. In particular, the researchers emphasized the importance of choosing a combination of the capital structure in companies (Ali and Divya, 2019; Uremadu and Onyekachi, 2018; Dananti and Cahjono, 2017; Kristyana and Dananti, 2017; Terzioğlu, 2017; Mahdaleta et al., 2016; Hamid et al., 2015; Shahar et al., 2015; Priya et al., 2015; Akeem et al., 2014; Leon, 2013; Jacobides, 2013; Rajendran and Nimalthasan, 2013; Zhi-qiang, 2012; Cuong and Canh, 2012; and others). According to some researchers, the capital structure is formed by taking into account the marginal benefits of the debt capital with the marginal costs of the debt capital (Nguyen et al., 2021; Zeitun et al., 2017; Bolton and Huang, 2016; Cummins and Weiss, 2016; Sheikh and Qureshi, 2014; Dissanayake and Fernando, 2015; and others). Other researchers indicated that companies sought to finance their activities from internal funding sources (Iroegbu Ferdinand et al., 2018; Ahsan et al., 2016; Kedir and Mekonnen, 2015; Mukherjee and Mahakud, 2010; and others).

In companies of different sectors, the capital structure may be formed differently. Meanwhile, capital structure surveys do not distinguish between companies by sector, and often all types of companies are treated as a homogenous group (Hamzah and Marimuthu, 2018; Koralun-Bereznicka, 2013). The development of scientific progress in the maritime sector lacks empirical research to analyze the formation of a capital structure in companies in the maritime sector in particular. Many studies in the maritime sector focus on the areas of maritime policy, the marine ecosystem or maritime sub-sectors, such as fisheries, energy, and transport logistics. K. Morrissey and C. O'Donoghue (2013) investigated the role of the maritime sector in the Irish economy and found that this sector creates a significant added value for the national economy, and, therefore, it is appropriate to promote it through additional investments. Research conducted by K.I. Jacobsen et al. (2014) confirmed that the activities of the maritime sector companies, in particular the maritime energy industry, have a significant impact on the economies of maritime



countries. N.B. Dang et al.'s (2017) research showed that the development of sustainable fisheries in Vietnam is hindered by inefficient state institutions of the country which regulate the activities of the marine sector. Researchers analyzing the financing, solvency and liquidity problems, and debt service capabilities of maritime companies (Yeo, 2016; Drobetz et al., 2013; Albertijn et al., 2011; Lin et al., 2010) agree that the maritime sector faces volatile cash flows, as well as constantly changing freight and ship prices, especially regarding construction, purchase, rental, etc.; therefore, the risk management is of high importance. In the research, scientific discussions arise regarding the expediency of the sources of financing the activities of companies in the maritime sector. Some investigations revealed that, although the main source of financing the maritime sector companies is credit resources, the companies sought to take advantage of financing opportunities in external capital markets (Merika et al., 2015). Other investigations found that the maritime sector companies were seeking to finance their activities through internal sources of financing (Yang et al., 2021; Paun et al., 2016; Lee, 2016; Drobetz et al., 2013; Arvanitis et al. 2012; Thalassinos et al., 2012). Measurements of the capital structure of the maritime sector are limited to a key indicator relating to the company's total liabilities or total debts of the company. Insufficient attention to the indicator of long-term debts can be seen, since long-term debts are very significant in companies of the maritime sector in order to finance the construction or purchase of a new ship, acquisition of equipment, etc.

There are relatively few studies of the Lithuanian maritime sector in the scientific literature. Such analysis is difficult due to the specificity of the sector, the complexity of operations, and the broad classification of companies. However, there are fragmentary studies about the maritime sector, although they are more related to the actualities of environmental changes and the emerging phenomena. V. Grublienė (2005, 2007, 2010, 2012) evaluated the changes, problems and perspectives of the fishery sector of the Lithuanian maritime economy as a regional business and investigated the importance of

clustering in the maritime economy. R. Viederytė and V. Juščius (2011, 2012, 2014, 2016) continued research on the formation and promotion of clustering in the Lithuanian maritime sector in order to assess the impact of the maritime sector on the country's economy. Their research showed that the legislative base along with the influence of financial resources, investments and innovations is important for the creation and faster development of clusters. The main obstacles to maritime clusterization are the lack of trust among the potential cluster members, the lack of experience in partnership activities, and practically non-functioning business information systems. J. Belova and R. Mickienė (2010, 2012, 2015, 2017) assessed the efficiency of the maritime sector and found that the efficiency of this sector strengthens international and political positions of the involved countries because it is an activity directly related to international economic cooperation, attraction of foreign investment, etc. The high financial performance of companies in the maritime sector makes it possible to attract new users of port services, cargo owners, shipping lines and investors. Research on the capital structure in Lithuanian companies showed that, when forming the capital structure, companies sought to maintain the highest possible level of the equity capital within the company's capital structure. Such a decision was determined by the instability of the business environment of the country at that time and the poorly developed capital market (Rumšaitė and Vasiliauskaitė, 2000; Kipišas, 2004). Later studies on the formation of the capital structure revealed that, when the international movement of capital became more active, Lithuanian companies increased the level of borrowed capital in the capital structure, while taking into account the ratio of the financing costs and the involved risk, in order to achieve the optimal capital structure (Cibulskienė, 2007, Cibulskienė and Grigaliūnienė, 2008; Lileikienė et al., 2008, 2014; and others).

In the world of science, there is a difference of opinion regarding the direction and significance of the influence of the factors that establish the capital structure. Many researchers studied the factors

which establish the capital structure of a company and highlighted the main microenvironmental and macroenvironmental factors establishing the capital structure (Jaworski and Czerwonka, 2021; Gharaibeh and Saqer, 2020; Kajola and Olabisi, 2019; Sen and Ranjan, 2018; Sheikh et al., 2017; Zeitun et al., 2017; Yeo, 2016; Güner, 2016; Ramezanalivaloujerdi et al., 2015; Acaravci, 2015; Malshe et al., 2015; Hamid et al., 2015; Vatavu, 2015; Danso et al., 2014; Sheikh et al., 2014; Obradovich et al., 2013; Fosu, 2013; and others). However, when analyzing the factors of the capital structure, microenvironmental factors tend to dominate in the research because they depend on company-specific indicators that can be controlled. In many empirical studies, they are repeated, and only the methods of measuring the factors actually differ. However, the capital structure of companies is affected not only by microenvironmental factors but also by various macroenvironmental factors of the country. They are given less attention in the studies, and this situation leads to another scientific problem. Macroeconomic indicators, such as the change in the gross domestic product, the inflation rate, and the interest rate, are commonly used as factors in the macroeconomic capital structure. However, the political, geopolitical, social, natural and technological environment is not taken into account. Therefore, in order to properly assess the impact of the factors on the capital structure, it is important to analyze not only microenvironmental factors but also macroenvironmental factors.

When analysing a particular sector, the impact of specific factors on the capital structure of the company becomes very significant (Drobeta et al., 2013; Koralun-Bereznicka, 2013). Therefore, additional research is needed to analyze how the influence of factors on the capital structure varies depending on the sector. A number of researchers (Yang et al., 2021; Paun and Topan, 2016; Lee, 2016; Merika et al., 2015; Arvanitis and Tzigkounaki, 2012; Thalassinos and Tzigkounaki, 2012) who have investigated the factors determining the capital structure in the maritime sector limited them to microenvironmental factors. The following main microenvironmental

factors in the maritime sector have been distinguished: profitability, liquidity, tangible assets indicator, company growth, size, and tax benefits. However, the obtained results highlighted differences of opinion regarding the impact of factors on the formation of the capital structure in the maritime sector. Macroenvironmental factors related not only to the country's economic situation but also to the political and geopolitical environment and emphasizing the specificity of the maritime sector are important for the companies representing the maritime sector. The factors related to the specificity of this business sector have not been sufficiently addressed in the studies. Studies that comprehensively evaluate the impact of both microenvironmental and macroenvironmental factors on the capital structure in the maritime sector have not been developed yet. Almost no studies were found to analyze *only* macroenvironmental factors. It is, therefore, appropriate to examine the factors influencing the formation of the capital structure of companies in the maritime sector by extending the range of factors.

In the course of time, globalization changes take place, and uncertainty in financial markets increases, the formation of the capital structure is also influenced by the factors of the natural environment. Particular attention is being paid to environmental protection, which complements microenvironmental and macroenvironmental factors. For today's companies developing their business in the maritime sector, the assessment of these factors is important when forming a capital structure. Microenvironmental factors related to environmental protection are difficult to analyze due to a lack of data, and it is, therefore, appropriate to include them in the research at the macro level. It has been noted that capital structure research rarely includes or excludes factors related to a company's social responsibility and environmental performance. Like all types of transport using fossil fuels, ships emit carbon dioxide, thereby making a huge impact on the global climate change and acidification. Therefore, according to many scientists, the problem of pollution is extremely relevant for the companies in the maritime sector (Gong et al., 2018; Liu et al., 2018;

Lin et al., 2018; Chen et al., 2018; Kopela, 2017; Matthias et al., 2016; Aulinger et al., 2016; Merika et al., 2015; Boscarato et al., 2015; Han, 2010; and others). In order to ensure the continuous and long-term creation of business value, focusing solely on the pursuit of the personal interests of the company owners and stakeholders and maximizing the profit is too narrow an approach in the context of sustainable finances. Although maximizing the stakeholders' assets is one of the company's objectives reflecting the financial-economic aspect, it should also be complemented from the economic-social point of view in order to ensure environmental efficiency and the social well-being of the stakeholders.

The results of the studies assessing the impact of the capital structure on the business value are contradictory. Some researchers did not find a significant link between the capital structure and the business value (Yusra et al., 2019; Adenugba et al., 2016; Chadha and Sharma, 2015; Hassan et al., 2014; and others). Meanwhile, other researchers determined that the capital structure had a significant positive link to the business value (Zavala and Salgado, 2019; Hirdinis, 2019; Obradovich and Gill, 2013; Adeyemi and Oboh, 2011; Saeedi and Mahmoodi, 2011; Chowdhury, 2010) and argued that financing a company's activities with borrowed capital would increase its business value. Another group of researchers highlighted that there is a significant negative link between the capital structure and the business value (Javeed et al., 2017; Mahdaleta et al., 2016; Khan, 2012; Chen et al., 2011; and others); they argued that an increase of borrowed capital causes financial difficulties for companies. However, there is a significant lack of studies assessing the impact of the capital structure on the business value in the maritime sector. Empirical studies conducted in the sub-sector of fisheries have shown that there is a non-linear relationship between the capital structure and the business value. It was thus revealed that an increase of debts in the capital structure initially increases the business value, yet it begins to decrease afterwards (Cuong, 2014; Cuong and Canh, 2012). When analyzing the impact of the capital structure on the business value,

there is a lack of studies pursuing the objective to determine what level of borrowed capital would increase the business value. This type of research is particularly underdeveloped (Susanti, 2016; Cuong, 2014; Cuong and Canh, 2012; Cheng et al., 2010; and others), and the results are ambiguous regarding the level of debt acceptable to the company in order to increase the business value.

Summarizing the research level of the scientific problem, it can be stated that, in the scientific works related to the formation of the capital structure, determination of the business value and analysis of their interrelationship, there is a noticeable limitation of research and assessment of specific factors in individual economic sectors. It is especially acute in the maritime sector. The specificity of the activities and the constant competition lead to the aggressive financing strategies applied by the companies in the maritime sector. This creates the need for larger-scale investments, which changes the ratio of the owned and borrowed funds in the capital structure. The stability and competitiveness of the maritime sector would be ensured by the formation of a capital structure that enhances the business value when taking into account in advance the determining factors that alter the capital structure ratio and affect the business value. Upon considering the aspects highlighted in the theoretical analysis of scientific sources, **the scientific problem** has been formulated on the following issues: What factors determine the capital structure in the companies of the maritime sector and what is the impact of the capital structure on the business value in the maritime sector when the level of debts is changing?

**The object of the dissertation:** the impact of the capital structure on the business value.

**The subject of the dissertation:** the impact of the capital structure on the business value in the companies of the maritime sector.

**The aim of the research** is to determine the factors of the capital structure of the companies of the maritime sector determining the business value by analyzing the theory and empirical studies of the

impact of the capital structure on the business value and creating a conceptual model of assessment.

**The objectives of the research** are as follows:

1. To conceptualize the principles of the capital structure formation of the companies of the maritime sector and systematize the factors determining the capital structure.

2. After analyzing the content of the business value and the ways of increasing it, to reveal the theoretical connections between the capital structure and the business value.

3. To create a conceptual model for assessing the impact of the capital structure of the maritime sector on the business value by identifying the influence of the microenvironmental and macroenvironmental factors while taking into account the specificity of the capital structure formation in the companies of the maritime sector.

4. To develop a methodology for investigating the impact of the capital structure on the business value adapted to the companies in the maritime sector.

5. After empirically verifying the conceptual model of assessment, to assess the impact of the capital structure of the maritime sector companies when the level of debts is changing, and to establish its determining capital structure factors on the business value.

**Methods used in the dissertation.** Analysis of scientific sources, grouping, comparison, synthesis, generalization, inductive and deductive methods have been employed to reveal the theoretical justification of the impact of the capital structure on the business value and to develop the methodology for assessing the impact of the capital structure of the companies of the maritime sector on the business value. The empirical research was based on statistical, econometric, specification and grouping methods. In order to reveal the specificity of the capital structure formation in the maritime sector companies, an expert survey was conducted, and the multi-criteria evaluation method was applied to interpret the obtained results. Descriptive statistics methods and econometric modeling – regression analysis of panel data

– were used to establish the factors determining the capital structure and to assess the impact of the capital structure on the business value. *MS Excel Version 2208*, *SPSS 23.0.0.0* and *GRETLL 2020e-git* software programs were used for data processing. The selected investigation period covers the years 2010–2019.

### **Research hypotheses:**

H<sub>1</sub>: When forming the capital structure of the companies of the maritime sector, microenvironmental factors are more significant than macroenvironmental factors for the level of the borrowed capital.

H<sub>2</sub>: Lower profitability increases the level of the borrowed capital in the capital structure of the companies of the maritime sector.

H<sub>3</sub>: The capital structure has a significant impact on the business value in the companies of the maritime sector under the influence of microenvironmental factors.

H<sub>4</sub>: Growth in the share of the borrowed capital in the capital structure may have both positive marginal and negative marginal effects on the business value in the companies of the maritime sector.

H<sub>5</sub>: The growth of the share of the borrowed capital in the companies of the maritime sector increases the business value up to a tipping point, from which, the business value starts to decrease whereas the borrowed capital continues to increase under the significant influence of the factors of the capital structure.

**Limitations of the investigation.** In conducting an empirical research of the impact of the capital structure on the business value in the companies of the maritime sector, the dissertation is limited to the main segments of the maritime sector – the water transport industry (shipping, shipbuilding and repair), ports and logistics (shipping, port loading); hence, this research has been distanced from such segments as seabed exploration and exploitation, hydro-engineering, fisheries and aquaculture, etc., as these segments are not directly related to the industry and transport. The investigation uses the data of those companies that publicly submit their data as presented in the Bloomberg database; hence, the business value measurements are adapted to the companies listed on the Stock Exchange. Since some of



the companies included in the data set went bankrupt during the analyzed period, and some others were experiencing negative cash flows, the discounted cash flow method was *not* used to assess the business value. When assessing the impact of microenvironmental factors on the capital structure and the business value, the data of the financial statements of the companies were used, therefore, the influence of the social responsibility factors of the companies was not analyzed due to the lack of the internal data.

**Results indicating the scientific novelty and significance of the dissertation:**

1. The need and necessity to assess the impact of the capital structure on the business value in the companies of the maritime sector as a separate economic sector have been justified.

2. Taking into account the innovative changes taking place in the environment related to the digitalization processes of technologies, new requirements for environmental protection, the increasing role of the green finance, the concept of the capital structure of the maritime sector company has been expanded and actualized more accurately than before, and the definitions reflecting the aspects of the capital structure of the companies of the maritime sector have been used. It has been proposed to expand the concept of the capital structure considering the creation of the means of forming a combination of the borrowed and equity capital and the ways to ensure that the capital structure decisions made in the company increase the business value through the improvement of the company's performance, in order to have a positive impact on the company, the maritime sector, the broad society, and the entire country.

3. The specificity of the maritime sector has been highlighted, and the factors related to the company's political and geopolitical situation, the environmental efficiency, and risk management which cumulatively have a significant impact on the capital structure and the business value of the companies in this sector have been revealed. This allows for the formation of new scientific knowledge based on

empirical research and the creation of scientific assumptions for further relevant investigation in the maritime sector.

4. A conceptual model including specific factors of the maritime sector which combine the concepts of the capital structure and the business value enhancement has been created; the impact of the maritime sector's capital structure on the business value has been developed and empirically tested. The universality of the model allows for conducting research by using data from various countries, different segments of the maritime sector and companies while comparing their results with each other.

5. The tested research methodology of the maritime sector can be used for the scientific research of other sectors by including the specific factors of the relevant sector in the created conceptual model for assessing the impact of the capital structure on the business value.

#### **Results of practical relevance:**

1. After identifying the main factors characterizing the specifics of the maritime sector and their impact, the possibilities of companies to purposefully and efficiently choose the capital structure that increases the business value, the formation methods and tools have been proven.

2. The marginal effect of the capital structure on the business value has been established, which shows the level to which the companies in the maritime sector can increase debt in the capital structure in order to increase the business value under the influence of the factors specified in the model.

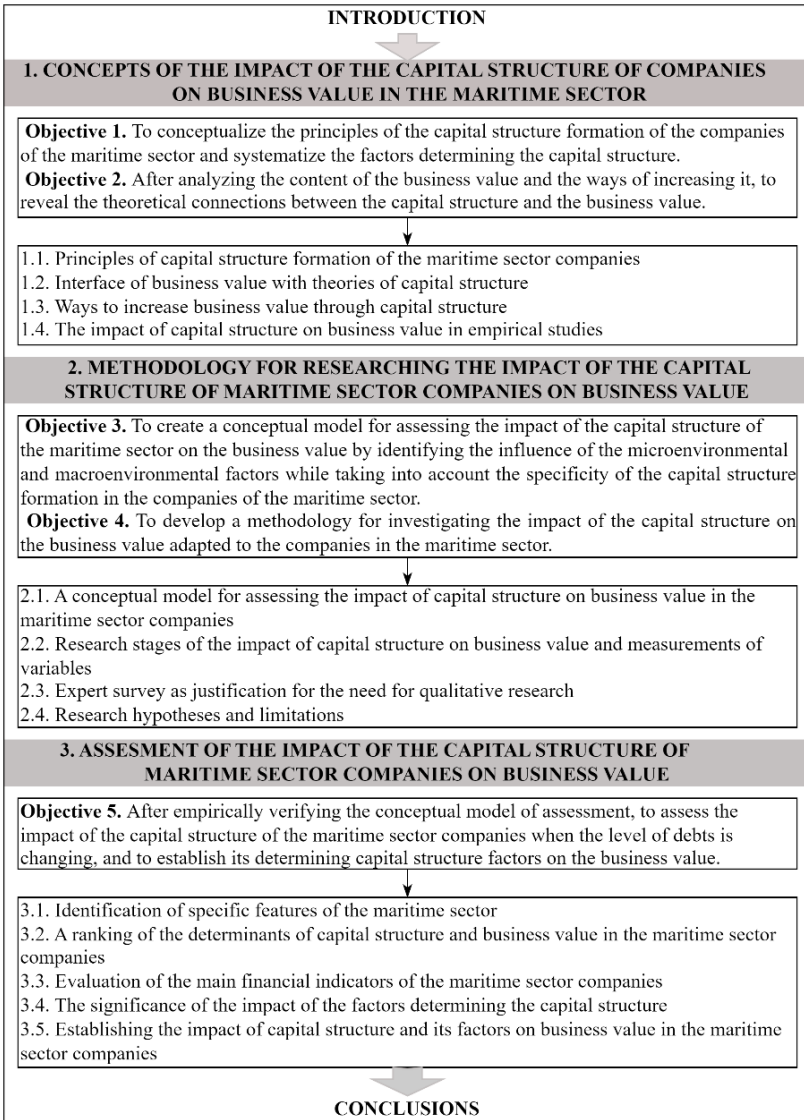
3. The actualized factors of the capital structure are significant in the formation of the policy of the maritime sector at the state level and the implementation of the financing policy of the companies in this sector in financial institutions.

**Dissertation structure and scope.** The dissertation consists of an introduction, three main parts, conclusions, a list of literature sources, and annexes. The formulated scientific problem, the object of the dissertation, the aim and the objectives set to achieve it determined the logical structure of the dissertation (see Figure 1). The scope of the

dissertation is 226 pages without annexes. It contains 38 tables, 41 figures and 27 annexes. The list of references includes 406 sources.

In the first part, after analyzing the scientific research and the developed practice in Lithuania and foreign countries, the concepts of the impact of the capital structure of the maritime sector companies on the business value have been revealed. In the second part of the dissertation, after selecting the research methods and measuring the capital structure, its determining factors and business value, the methodology for assessing the impact of the capital structure of the maritime sector companies on the business value has been developed. A conceptual model for assessing the impact of the capital structure on the business value in the maritime sector companies has been created and justified by taking into account the theoretical concepts of the formation of the dependence of the business value on the capital structure of the company presented in the first part of the dissertation. Taking into account the scientific problem and the aim of the dissertation, the rationale for incorporating microenvironmental and macroenvironmental factors which influence the formation of the capital structure and the business value in the developed model has been presented. The relevance of the research to the problem under consideration has been justified, and the main hypotheses of the research have been outlined. In the third part of the dissertation, an assessment of the impact of the capital structure of the maritime sector companies on the business value has been conducted. A model for assessing the impact of the capital structure on the business value in the European companies of the maritime sector has been empirically tested. After conducting a survey of experts and identifying the specificity of the maritime sector, the factors determining the capital structure and the increase in the business value have been highlighted. The significance of the microenvironmental and macroenvironmental factors determining the increase of the business value through the capital structure in the companies of the maritime sector has been identified. The impact of the capital structure and its factors on the business value and the level of the capital structure up to which the

business value increases has been determined by pinpointing the moment after which any further increase of the borrowed capital results in the business value beginning to decrease.



**Fig. 1.** The logical structure of the dissertation

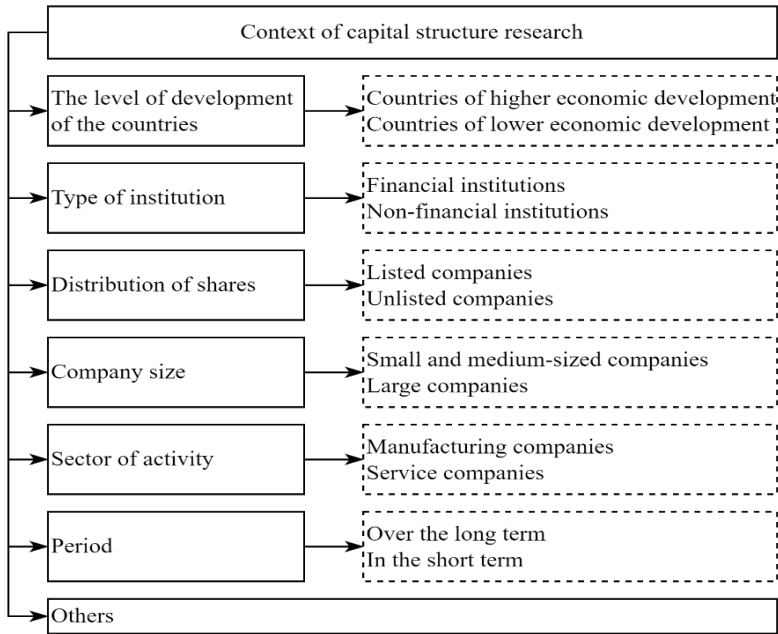
# 1. CONCEPTS OF THE IMPACT OF THE CAPITAL STRUCTURE OF COMPANIES ON BUSINESS VALUE IN THE MARITIME SECTOR

The first chapter of the dissertation conceptualizes the principles of the capital structure (hereinafter CS) formation of the companies of the maritime sector, identifies and systematizes the microenvironmental and macroenvironmental factors determining CS, and the specificity of the maritime sector (hereinafter MS) is reflected. The business value (hereinafter BV), its content and the ways of increasing it are analyzed as well. In order to determine which level of CS allows increasing the business value in the maritime sector, the theoretical links between the company's CS and BV are revealed.

The context of CS research in the works of various scientists can be evaluated differently since the principles of CS formation do not match between different countries, sectors, and company forms (Gharaibeh and Bani Khaled, 2020; Uremadu, O. Onyekachi, 2018; Dananti and Cahjono, 2017; Sarlija and Harc, 2016; Khan and Adom, 2015; Matemilola et al., 2014; Obradovich and Gill, 2013; Vera and Nganso, 2012; Gill et al., 2011; and others). Various contexts of CS research were considered, which allowed revealing the limitations of CS research in the maritime sector. They are indicated in Figure 2.

Empirical studies highlight different microenvironmental and macroenvironmental factors that are important to investigate the possibilities to increase BV in the context of CS (Ramli et al., 2019; Kajola and Olabisi, 2019; Sen and Ranjan, 2018; Sheikh et al., 2017; Zeitun et al., 2017; Yeo, 2016; Güner, 2016; Ramli and Nartea, 2016; Ramezanalivaloujerdi et al., 2015; Acaravci, 2015; Malshe et al., 2015; Hamid et al., 2015; Danso et al., 2014; Sheikh et al., 2014; Obradovich et al., 2013; Akbar et al., 2012; Fan et al., 2012; and others). Microenvironmental factors depend only on the indicators of a specific company, while macroenvironmental factors are the same for all the companies operating in a specific country's market, but their significance may vary considerably. Based on empirical research, it

can be stated that there is a consensus among scientists on what/which factors determine the size of CS, but there is no consensus on their impact (Hacini et al., 2022; Dalal, 2013).



**Fig. 2.** Characteristics of the context of capital structure research

Researchers indicate that CS theories are distinguished by the factors they emphasize, and, for each CS theory, the choice between the borrowed and the equity capital depends on microenvironmental factors (El-Chaarani and El-Abiad, 2019; Pacheco and Tavares, 2017; Güner, 2016; Cummins and Weiss, 2016; Ahsan et al., 2016; Kedir and Mekonnen, 2015; Acaravci, 2015; Adair and Adaskou, 2015; Matemilola et al., 2014; Sheikh and Qureshi, 2014; Vera and Nganso, 2012; Serrasqueiro and Caetano, 2012; and others). Despite the shortcomings of the CS theories, especially in the case of MS, they are significant due to the possibility to systematize various CS factors (see Table 1) that can influence the choice of CS and increase BV depending on the business sector.

**Table 1. Influence of microenvironmental factors on the capital structure of the company when taking into account the theories of capital structure**

<b>Factor</b>	<b>Trade-off theory</b>	<b>Pecking order theory</b>	<b>Model based on agency cost</b>	<b>Signaling theory</b>	<b>Market timing theory</b>
Company size	+	+ / -	+ / -	-	+
Profitability	+	-	+	-	-
Company growth	-	+ / -	+ / -	-	-
Liquidity	+	-	n. i.	n. i.	n. i.
Lifespan of the company	+	-	n. i.	n. i.	n. i.
Tangibility	+	+ / -	+ / -	n. i.	+
Non-debt tax shield	-	-	+	n. i.	n. i.
Risk	-	-	n. i.	-	n. i.
Volatility of income	-	+	n. i.	n. i.	n. i.

Note. The sign ‘+’ reflects positive dependence, the sign ‘-’ reflects negative dependence, ‘n. i.’ stands for ‘not identified’.

Source: compiled by the author, based on Krištofik et al., 2022; Kuč and Kaličanin, 2021; Khaki and Akin, 2020; Pandey et al., 2019; Yildirim et al., 2018; Hang, 2018; Morri and Parri, 2017; Imtiaz et al., 2016; Acaravci, 2015; and others.

The analysis of scientific sources shows that the methods of increasing BV are related to the company’s financial policy, which determines the conditions for the formation of CS. In order to increase BV, the company invests in the purchase or renovation of long-term assets and foresees from which financial funds to fulfil the investment decisions that have been made. The ratio of the equity and the borrowed capital of the company determines the dividend payment decisions, which affects BV through the stock price in the market (Kuč and Kaličanin, 2021; Handriani and Robiyanto, 2018; Zheng, 2017; Ernayani and Sari, 2017; Qureshi, 2007; Damodaran, 2007). It is possible to conceptualize the concept of CS that increases the business

value, including the significant features of the optimal CS: it is a combination of equity and the borrowed capital that creates a balance between risk and profitability; this increases the company's share price to the highest degree, thereby increasing the business value, ensuring benefits for the company's stakeholders and the society, creating the environmental well-being in the context of sustainable development. Therefore, determining CS that increases the business value would help MS companies significantly save on the costs of financial resources necessary to finance the long-term assets of the companies in this sector and increase the business value. The increasing role of the green finance and the corporate social responsibility will increasingly influence the cost of the borrowed capital (Kruk, 2021; Matemilola et al., 2018; Rouf, 2015; Goyal, 2013; Reverte, 2012; Ghoul et al., 2011; Goss and Roberts, 2011; and others); therefore, in order to achieve CS that increases business value, the priorities of the funding sources may change in the modern MS companies. An increase of BV is ensured by high financial results which depend on the company's generated cash, operational efficiency, and the technologies in use. Digitalization processes started in the maritime sector (Thiess and Müller, 2018; Agrifoglio and Cannavale, 2017; Lambrou, 2016; Wang et al., 2015; Song and Lee, 2012; and others), and the attention paid to environmental protection (Majumdar and Bappy, 2022; Matthias et al., 2016; Boscarato et al., 2015; and others) require a redistribution of the financial resources. This should be considered as an inevitable direction of the business value creation and its increase. The formation of CS which is focused on increasing the social and environmental responsibility makes it possible to reduce the capital cost, which is also in the interest of MS companies.

The results of investigations analyzing the impact of CS on BV are ambiguous. One group of researchers did not establish any link between CS and BV, or the established link was very weak (Yusra et al., 2019; Adenugba et al., 2016; Chadha and Sharma, 2015; Hassan et al., 2014; and others). Another group of researchers confirmed that



CS exhibits a significant positive link with BV (Zavala and Salgado, 2019; Hirdinis, 2019; Obradovich and Gill, 2013; Adeyemi and Oboh, 2011; Saeedi and Mahmoodi, 2011; Chowdhury, 2010). Another group of researchers identified that there is a significant negative link between CS and the company's market value and BV (Javeed et al., 2017; Mahdaleta et al., 2016; Khan, 2012; Chen et al., 2011; and others). Thus, the investigations have shown that CS has an impact on BV, or that this link may be insignificant.

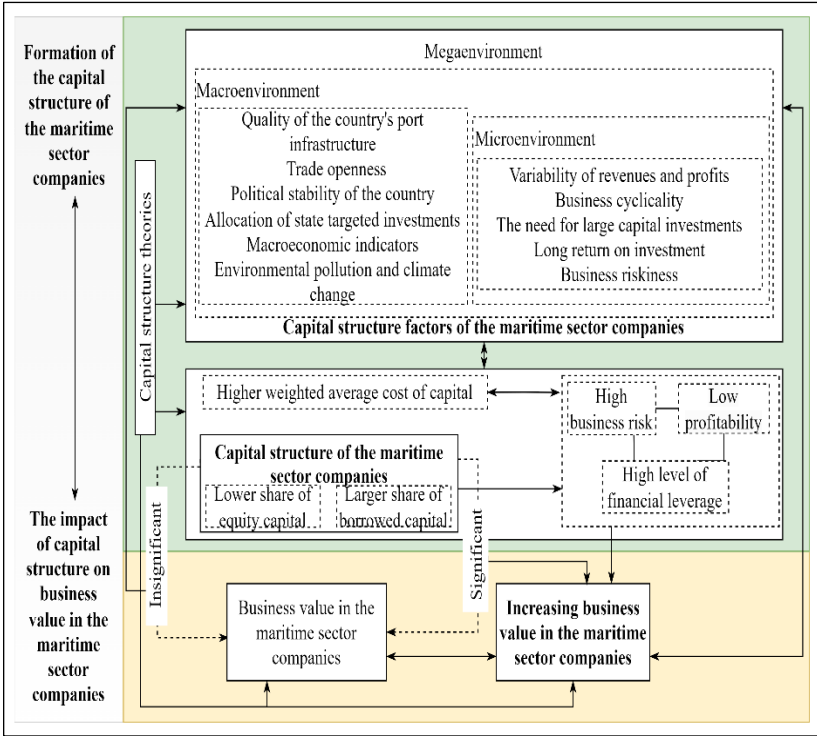
When summarizing the concepts of the impact of companies' CS on the business value in the maritime sector, it can be stated that the chosen combination of CS must guarantee sufficient financial resources for the companies' activities while ensuring the minimal cost and risk, increasing the welfare of the stakeholders and the business value. In the opinion of the author of the dissertation, the conducted investigations miss the specific CS factors characteristic of the maritime sector related to the political aspects of the countries, the geopolitical situation as well as the quality assurance of the port infrastructure because, in the modern context, MS companies must not limit themselves to the maximization of the stakeholders' wealth and well-being, but rather take into account other interested parties as well as the society in general; companies should take care of the effectiveness of environmental protection, use green finance and evaluate these aspects in the formation of CS. The differences of opinion revealed in the investigations allow us to state that the impact of CS on BV may vary to some extent. This dissertation takes the view that CS increases BV, but the borrowed capital in the company's capital structure can be increased up to a certain level, after which, while it still continues to increase, BV begins to decrease. In order to make the CS analysis of MS companies more comprehensively, the empirical research was carried out in two stages: first, the influence of the microenvironmental and macroenvironmental factors on CS was determined, and then the impact of CS and its factors on business value was analyzed in order to determine what level of CS would increase the business value in MS companies.

## 2. METHODOLOGY FOR RESEARCHING THE IMPACT OF THE CAPITAL STRUCTURE OF MARITIME SECTOR COMPANIES ON BUSINESS VALUE

In the second part of the dissertation, after selecting the research methods and the measurements of CS and its factors and BV, based on scientific arguments, a methodology for researching the impact of CS on the business value of MS companies was prepared. A conceptual model for assessing the impact of the capital structure on the business value was created and justified. Taking into account the scientific problem and the aim of the dissertation, the justification of the inclusion of microenvironmental and macroenvironmental variables influencing the formation of the capital structure and the increase of the business value in the model being developed in MS companies was conducted.

After the theoretical analysis of the scientific sources related to the formation of CS and the increase of BV, a conceptual model (Figure 3) has been proposed, the purpose of which is to reveal how to evaluate the impact of CS formation on the increase of the business value in the companies of the maritime sector. The formation of CS is determined by various factors which can be classified into microenvironmental and macroenvironmental factors. Microenvironmental factors depend only on the indicators of a specific company, while macroenvironmental factors are the same for all companies operating in that market, but their significance can vary considerably. Considering the specifics of the sector, the economic, political, geopolitical, social, technological and natural environment dimensions can have a different impact on the formation of CS. As MS is characterized as global, and as it takes place in a global market environment, the microenvironment and macroenvironment of companies operate in the *megaenvironment*: these environments are closely interconnected. The megaenvironment in which the companies of the maritime sector operate is reflected by macroenvironmental

factors related to the economic growth, political and geopolitical situation, and environmental protection.



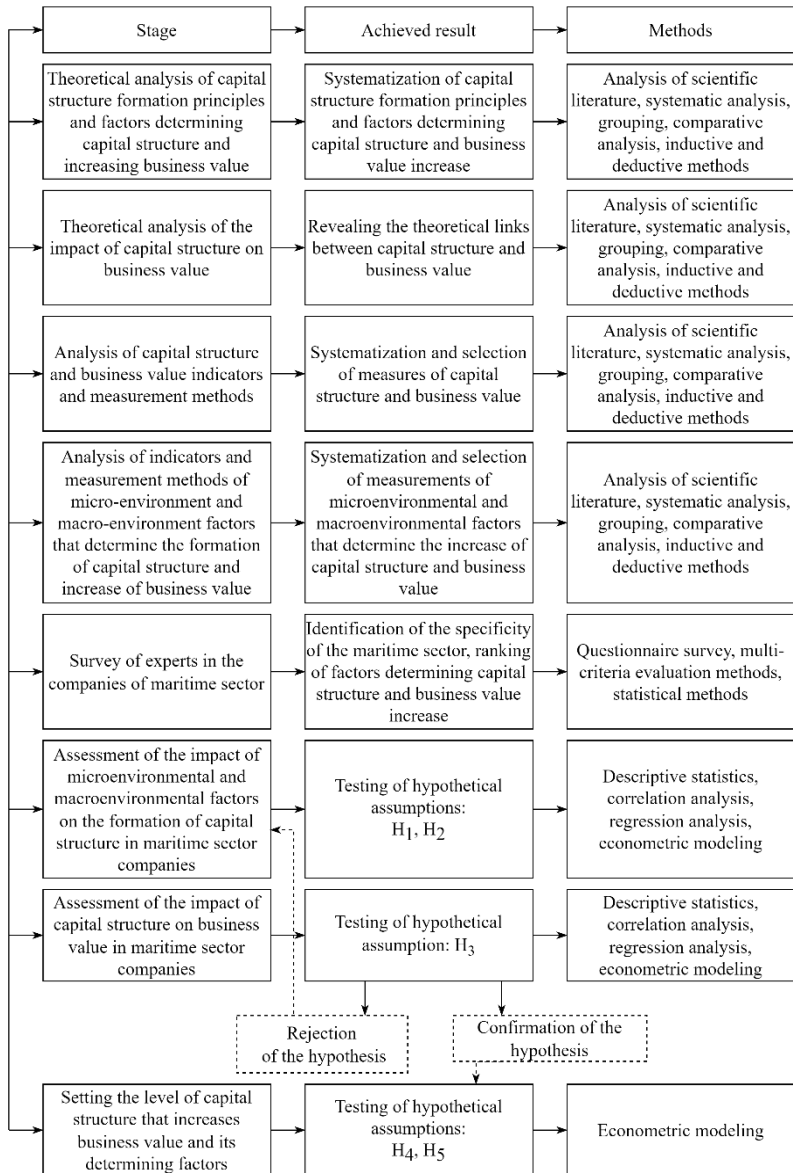
**Fig. 3.** A conceptual model for assessing the impact of capital structure on business value in the maritime sector companies

The main components of CS are the equity and the borrowed capital, and these components of CS can be represented in different proportions. The CS of companies in the MS is usually dominated by a larger share of the borrowed capital. The higher is the share of the borrowed capital in CS, the higher is the financial leverage (FL), and the higher is the risk. The cost of the employed capital is important to BV, as the lower weighted average costs of the capital through CS increase BV. The cost of the equity capital is usually higher than the cost of the borrowed capital. However, if FL is excessively high, it will increase the cost of both the equity and the borrowed capital. By

minimizing the cost of the weighted capital, the risk is minimized, the profitability is increased, and CS is formed that increases BV. When CS increasing the business value is not achieved, feedback is applied to re-evaluate the factors influencing CS.

BV directly depends on the value created by the company (the earned sales revenue and the received profit); hence, the increase of BV is determined by the increase in profit while taking into account the risk. The impact of CS on the business value may vary. After identifying a significant impact of CS on the business value, it is possible to find such CS that would increase the business value. With the increase of the borrowed capital, BV can only increase up to a certain level. After reaching it and further continuing to increase the borrowed capital, BV would start to decrease. Based on the conceptual model of assessing the impact of CS on the business value, the research is conducted in stages according to the algorithm provided in Figure 4.

In order to create a methodology for assessing the impact of CS of MS companies on BV, it is necessary to choose reasonably the measurements of CS and BV. After the analysis of scientific sources and conducted empirical research as well as the survey of experts, microenvironmental and macroenvironmental factors influencing CS and BV in MS companies are selected in the model. Based on the results of CS and FL measurement analysis and considering the specificity of the maritime sector, when a sizable part of the debts is long-term, and while seeking that CS measurements would be based on the balance sheet and the market value, three selected indicators reflect CS in the dissertation: 1) the ratio of all debts to assets; 2) the ratio of long-term debts to assets; 3) the ratio of the debts to the equity of the market value.



**Fig. 4.** Algorithm for assessing the impact of capital structure on business value

After analyzing the CS variables examined by scientific research and conducting their measurements, various microenvironmental variables and their measurements were chosen to be applied in the dissertation, which are systematized in Table 2. The *Bloomberg* database was used to calculate the indicators by collecting the financial information of MS companies.

**Table 2. Microenvironmental factors and their measurements**

<b>Independent variables</b>	<b>Measurement</b>
Profitability (PROFIT)	1. EBITDA profitability; 2. Net profitability; 3. ROA
Tangibility (TANG)	The ratio of long-term net assets to total assets
Company size (SIZE)	Natural logarithm of total assets
Company growth (GROWTH)	Percentage change in sales revenue
Liquidity (LIQUID)	The ratio of short-term assets to current liabilities
Non-debt tax shield (NDTS)	The ratio of depreciation expense to total assets
Risk (RISK)	EBIT standard deviation

Since the external environment is important for the activity of every company, macroenvironmental factors are undoubtedly important in the CS research as well. They are included in the econometric model by emphasizing specific MS factors: the political stability of the country, the quality of the port infrastructure, the aspects of trade openness, environment and resource productivity (Table 3).

**Table 3. Macroevironmental factors and their measurements**

<b>Independent variables</b>	<b>Measurement</b>	<b>Data source</b>
GDP	1. GDP change, in percentage. 2. The logarithmic difference in GDP per capita	World Bank
INFL	Annual inflation rate, in percentage	World Bank
RATE	Interest rate, in percentage	BIS statistics
TRADE	Trade openness indicator	TRADE MAP
PRODUCT	Annual growth rate of production per employee, in percentage	ILOSTAT
PORT	Port infrastructure quality index	World Bank
STABIL	Political stability index	World Bank
INVEST	1. Change in foreign direct investments (FDI), in percentage; 2. The ratio of FDI net inflows to GDP, in percentage	World Bank
ACTIV	Labor force activity level, in percentage	World Bank
ENV	Environmental and resource productivity, USD/kg	stats.oecd.org

In this dissertation, the microenvironmental and macroenvironmental factors influencing CS are estimated by regression equations, each time including one of the three CS and one of the three profitability measurements as a variable component of the equation. In this way, 9 models have been created in the empirical research of the dissertation based on the regression equations and the calculations made with them:

1. When the capital structure is expressed as the ratio of the total debt to the total assets (TD/TA), and profitability is reflected by EBITDA profitability:

$$\begin{aligned}
KS (TD/TA)_{i,j,t} = & \beta_0 + \\
& \beta_1 PROFIT (EBITDA \textit{ profitability})_{i,j,t} + \beta_2 SIZE_{i,j,t} + \\
& \beta_3 TANG_{i,j,t} + \beta_4 LIQUID_{i,j,t} + \beta_5 GROWTH_{i,j,t} + \\
& \beta_6 NDT S_{i,j,t} + \beta_7 RISK_{i,j,t} + \beta_8 GDP_{j,t} + \beta_9 INFL_{j,t} + \\
& \beta_{10} RATE_{j,t} + \beta_{11} INVEST_{j,t} + \beta_{12} TRADE_{j,t} + \\
& \beta_{13} PORT_{j,t} + \beta_{14} STABIL_{j,t} + \beta_{15} PRODUCT_{j,t} + \\
& \beta_{16} ACTIV_{j,t} + \beta_{17} ENV_{j,t} + \varepsilon_{i,j,t}
\end{aligned} \tag{1}$$

2. When the capital structure is expressed as the ratio of the total debt to the total assets (TD/TA) and profitability is reflected by net profitability:

$$\begin{aligned}
KS (TD/TA)_{i,j,t} = & \beta_0 + \\
& \beta_1 PROFIT (Net \textit{ profitability})_{i,j,t} + \beta_2 SIZE_{i,j,t} + \\
& \beta_3 TANG_{i,j,t} + \beta_4 LIQUID_{i,j,t} + \beta_5 GROWTH_{i,j,t} + \\
& \beta_6 NDT S_{i,j,t} + \beta_7 RISK_{i,j,t} + \beta_8 GDP_{j,t} + \beta_9 INFL_{j,t} + \\
& \beta_{10} RATE_{j,t} + \beta_{11} INVEST_{j,t} + \beta_{12} TRADE_{j,t} + \\
& \beta_{13} PORT_{j,t} + \beta_{14} STABIL_{j,t} + \beta_{15} PRODUCT_{j,t} + \\
& \beta_{16} ACTIV_{j,t} + \beta_{17} ENV_{j,t} + \varepsilon_{i,j,t}
\end{aligned} \tag{2}$$

3. When the capital structure is expressed as the ratio of the total debt to the total assets (TD/TA) and profitability is expressed as the profitability of assets:

$$\begin{aligned}
KS (TD/TA)_{i,j,t} = & \beta_0 + \beta_1 PROFIT (ROA)_{i,j,t} + \\
& \beta_2 SIZE_{i,j,t} + \beta_3 TANG_{i,j,t} + \beta_4 LIQUID_{i,j,t} + \\
& \beta_5 GROWTH_{i,j,t} + \beta_6 NDT S_{i,j,t} + \beta_7 RISK_{i,j,t} + \\
& \beta_8 GDP_{j,t} + \beta_9 INFL_{j,t} + \beta_{10} RATE_{j,t} + \beta_{11} INVEST_{j,t} + \\
& \beta_{12} TRADE_{j,t} + \beta_{13} PORT_{j,t} + \beta_{14} STABIL_{j,t} + \\
& \beta_{15} PRODUCT_{j,t} + \beta_{16} ACTIV_{j,t} + \beta_{17} ENV_{j,t} + \varepsilon_{i,j,t}
\end{aligned} \tag{3}$$

4. When the capital structure is expressed as the ratio of long-term liabilities to the total assets (LTD/TA) and profitability is reflected by EBITDA:



$$\begin{aligned}
KS (LTD/TA)_{i,j,t} = & \beta_0 + \\
& \beta_1 PROFIT (EBITDA \textit{profitability})_{i,j,t} + \beta_2 SIZE_{i,j,t} + \\
& \beta_3 TANG_{i,j,t} + \beta_4 LIQUID_{i,j,t} + \beta_5 GROWTH_{i,j,t} + \\
& \beta_6 NDT S_{i,j,t} + \beta_7 RISK_{i,j,t} + \beta_8 GDP_{j,t} + \beta_9 INFL_{j,t} + \\
& \beta_{10} RATE_{j,t} + \beta_{11} INVEST_{j,t} + \beta_{12} TRADE_{j,t} + \\
& \beta_{13} PORT_{j,t} + \beta_{14} STABIL_{j,t} + \beta_{15} PRODUCT_{j,t} + \\
& \beta_{16} ACTIV_{j,t} + \beta_{17} ENV_{j,t} + \varepsilon_{i,j,t}
\end{aligned} \tag{4}$$

5. When the capital structure is expressed as the ratio of long-term liabilities to the total assets (LTD/TA), and profitability is reflected by net profitability:

$$\begin{aligned}
KS (LTD/TA)_{i,j,t} = & \beta_0 + \\
& \beta_1 PROFIT (Net \textit{profitability})_{i,j,t} + \beta_2 SIZE_{i,j,t} + \\
& \beta_3 TANG_{i,j,t} + \beta_4 LIQUID_{i,j,t} + \beta_5 GROWTH_{i,j,t} + \\
& \beta_6 NDT S_{i,j,t} + \beta_7 RISK_{i,j,t} + \beta_8 GDP_{j,t} + \beta_9 INFL_{j,t} + \\
& \beta_{10} RATE_{j,t} + \beta_{11} INVEST_{j,t} + \beta_{12} TRADE_{j,t} + \\
& \beta_{13} PORT_{j,t} + \beta_{14} STABIL_{j,t} + \beta_{15} PRODUCT_{j,t} + \\
& \beta_{16} ACTIV_{j,t} + \beta_{17} ENV_{j,t} + \varepsilon_{i,j,t}
\end{aligned} \tag{5}$$

6. When the capital structure is expressed as the ratio of long-term debt to the total assets (LTD/TA), and profitability is reflected by the profitability of assets:

$$\begin{aligned}
KS (LTD/TA)_{i,j,t} = & \beta_0 + \beta_1 PROFIT (ROA)_{i,j,t} + \\
& \beta_2 SIZE_{i,j,t} + \beta_3 TANG_{i,j,t} + \beta_4 LIQUID_{i,j,t} + \\
& \beta_5 GROWTH_{i,j,t} + \beta_6 NDT S_{i,j,t} + \beta_7 RISK_{i,j,t} + \\
& \beta_8 GDP_{j,t} + \beta_9 INFL_{j,t} + \beta_{10} RATE_{j,t} + \beta_{11} INVEST_{j,t} + \\
& \beta_{12} TRADE_{j,t} + \beta_{13} PORT_{j,t} + \beta_{14} STABIL_{j,t} + \\
& \beta_{15} PRODUCT_{j,t} + \beta_{16} ACTIV_{j,t} + \beta_{17} ENV_{j,t} + \varepsilon_{i,j,t}
\end{aligned} \tag{6}$$

7. When the capital structure is expressed as the ratio of the debts to the equity of the market value (D/E), and profitability is reflected by EBITDA profitability:

$$\begin{aligned}
KS (D/E)_{i,j,t} = & \beta_0 + \\
& \beta_1 PROFIT (EBITDA \textit{profitability})_{i,j,t} + \beta_2 SIZE_{i,j,t} +
\end{aligned}$$

$$\begin{aligned}
& \beta_3 TANG_{i,j,t} + \beta_4 LIQUID_{i,j,t} + \beta_5 GROWTH_{i,j,t} + \\
& \beta_6 NDTS_{i,j,t} + \beta_7 RISK_{i,j,t} + \beta_8 GDP_{j,t} + \beta_9 INFL_{j,t} + \\
& \beta_{10} RATE_{j,t} + \beta_{11} INVEST_{j,t} + \beta_{12} TRADE_{j,t} + \beta_{13} PORT_{j,t} + \\
& \beta_{14} STABIL_{j,t} + \beta_{15} PRODUCT_{j,t} + \beta_{16} ACTIV_{j,t} + \quad (7) \\
& \beta_{17} ENV_{j,t} + \varepsilon_{i,j,t}
\end{aligned}$$

8. When the capital structure is expressed as the ratio of the debts to the equity of the market value (D/E), and profitability is reflected by net profitability:

$$\begin{aligned}
KS(D/E)_{i,j,t} &= \beta_0 + \\
& \beta_1 PROFIT(Net\ profitability)_{i,j,t} + \beta_2 SIZE_{i,j,t} + \\
& \beta_3 TANG_{i,j,t} + \beta_4 LIQUID_{i,j,t} + \beta_5 GROWTH_{i,j,t} + \\
& \beta_6 NDTS_{i,j,t} + \beta_7 RISK_{i,j,t} + \beta_8 GDP_{j,t} + \beta_9 INFL_{j,t} + \\
& \beta_{10} RATE_{j,t} + \beta_{11} INVEST_{j,t} + \beta_{12} TRADE_{j,t} + \\
& \beta_{13} PORT_{j,t} + \beta_{14} STABIL_{j,t} + \beta_{15} PRODUCT_{j,t} + \quad (8) \\
& \beta_{16} ACTIV_{j,t} + \beta_{17} ENV_{j,t} + \varepsilon_{i,j,t}
\end{aligned}$$

9. When the capital structure is expressed as the ratio of the debts to the equity of the market value (D/E), and profitability is reflected by the profitability of assets:

$$\begin{aligned}
KS(D/E)_{i,j,t} &= \beta_0 + \beta_1 PROFIT(ROA)_{i,j,t} + \\
& \beta_2 SIZE_{i,j,t} + \beta_3 TANG_{i,j,t} + \beta_4 LIQUID_{i,j,t} + \\
& \beta_5 GROWTH_{i,j,t} + \beta_6 NDTS_{i,j,t} + \beta_7 RISK_{i,j,t} + \\
& \beta_8 GDP_{j,t} + \beta_9 INFL_{j,t} + \beta_{10} RATE_{j,t} + \beta_{11} INVEST_{j,t} + \\
& \beta_{12} TRADE_{j,t} + \beta_{13} PORT_{j,t} + \beta_{14} STABIL_{j,t} + \quad (9) \\
& \beta_{15} PRODUCT_{j,t} + \beta_{16} ACTIV_{j,t} + \beta_{17} ENV_{j,t} + \varepsilon_{i,j,t}
\end{aligned}$$

Where:  $KS_{i,j,t}$  = the capital structure in company  $i$  in country  $j$  at time  $t$ , when CS is expressed in three measurements: the ratio of the total debts to the total assets; the ratio of long-term debts to the total assets; the ratio of the debts to the equity of the market value.

$\beta$  – unknown population regression function coefficients.

The covariances of the model which indicate the microenvironmental regressors at the company level of each company  $i$  in country  $j$  at time  $t$  are as follows:

$PROFIT_{i,j,t}$  = the company's profitability which is expressed in three measurements: EBITDA profitability; ROA; and net profitability;

$SIZE_{i,j,t}$  = company size;

$TANG_{i,j,t}$  = tangibility;

$LIQUID_{i,j,t}$  = liquidity ratio;

$GROWTH_{i,j,t}$  = company growth;

$NDTS_{i,j,t}$  = tax effect;

$RISK_{i,j,t}$  = business risk.

The macroenvironmental regressors common to all companies in each country  $j$  at time  $t$  are as follows:

$GDP_{j,t}$  = GDP change;

$INFL_{j,t}$  = country's annual inflation rate;

$RATE_{j,t}$  = interest rate;

$INVEST_{j,t}$  = FDI change;

$TRADE_{j,t}$  = trade openness;

$PORT_{j,t}$  = port infrastructure quality index;

$STABIL_{j,t}$  = political stability index;

$PRODUCT_{j,t}$  = the productivity level of the country's workers;

$ACTIV_{j,t}$  = the activity level of the country's population;

$ENV_{j,t}$  = environmental and resource productivity.

The random error term for each company  $i$  in each country  $j$  at time  $t$  is defined as  $\varepsilon_{i,j,t}$ .

In order to determine the link between the selected variables and the company's CS, unbalanced panel data are used, i.e. data where some observations are missing (Serghiescu and Văidean, 2014). The collected observations are of three dimensions: the levels of the company, the country, and the time. Empirical research was conducted with the statistical software *SPSS* and *GRET*.

Tobin's Q and EV/EBITDA indicators are used in the dissertation to measure the business value in MS companies. The impact of CS on BV, as well as other possible capital structure factors having an impact on BV, is estimated by regression equations, each time including one

of the two business values, one of the three CS and one of the three profitability measures as the variable components of the equation. In this way, 6 main models are formed in the empirical research of the dissertation which are based on regression equations and the calculations made with them.

1. When the business value is expressed by the Tobin's Q coefficient, and the capital structure is expressed by the ratio of the total liabilities to the total assets:

$$\begin{aligned}
 VV(Tobin's Q)_{i,j,t} = & \beta_0 + \beta_1 KS(TD/TA)_{i,j,t} + \\
 & \beta_2 SIZE_{i,j,t} + \beta_3 PROFIT_{i,j,t} + \beta_4 TANG_{i,j,t} + \\
 & \beta_5 LIQUID_{i,j,t} + \beta_6 RISK_{i,j,t} + \beta_7 GROWTH_{i,j,t} + \\
 & \beta_8 GDP_{j,t} + \beta_9 TRADE_{j,t} + \beta_{10} PORT_{j,t} + \beta_{11} STABIL_{j,t} \cdot \quad (10) \\
 & + \beta_{12} ENV_{j,t} + \varepsilon_{i,j,t}
 \end{aligned}$$

2. When the business value is expressed by the Tobin's Q coefficient, and the capital structure is expressed by the ratio of the long-term liabilities to the total assets:

$$\begin{aligned}
 VV(Tobin's Q)_{i,j,t} = & \beta_0 + \beta_1 KS(LTD/TA)_{i,j,t} + \\
 & \beta_2 SIZE_{i,j,t} + \beta_3 PROFIT_{i,j,t} + \beta_4 TANG_{i,j,t} + \\
 & \beta_5 LIQUID_{i,j,t} + \beta_6 RISK_{i,j,t} + \beta_7 GROWTH_{i,j,t} + \\
 & \beta_8 GDP_{j,t} + \beta_9 TRADE_{j,t} + \beta_{10} PORT_{j,t} + \\
 & \beta_{11} STABIL_{j,t} + \beta_{12} ENV_{j,t} + \varepsilon_{i,j,t} \quad (11)
 \end{aligned}$$

3. When the business value is expressed by the Tobin's Q coefficient, and the capital structure is expressed by the ratio of the debts to the equity of the market value:

$$\begin{aligned}
 VV(Tobin's Q)_{i,j,t} = & \beta_0 + \beta_1 KS(D/E)_{i,j,t} + \\
 & \beta_2 SIZE_{i,j,t} + \beta_3 PROFIT_{i,j,t} + \beta_4 TANG_{i,j,t} + \\
 & \beta_5 LIQUID_{i,j,t} + \beta_6 RISK_{i,j,t} + \beta_7 GROWTH_{i,j,t} + \\
 & \beta_8 GDP_{j,t} + \beta_9 TRADE_{j,t} + \beta_{10} PORT_{j,t} + \beta_{11} STABIL_{j,t} + \\
 & + \beta_{12} ENV_{j,t} + \varepsilon_{i,j,t} \quad (12)
 \end{aligned}$$

4. When the business value is expressed by the ratio of EV to EBITDA, and the capital structure is expressed by the ratio of the total debts to the total assets:

$$\begin{aligned}
VV (EV/EBITDA)_{i,j,t} = & \beta_0 + \beta_1 KS (TD/TA)_{i,j,t} + \\
& \beta_2 SIZE_{i,j,t} + \beta_3 PROFIT_{i,j,t} + \beta_4 TANG_{i,j,t} + \\
& \beta_5 LIQUID_{i,j,t} + \beta_6 RISK_{i,j,t} + \beta_7 GROWTH_{i,j,t} + \\
& \beta_8 GDP_{j,t} + \beta_9 TRADE_{j,t} + \beta_{10} PORT_{j,t} + \\
& \beta_{11} STABIL_{j,t} + \beta_{12} ENV_{j,t} + \varepsilon_{i,j,t}
\end{aligned} \tag{13}$$

5. When the business value is expressed by the ratio of EV to EBITDA, and the capital structure is expressed by the ratio of long-term liabilities to the total assets:

$$\begin{aligned}
VV (EV/EBITDA)_{i,j,t} = & \beta_0 + \beta_1 KS (LTD/TA)_{i,j,t} + \\
& \beta_2 SIZE_{i,j,t} + \beta_3 PROFIT_{i,j,t} + \beta_4 TANG_{i,j,t} + \\
& \beta_5 LIQUID_{i,j,t} + \beta_6 RISK_{i,j,t} + \beta_7 GROWTH_{i,j,t} + \\
& \beta_8 GDP_{j,t} + \beta_9 TRADE_{j,t} + \beta_{10} PORT_{j,t} + \\
& \beta_{11} STABIL_{j,t} + \beta_{12} ENV_{j,t} + \varepsilon_{i,j,t}
\end{aligned} \tag{14}$$

6. When the business value is expressed by the ratio of EV to EBITDA, and the capital structure is expressed by the ratio of the debts to the equity of the market value:

$$\begin{aligned}
VV (EV/EBITDA)_{i,j,t} = & \beta_0 + \beta_1 KS (D/E)_{i,j,t} + \\
& \beta_2 SIZE_{i,j,t} + \beta_3 PROFIT_{i,j,t} + \beta_4 TANG_{i,j,t} + \\
& \beta_5 LIQUID_{i,j,t} + \beta_6 RISK_{i,j,t} + \beta_7 GROWTH_{i,j,t} + \\
& \beta_8 GDP_{j,t} + \beta_9 TRADE_{j,t} + \beta_{10} PORT_{j,t} + \\
& \beta_{11} STABIL_{j,t} + \beta_{12} ENV_{j,t} + \varepsilon_{i,j,t}
\end{aligned} \tag{15}$$

Where:  $VV_{i,j,t}$  = business value in company  $i$  in country  $j$  at time  $t$ , where BV is expressed in two measurements as the Tobin's Q indicator and EV/EBITDA ratio.

$\beta$  – unknown population regression function coefficients.

The covariances of the model which indicate the regressors at the company level of each company  $i$  in country  $j$  at time  $t$  are as follows:

$KS_{i,j,t}$  = the capital structure which is measured by the ratio of the total debts to assets, the ratio of long-term debts to assets, and the ratio of the borrowed capital of the market value to the equity of the market;  
 $PROFIT_{i,j,t}$  = the company's profitability which is expressed in three measurements: net profitability, ROA and EBITDA profitability;  
 $SIZE_{i,j,t}$  = company size;  
 $TANG_{i,j,t}$  = tangibility;  
 $LIQUID_{i,j,t}$  = liquidity ratio;  
 $GROWTH_{i,j,t}$  = company growth;  
 $RISK_{i,j,t}$  = business risk.

The macro-level regressors common to all companies in each country  $j$  at time  $t$  are as follows:

$GDP_{j,t}$  = GDP change;  
 $TRADE_{j,t}$  = trade openness;  
 $PORT_{j,t}$  = port infrastructure quality index;  
 $STABIL_{j,t}$  = political stability index;  
 $ENV_{j,t}$  = environmental and resource productivity.

The random error term for each company  $i$  in each country  $j$  at time  $t$  is defined as  $\varepsilon_{i,j,t}$ .

In this dissertation, it is assumed that the impact of debts on BV depends on the size of the existing debts. Initially, the impact of debts on BV is positive, but, as the debts keep growing, the marginal positive effect decreases. Therefore, the dissertation aims to find out where that effect on the slope curve is statistically significant. This statistical significance is evaluated with confidence intervals that provide more information and show the limits of statistical significance. In order to determine the impact of  $X_1$  on  $Y$  at a certain level of  $X_2$ , coefficients  $b_1$  and  $b_3$  obtained in the panel model are combined. The standard errors of  $b_1$  and  $b_3$  are combined to determine the standard errors of these effects. Covariances of the coefficients are calculated to determine the conditional standard errors. Since  $X$  and  $Y$  are random

variables, and  $a$  is a constant, the following formulas are used in this dissertation to calculate the confidence intervals (Friedrich, 1982):

$$\text{var}(aX) = a^2\text{var}(X), \quad (16)$$

$$\text{var}(X + Y) = \text{var}(X) + \text{var}(Y) + 2\text{cov}(X, Y), \quad (17)$$

$$\text{cov}(X, aY) = a \text{cov}(X, Y)$$

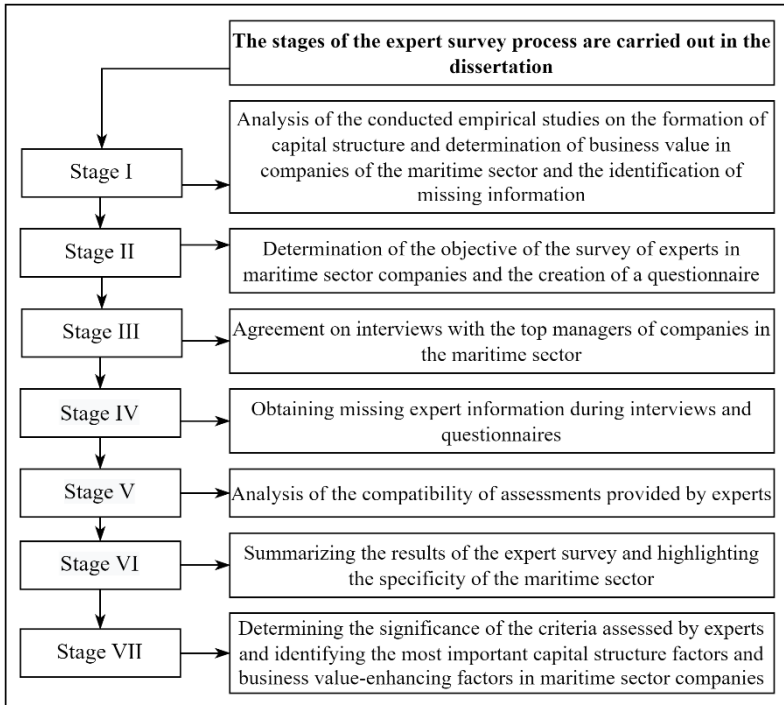
The standard error of the sum ( $b_1 + b_3X_2$ ) is: (18)

$$S_{(b_1+b_3x_2)} = \sqrt{\text{var}(b_1) + X_2^2\text{var}(b_3) + 2X_2\text{cov}(b_1, b_3)}. \quad (19)$$

In accordance with the analogous statistical course of the research, as indicated in the analysis of the impact of microenvironmental and macroenvironmental factors on the capital structure, the second stage of the research was conducted in order to assess the impact of the capital structure on the business value of the companies in the maritime sector.

In order to clarify the specificity of the maritime sector, the aspects of the capital structure formation and to specify which variables that are relevant for MS companies should be included in the econometric models of the capital structure and business value, the expert survey method was chosen as the basis of the qualitative research. When conducting the expert survey in the dissertation, the following stages of the expert survey procedure are followed which are illustrated in Figure 5.

The results of the expert survey identify the specific features of MS and specify the microenvironmental and macroenvironmental factors that influence the formation of CS and the increase of BV. After assessing the degree of compatibility of the experts' opinions, multi-criteria methods and ranking of element weights are applied to determine the significance of the factors.



**Fig. 5.** Stages of the maritime sector expert survey process

In order to evaluate the CS factors in the companies of the maritime sector and to determine the impact between CS and the business value as well as within which limits of the CS relationship the business value is increasing, the formulated explanatory hypotheses are tested in the third chapter of the dissertation which is based on the results of the correlation-regression analysis of the panel data.

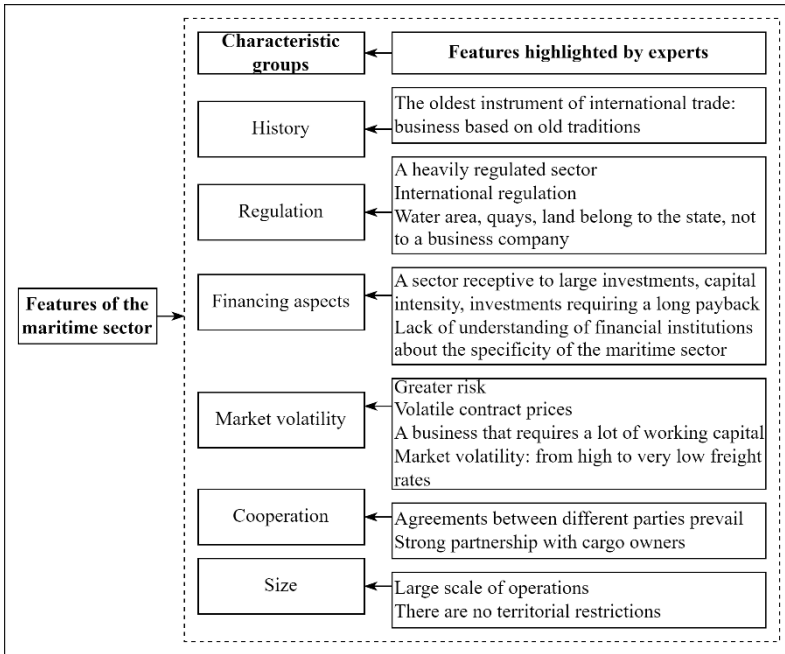


### 3. ASSESSMENT OF THE IMPACT OF THE CAPITAL STRUCTURE OF MARITIME SECTOR COMPANIES ON BUSINESS VALUE

The third chapter of the dissertation empirically tests the model for assessing the impact of CS and its factors on the business value in MS companies. In order to identify the specificity of MS, an expert survey was conducted, the purpose of which was to distinguish the features of MS specificity and to determine the factors that influence the formation of CS and the increase of the business value in MS companies.

The questionnaire survey of top-level managers of MS companies was conducted in September–October 2020. The survey was attended by 8 top-level managers with 17 to 40 years of work experience in MS activities, and it represented the following groups of port companies: forwarding, experts-inspectors, classification companies, ship repair, construction, technical service, shipping companies, and chartering. When analyzing the respondents' answers to questions about the specifics of the maritime sector, the most significant features reflecting the companies' activities were determined (see Figure 6).

When analyzing the results of the expert survey, the compatibility of the opinions of the participating experts on ranking questions was evaluated. Since there were more than two experts in the conducted research, the compatibility of the experts' opinions was checked by concordance coefficients. When assessing the compatibility of the experts' answers (Table 4) regarding the impact of the groups of macroenvironmental factors on MS companies, the assessment of macroenvironment, microenvironment and risk factors, Kendall's coefficient of concordance approaches the unit, so it can be stated that the experts' assessment is compatible.



**Fig. 6.** Features reflecting the specificity of maritime sector companies

Source: compiled by the author, based on the results of a survey of experts

The consensus of the experts' opinion is also confirmed by the  $\chi^2$  criterion since its obtained value is higher than  $\chi^2_{kr}$ :  $22.56 > 11.070$  was obtained in the compatibility of the assessment of groups of macroenvironmental factors, macroenvironmental factors –  $58.032 > 22.362$ , microenvironmental factors –  $52.096 > 19.675$ , risk factors –  $58.136 > 22.362$ .

**Table 4. Analysis of compatibility of experts' opinions on ranking questions**

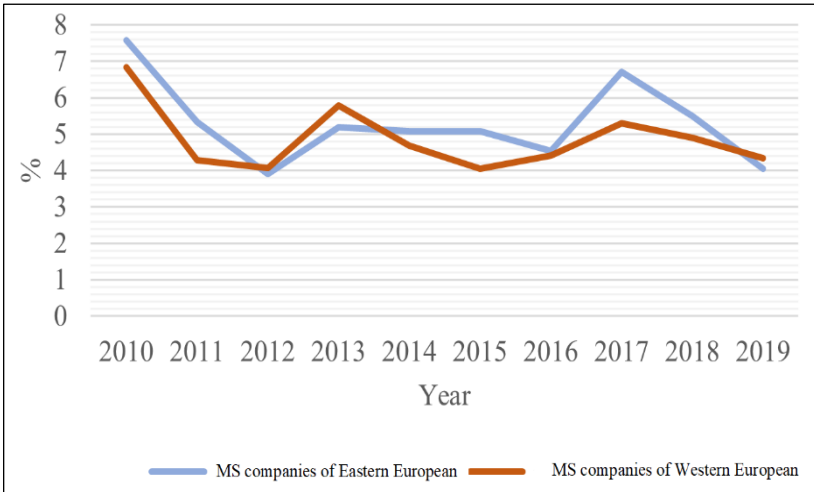
<b>Question</b>	<b>The sum of squared deviation S</b>	<b>The maximum value of the sum S<sub>max</sub></b>	<b>W concordance coefficient</b>	<b><math>\chi^2</math></b>	<b><math>\chi^2_{kr}</math></b>
Assessment of groups of macroenvironmental factors	632	1120	0.564	22.56	11.070
Assessment of macroenvironmental factors	3134	14560	0.558	58.032	22.362
Assessment of microenvironmental factors	1036	9152	0.592	52.096	19.675
Assessment of risk factors	3248	12480	0.559	58.136	22.362

Source: compiled by the author, based on the results of a survey of experts

After applying the main multi-criteria assessment methods (geometric mean, unit sum of all indicators and simple additive weighting), estimates of the groups of macroenvironmental factors, microenvironmental and macroenvironmental factors were calculated. Based on the obtained results, the macroenvironmental factors identified by the experts are included in the econometric models presented in Chapter 2.

The scope of the empirical research is 238 companies in the maritime sector of Eastern and Western Europe representing the shipping, shipyard and repair as well as port loading/unloading sectors. The period of the empirical research covers the years 2010–2019. The research aims to assess the impact of microenvironmental and macroenvironmental factors on the capital structure and its impact on the business value and to determine the possible ratio of the capital structure that increases the business value.

The cost of capital has a significant impact on the formation of a capital structure that increases the business value. The weighted average cost of the capital in the companies of the maritime sector varies between 4 percent and 8 percent. At the beginning of the analyzed period (2010–2013), it was the highest in both Eastern and Western European companies, and, throughout the period, except for 2012–2013, it remained higher in the Eastern European maritime sector companies (Figure 7).



**Fig. 7.** The weighted average cost of capital in maritime sector companies

Source: compiled by the author, based on the result from *Bloomberg* database

In order to test the hypotheses about the impact of the microenvironmental and macroenvironmental factors on CS, the author of the dissertation has created 9 models which are presented in the second part of the dissertation. Based on the models, it is first analyzed how the factors related to the company’s activities influence CS (Table 5).

**Table 5. The impact of microenvironmental factors related to the company's activity on the capital structure in maritime sector companies**

		Factor	Profitability	Liquidity	Company growth	Risk
<b>The effect obtained by OLS and FE methods</b>						
Dependent variable TD/TA	Model 1	OLS const=-76.15*** (16.02) Adjusted R <sup>2</sup> = 0.3508; n=1809	Nonlinear	Negative -0.4369* (0.2450)	Insignificant	Negative -0.01066*** (0.002599)
		FE const=-77.99* (39.90) Adjusted R <sup>2</sup> = 0.2022; n=1809	Nonlinear	Negative -0.3880** (0.1684)	Positive 0.001206*** (0.000262)	Insignificant
	Model 2	OLS const=-88.77** (43.15) Adjusted R <sup>2</sup> = 0.3611; n=1806	Negative -0.1902*** (0.05625)	Insignificant	Insignificant	Negative -0.01115*** (0.002722)
		FE const=-77.99* (39.90) Adjusted R <sup>2</sup> = 0.2097; n=1809	Negative -0.1419** (0.05508)	Negative -0.3390* (0.1798)	Positive 0.000983*** (0.000172)	Insignificant
	Model 3	OLS const=-73.58*** (16.31) Adjusted R <sup>2</sup> = 0.3422; n=1806	Insignificant	Negative -0.4485* (0.2349)	Insignificant	Negative -0.01049*** (0.00256)
		FE const=-74.99* (40.92) Adjusted R <sup>2</sup> = 0.1893; n=1809	Insignificant	Negative -0.4129** (0.1720)	Positive 0.000924*** (0.000202)	Insignificant
Dependent variable L/TD/TA	Model 4	OLS const=-99.18*** (13.21) Adjusted R <sup>2</sup> = 0.3614; n=1808	Insignificant	Insignificant	Positive 0.000286** (0.000126)	Negative -0.01059*** (0.002508)
		FE const=-63.12* (34.11) Adjusted R <sup>2</sup> = 0.1158; n=1808	Insignificant	Insignificant	Positive 0.001002*** (0.000186)	Insignificant
	Model 5	OLS const=-103.1*** (13.29) Adjusted R <sup>2</sup> = 0.3679; n=1805	Negative -0.09874*** (0.03053)	Insignificant	Positive 0.000294** (0.000129)	Negative -0.01089*** (0.002612)
		FE const=-67.71* (35.52) Adjusted R <sup>2</sup> = 0.1228; n=1806	Negative -0.07826*** (0.02700)	Insignificant	Positive 0.001021*** (0.000181)	Insignificant
	Model 6	OLS const=-97.44*** (13.12) Adjusted R <sup>2</sup> = 0.3654; n=1805	Nonlinear	Insignificant	Positive 0.00027** (0.000126)	Negative -0.01035*** (0.002467)
		FE const=-61.18* (35.12) Adjusted R <sup>2</sup> = 0.1162; n=1806	Insignificant	Insignificant	Positive 0.000995*** (0.00018)	Insignificant
Dependent variable D/E	Model 7	OLS const=-56.27** (21.87) Adjusted R <sup>2</sup> = 0.3014; n=1779	Negative -0.01080** (0.005128)	Negative -0.6253* (0.3370)	Negative -0.000347* (0.000203)	Negative -0.01350*** (0.003793)
		FE const=-91.17* (52.42) Adjusted R <sup>2</sup> = 0.2052; n=1780	Negative -0.005973* (0.003184)	Negative -0.6264** (0.2695)	Insignificant	Insignificant
	Model 8	OLS const=-66.16*** (22.31) Adjusted R <sup>2</sup> = 0.3197; n=1775	Negative -0.2833*** (0.09014)	Insignificant	Negative -0.000353* (0.0001995)	Negative -0.01444*** (0.003857)
		FE const=-97.29* (53.85) Adjusted R <sup>2</sup> = 0.2255; n=1776	Negative -0.1911*** (0.05998)	Negative -0.4938* (0.2517)	Insignificant	Insignificant
	Model 9	OLS const=-55.18** (22.17) Adjusted R <sup>2</sup> = 0.2936; n=1775	Negative -0.003003** (0.001269)	Negative -0.6060* (0.3227)	Negative -0.0003570* (0.000203)	Negative -0.01335*** (0.003806)
		FE const=-88.31 (53.62) Adjusted R <sup>2</sup> = 0.2004; n=1776	Insignificant	Negative -0.5963** (0.2509)	Insignificant	Insignificant

Based on the obtained results of the models, the impact of the factors related to the company's characteristics on CS is analyzed (Table 6).

**Table 6. The impact of microenvironmental factors related to the company's characteristics on the capital structure in maritime sector companies**

Factor		Company size	Tangibility	Non-debt tax shield	
<b>The effect obtained by OLS and FE methods</b>					
Dependent variable TD/TA	Model 1	OLS const=-76.15*** (16.02) Adjusted R <sup>2</sup> = 0.3508; n=1809	Positive 2.766*** (0.6476)	Positive 0.3205*** (0.03962)	Nonlinear
		FE const=-77.99* (39.90) Adjusted R <sup>2</sup> = 0.2022; n=1809	Positive 3.625** (1.738)	Positive 0.2290*** (0.05878)	Nonlinear
	Model 2	OLS const=-88.77** (43.15) Adjusted R <sup>2</sup> = 0.3611; n=1806	Positive 3.168*** (0.6725)	Positive 0.3241*** (0.03877)	Nonlinear
		FE const=-77.99* (39.90) Adjusted R <sup>2</sup> = 0.2097; n=1809	Positive 4.154** (1.975)	Positive 0.2439*** (0.05724)	Nonlinear
	Model 3	OLS const=-73.58*** (16.31) Adjusted R <sup>2</sup> = 0.3422; n=1806	Positive 2.657*** (0.6465)	Positive 0.3194*** (0.03972)	Nonlinear
		FE const=-74.99* (40.92) Adjusted R <sup>2</sup> = 0.1893; n=1809	Positive 3.535** (1.740)	Positive 0.2303*** (0.05519)	Nonlinear
Dependent variable LTD/TA	Model 4	OLS const=-99.18*** (13.21) Adjusted R <sup>2</sup> = 0.3614; n=1808	Positive 3.192*** (0.5487)	Positive 0.3207*** (0.03456)	Insignificant
		FE const=-63.12* (34.11) Adjusted R <sup>2</sup> = 0.1158; n=1808	Positive 2.901** (1.361)	Positive 0.2555*** (0.05630)	Insignificant
	Model 5	OLS const=-103.1*** (13.29) Adjusted R <sup>2</sup> = 0.3679; n=1805	Positive 3.448*** (0.5700)	Positive 0.3220*** (0.03416)	Insignificant
		FE const=-67.71* (35.52) Adjusted R <sup>2</sup> = 0.1228; n=1806	Positive 3.167** (1.492)	Positive 0.2612*** (0.05486)	Insignificant
	Model 6	OLS const=-97.44*** (13.12) Adjusted R <sup>2</sup> = 0.3654; n=1805	Positive 3.109*** (0.5466)	Positive 0.3155*** (0.03423)	Insignificant
		FE const=-61.18* (35.12) Adjusted R <sup>2</sup> = 0.1162; n=1806	Positive 2.846** (1.371)	Positive 0.2508*** (0.05615)	Insignificant
Dependent variable D/E	Model 7	OLS const=-56.27** (21.87) Adjusted R <sup>2</sup> = 0.3014; n=1779	Positive 3.279*** (0.7839)	Positive 0.3796*** (0.05128)	Nonlinear
		FE const=-91.17* (52.42) Adjusted R <sup>2</sup> = 0.2052; n=1780	Positive 5.598** (2.330)	Positive 0.2980*** (0.06619)	Nonlinear
	Model 8	OLS const=-66.16*** (22.31) Adjusted R <sup>2</sup> = 0.3197; n=1775	Positive 3.834*** (0.8363)	Positive 0.3809*** (0.04968)	Nonlinear
		FE const=-97.29* (53.85) Adjusted R <sup>2</sup> = 0.2255; n=1776	Positive 5.935** (2.468)	Positive 0.2972*** (0.06601)	Nonlinear
	Model 9	OLS const=-55.18** (22.17) Adjusted R <sup>2</sup> = 0.2936; n=1775	Positive 3.231*** (0.7932)	Positive 0.3775*** (0.05181)	Nonlinear
		FE const=-88.31 (53.62) Adjusted R <sup>2</sup> = 0.2004; n=1776	Positive 5.483** (2.338)	Positive 0.2932*** (0.06609)	Nonlinear

After evaluating the significant factors influencing CS, it is possible to determine which CS theory is used as a basis to form the CS of companies (Table 7). Based on the obtained results, it has been

clarified that MS companies rely on the statements of the pecking order theory when forming CS. Since the coefficient reflecting the link between the capital structure and profitability is statistically significant and negative in four models when calculated by employing the OLS and FE methods, the hypothesis that a lower profitability increases the level of the borrowed capital in the capital structure of the companies of the maritime sector has been confirmed.

**Table 7. The impact of the main microenvironmental factors on the capital structure of the company when taking into account the main theories of the capital structure and the correlations of the obtained results**

Factor	Trade-off theory	Pecking order theory	Model based on agency cost	Results obtained
Company size	+	+ / -	+ / -	+
Profitability	+	-	+	-
Company growth	-	+ / -	+ / -	+ / -
Liquidity	+	-	<i>not identified</i>	-
Tangibility	+	+ / -	+ / -	+
Non-debt tax shield	-	-	+	non-linear relationship
Risk (volatility of income)	-	+ / -	<i>not identified</i>	-

Note. The sign ‘+’ represents a positive relationship, the sign ‘-’ denotes a negative relationship.

Next, the impact of various macroenvironmental factors on CS in MS companies is analyzed (Tables 8–10). According to the selected variables of the external environment, it can be seen that the impact of the macroenvironmental factors on the CS of MS companies is very weak.

Based on the obtained results (Table 8), FDI would have the most significant impact on the CS of MS companies.

**Table 8. The impact of macroenvironmental factors related to the economic environment on the capital structure in maritime sector companies**

Factor		Economics growth	Inflation rate	Interest rate	Change in FDI	
<b>The effect obtained by OLS and FE methods</b>						
Dependent variable: TD/TA	Model 1	OLS const=-76.15*** (16.02) Adjusted R <sup>2</sup> = 0.3508; n=1809	Negative -19.86** (9.258)	Insignificant	Insignificant	Insignificant
		FE const=-77.99* (39.90) Adjusted R <sup>2</sup> = 0.2022; n=1809	Insignificant	Insignificant	Positive 0.5116* (0.2922)	Negative -0.1224*** (0.02151)
	Model 2	OLS const=-88.77** (43.15) Adjusted R <sup>2</sup> = 0.3611; n=1806	Negative -18.51** (9.193)	Insignificant	Insignificant	Insignificant
		FE const=-77.99* (39.90) Adjusted R <sup>2</sup> = 0.2097; n=1809	Insignificant	Insignificant	Positive 0.5525* (0.3039)	Negative -0.1280*** (0.02214)
	Model 3	OLS const=-73.58*** (16.31) Adjusted R <sup>2</sup> = 0.3422; n=1806	Negative -18.63** (9.392)	Insignificant	Insignificant	Insignificant
		FE const=-74.99* (40.92) Adjusted R <sup>2</sup> = 0.1893; n=1809	Insignificant	Insignificant	Positive 0.5617* (0.3182)	Negative -0.1244*** (0.02154)
Dependent variable: LTD/TA	Model 4	OLS const=-99.18*** (13.21) Adjusted R <sup>2</sup> = 0.3614; n=1808	Insignificant	Insignificant	Insignificant	Insignificant
		FE const=-63.12* (34.11) Adjusted R <sup>2</sup> = 0.1158; n=1808	Insignificant	Insignificant	Insignificant	Negative -0.1309*** (0.02005)
	Model 5	OLS const=-103.1*** (13.29) Adjusted R <sup>2</sup> = 0.3679; n=1805	Insignificant	Insignificant	Insignificant	Insignificant
		FE const=-67.71* (35.52) Adjusted R <sup>2</sup> = 0.1228; n=1806	Insignificant	Insignificant	Insignificant	Negative -0.1323*** (0.02017)
	Model 6	OLS const=-97.44*** (13.12) Adjusted R <sup>2</sup> = 0.3654; n=1805	Insignificant	Insignificant	Insignificant	Insignificant
		FE const=-61.18* (35.12) Adjusted R <sup>2</sup> = 0.1162; n=1806	Insignificant	Insignificant	Insignificant	Negative -0.1297*** (0.01999)
Dependent variable: D/E	Model 7	OLS const=-56.27** (21.87) Adjusted R <sup>2</sup> = 0.3014; n=1779	Insignificant	Insignificant	Insignificant	Negative -0.07723*** (0.02541)
		FE const=-91.17* (52.42) Adjusted R <sup>2</sup> = 0.2052; n=1780	Insignificant	Insignificant	Insignificant	Negative -0.1092*** (0.03266)
	Model 8	OLS const=-66.16*** (22.31) Adjusted R <sup>2</sup> = 0.3197; n=1775	Insignificant	Insignificant	Insignificant	Negative -0.07322*** (0.02544)
		FE const=-97.29* (53.85) Adjusted R <sup>2</sup> = 0.2255; n=1776	Insignificant	Insignificant	Insignificant	Negative -0.1076*** (0.03297)
	Model 9	OLS const=-55.18** (22.17) Adjusted R <sup>2</sup> = 0.2936; n=1775	Insignificant	Insignificant	Insignificant	Negative -0.07603*** (0.02522)
		FE const=-88.31 (53.62) Adjusted R <sup>2</sup> = 0.2004; n=1776	Insignificant	Insignificant	Insignificant	Negative -0.1076*** (0.03279)

Based on the OLS method, the most statistically significant in these models (Table 9) is the country's political stability index when the capital structure is measured by the ratio of the total debts to assets



and the ratio of long-term debts to assets. Among the other variables, statistically insignificant links were obtained.

**Table 9. The impact of macroenvironmental factors related to sector-specific factors on capital structure in maritime sector companies**

Factor		Political stability index	Port infrastructure quality index	Trade openness index	
<b>The effect obtained by OLS and FE methods</b>					
Dependent variable TD/TA	Model 1	OLS const=-76.15*** (16.02) Adjusted R <sup>2</sup> = 0.3508; n=1809	Negative -5.284** (2.524)	Insignificant	Insignificant
		FE const=-77.99* (39.90) Adjusted R <sup>2</sup> = 0.2022; n=1809	Insignificant	Insignificant	Insignificant
	Model 2	OLS const=-88.77** (43.15) Adjusted R <sup>2</sup> = 0.3611; n=1806	Negative -4.949* (2.517)	Insignificant	Insignificant
		FE const=-77.99* (39.90) Adjusted R <sup>2</sup> = 0.2097; n=1809	Insignificant	Insignificant	Insignificant
	Model 3	OLS const=-73.58*** (16.31) Adjusted R <sup>2</sup> = 0.3422; n=1806	Negative -5.280** (2.542)	Positive 3.094* (1.863)	Insignificant
		FE const=-74.99* (40.92) Adjusted R <sup>2</sup> = 0.1893; n=1809	Insignificant	Insignificant	Insignificant
Dependent variable LTD/TA	Model 4	OLS const=-99.18*** (13.21) Adjusted R <sup>2</sup> = 0.3614; n=1808	Negative -5.896*** (2.107)	Insignificant	Insignificant
		FE const=-63.12* (34.11) Adjusted R <sup>2</sup> = 0.1158; n=1808	Insignificant	Insignificant	Insignificant
	Model 5	OLS const=-103.1*** (13.29) Adjusted R <sup>2</sup> = 0.3679; n=1805	Negative -5.659*** (2.122)	Insignificant	Insignificant
		FE const=-67.71* (35.52) Adjusted R <sup>2</sup> = 0.1228; n=1806	Insignificant	Insignificant	Insignificant
	Model 6	OLS const=-97.44*** (13.12) Adjusted R <sup>2</sup> = 0.3654; n=1805	Negative -5.736*** (2.108)	Insignificant	Insignificant
		FE const=-61.18* (35.12) Adjusted R <sup>2</sup> = 0.1162; n=1806	Insignificant	Insignificant	Insignificant
Dependent variable D/E	Model 7	OLS const=-56.27** (21.87) Adjusted R <sup>2</sup> = 0.3014; n=1779	Insignificant	Insignificant	Insignificant
		FE const=-91.17* (52.42) Adjusted R <sup>2</sup> = 0.2052; n=1780	Insignificant	Insignificant	Insignificant
	Model 8	OLS const=-66.16*** (22.31) Adjusted R <sup>2</sup> = 0.3197; n=1775	Insignificant	Insignificant	Insignificant
		FE const=-97.29* (53.85) Adjusted R <sup>2</sup> = 0.2255; n=1776	Insignificant	Insignificant	Insignificant
	Model 9	OLS const=-55.18** (22.17) Adjusted R <sup>2</sup> = 0.2936; n=1775	Insignificant	Insignificant	Insignificant
		FE const=-88.31 (53.62) Adjusted R <sup>2</sup> = 0.2004; n=1776	Insignificant	Insignificant	Insignificant

Next, the macroenvironmental factors related to the social and natural environment are analyzed (Table 10).

**Table 10. The impact of macroenvironmental factors related to the social and natural environment on the capital structure in maritime sector companies**

Factor		Labor force activity rate	Annual growth rate of output per worker	Environmental and resource productivity	
<b>The effect obtained by OLS and FE methods</b>					
Dependent variable TD/TA	Model 1	OLS const=-76.15*** (16.02) Adjusted R <sup>2</sup> = 0.3508; n=1809	Insignificant	Insignificant	Insignificant
		FE const=-77.99* (39.90) Adjusted R <sup>2</sup> = 0.2022; n=1809	Insignificant	Positive 0.4321*** (0.1483)	Insignificant
	Model 2	OLS const=-88.77*** (43.15) Adjusted R <sup>2</sup> = 0.3611; n=1806	Insignificant	Insignificant	Insignificant
		FE const=-77.99* (39.90) Adjusted R <sup>2</sup> = 0.2097; n=1809	Insignificant	Positive 0.4842*** (0.1485)	Insignificant
	Model 3	OLS const=-73.58*** (16.31) Adjusted R <sup>2</sup> = 0.3422; n=1806	Insignificant	Insignificant	Insignificant
		FE const=-74.99* (40.92) Adjusted R <sup>2</sup> = 0.1893; n=1809	Insignificant	Positive 0.4087*** (0.1503)	Insignificant
Dependent variable LTD/TA	Model 4	OLS const=-99.18*** (13.21) Adjusted R <sup>2</sup> = 0.3614; n=1808	Positive 0.5728*** (0.2065)	Insignificant	Positive 5.616** (2.746)
		FE const=-63.12* (34.11) Adjusted R <sup>2</sup> = 0.1158; n=1808	Positive 0.3852* (0.2024)	Positive 0.4501*** (0.1732)	Insignificant
	Model 5	OLS const=-103.1*** (13.29) Adjusted R <sup>2</sup> = 0.3679; n=1805	Positive 0.5686*** (0.2052)	Insignificant	Positive 5.583** (2.734)
		FE const=-67.71* (35.52) Adjusted R <sup>2</sup> = 0.1228; n=1806	Positive 0.3868* (0.2018)	Positive 0.4776*** (0.1782)	Insignificant
	Model 6	OLS const=-97.44*** (13.12) Adjusted R <sup>2</sup> = 0.3654; n=1805	Positive 0.5642*** (0.2069)	Insignificant	Positive 5.456* (2.773)
		FE const=-61.18* (35.12) Adjusted R <sup>2</sup> = 0.1162; n=1806	Positive 0.3872* (0.2038)	Positive 0.4429** (0.1735)	Insignificant
Dependent variable D/E	Model 7	OLS const=-56.27*** (21.87) Adjusted R <sup>2</sup> = 0.3014; n=1779	Insignificant	Insignificant	Positive 9.003*** (4.360)
		FE const=-91.17* (52.42) Adjusted R <sup>2</sup> = 0.2052; n=1780	Insignificant	Insignificant	Insignificant
	Model 8	OLS const=-66.16*** (22.31) Adjusted R <sup>2</sup> = 0.3197; n=1775	Insignificant	Insignificant	Positive 8.886** (4.234)
		FE const=-97.29* (53.85) Adjusted R <sup>2</sup> = 0.2255; n=1776	Insignificant	Insignificant	Insignificant
	Model 9	OLS const=-55.18** (22.17) Adjusted R <sup>2</sup> = 0.2936; n=1775	Insignificant	Insignificant	Positive 8.924*** (4.417)
		FE const=-88.31 (53.62) Adjusted R <sup>2</sup> = 0.2004; n=1776	Insignificant	Insignificant	Insignificant

As it can be seen from the data presented in Table 11, after removing the macroenvironmental factors from the models, the coefficient of determination  $R^2$  (which shows what part of the variation in the capital structure variable can be explained by the model factors) and the residual sum of the squared error (RSS, which shows the discrepancy between each actual observation and the coefficients of the model calculated by the theoretical model sum of squares) slightly changed. Meanwhile, after removing the microenvironmental factors, the remaining variables in the model explain significantly less variation in the capital structure variable than in the general case. Based on the hypothesis testing procedure, the group of microenvironmental factors is recognized as more significant. The hypothesis that microenvironmental factors are more significant than macroenvironmental factors for the volume of the borrowed capital when forming the capital structure of the companies of the maritime sector has been confirmed.

**Table 11. Coefficients of determination of models and residual sum of squared errors**

Model	OLS method		FE method	
	R <sup>2</sup>	RSS	R <sup>2</sup>	RSS
<b>Model 1 (general)</b>	<b>0.360834</b>	<b>673945.5</b>	<b>0.202211</b>	<b>218088.6</b>
Model with micro-environmental factors	0.333587	728872.1	0.186391	235570.4
Model with macro-environmental factors	0.073890	986696.6	0.024926	272640.0
<b>Model 2 (general)</b>	<b>0.352375</b>	<b>679763.5</b>	<b>0.209660</b>	<b>215769.0</b>
Model with micro-environmental factors	0.347255	612482.6	0.194384	232967.5
Model with macro-environmental factors	0.073890	986696.6	0.024926	272640.0
<b>Model 3 (general)</b>	<b>0.370687</b>	<b>661405.6</b>	<b>0.189302</b>	<b>221696.1</b>
Model with micro-environmental factors	35.55375	712649.2	0.172240	239747.8
Model with macro-environmental factors	0.073890	986696.6	0.024926	272640.0
<b>Model 4 (general)</b>	<b>0.371277</b>	<b>575756.7</b>	<b>0.115761</b>	<b>252148.9</b>

Model with micro-environmental factors	0.343605	617840.9	0.104470	264610.3
Model with macro-environmental factors	0.079029	849457.7	0.012334	286162.6
<b>Model 5 (general)</b>	<b>0.377405</b>	<b>568573.0</b>	<b>0.122805</b>	<b>247909.3</b>
Model with micro-environmental factors	0.352015	608291.2	0.111861	260167.8
Model with macro-environmental factors	0.079029	849457.7	0.012334	286162.6
<b>Model 6 (general)</b>	<b>0.375270</b>	<b>570694.2</b>	<b>0.116178</b>	<b>252032.7</b>
Model with micro-environmental factors	0.347255	612482.6	0.104853	264500.3
Model with macro-environmental factors	0.079029	849457.7	0.012334	286162.6
<b>Model 7 (general)</b>	<b>0.311983</b>	<b>1071054</b>	<b>0.205233</b>	<b>321661.0</b>
Model with micro-environmental factors	0.296499	1131653	0.192342	341442.1
Model with macro-environmental factors	0.050951	1494307	0.036867	399515.1
<b>Model 8 (general)</b>	<b>0.330078</b>	<b>1039375</b>	<b>0.225549</b>	<b>312406.3</b>
Model with micro-environmental factors	0.316511	1095872	0.213787	331328.4
Model with macro-environmental factors	0.050951	1494307	0.036867	399515.1
<b>Model 9 (general)</b>	<b>0.304374</b>	<b>1076943</b>	<b>0.200391</b>	<b>323619.3</b>
Model with micro-environmental factors	0.288518	1137182	0.187532	343467.8
Model with macro-environmental factors	0.050951	1494307	0.036867	399515.1

Upon analyzing the impact of CS on the business value in MS companies, the obtained results, calculated by the OLS method, show that the business value, reflected by the Tobin Q indicator, is affected by the ratio of all debts and assets when such microenvironmental factors as the profitability, revenue growth, company size, tangible assets indicator, risk, liquidity are also included in the model. The impact of CS on the business value is also confirmed by the results calculated by using the method of fixed effects: the business value, reflected by the Tobin Q indicator, is affected by the capital structure which is measured by the ratio of all debts to assets and the ratio of the debts to the equity of the market value. The business value, which

is reflected by the EV/EBITDA indicator, is affected by the capital structure measured by the ratio of long-term debts to the total assets. Since, after calculating the regression equation estimates and statistical significance in the constructed econometric models, the coefficients reflecting the link between CS and BV, as well as microenvironmental factors are statistically significant; therefore, the third hypothesis that CS has a significant impact on the business value in the maritime sector companies has been confirmed.

The obtained results analyzing the impact of microenvironmental factors on BV show that the most significant microenvironmental factor for BV is the revenue growth in the company. Such microenvironmental factors as profitability, company size and liquidity are also significant. The obtained results analyzing the impact of macroenvironmental factors on BV show that economic growth and political stability are significant factors for BV, whereas the other macroenvironmental factors are not significant for the business value in MS companies. The research shows that microenvironmental factors are more significant than macroenvironmental factors for the business value in MS companies.

In order to find the breaking point up to which the growth of the share of the borrowed capital increases the business value in MS companies, various models have been created: first, none of the variables is logarithmized, then, the dependent variable is logarithmized, then, the independent variable is logarithmized as well. The results of the obtained most that the increase in the share of the borrowed capital can have both positive marginal and negative marginal effect on business value in the maritime sector has been confirmed. significant model are presented in Table 12. By using the regression equations in which the BV is dependent, where CS is the independent variable, a nonlinear and inverted U-shaped link between CS and BV has been found. As the coefficient at the capital structure indicator is statistically significant and positive, and the squared coefficient at the capital structure indicator is statistically significant and negative, the fourth hypothesis

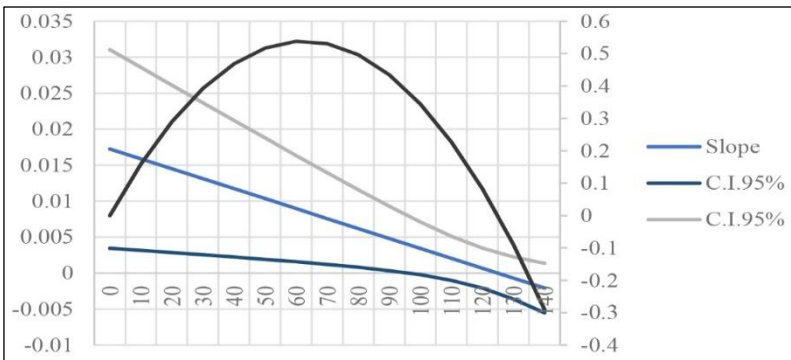
Table 12. **The impact of capital structure on business value (log Tobin Q)**

Independent variables	Dependent variable
	Business value is approximated by the logarithmic Tobin Q indicator
const	-0.379904
CS (D/E)	<b>0.0180196**</b>
Sq CS (D/E)	<b>-0.000145815**</b>
RISK	-5.60492e-06
EBITDA profitability	-5.37031e-05
LIQUID	-0.000411917
SIZE	-0.00145389
<b>GROWTH</b>	<b>8.24151e-06***</b>
<b>TANG</b>	<b>-0.00564101***</b>
<b>GDP</b>	<b>-0.0204398***</b>
<b>PORT</b>	<b>0.135347***</b>
STABIL	-0.0181411
TRADE	-0.000255102
ENV	-0.00538704
R <sup>2</sup>	0.221050
Adjusted R <sup>2</sup>	0.209328
n	1485

\* p < 0.1; \*\* p < 0.05; \*\*\* p < 0.01

The obtained results show that, when the business value is reflected by the logarithmic Tobin Q indicator, the business value keeps increasing until the capital structure is equal to 61.79 percent ( $-0.0180196 / (2 * (-0.000145815)) = 61.78925351$ ). Thus, when forming the capital structure in MS companies, the share of the borrowed capital should not exceed 62 percent. Based on the obtained result in the econometric model, a breaking point has been determined under the significant influence of CS factors: company growth, tangibility, economic growth and port infrastructure quality index, the fifth hypothesis has been confirmed as the growth of the share of the borrowed capital in MS companies increases the business value, but there is a breaking point from which the business value starts to decrease as the borrowed capital continues to increase, under the

significant influence of capital structure factors. A further increase in debts may have a positive marginal effect on the business value in one case, and a negative one in the other. This means that the impact of the company's debts on the business value depends on the size of the debts. The marginal effect at each debt point is different, and its statistical significance is also different. A slope is calculated to estimate this marginal effect. The obtained CS marginal effect in the range of the observed values and the breaking point are illustrated in Figure 8 which presents a wide confidence interval indicating that the lower are the debts, the greater is the variation of the marginal effect.



**Fig. 8.** The marginal effect of capital structure on the business value in the range of the observed values and the obtained breaking point

Based on the data presented in Figure 10, it can be stated that, after reaching the 95 percent level of debts, there is no longer a statistically significant impact on the business value. This means that the higher are the debts, the smaller the marginal effect becomes as the debts increase, and the variation of the effect itself also decreases. The obtained results show that the marginal effect of CS on the business value is positive but decreasing.

When summarizing the third part of the dissertation, it can be stated that the expert survey highlighted the specificity of MS and specified the main factors leading to the formation of CS and the increase of BV which are included in the created econometric models. After evaluating the dynamics of the main financial indicators, the

financial indicators of the Western European MS companies are higher than those of the Eastern European companies, therefore, BV is also higher in the Western European MS companies.

The conducted empirical research has shown that microenvironmental factors are more significant than macroenvironmental factors in the formation of CS in the companies of the maritime sector. More profitable MS companies tend to borrow less, and they seek to finance their activities from internal financial resources. This has also been confirmed by the impact of the liquidity indicator on the capital structure of MS companies. The results show that MS companies of higher liquidity prefer to use internally generated funds. Greater liquidity ensures positive working capital; thus, funds can be saved for long-term investments without the need to borrow from other external sources. Riskier MS companies also tend to borrow less. However, larger MS companies have a greater tendency to borrow. The indicator of tangible assets is positively related to the capital structure of MS companies, and the increased assets of the company would increase financing with borrowed funds. This indicates that companies have sizable tangible assets that can be used as collateral, which makes it easier to access funds from external sources. In the qualitative research, experts distinguished the significance of the country's economic, political and geopolitical environment for MS companies. The results of the empirical research have shown that the political environment of the country exerts a significant impact on the choice of financial resources, whereas the index of political stability has a negative impact on CS. When assessing the impact of CS on the business value, it was found that CS makes a significant impact on the business value in MS companies. The use of borrowed funds offers advantages as companies have more investment options that can increase BV. The obtained results show that the marginal impact of CS on the business value is positive but decreasing under the significant influence of the factors of the capital structure.



## CONCLUSIONS

1. The features of the formation of the capital structure in the companies of the maritime sector have been conceptualized. The formation of the capital structure of the maritime sector companies is the creation of means and methods for determining the combination of the borrowed and the equity capital, thereby ensuring that the decisions made in the company increase the business value by improving the company's activities, and thus achieving a positive impact on the company, the maritime sector, the broad society, and the entire country. This expanded definition of the capital structure more than the common definitions used so far reflects the aspects of the capital structure formation of the companies operating in the maritime sector and is necessary due to the changes taking place in the environment: the digitalization processes of technologies as well as the new emerging requirements for environmental protection caused by the ongoing processes of the climate change. The new definition of the capital structure is also applied to other sectors where high technologies are being used, active digitization processes are taking place, and green finance is being actualized. Reasonable capital structure formation decisions ensure sufficient financial funds guaranteeing the minimum cost of the capital and helping to achieve the objectives set by a company operating in the maritime sector. After analyzing the scientific sources, it was found that, in the formation of the capital structure in the companies of the maritime sector, certain exceptions are encountered since, for the activity of companies belonging to this sector, large amounts of borrowed capital are required. Companies are facing market volatility, as well as strong domestic and international regulations. This sector relies on heavy investment and requires extensive capital to acquire fixed assets of a high value. As digital transformation is taking place worldwide, the need for the use of high-tech in the national ports, shipping, shipbuilding and repair sector business companies is increasing. In the maritime sector, due to the nature of the activity, advanced and

innovative technologies and high-value equipment are used, so this implies a larger share of borrowed capital in the company's capital structure. As this capital is often formed from borrowed funds, the companies of the maritime sector are denoted by a high financial sector index, and they tend to encounter high financial risk.

The factors determining the capital structure have been systematized. Microenvironmental factors related to the company's activities and results and macroenvironmental factors related to the country's economic, political-legal, geopolitical, socio-cultural, natural and technological environment, are the same for all companies operating in the discussed market, however, their significance may differ considerably. After conducting detailed analysis of empirical research on the capital structure, it was noticed that, in many of them, when creating a model of factors affecting the capital structure, such microenvironmental factors as profitability, company size, tangible assets indicator, income growth, tax effect, liquidity, risk are included. The inflation rate, the GDP change and the interest rate are included in macroenvironmental factors. Scientists include different factors in models and choose different measurements of them. The results of the conducted empirical research revealing the impact of microenvironmental and macroenvironmental factors on the capital structure vary depending on the region, the level of development of the country, the sector in which the company is operating, etc. It has also been emphasized that the dependence on the factors of the capital structure can be different when evaluated in terms of different theories of the capital structure. The significance of the theories covering the capital structure is that they help to distinguish between various factors that can influence the choice of the capital structure.

2. The content of the business value and the ways of increasing it have been analyzed. The business value is defined as a measure of business usefulness at a given time which is determined according to the appropriate valuation methodology and which reflects the value of the company's physical capital, as well as its intangible capital, and is based on the expectation of business continuity. The increase of the

business value is ensured by high financial results which depend on the cash generated by the company, its operational efficiency, and the technologies in use. In order to increase the business value, many factors related to the company's activities, its results, the specificity of the sector and the country's environment must be taken into consideration. When forming a capital structure that increases the business value in the companies of the maritime sector, it is necessary to assess the interests of many stakeholders – not only the company owners, shareholders, investors, but also the society in general – in order to ensure the effectiveness of environmental protection. The capital structure that increases business value should benefit not only the company's owners, shareholders, and other investors, but also the broad society and the environment. It is possible to expand the concept of the capital structure which increases the business value: it is a combination of the borrowed and the equity capital that creates a balance between risk and profitability, that increases the company's share price to the highest degree, as well as its business value, ensures benefits for the company's stakeholders, and for the whole society, by creating welfare for the environment in the context of sustainable development. A sustainable financial system aims for social and environmental responsibility underlined by green finance. Although companies in the maritime sector, the entire society and the government have their own interests, the effectiveness of environmental protection must also be reflected within the context of these interests. The formation of a capital structure that increases the business value and is focused on increasing the social and environmental responsibility makes it possible to reduce the cost of the capital, which is also in the interest of the companies in the maritime sector. The analyzed scientific literature and the conducted empirical research reveal a new approach in which the main aim of the company is not limited to profit maximization, and the financial resources of the companies of the maritime sector are evaluated as a means to help achieve sustainable development. This becomes a necessary condition in the process of forming the capital structure and

increasing the business value under the conditions of the global market economy. After assessing the specificity of the maritime sector and the relevant need to ensure the effectiveness of environmental protection, the expansion of the concept of the capital structure in the business companies of this sector presupposes the need to take into consideration the public interest and the wider groups of stakeholders.

The theoretical interface between the capital structure and the business value has been revealed. Discrepant and ambiguous results on the impact of the capital structure on the business value have been determined in empirical research. Although there are investigations showing that the capital structure has no impact on the business value which confirm the classical theories of the insignificance of the capital, many empirical investigations reflect nevertheless that the capital structure and the business value are closely related and establish a significant positive or negative link between the capital structure and the analyzed value.

3. A conceptual model for assessing the impact of the maritime sector companies' capital structure on the business value which identify the impact of environmental factors while taking into account the specificity of the capital structure formation in the companies of the maritime sector has been created. The microenvironmental factors determining the formation of the capital structure depend only on the indicators of a specific company, while the macroenvironmental factors are the same for all the companies operating in that market, but their significance may differ considerably. Considering the specificity of the sector, economic, political, geopolitical, social, technological and natural environment dimensions may have a different impact on the formation of the capital structure. Since the maritime sector is global and functions in the global market, the microenvironment and the macroenvironment operate in the megaenvironment, i.e. all these environments interact in a complex way. The formation of the capital structure and the enhancement of the business value are influenced by innovative environmental changes arising from the megaenvironment, which requires safer technologies from the maritime companies for the

sake of protecting the environment, and which subsequently reflects the need for the green finance along with the necessity of digitization processes. The megaenvironment of the maritime sector is particularly closely related to the macroenvironment, therefore, the megaenvironment in which the companies of the maritime sector are operating is reflected by the macroenvironmental indicators related to the economic growth, the political and geopolitical situation, and environment protection. When forming the capital structure that increases the business value, the aim is to minimize the weighted capital costs because, in this way, risk is minimized whereas profitability is increased. The cost of the capital can be reduced by those capital structure solutions which are focused on increasing the social and environmental responsibility, thus, the role of the green finance, manifested in innovative environmental changes and reflected in the macroenvironment, is significant. The factors having an impact on the capital structure are dynamic. When a capital structure that maximizes business value fails to be achieved, feedback is applied to reassess the factors affecting the capital structure. The impact of the capital structure on the business value can be different. After establishing the significant impact of the capital structure on the business value and applying the created conceptual model for assessing the impact of the capital structure on the business value, it is possible to find such a capital structure that would increase the business value in the companies representing the maritime sector.

4. A methodology for assessing the impact of the capital structure on the business value which is adapted to companies in the maritime sector has been created. Based on the created conceptual model for assessing the impact of the capital structure on the business value and aiming for complexity, two research stages were formed in the methodology section. The first stage of the research aims to analyze the impact of the factors of the capital structure on its formation. After analyzing the capital structure and measuring the financial leverage upon taking into account the specificity of the maritime sector, the capital structure is reflected by three selected indicators: the ratio of

all debts to assets, the ratio of long-term debts to assets, and the ratio of the debts to the equity of the market value. In this way, the measurement of the capital structure is not limited to the book value of the company, but also an indicator related to the market value is included. By using the multiple regression analysis model, the impact of the microenvironmental and macroenvironmental factors on the capital structure in the companies of the maritime sector has been analyzed. Microenvironmental factors related to the company's characteristics and activities, macroenvironmental factors including the specific maritime sector factors, such as the political stability index, the trade openness index, the quality index of the country's port infrastructure, and an indicator reflecting the green growth are included as variables in this model. In the second stage of the research, the impact of the capital structure on the business value in the companies of the maritime sector was analyzed. The business value in the companies of the maritime sector is shown by the Tobin Q and EV/EBITDA indicators, as these indicators are focused not only on the book value but also on the market value, reflecting the investors' confidence in the company and expectations related to cash flows and their growth in the future. When analyzing the impact of the capital structure on the business value, the following factors of the capital structure are also included in the model: profitability, liquidity, indicator of tangible assets, risk and income growth – which are significant for the business value of the companies of the maritime sector. By applying the method of non-linear regression analysis, it is possible to determine the level of the capital structure which increases the business value in the companies of the maritime sector.

After conducting a survey of experts of the maritime sector and summarizing the results, it can be stated that not only is the economic environment most important for the companies in this sector, but the political and geopolitical environment plays an especially significant role since it is a global business that is highly regulated both at the national and international levels. Therefore, when forming a model for assessing the impact of the capital structure on the business value, it

includes the criteria identified by experts as extremely significant. These are related to the state's political stability, exports and imports, and they are reflected in the country's trade openness indicator. The experts also noted the indicators reflecting the social environment: the level of activity of the country's workforce and the annual growth rate of production per worker. In the course of the survey of experts, it was revealed that the maritime sector is receptive to large investments requiring a long payback and capital intensity. Volatile freight prices create high inequalities of products on the market. These factors increase the risk which companies are facing. The discussed aspects suggest that the specificity of the activities of the companies in the maritime sector determines the differences in the formation of the capital structure. The specificity of the maritime sector exerts a fundamental impact on the formation of the capital structure in companies.

5. The created conceptual model for assessing the impact of the capital structure of the companies of the maritime sector and its factors on the business value has been empirically verified. The obtained results show that profitability has a negative impact on the capital structure in the companies of the maritime sector. Therefore, the more profitable companies in the maritime sector tend to borrow less and primarily seek to finance their activities from internal funds. The hypothesis that lower profitability increases the level of the borrowed capital in the capital structure of the companies of the maritime sector has been confirmed. The company size and the indicator of tangible assets exhibit a positive impact on the capital structure. This suggests that, in the formation of the capital structure in the maritime sector, the features of the pecking order theory are followed. The larger a company is and the more tangible assets in the maritime sector it possesses, the more it tends to borrow. However, most macroenvironmental factors of the capital structure do not have a significant impact; thus, the hypothesis that microenvironmental factors are more significant than macroenvironmental factors for the

level of the borrowed capital in the formation of the capital structure of the companies of the maritime sector has been confirmed.

The impact of the capital structure of the companies of the maritime sector on the business value when the level of debts is changing has been evaluated, and the factors pertaining to the capital structure determining it have been established. The hypothesis that the capital structure has a significant impact on the business value in the companies of the maritime sector under the influence of microenvironmental factors has been confirmed. The empirical research has revealed that the higher are the company's debts, the smaller is the marginal impact as the debts increase, while the variation of the impact itself decreases. The obtained results show that the marginal impact of the capital structure on the business value is positive but decreasing. The hypothetical assumption that the growth of the share of the borrowed capital in the company's capital structure can have both a positive marginal and a negative marginal impact on the business value has been confirmed. However, the financial behavior of the companies of the maritime sector is not based on the trade-off theory; hence, determining the specific optimal ratio of the capital structure in the maritime sector companies is highly complicated due to the differences in the scale of the companies' activities and the turnover volumes. In the course of the empirical research, only a few panel models showed that, in the formation of the capital structure in the maritime sector, the borrowed capital should not exceed 62 percent. The hypothesis that the growth of the share of the borrowed capital in the companies of the maritime sector increases the business value, but there is a breaking point from which the business value starts decreasing while the borrowed capital still continues to increase under the significant influence of the factors pertaining to the capital structure has been confirmed. The growth factor of the company, which is related to the increase of income in the companies of the maritime sector, has the biggest decisive influence on the business value, along with tangibility, the growth of the country's economy and the quality of the port infrastructure.



**Further directions of research development.** The model for assessing the impact of the capital structure on the business value developed in the present dissertation which is based on the developed assessment methodology can be applied as follows: a) to analyze the formation of the capital structure of non-listed companies in the maritime sector; b) to investigate the impact of the capital structure of non-listed companies in the maritime sector on the business value by changing the measurement of the business value; c) to investigate the impact of the capital structure of listed companies in the maritime sector on the market value; d) to assess the impact of the capital structure on the business value by including new or changing some already existing microenvironmental and macroenvironmental factors affecting the companies operating in the maritime sector.

## REZIUMĖ

**Temos aktualumas.** Visą pasaulį ir atskiras šalis vienaip ar kitaip paveikiančios ekonomikos, finansų krizės, išstinkančios pandemijos turi didelį poveikį verslui ir jo rezultatams. Dėl smukusio vartojimo, sutrikusių atsiskaitymų, ribotų ar neprieinamų finansavimo šaltinių ir kitų ekonominių-finansinių priežasčių verslo įmonių veikla gali sutrikti. Įmonėms siekiant išlikti ir sėkmingai veikti įvairiomis ekonominio ciklo sąlygomis, o ypač kriziniu laikotarpiu, ypatingą svarbą įgyja efektyvus ir racionalus finansų valdymas. Galima teigti, kad šiuolaikinėmis rinkos ekonomikos sąlygomis vienas svarbiausių uždavinių verslo įmonėms yra priimti ekonomiškai pagrįstus sprendimus dėl finansavimo šaltinių struktūros, nes kapitalo struktūros formavimas sąlygoja įmonės gebėjimą maksimaliai didinti įmonės grąžą, veiksmingai valdyti riziką, sėkmingai veikti konkurencinėje aplinkoje, siekiant patenkinti įvairių suinteresuotųjų šalių poreikius. Šitaip užtikrindama gerovę, stabilumą ir tvarumą įmonė geba pasiekti vieną iš pagrindinių tikslų – maksimizuoti vertę akcininkams. Finansinis stabilumas ir nemokumo rizika yra susijusi su skolintu kapitalu, jo dydžiu ir pokyčiais įmonės kapitalo struktūroje.

Sprendžiant įvairius su įmonės nuosavybe susijusius klausimus, kyla verslo vertės nustatymo poreikis. Įmonių vadovai, investuotojai ir kiti suinteresuotieji asmenys siekia atsakyti į klausimą, kokią kapitalo struktūrą pasirinkti, kad būtų galima garantuoti pelningą bei ilgalaikę įmonės veiklą ir taip maksimizuoti verslo vertę. Todėl kapitalo struktūros, kuri maksimizuotų verslo vertę su minimaliais svertinio kapitalo kaštais, pasirinkimas rinkos sąlygomis tampa aktuali problema, o kapitalo struktūros tyrimai išlieka reikšmingi ir dabarties verslo pasaulyje. Verslo vertės maksimizavimas aktualus daugeliui su įmone susijusių suinteresuotųjų šalių, kurios mokslinėje literatūroje pirmiausia įvardijamos kaip įmonės savininkai, akcininkai, kreditoriai, kiti investuotojai. Paskutinį dešimtmetį atliekama vis daugiau mokslinių tyrimų, įrodančių, jog įmonių veikla yra

suinteresuota ir visuomenė, kurios požiūris į įmonės sukuriama reputaciją gali turėti įtakos verslo vertei.

Jūrinis sektorius bet kuriai šaliai yra strategiškai svarbus ir ekonomiškai reikšmingas. Šio sektoriaus verslo įmonių socialinis-ekonominis indėlis visos valstybės mastu yra itin svarus. Formuojant kapitalo struktūrą jūrinio sektoriaus įmonėse susiduriama su tam tikrais išskirtinumais, nes šių įmonių veiklai reikalingas didelis skolintas kapitalas. Jūrinio sektoriaus įmonių verslo vertės didinimas turi teigiamą reikšmę tiek nacionaliniu, tiek tarptautiniu mastu.

**Mokslinė problema ir jos ištyrimo lygis.** Pirmieji kapitalo struktūros tyrimai pradėti XX a. antrojoje pusėje. Pradininkais laikomi D. Durand (1952), F. Modigliani, M. M. Miller (1958, 1963), G. Donaldson (1961), daugiausia dėmesio skyrę skolinto ir nuosavo kapitalo kainai. Jų sekėjai, atlikdami tyrimus, siekė nustatyti, kurios kapitalo struktūros teorijos geriausiai atspindi, kas nulemia kapitalo struktūros formavimą įmonėse (Jensen, Meckling, 1976; Myers, Majluf, 1984; Jensen, Smith, 1984; De Angelo, Masulis, 1980; Fama, French, 2002; Baker, Wurgler, 2002). Pirmiausia empiriniai tyrimai buvo atliekami JAV įmonėse (Leary, Roberts, 2005; Frank, Goyal, 2003; Shyam-Sunder, Myers, 1999; ir kt.). Vėliau, plečiantis kapitalo rinkoms ir didėjant įmonių finansinių duomenų prieinamumui, atliekamų kapitalo struktūros tyrimų daugėjo ir Europos šalių įmonėse (Adair, Adaskou, 2015; Arvanitis ir kt., 2012; Serrasqueiro, Caetano, 2012; ir kt.), ir Azijos, taip pat kitų šalių įmonėse (Afolabi ir kt., 2019; Abdallah, Ismail, 2017; Adenugba ir kt., 2016; Matemilola ir kt., 2014; Al-Taani, 2013; ir kt.). Tyrėjai ypač pabrėžė kapitalo struktūros derinio pasirinkimo reikšmę įmonėse (Ali, Divya, 2019; Uremadu, Onyekachi, 2018; Dananti, Cahjono, 2017; Kristyana Dananti, 2017; Terzioğlu, 2017; Mahdaleta ir kt., 2016; Hamid ir kt., 2015; Shahar kt., 2015; Priya ir kt., 2015; Akeem ir kt., 2014; Leon, 2013; Jacobides, 2013; Rajendran, Nimalthasan, 2013; Zhi-qiang, 2012; Cuong, Canh, 2012; ir kt.). Vienų tyrėjų nuomone, kapitalo struktūra formuojama atsižvelgiant į ribinę skolinto kapitalo naudą esant ribiniams skolinto kapitalo kaštams (Nguyen ir kt., 2021; Zeitun ir kt.,

2017; Bolton, Huang, 2016; Cummins, Weiss, 2016; Sheikh, Qureshi, 2014; Dissanayake, Fernando, 2015; ir kt.). Kiti tyrėjai nurodė, kad įmonės savo veiklą siekė finansuoti iš vidinių finansavimo šaltinių (Iroegbu Ferdinand, Nnenna ir kt., 2018; Ahsan ir kt., 2016; Kedir, Mekonnen, 2015; Mukherjee, Mahakud, 2010; ir kt.).

Skirtingų sektorių įmonėse kapitalo struktūra yra formuojama skirtingai. Kapitalo struktūros tyrimuose įmonės nėra atskiriamos pagal sektorių, o dažnai visų tipų įmonės traktuojamos kaip homogeniška grupė (Hamzah, Marimuthu, 2018; Koralun-Bereznicka, 2013). Mokslo pažangai jūriniame sektoriuje vystyti trūksta empirinių tyrimų, kuriuose būtų analizuojamas kapitalo struktūros formavimas būtent jūrinio sektoriaus įmonėse. Daugelis jūrinio sektoriaus tyrimų koncentruoti jūrų politikos, jūrinės ekosistemos ar jūrinių subsektorių – žuvininkystės, energetikos, transporto logistikos – srityse. K. Morrissey, C. O'Donoghue (2013) nagrinėjo jūrinio sektoriaus vaidmenį Airijos ekonomikai ir nustatė, kad šis sektorius nacionaliniam ūkiui sukuria didelę pridėtinę vertę, todėl tikslinga jį skatinti papildomomis investicijomis. K. I. Jacobsen ir kt. (2014) atliktas tyrimas patvirtino, kad reikšmingą poveikį jūrinių šalių ekonomikai turi jūrinio sektoriaus įmonių veikla, ypač jūrinės energetikos pramonė. N. B. Dang ir kt. (2017) atlikti tyrimai parodė, kad plėtoti darnią žuvininkystę Vietname trukdo neefektyviai veikiančios šalies valstybinės institucijos, reguliuojančios jūrinio sektoriaus veiklą. Jūrinio sektoriaus įmonių finansavimą, mokumo ir likvidumo problemas bei išskolinimų mokėjimo galimybes analizavę mokslininkai (Yeo, 2016; Drobetz ir kt., 2013; Albertijn ir kt., 2011; Lin ir kt., 2010) pritaria, kad jūrinis sektorius susiduria su nepastoviais grynujų pinigų srautais, nuolat kintančiomis frachtų ir laivų kainomis – statybos, pirkimo, nuomos ar kt., – todėl svarbus rizikos valdymas. Tyrimuose kyla mokslinių diskusijų dėl jūrinio sektoriaus įmonių veiklos finansavimo šaltinių tikslingumo. Vieni tyrimai atskleidė, kad nors pagrindinis jūrinio sektoriaus įmonių veiklos finansavimo šaltinis yra kreditiniai ištekliai, įmonės siekė pasinaudoti finansavimo galimybėmis išorinėse kapitalo rinkose (Merika, Theodoropoulou ir

kt., 2015). Kiti tyrimai nustatė, kad jūrinio sektoriaus įmonės siekė veiklą finansuoti vidiniais finansavimo šaltiniais (Yang ir kt., 2021; Paun ir kt., 2016; Lee, 2016; Drobotz ir kt., 2013; Arvanitis ir kt., 2012; Thalassinou ir kt., 2012). Jūrinio sektoriaus kapitalo struktūros matavimuose apsiribojama pagrindiniu rodikliu, susijusiu su visais įmonės išpareigojimais ar bendraisiais įmonės išsiskolinimais. Įžvelgiamas nepakankamas dėmesys ilgalaikių išsiskolinimų rodikliui, nes ilgalaikiai išsiskolinimai yra labai reikšmingi jūrinio sektoriaus įmonėse, siekiant finansuoti naujo laivo statybą, pirkimą, įrangos įsigijimą ir kt.

Mokslinėje literatūroje santykinai nedaug Lietuvos jūrinio sektoriaus tyrimų. Tokia analizė yra sudėtinga dėl sektoriaus specifiškumo, veiklos kompleksiško, plačios įmonių klasifikacijos. Visgi esama fragmentinių jūrinio sektoriaus tyrimų, nors jie labiau susiję su aplinkoje vykstančių pokyčių ir susiformavusių reiškinų aktualijomis. V. Grublienė (2005, 2007, 2010, 2012) vertino Lietuvos jūrų ūkio žuvininkystės sektoriaus, kaip regioninio verslo, pokyčius, problemas ir perspektyvas bei nagrinėjo klasterizacijos svarbą jūrų ūkyje. Lietuvos jūrinio sektoriaus klasterizacijos formavimo ir skatinimo tyrimus tęsė R. Viederytė, V. Juščius ir kt. (2011, 2012, 2014, 2016) – siekė įvertinti jūrinio sektoriaus poveikį šalies ekonomikai. Tyrimai parodė, kad klasteriams kurtis ir sparčiau vystytis yra svarbi teisinė bazė, finansinių išteklių, investicijų ir inovacijų įtaka. Pagrindinės kliūtys jūrinei klasterizacijai – pasitikėjimo tarp potencialių klasterio narių stoka, veiklos partnerystėje patirties stoka ir praktiškai neveikiančios verslo informacinės sistemos. J. Belova, R. Mickienė ir kt. (2010, 2012, 2015, 2017) vertino jūrinio sektoriaus efektyvumą ir nustatė, kad šio sektoriaus veiklos efektyvumas stiprina šalių tarptautines ir politines pozicijas, nes tai veikla, tiesiogiai susijusi su tarptautiniu ekonominiu bendradarbiavimu, užsienio investicijų pritraukimu ir kt. Geri jūrinio sektoriaus įmonių finansiniai rezultatai sudaro sąlygas pritraukti naujų uosto paslaugų naudotojų, krovinių savininkų, laivybos linijų, investuotojų. Kapitalo struktūros tyrimai Lietuvos įmonėse parodė,

kad įmonės, formuodamos kapitalo struktūrą, siekė išlaikyti kuo aukštesnį nuosavo kapitalo lygį įmonės kapitalo struktūroje. Tokį apsisprendimą lėmė tuo metu šaliai būdingas verslo aplinkos nepastovumas ir silpnai išvystyta kapitalo rinka (Rumšaitė, Vasiliauskaitė, 2000; Kipišas, 2004). Vėlesni kapitalo struktūros formavimo tyrimai atskleidė, kad, suaktyvėjus tarptautiniam kapitalo judėjimui, Lietuvos įmonės kėlė skolinto kapitalo lygį kapitalo struktūroje, atsižvelgdamos į finansavimo kaštų ir rizikos santykį ir siekdamos optimalios kapitalo struktūros (Cibulskienė, 2007; Cibulskienė, Grigaliūnienė, 2008; Lileikienė ir kt., 2008, 2014; ir kt.).

Mokslo pasaulyje esama skirtingų nuomonių dėl kapitalo struktūrą lemiančių veiksnių poveikio krypties ir reikšmingumo. Daugelis mokslininkų tyrė įmonės kapitalo struktūrą sąlygojančius veiksnius ir išryškino pagrindinius mikroaplinkos ir makroaplinkos veiksnius, lemiančius kapitalo struktūrą (Jaworski, Czerwonka, 2021; Gharaibeh, Saqer, 2020; Kajola, Olabisi, 2019; Sen, Ranjan, 2018; Sheikh ir kt., 2017; Zeitun ir kt., 2017; Yeo, 2016; Güner, 2016; Ramezanalivaloujerdi ir kt., 2015; Acaravci, 2015; Malshe ir kt., 2015; Hamid ir kt., 2015; Vatavu, 2015; Danso ir kt., 2014; Sheikh ir kt., 2014; Obradovich ir kt., 2013; Fosu, 2013; ir kt.). Tačiau, analizuojant kapitalo struktūros veiksnius, tyrimuose dažniausiai dominuoja mikroaplinkos veiksniai, nes jie priklauso nuo konkrečios įmonės rodiklių, kuriuos galima kontroliuoti. Daugelyje empirinių tyrimų šie veiksniai kartojasi, skiriasi tik jų matavimo būdai. Tačiau įmonių kapitalo struktūrą veikia ne tik mikroaplinkos veiksniai, bet didelę įtaką daro ir įvairūs šalies makroaplinkos veiksniai. Jiems tyrimuose yra skiriama mažiau dėmesio ir ši aplinkybė sąlygoja dar vieną mokslinę problemą. Dažniausiai kaip makroaplinkos kapitalo struktūros veiksniai naudojami makroekonominiai rodikliai – bendrojo vidaus produkto pokytis, infliacijos lygis ir palūkanų norma. Tačiau nėra atsižvelgiama į politinę, geopolitinę, socialinę, gamtinę bei technologinę aplinką. Todėl, siekiant tinkamai įvertinti veiksnių įtaką kapitalo struktūrai, svarbu analizuoti ne tik mikroaplinkos, bet ir makroaplinkos veiksnius.

Analizuojant konkretų sektorių, specifinių veiksnių įtaka įmonės kapitalo struktūrai tampa labai reikšminga (Drobeta ir kt., 2013; Koralun-Bereznicka, 2013). Todėl, siekiant išanalizuoti, kaip skiriasi veiksnių įtaka kapitalo struktūrai, atsižvelgiant į sektorių, reikia papildomų tyrimų. Mokslininkai (Yang, Lee ir kt., 2021; Paun, Topan, 2016; Lee, 2016; Merika, Theodoropoulou ir kt., 2015; Arvanitis, Tzigkounaki, 2012; Thalassinou, Tzigkounaki, 2012), tyrę kapitalo struktūrą lemiančius veiksnius jūriniame sektoriuje, apsiribojo mikroaplinkos veiksniais. Jūriniame sektoriuje išskirti šie pagrindiniai mikroaplinkos veiksniai: pelningumas, likvidumas, materialiojo turto rodiklis, įmonės augimas, dydis, mokesčių nauda. Tačiau gauti rezultatai išryškino nuomonių dėl veiksnių poveikio kapitalo struktūros formavimui jūriniame sektoriuje skirtumus. Jūrinio sektoriaus įmonėms svarbūs makroaplinkos veiksniai, susiję ne tik su šalies ekonomine situacija, bet ir politine, geopolitine aplinka, ir akcentuojantys jūrinio sektoriaus specifiškumą. Veiksniams, susijusiems su įmonių veiklos sektoriaus specifiškumu, tyrimuose skiriama per mažai dėmesio. Neplėtojami tyrimai, kuriuose kompleksiskai vertinama tiek mikroaplinkos, tiek makroaplinkos veiksnių įtaka kapitalo struktūrai jūriniame sektoriuje. Tyrimų, kuriuose analizuojami tik makroaplinkos veiksniai, beveik nebuvo rasta. Todėl reikėtų ištirti, kokie veiksniai daro įtaką jūrinio sektoriaus įmonių kapitalo struktūros formavimui, praplečiant veiksnių spektrą.

Keičiantis laikmečiui, vykstant globalizacijos pokyčiams, didėjant neapibrėžtumui finansų rinkose, kapitalo struktūros formavimui įtakos turi ir gamtinės aplinkos veiksniai. Ypač stiprėja dėmesys aplinkosaugai, kuri papildo mikroaplinkos ir makroaplinkos veiksniais. Šiandienos įmonėms, plėtojančioms savo verslą jūriniame sektoriuje, formuojant kapitalo struktūrą yra svarbus šių veiksnių įvertinimas. Mikroaplinkos veiksniais, susijusius su aplinkosauga, sudėtinga analizuoti dėl duomenų trūkumo, todėl tikslinga į tyrimus juos įtraukti makrolygmeniu. Pastebėta, kad į kapitalo struktūros tyrimus retai įtraukiami arba visai neįtraukiami veiksniai, susiję su įmonės socialine atsakomybe ir aplinkosaugos veiksmingumu. Laivai,

kaip ir visos iškastinių kurą naudojančios transporto rūšys, išskiria anglies dvideginį, daug prisidedantį prie pasaulinės klimato kaitos ir rūgštėjimo. Todėl, kaip teigia daugelis mokslininkų, užterštumo problema itin aktuali jūrinio sektoriaus įmonėms (Gong ir kt., 2018; Liu, Ying ir kt., 2018; Lin ir kt., 2018; Chen ir kt., 2018; Kopela, 2017; Matthias ir kt., 2016; Aulinger ir kt., 2016; Merika ir kt., 2015; Boscarato ir kt., 2015; Han, 2010; ir kt.). Norint užtikrinti nuolatinį ir ilgalaikį verslo vertės kūrimą, orientuotis tik į asmeninių įmonės savininkų, akcininkų interesų siekimą ir pelno maksimizavimą yra per siauras požiūris tvarių finansų sąlygomis. Nors akcininkų turto maksimizavimas yra vienas iš finansinių-ekonominių aspektų atspindinčių įmonės tikslų, siekiant užtikrinti aplinkosaugos veiksmingumą bei suinteresuotųjų asmenų socialinę gerovę, jį reikėtų papildyti ekonominiu-socialiniu aspektu.

Tyrimų, vertinusių kapitalo struktūros poveikį verslo vertei, rezultatai yra priešaringi. Vieni tyrėjai nenustatė reikšmingo ryšio tarp kapitalo struktūros ir verslo vertės (Yusra ir kt., 2019; Adenugba ir kt., 2016; Chadha, Sharma, 2015; Hassan ir kt., 2014; ir kt.). Kiti tyrėjai patvirtino, kad kapitalo struktūra turi reikšmingą teigiamą ryšį su verslo verte (Zavala, Salgado, 2019; Hirdinis, 2019; Obradovich, Gill, 2013; Adeyemi, Oboh, 2011; Saeedi, Mahmoodi, 2011; Chowdhury, 2010), ir teigė, kad įmonės veiklos finansavimas skolintu kapitalu didintų verslo vertę. Dar viena tyrėjų grupė pabrėžė, kad tarp kapitalo struktūros ir verslo vertės yra reikšmingas neigiamas ryšys (Javeed ir kt., 2017; Mahdaleta ir kt., 2016; Khan, 2012; Chen ir kt., 2011; ir kt.), argumentuodami, kad didėjantis skolintas kapitalas sukelia įmonėms finansinių sunkumų. Tačiau labai stinga tyrimų, kuriuose būtų vertinamas kapitalo struktūros poveikis verslo vertei jūriniame sektoriuje. Žuvininkystės subsektoriuje atlikti empiriniai tyrimai parodė, kad tarp kapitalo struktūros ir verslo vertės yra netiesinis ryšys, atskleidžiantis, jog didinant įsiskolinimus kapitalo struktūroje verslo vertė iš pradžių didėja, o vėliau pradeda mažėti (Cuong, 2014; Cuong, Canh, 2012). Analizuojant kapitalo struktūros poveikį verslo vertei, pasigendama tyrimų, kuriais būtų nustatyta,



koks skolinto kapitalo lygis didintų verslo vertę. Tokio pobūdžio tyrimai ypač menkai plėtojami (Susanti, 2016; Cuong, 2014; Cuong, Canh, 2012; Cheng ir kt., 2010; ir kt.) ir jų rezultatai dėl įmonei priimtino įsiskolinimų lygio, siekiant didinti verslo vertę, yra prieštaringi.

Apibendrinant mokslinės problematikos ištirtumo lygį, galima konstatuoti, kad mokslininkų darbuose, susijusiuose su kapitalo struktūros formavimu, verslo vertės nustatymu ir ryšių analize, pastebimas tyrimų ribotumas ir specifinių veiksnių vertinimas atskiruose ekonominiuose sektoriuose. Ypač jis ryškus jūrinio sektoriaus tematikoje. Veiklos specifiskumas ir nuolatinė konkurencija sąlygoja jūrinio sektoriaus įmonių taikomas agresyvaus finansavimo strategijas. Dėl to kyla didesnių apimčių investicijų poreikis, o tai pakeičia nuosavų ir skolintų lėšų santykį kapitalo struktūroje. Jūrinio sektoriaus veiklos stabilumą ir konkurencingumą užtikrintų verslo vertę didinančios kapitalo struktūros formavimas, iš anksto įvertinant ją nulemiančius veiksnius, pakeičiančius kapitalo struktūros santykį ir darančius poveikį verslo vertei.

Atsižvelgiant į teorinėje mokslinių šaltinių analizėje išryškėjusius aspektus, **mokslinė problema** formuluojama tokiais klausimais: kokie veiksniai nulemia kapitalo struktūrą jūrinio sektoriaus įmonėse ir koks kapitalo struktūros, kintant įsiskolinimų lygiui, poveikis verslo vertei jūriniame sektoriuje?

**Disertacijos objektas:** kapitalo struktūros poveikis verslo vertei.

**Disertacijos dalykas:** kapitalo struktūros poveikis verslo vertei jūrinio sektoriaus įmonėse.

**Tyrimo tikslas** – išanalizavus kapitalo struktūros poveikio verslo vertei teoriją bei empirinius tyrimus ir sukūrus vertinimo konceptualųjį modelį, nustatyti jūrinio sektoriaus įmonių kapitalo struktūros veiksnius, lemiančius verslo vertę.

**Tyrimo uždaviniai:**

1. Konceptualizuoti jūrinio sektoriaus įmonių kapitalo struktūros formavimo principus ir susisteminti kapitalo struktūrą lemiančius veiksnius.

2. Išnagrinėjus verslo vertės turinį ir didinimo būdus, atskleisti kapitalo struktūros ir verslo vertės teorines sąsajas.
3. Sukurti jūrinio sektoriaus įmonių kapitalo struktūros poveikio verslo vertei vertinimo konceptualųjį modelį, identifikuojantį mikroaplinkos ir makroaplinkos veiksnių įtaką, atsižvelgiant į kapitalo struktūros formavimo specifiškumą jūrinio sektoriaus įmonėse.
4. Parengti kapitalo struktūros poveikio verslo vertei tyrimo metodologiją, pritaikytą jūrinio sektoriaus įmonėms.
5. Empiriškai patikrinus vertinimo konceptualųjį modelį, įvertinti jūrinio sektoriaus įmonių kapitalo struktūros, kintant įsiskolinimų lygiui, poveikį verslo vertei ir nustatyti ją lemiančius kapitalo struktūros veiksnius.

**Disertacijoje taikyti metodai.** Atskleidžiant kapitalo struktūros poveikio verslo vertei teorinį pagrindimą bei rengiant jūrinio sektoriaus įmonių kapitalo struktūros poveikio verslo vertei vertinimo metodologiją, naudota mokslinių šaltinių analizė, grupavimas, lyginimas, sintezė, apibendrinimas, indukcinis ir dedukcinis metodai. Atliekant empirinį tyrimą, remiamasi statistiniais, ekonometriniais, detalizavimo ir grupavimo metodais. Siekiant atskleisti kapitalo struktūros formavimo specifiškumą jūrinio sektoriaus įmonėse, atlikta ekspertų apklausa ir gautiems rezultatams taikytas daugiakriterio vertinimo metodas. Kapitalo struktūrą lemiantiems veiksniams nustatyti ir kapitalo struktūros poveikiui verslo vertei įvertinti taikyti aprašomosios statistikos metodai ir ekonometrinis modeliavimas – sublokuotų duomenų (angl. *panel data*) regresinė analizė. Duomenims apdoroti naudotos MSeXcel, SPSS ir GRETL kompiuterinės programos. Pasirinktas tyrimo laikotarpis apima 2010–2019 metus.

#### **Tyrimo hipotezės:**

H<sub>1</sub>: Formuojant jūrinio sektoriaus įmonių kapitalo struktūrą, skolinto kapitalo lygiui mikroaplinkos veiksniai yra reikšmingesni nei makroaplinkos veiksniai.

H<sub>2</sub>: Mažesnis pelningumas didina skolinto kapitalo lygį jūrinio sektoriaus įmonių kapitalo struktūroje.

H<sub>3</sub>: Kapitalo struktūra turi reikšmingą poveikį verslo vertei jūrinio sektoriaus įmonėse, veikiant mikroaplinkos veiksniams.

H<sub>4</sub>: Skolinto kapitalo dalies augimas kapitalo struktūroje gali turėti tiek teigiamą ribinį, tiek neigiamą ribinį poveikį verslo vertei jūrinio sektoriaus įmonėse.

H<sub>5</sub>: Skolinto kapitalo dalies augimas jūrinio sektoriaus įmonėse didina verslo vertę iki lūžio taško, nuo kurio toliau didinant skolintą kapitalą, verslo vertė pradeda mažėti, reikšmingai veikiant kapitalo struktūros veiksniams.

**Disertacijos struktūra ir apimtis.** Disertaciją sudaro įvadas, vartojamų sąvokų, trumpinių, santrumpų lietuvių ir anglų kalbomis sąrašas, trys pagrindinės dalys, išvados, literatūros šaltinių sąrašas ir priedai. Suformuluota mokslinė problema, disertacijos objektas, tikslas ir jam pasiekti iškelti uždaviniai lėmė disertacijos loginę struktūrą. Disertacijos apimtis yra 226 puslapiai be priedų. Joje pateikta 38 lentelės, 41 paveikslas, 27 priedai. Literatūros sąrašą sudaro 406 šaltiniai.

Pirmojoje dalyje, išanalizavus atliktus mokslinius tyrimus ir susiformavusią praktiką Lietuvoje bei užsienio šalyse, atskleistos jūrinio sektoriaus įmonių kapitalo struktūros poveikio verslo vertei koncepcijos. Antrojoje disertacijos dalyje, atrinkus tyrimo metodus ir atlikus kapitalo struktūros, ją lemiančių veiksnių ir verslo vertės matavimus, parengta jūrinio sektoriaus įmonių kapitalo struktūros poveikio verslo vertei vertinimo tyrimo metodologija. Trečiojoje disertacijos dalyje atliktas jūrinio sektoriaus įmonių kapitalo struktūros ir jos veiksnių poveikio verslo vertei vertinimas.

**Tyrimo apribojimai.** Disertacijoje, atliekant kapitalo struktūros poveikio verslo vertei vertinimo jūrinio sektoriaus įmonėse empirinį tyrimą, apsiribojama pagrindiniais jūrinio sektoriaus segmentais – vandens transporto pramonė (laivyba, laivų statyba ir remontas), jūrų uostai ir logistika (laivyba, uosto krova) – ir atsiribojama nuo tokių segmentų kaip jūros dugno tyrinėjimas ir eksploatacija, hidromechanika, žuvininkystė ir akvakultūra bei kt., nes šie segmentai nesiejami su pramone ir transportu. Tyrime naudojamos tų įmonių

duomenimis, kurios viešai pateikia savo duomenis, o šie pateikiami Bloombergo duomenų bazėje, todėl verslo vertės matavimai yra pritaikyti į Vertybinių popierių biržos prekybos sąrašą įtrauktoms įmonėms. Kadangi analizuojamu laikotarpiu kai kurios į duomenų masyvą įtrauktos įmonės patyrė bankrotą, kai kurios kitos turi neigiamus pinigų srautus, vertinant verslo vertę nebuvo taikytas diskontuotų pinigų srautų metodas. Vertinant mikroaplinkos veiksnių įtaką kapitalo struktūrai ir verslo vertei, naudoti įmonių finansinių ataskaitų duomenys, todėl nebuvo analizuota įmonių socialinės atsakomybės veiksnių įtaka dėl vidinių duomenų trūkumo.

### **Disertacijos mokslinį naujumą ir reikšmingumą nusakantys rezultatai:**

1. Pagrįstas poreikis ir būtinybė vertinti kapitalo struktūros poveikį verslo vertei jūrinio sektoriaus, kaip atskiro ekonominio sektoriaus, įmonėse.

2. Aprašyta ir aktualizuota, atsižvelgiant į aplinkoje vykstančius inovatyvius pokyčius, susijusius su technologijų skaitmenizacijos procesais, naujais reikalavimais aplinkosaugai, didėjančiu žaliųjų finansų vaidmeniu, įmonės kapitalo struktūros jūriniame sektoriuje samprata, tiksliau nei iki šiol vartoti apibrėžimai atspindinti jūrinio sektoriaus įmonių kapitalo struktūros formavimo aspektus. Pasiūlyta praplėsti kapitalo struktūros sampratą požiūriu, jog tai skolino ir nuosavo kapitalo derinio formavimo priemonių ir būdų, užtikrinančių, kad įmonėje priimami kapitalo struktūros sprendimai didintų verslo vertę gerinant įmonės veiklą, siekiant teigiamo poveikio įmonei, jūriniam sektoriui, visuomenei bei šaliai, sukūrimas.

3. Išryškintas jūrinio sektoriaus specifiškumas ir atskleisti veiksniai, susiję su įmonės politine ir geopolitine situacija, aplinkosaugos veiksmingumu, rizikos valdymu, turintys reikšmingą įtaką šio sektoriaus įmonių kapitalo struktūrai ir verslo vertei. Tai leidžia suformuoti naujas mokslines žinias, pagrįstas empiriniu tyrimu, ir sukurti mokslines prielaidas tolesniems aktualiems jūrinio sektoriaus tyrimams.

4. Sukurtas, įtraukiant kapitalo struktūros ir verslo vertės didinimo koncepcijas sujungiančius jūrinio sektoriaus specifinius veiksnius, ir empiriškai patikrintas jūrinio sektoriaus kapitalo struktūros poveikio verslo vertei vertinimo konceptualusis modelis. Modelio universalumas leidžia atlikti tyrimus naudojant skirtingų šalių, skirtingų jūrinio sektoriaus segmentų ir įmonių duomenis, tarpusavyje lyginant jų rezultatus.

5. Patikrinta jūrinio sektoriaus tyrimo metodologija gali būti panaudota kitų sektorių moksliniams tyrimams, įtraukiant į sukurtą kapitalo struktūros poveikio verslo vertei vertinimo konceptualųjį modelį atitinkamo sektoriaus specifinius veiksnius.

### **Praktinį reikšmingumą nusakantys rezultatai:**

1. Identifikavus pagrindinius jūrinio sektoriaus specifiką apibūdinančius veiksnius ir jų poveikį, įrodytos įmonių galimybės tikslingai ir efektyviai pasirinkti kapitalo struktūros, didinančios verslo vertę, formavimo būdus ir priemones.

2. Nustatytas verslo vertei kapitalo struktūros ribinis efektas, kuris parodo, iki kokio lygio jūrinio sektoriaus įmonės gali didinti įsiskolinimus kapitalo struktūroje, siekdamos didinti verslo vertę, veikiant modelyje nurodytiems veiksniams.

3. Aktualizuoti kapitalo struktūros veiksniai yra reikšmingi, formuojant jūrinio sektoriaus politiką valstybės lygmeniu ir vykdant šio sektoriaus įmonių finansavimo politiką finansinėse institucijose.

### **Disertacijos išvados ir tolesnės tyrimų kryptys.**

1. Konceptualizuoti jūrinio sektoriaus įmonių kapitalo struktūros formavimo principai. Jūrinio sektoriaus įmonių kapitalo struktūros formavimas – tai sukūrimas skolinto ir nuosavo kapitalo derinio nustatymo priemonių ir būdų, užtikrinančių, kad įmonėje priimami sprendimai padidins verslo vertę pagerinus įmonės veiklą, taip siekiant teigiamo poveikio įmonei, jūriniam sektoriui, visuomenei bei šaliai. Šis praplėstas kapitalo struktūros apibrėžimas labiau nei ligi šiol naudoti bendri apibrėžimai atspindi jūrinio sektoriaus įmonių kapitalo struktūros formavimo aspektus ir yra reikalingas dėl aplinkoje vykstančių pokyčių – technologijų skaitmenizavimo procesų ir naujų

reikalavimų aplinkosaugai, kuriuos sąlygoja vykstantys klimato kaitos procesai. Nauja kapitalo struktūros apibrėžtis pritaikoma ir kitiems sektoriams, kuriuose naudojamos aukštosios technologijos, vyksta aktyvūs skaitmenizavimo procesai ir aktualizuojami žalieji finansai. Pagrįsti kapitalo struktūros formavimo sprendimai užtikrina pakankamas finansines lėšas, garantuojančias minimalią kapitalo kainą ir padedančias pasiekti jūrinio sektoriaus įmonės išsikeltus tikslus. Išanalizavus mokslinius šaltinius nustatyta, kad formuojant kapitalo struktūrą jūrinio sektoriaus įmonėse susiduriama su tam tikrais išskirtinumais, nes šio sektoriaus įmonių veiklai reikalingas didelių apimčių skolintas kapitalas, susiduriama su rinkos nepastovumu, stipriu šalies ir tarptautiniu reguliavimu. Šis sektorius remiasi didelėmis investicijomis ir reikalauja didelio kapitalo aukštos vertės ilgalaikiam turtui įsigyti. Pasaulyje vykstant skaitmeninei transformacijai, stiprėja aukštųjų technologijų pritaikymo poreikis šalių uostuose, laivybos, laivų statybos ir remonto sektorių verslo įmonėse. Jūriniame sektoriuje pagal veiklos pobūdį naudojamos pažangios ir inovatyvios technologijos, didelės vertės įrenginiai, todėl tai suponuoja didesnę skolinto kapitalo dalį įmonės kapitalo struktūroje. Kadangi šis kapitalas dažnai formuojamas iš skolintų lėšų, jūrinio sektoriaus įmonių finansinio sektoriaus rodiklis yra aukštas ir jos susiduria su didele finansine rizika.

Susisteminti kapitalo struktūrą lemiantys veiksniai. Mikroaplinkos veiksniai susiję su įmonės veikla ir jos rezultatais, o makroaplinkos veiksniai susiję su šalies ekonomine, politine-teisine, geopolitine, socialine-kultūrine, gamtine ir technologine aplinka, jie yra vienodi visoms toje rinkoje veikiančioms įmonėms, tačiau jų reikšmingumas gali gerokai skirtis. Atlikus išsamią kapitalo struktūros empirinių tyrimų analizę matyti, kad į daugelį jų, sudarant kapitalo struktūrai įtakos turinčių veiksnių modelį, yra įtraukiami tokie mikroaplinkos veiksniai kaip pelningumas, įmonės dydis, materialiojo turto rodiklis, pajamų augimas, mokesčių efektas, likvidumas, rizika. Iš makroaplinkos veiksnių yra įtraukiami infliacijos dydis, BVP pokytis, palūkanų norma. Mokslininkai į modelius įtraukia skirtingus

veiksnius ir parenka skirtingus jų matavimus. Atliktų empirinių tyrimų rezultatai, atskleidžiantys mikroaplinkos ir makroaplinkos veiksnių įtaką kapitalo struktūrai, varijuoja – priklauso nuo regiono, šalies išsivystymo lygio, sektoriaus, kuriame veikia įmonė, ir pan. Taip pat akcentuojama, kad kapitalo struktūros veiksnių priklausomybė gali būti skirtinga, vertinant skirtingų kapitalo struktūros teorijų požiūriu. Kapitalo struktūros teorijų svarba ta, kad jos padeda išskirti įvairius veiksnius, kurie gali turėti įtakos pasirenkant kapitalo struktūrą.

2. Išnagrinėtas verslo vertės turinys ir jos didinimo būdai. Verslo vertė yra apibrėžiama kaip verslo naudingumo tam tikru metu matas, nustatytas pagal atitinkamą vertinimo metodiką ir atspindintis įmonės fizinio kapitalo vertę, taip pat jos nematerialųjį kapitalą, ir yra pagrįsta lūkesčiu dėl veiklos tęstinumo. Verslo vertės didinimą užtikrina geri finansiniai rezultatai, priklausantys nuo įmonės generuojamų grynujų pinigų, veiklos efektyvumo, taikomų technologijų. Siekiant didinti verslo vertę, reikia atsižvelgti į daugelį veiksnių, susijusių su įmonės veikla, jos rezultatais, sektoriaus specifiškumu ir šalies aplinka. Formuojant verslo vertę didinančią kapitalo struktūrą jūrinio sektoriaus įmonėse, būtina įvertinti daugelio suinteresuotųjų – ne tik įmonės savininkų, akcininkų, investuotojų, bet ir visuomenės – interesus, norint užtikrinti aplinkosaugos veiksmingumą. Kapitalo struktūra, didinanti verslo vertę, turėtų teikti naudą ne tik įmonės savininkams, akcininkams ir kt. investuotojams, bet ir visuomenei bei aplinkai. Galima išplėsti verslo vertę didinančios kapitalo struktūros sampratą: tai pusiausvyrą tarp rizikos ir pelningumo sukuriantis skolinto ir nuosavo kapitalo derinys, didinantis iki aukščiausio laipsnio įmonės akcijos kainą, drauge ir verslo vertę, užtikrinantis naudą įmonės suinteresuotiems asmenims, visuomenei, kuriant gerovę aplinkai tvaraus vystymosi kontekste. Tvarioje finansų sistemoje siekiama socialinės ir aplinkosauginės atsakomybės, kurią pabrėžia žalieji finansai. Nors jūrinio sektoriaus įmonės, visuomenė ir vyriausybė turi savų interesų, tačiau tarp šių interesų turi atsispindėti ir aplinkos apsaugos veiksmingumas. Kapitalo struktūros, didinančios verslo vertę, formavimas, orientuotas į socialinės ir aplinkosauginės

atsakomybės didinimą, įgalina sumažinti kapitalo kainą, o tuo yra suinteresuotos ir jūrinio sektoriaus įmonės. Analizuotoje mokslinėje literatūroje ir empiriniuose tyrimuose atskleidžiamas naujas požiūris, kad pagrindinis įmonės tikslas neapsiriboja pelno maksimizavimu, o jūrinio sektoriaus įmonių finansiniai ištekliai vertinami kaip priemonė, kuri padėtų pasiekti tvarų vystymąsi. Tai tampa būtina sąlyga kapitalo struktūros formavimo ir verslo vertės didinimo procese globalios rinkos ekonomikos sąlygomis. Įvertinus jūrinio sektoriaus specifiką ir aktualų poreikį užtikrinti aplinkosaugos veiksmingumą, kapitalo struktūros sampratos išplėtimas šio sektoriaus verslo įmonėse suponuoja poreikį atsižvelgti į visuomeninį interesą ir didesnes suinteresuotųjų grupes.

Atskleistos kapitalo struktūros ir verslo vertės teorinės sąsajos. Empiriniuose tyrimuose nustatyti prieštaringi ir nevienareikšmiški rezultatai, atspindintys kapitalo struktūros poveikį verslo vertei. Nors yra atlikta tyrimų, parodančių, kad kapitalo struktūra neturi poveikio verslo vertei, ir patvirtinančių klasikines kapitalo nereikšmingumo teorijas, daugelis empirinių tyrimų atspindi, kad kapitalo struktūra ir verslo vertė yra glaudžiai susijusios ir nustato reikšmingą teigiamą arba neigiamą ryšį tarp kapitalo struktūros ir analizuojamos vertės.

3. Sukurtas jūrinio sektoriaus kapitalo struktūros poveikio verslo vertei vertinimo konceptualusis modelis, identifikuojantis mikroaplinkos ir makroaplinkos veiksnių įtaką, atsižvelgiant į kapitalo struktūros formavimo specifiškumą jūrinio sektoriaus įmonėse. Kapitalo struktūros formavimą lemiantys mikroaplinkos veiksniai priklauso tik nuo konkrečios įmonės rodiklių, o makroaplinkos veiksniai yra vienodi visoms toje rinkoje veikiančioms įmonėms, tačiau jų reikšmingumas gali gerokai skirtis. Atsižvelgiant į sektoriaus specifiką, skirtingą įtaką formuojant kapitalo struktūrą gali turėti ekonominės, politinės, geopolitinės, socialinės, technologinės ir gamtinės aplinkos dimensijos. Kadangi jūrinis sektorius yra globalus ir funkcionuoja pasaulinėje rinkoje, mikroaplinka ir makroaplinka veikia megaaplinkoje – visos šios aplinkos sąveikauja kompleksiskai. Kapitalo struktūrai formuoti ir verslo vertei didinti įtakos turi



inovatyvūs aplinkos pokyčiai, kylantys iš megaaplinkos, kuri reikalauja iš jūrinio sektoriaus įmonių saugesnių technologijų tausojant aplinką, atspindi žaliųjų finansų poreikį, skaitmenizavimo procesų būtinumą. Jūrinio sektoriaus megaaplinka yra ypač glaudžiai susijusi su makroaplinka, todėl megaaplinką, kurioje veikia jūrinio sektoriaus įmonės, atspindi makroaplinkos rodikliai, susiję su ekonomikos augimu, politine ir geopolitine situacija, aplinkosauga. Formuojant verslo vertę didinančią kapitalo struktūrą, siekiama minimizuoti svertinius kapitalo kaštus, nes tokiu būdu minimizuojama rizika ir didinamas pelningumas. Kapitalo kainą įgalina sumažinti tokie kapitalo struktūros sprendimai, kurie yra orientuoti į socialinės ir aplinkosauginės atsakomybės didinimą, todėl reikšmingas žaliųjų finansų vaidmuo, pasireiškiantis inovatyviais aplinkos pokyčiais ir atsispindintis makroaplinkoje. Veiksniai, turintys įtakos kapitalo struktūrai, yra dinamiški. Nepasiekus kapitalo struktūros, didinančios verslo vertę, pritaikomas grįžtamasis ryšys tam, kad būtų vėl įvertinti veiksniai, turintys įtakos kapitalo struktūrai. Kapitalo struktūros poveikis verslo vertei gali būti skirtingas. Nustačius reikšmingą kapitalo struktūros poveikį verslo vertei ir pritaikius sukurtą kapitalo struktūros poveikio verslo vertei vertinimo conceptualųjį modelį, galima surasti tokią kapitalo struktūrą, kuri didintų verslo vertę jūrinio sektoriaus įmonėse.

4. Parengta kapitalo struktūros poveikio verslo vertei tyrimo metodologija, pritaikyta jūrinio sektoriaus įmonėms. Remiantis sukurtu kapitalo struktūros poveikio verslo vertei vertinimo konceptualiuoju modeliu ir siekiant kompleksiško, metodikoje suformuoti du tyrimo etapai. Pirmame tyrimo etape siekiama išanalizuoti kapitalo struktūros veiksnių poveikį jos formavimui. Atlikus kapitalo struktūros bei finansinio sverto matavimo analizę ir atsižvelgus į jūrinio sektoriaus specifiškumą, kapitalo struktūrą atspindi trys pasirinkti rodikliai: visų įsiskolinimų ir turto santykis, ilgalaikių įsiskolinimų ir turto santykis, įsiskolinimų ir nuosavybės rinkos vertės santykis. Taigi kapitalo struktūros matavimuose neapsiribojama tik įmonės balansine verte, bet įtrauktas ir rodiklis,

susijęs su rinkos verte. Naudojantis daugialypės regresinės analizės modeliu, išanalizuota mikroaplinkos ir makroaplinkos veiksnių įtaka kapitalo struktūrai jūrinio sektoriaus įmonėse. Į šį modelį kaip kintamieji įtraukti mikroaplinkos veiksniai, susiję su įmonės charakteristika ir veikla, makroaplinkos veiksniai, apimantys ir specifinius jūrinio sektoriaus veiksnius, tokius kaip politinio stabilumo indeksas, prekybos atvirumo indeksas, šalies uostų infrastruktūros kokybės indeksas ir žaliąjį augimą atspindintis rodiklis. Antrame tyrimo etape išanalizuotas kapitalo struktūros poveikis verslo vertei jūrinio sektoriaus įmonėse. Verslo vertę jūrinio sektoriaus įmonėse parodo Tobino Q ir  $EV / EBITDA$  rodikliai, nes šie rodikliai orientuoti ne tik į balansinę vertę, bet ir į rinkos vertę, atspindi investuotojų pasitikėjimą įmone ir lūkesčius, susiję su pinigų srautais ir jų didėjimu ateityje. Analizuojant kapitalo struktūros poveikį verslo vertei, į modelį įtraukiami ir kapitalo struktūros veiksniai: pelningumas, likvidumas, materialiojo turto rodiklis, rizika ir pajamų augimas, kurie yra reikšmingi jūrinio sektoriaus įmonių verslo vertei. Taikant netiesinės regresinės analizės metodą, galima nustatyti kapitalo struktūros lygį, kuris didina verslo vertę jūrinio sektoriaus įmonėse.

Atlikus jūrinio sektoriaus ekspertų apklausą ir apibendrinus rezultatus galima teigti, kad šio sektoriaus įmonėms svarbiausia yra ne ekonominė aplinka, bet ypač reikšmingą vaidmenį atlieka politinė ir geopolitinė aplinka, nes tai globalus verslas, labai reguliuojamas tiek šalies, tiek tarptautiniu lygmeniu. Todėl formuojant kapitalo struktūros poveikio verslo vertei vertinimo modelį, į jį įtraukti ekspertų kaip itin reikšmingi išskirti kriterijai, susiję su valstybės politiniu stabilumu, eksportu ir importu, atspindimais šalies prekybos atvirumo rodiklyje. Ekspertai pažymėjo ir socialinę aplinką atspindinčius rodiklius – šalies darbuotojų aktyvumo lygį ir metinį vieno darbuotojo produkcijos augimo tempą. Ekspertų apklausos metu išryškėjo, kad jūrinis sektorius imlus didelėms ilgo atsipirkimo reikalaujančioms investicijoms ir kapitalo intensyvumui. Nepastovios frachtų kainos sukuria didelį produktų netolygumą rinkoje. Dėl šių

veiksnių padidėja įmonės rizika. Aptarti aspektai leidžia teigti, kad jūrinio sektoriaus įmonių veiklos specifika nulemia kapitalo struktūros formavimo skirtumus. Jūrinio sektoriaus specifiškumas daro esminę įtaką formuojant kapitalo struktūrą įmonėse.

5. Empiriškai patikrintas sukurtas conceptualusis vertinimo modelis jūrinio sektoriaus įmonėse. Gauti rezultatai rodo, kad jūrinio sektoriaus įmonių kapitalo struktūrai neigiamą poveikį turi pelningumas. Vadinasi, pelningesnės jūrinio sektoriaus įmonės yra linkusios skolintis mažiau ir pirmiausia savo veiklą stengiasi finansuoti iš vidinių lėšų. Hipotezė, kad mažesnis pelningumas didina skolinto kapitalo lygį jūrinio sektoriaus įmonių kapitalo struktūroje, patvirtinta. Kapitalo struktūrai teigiamą poveikį turi įmonės dydis ir materialiojo turto rodiklis. Tai rodo, kad jūrinio sektoriaus įmonėse formuojant kapitalo struktūrą yra laikomasi pasirinkimo eilės teorijos požymių. Kuo didesnė ir turinti daugiau materialiojo turto yra jūrinio sektoriaus įmonė, tuo daugiau ji linkusi skolintis. Tačiau daugelis kapitalo struktūros makroaplinkos veiksnių neturi reikšmingo poveikio, todėl hipotezė, kad formuojant jūrinio sektoriaus įmonių kapitalo struktūrą skolinto kapitalo lygiui mikroaplinkos veiksniai yra reikšmingesni nei makroaplinkos veiksniai, patvirtinta.

Įvertintas jūrinio sektoriaus įmonių kapitalo struktūros, kintant įsiskolinimų lygiui, poveikis verslo vertei ir nustatyti ją lemiantys kapitalo struktūros veiksniai. Patvirtinta hipotezė, kad kapitalo struktūra turi reikšmingą poveikį verslo vertei jūrinio sektoriaus įmonėse, veikiant mikroaplinkos veiksniais. Empirinis tyrimas parodė, kad kuo įmonės įsiskolinimai yra didesni, tuo ribinis efektas, didėjant įsiskolinimams, tampa mažesnis, sumažėja ir paties efekto variacija. Gauti rezultatai rodo, kad kapitalo struktūros ribinis poveikis verslo vertei yra teigiamas, bet mažėjantis. Hipotetinė prielaida, kad skolinto kapitalo dalies didėjimas įmonės kapitalo struktūroje gali turėti tiek teigiamą ribinį, tiek neigiamą ribinį poveikį verslo vertei, patvirtinta. Tačiau jūrinio sektoriaus įmonių finansinė elgsena nėra grindžiama kompromisinių modelių teorija, todėl konkretaus kapitalo struktūros santykio nustatymas jūrinio sektoriaus įmonėse yra labai

sudėtingas dėl įmonių veiklos masto bei apyvartos apimčių skirtumų. Empirinio tyrimo metu tik nedaug sublokuotų duomenų modelių parodė, kad formuojant kapitalo struktūrą jūrinio sektoriaus įmonėse skolintas kapitalas turėtų neviršyti 62 proc. Hipotezė, kad skolinto kapitalo dalies didėjimas jūrinio sektoriaus įmonėse didina verslo vertę, tačiau yra lūžio taškas, nuo kurio toliau didinant skolintą kapitalą, verslo vertė pradeda mažėti, reikšmingai veikiant kapitalo struktūros veiksniams, patvirtinta. Didžiausią lemiamą įtaką verslo vertei turi įmonės augimo veiksnys, susijęs su pajamų didėjimu jūrinio sektoriaus įmonėse, materialiojo turto rodiklis, šalies ekonomikos augimas ir uosto infrastruktūros kokybė.

**Tolesnės tyrimo plėtojimo kryptys.** Disertacijoje sukurtas kapitalo struktūros poveikio verslo vertei vertinimo modelis, remiantis parengta vertinimo metodika, gali būti pritaikytas: a) analizuojant jūrinio sektoriaus įmonių, neįtrauktų į biržos prekybos sąrašą, kapitalo struktūros formavimą; b) tiriant jūrinio sektoriaus įmonių, neįtrauktų į biržos prekybos sąrašą, kapitalo struktūros poveikį verslo vertei, pakeitus verslo vertės matavimą; c) tiriant jūrinio sektoriaus įmonių, įtrauktų į biržos prekybos sąrašą, kapitalo struktūros poveikį rinkos vertei; d) vertinant kapitalo struktūros poveikį verslo vertei, įtraukiant naujus ar keičiant esamus mikroaplinkos ir makroaplinkos veiksnius, turinčius įtakos jūrinio sektoriaus įmonėms.

## APPROVAL AND DISSEMINATION OF RESULTS OF THE DISSERTATION / DISERTACIJOS REZULTATŲ APROBAVIMAS IR SKLAIDA

Papers in peer-reviewed scientific publications / Darbo rezultatai, pateikti recenzuojamuose moksliniuose leidiniuose:

1. Puleikienė, K., Rudytė, D. (2022). The Factors Determining the Specific Nature of Formation of the Capital Structure in the Maritime Sectors's Business Companies. *Eurasian Business and Economics Perspectives: Proceedings of the 35th Eurasia Business and Economics Society Conference* (pp. 211-229). Cham: Springer International Publishing.
2. Lileikienė, A., Puleikienė, K. (2015). Optimalios kapitalo struktūros formavimo problemos verslo įmonėse. *Socialinių-ekonominių procesų Lietuvoje raidos prieštaros (teorija ir praktika)*, 258-277.
3. Lileikienė, A., Puleikienė, K., Bujanauskienė, V. (2014). The problems of optimal capital structure formation in the companies of maritime industry sector. *Journal of Management*, 2 (25), 77-87.

Reports delivered at academic conferences / Pranešimai konferencijose:

1. *Capital Structure Formation Decisions and Their Impact on the Company's Value: Evidence in the Maritime Sector*. International Scientific-Methodical-Practical Conference *Sustainable Regional Development: Economics, Management, Law and Technological Opportunities 2021*. 2021-10-01, Lithuania.
2. *The Factors Determining the Specific Nature of Formation of the Capital Structure in the Maritime Sector's Business Companies*. 35th EBES International Conference. 2021-04-09, Italy.
3. *Capital Structure Decisions in the Business Companies of Maritime Sector*. International Scientific-Methodical-Practical Conference *Sustainable Regional Development: Economical, Management, Technological and Law Possibilities 2019*. 2019-10-24, Lithuania.

4. *The Effect of Capital Structure on the Enterprise's Performance: The Case of Eastern and Western European Companies in the Maritime sector*. The 14th International Scientific and Practical Conference *Integration of Ukraine into the European and World Financial Area*. 2019-05-24, Ukraine.

5. *The Influence of Capital Structure on the Business Companies' Performance in the Maritime Sector*. International Conference *Business and Management Sciences: New Challenges in Theory and Practice*. 25th Anniversary of the Doctoral School of Management and Business Administration. 2018-10-24, Hungary.

6. *The Impact of Capital Structure on Performance in the Business Companies*. International Conference *Emerging Trends in Economics, Culture and Humanities (etECH2018)*. 2018-04-25, Latvia.

Gautas apdovanojimas už geriausią pranešimą finansų tematikos sekcijoje / Received the award for the best presentation in the financial section.

7. *The Influence of Capital Structure on Firm Value in the Business Companies*. International Scientific-Methodical-Practical Conference *Sustainable Regional Development: Economical, Management, Technological and Law Possibilities 2017*. 2017-10-27, Lithuania.

8. *Assessment of the Financial Situation of Klaipeda Port Enterprises*. 12-oji tarptautinė prof. V. Gronsko jaunųjų tyrėjų konferencija *Development in Economics: Theory and Practice*. 2015-12-10, Lithuania.

9. *The Assessment of Financial Status in Business Companies of Lithuanian Maritime Sector*. 11-oji tarptautinė mokslinė-metodinė konferencija *Darni regiono plėtra: Ekonomikos, Vadybos ir Technologijų galimybės 2015 / Sustainable Regional development: Economical, Management and Technological possibilities 2015*. 2015-10-23, Lithuania.

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## NOTES

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