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PECULIARITIES OF MARITIME BUSINESS FINANCING

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Abstract. *The article analyzes the approaches and methods of financing in the maritime business, changes in this sphere and the prospects of using new approaches in financing in the maritime business.*

The main problems that arise when making financing decisions are identified, attention is paid to the balance of riskiness, cost and profitability of investing in general and in the maritime business in particular. Attention is paid to the impact of financial leverage and financing volumes on decision-making regarding the financing of the construction of ships and terminals.

The role of banks and the range of sources issues in financing for shipping and port infrastructure has been identified.

The study shows that loans from commercial banks are the most popular and acceptable form of financing shipping and port infrastructure, but are a rather limited form of financing that requires the development and search for new forms of financing. The study also shows the problems of willingness to provide finance to maritime business industry for different types of vessels.

The main features of the use of various sources of financing are defined, taking into account the specifics of maritime activities (shipping, port infrastructure). The difference in behavior, attitude and calculations for projects of different groups of investors is shown.

The urgent need to find the latest forms of financing, taking into account the latest changes in the financial sector and the emergence and further development of blockchain technologies, was noted.

Keywords: *financing, shipping, banking, credit evaluation, industrial shipping, port infrastructure*

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ОСОБЛИВОСТІ ФІНАНСУВАННЯ МОРСЬКОГО БІЗНЕСУ

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Анотація. У статті аналізуються особливості, підходи та методи фінансування компаній і проєктів в сфері морського бізнесу, зміни в цій сфері та перспективи використання нових підходів до фінансування морського бізнесу. Визначено основні проблеми, які виникають при прийнятті рішень щодо фінансування, обґрунтування рішень щодо джерел і методів, приділено увагу балансу ризикованості, вартості та прибутковості інвестування загалом і в морський бізнес зокрема. Приділено увагу впливу фінансового важеля та обсягів фінансування на прийняття рішень щодо фінансування будівництва суден і терміналів. Визначено роль банків та коло джерел фінансування судноплавства та портової інфраструктури. Дослідження показує, що кредити комерційних банків є найбільш популярною та прийнятною формою фінансування судноплавства та портової інфраструктури, але є достатньо обмеженою формою, що вимагає розвитку і пошуку нових шляхів отримання фінансових ресурсів, нових підходів до визначення співвідношення доходність – ризикованість. Дослідження також демонструє проблеми готовності інвесторів та інших реципієнтів надавати фінансування галузі морського бізнесу для різних типів суден або різних видів обладнання. Визначено основні особливості використання різноманітних джерел фінансування з урахуванням специфіки морської діяльності (судноплавство, портова інфраструктура). Показана різниця в поведінці, ставленні та розрахунках щодо проєктів різних груп інвесторів.

Проведено дослідження історичного розвитку форм фінансування в морській сфері, враховуючи особливості застави, вплив кредитних процесів на стан і розвиток ринку морських перевезень. Зазначено нерозривність фінансових процесів та розвитку судноплавства та портової діяльності, наголошено, що диспропорції у фінансуванні призводять до спотворення нормальної роботи галузі.

Відзначено нагальну необхідність пошуку новітніх форм фінансування з урахуванням останніх змін у фінансовому секторі та появи та подальшого розвитку технологій блокчейн.

Ключові слова: фінансування, торгівельне судноплавство, банкінг, оцінка кредиту, індустрія судноплавства, портова інфраструктура

Problem statement. Maritime business is one of the key factors in world trade. The influence is determined not only by the possibilities of global trade, but by a number of factors of technical and technological development. The global economy depends on a fleet of merchant ships and the goods they carry, and on transport hubs capable of handling these goods and services. Many goods that are in the process of consumption have been transported by sea in one way or another. Maritime business today continues to rapidly develop and evolve. This is what leads to or is caused by increased investment. But due to the peculiarities of the field in terms of capital intensity, payback periods and the cost of project implementation, there are certain restrictions on the possibilities of using different financial means, different sources of financing. Commercial ships, marine terminals, access roads, transshipment equipment are very expensive means, their purchase or construction projects require large capital investments.

As an example, you can cite the cost of a tanker (can cost up to 100 million US dollars) or a container terminal (500 million euros). These huge investments mean that the maritime business, in terms of organizing shipping or handling cargo in ports, is one of the most capital-intensive industries in the world. This means that funding is an important factor for the industry, especially in times of boom or stagnation. The financing aspect can play an important role in a company's profitability, since financing costs are one of the largest items of fixed costs. This means that if a business owner can optimize their financing decisions, it can bring substantial revenue or save thanks to the

huge sums involved. This article is devoted to the study of maritime business financing decisions using the example of a shipping company or a port operator.

Review of the last research and publications. The influence of cycles on the development of shipping and problems of risks were studied by Stopford M., Holme I., Solvang B., Kirkadly R. and others. It was noticed that it is necessary to include cycle perspective into building maritime business strategy. The problems of balancing risk and profitability have been studied by many domestic and foreign scientists: Ross S., Westerfield R., Jaffe J. and others. But the peculiarities of the influence of the industry on the level of risk and a comprehensive study of the dependence of the choice of sources and methods of financing on the stage of the cycle, income and risk in the maritime business require further study.

Tasks of research. The purpose of the article is to recognize the peculiarities of financing process in general and in maritime business, the sources and methods of investment in the field, as well as to outline the limitations of using different financing practices.

The basic material of research. Analysis of sources and the financing process must begin with the determination of the basic WACC, or weighted average cost of capital. The idea behind WACC is that a company obtains financing from two main sources: debt and equity, with debt usually being the cheaper of the two. This conclusion can be made due to the following reasons. The first reason is that the interest a company pays on its debt reduces its tax base, while dividends do not. Also, investing in the debt of a particular company is

usually less risky than investing in the equity of the same company. This relationship between risk and cost of capital is explained by the CAPM, or capital asset model.

One could then conclude that the cheapest way to finance the project is to use only loans. However, this is not the case. This can be explained by a deeper reflection of the content of the CAPM, which allows us to say that the higher the risk, the higher the expected return of this asset should be. A case where a company or project is financed with a high degree of credit leverage gives a low WACC, but it also leads to an increase in risk. This is because the higher the leverage, the higher the fixed negative cash flow in the form of interest payments each month. This leads to an increase in the company's sensitivity to positive cash flow. In other words, high leverage increases the probability that the company will default on the loan. The relationship between risk and leverage, combined with the logic of WACC, means that a company or project should have an optimal capital ratio. At the moment, these two factors interfere with each other, and therefore finding a balance should be the first step in

the process of finding the optimal financial solution for a company or project. However, this point must be accurately calculated. However, the starting point is to see how high a level of equity capital a firm can get, all other factors being fixed. Therefore, the highest amount of debt with the same debt interest may be a good enough approximation to determine the point of the final level of leverage.

As an example of the ratio of own and borrowed capital (mainly investments and bank loans), we can cite the capital structure of Maersk Ukraine LLC. The value of the company's assets in 2020 amounted to UAH 784 million, of which UAH 414.5 million, i.e. 53 %, was equity capital [1]. The dynamics of indicators by company is shown in Table 1.

It is also very important to take into account the specifics and peculiarities of maritime business to assess the possibilities and prospects of financing. Thus, transportation is a business that significantly depends on commercial and business cycles. The reason for this situation is, first of all, the derivative nature of the work of transport.

Table 1

Technical and economic indicators of Maersk Ukraine LLC for 2018-2020 (million. \$)

Indicators	2018	2019	2020	Absolute deviation		Growth rate	
				2019-2020	2019-2020	2019-2020	2019-2020
Average annual value of assets	12,8	17,3	21,8	4,5	9	26,2	70,5
Average annual cost of equity	3,5	6,9	11,5	4,6	8	66,3	234,4
Average annual cost of equity (%)	27	40	53	13	26	133	196

Source: Own elaboration on 1

It is also very important to take into account the specifics and peculiarities of maritime business to assess the possibilities and prospects of financing. Thus, transportation is a business that significantly depends on commercial and business cycles. The reason for this situation is, first of all, the derivative nature of the work of transport. Given the significant amounts of funds that circulate in the cycle, the cycle is at the center of attention of business participants. Martin Stopford observes: «Just as the weather dominates the lives of sailors, the waves of the shipping cycle ripple through the financial lives of ship-owners» [2]. Examples of such changes can be traced through the analysis of transportation statistics of various types of cargo: grain from the US Persian Gulf to Rotterdam – Panamax bulker (spot market) – \$1 million (1986), \$3.5 million (1989), 1, \$5 million (1992), \$2.5 million (1995). Fluctuations in the cost of the vessel itself also have a significant impact: Panamax, (1981) – 6 million dollars in 1986, – 22 million dollars in 1989 and 1994, – 22 million dollars (2017). This demonstrates that timing and cycles are important in the shipping industry and influence sales, purchase and chartering decisions.

However, it is not only shipowners who face this risk, shippers are also exposed to fluctuations in the delivery cycle. The cost of transporting half a ton of grain from the US Persian Gulf to Japan increased from US\$ 5,2 million to US\$ 12,7 million between 1986 and 1989. This is an increase in the cost of transportation that cannot be neglected [3].

Cycles play a central role in the economics of maritime business. One of the biggest challenges is managing the

risk of investing in a business where there is great uncertainty about the future. The first step to understanding the function of delivery cycles is to understand risk allocation. As volume is volatile, the demand for merchant vessels also changes. This affects decision-making regarding ordering new ships, sending old ones to scrap metal, the need to design new terminals, modernize old ones, etc. A situation where trade is growing, but new ships are not being built, will lead to a halt in business. And not only in the industry itself. This will affect the metalworking industry, oil companies, ports and cargo owners. Only the owners of existing tonnage will benefit from such a situation. If there is an excess of tonnage, without cargo to load, ships are idle, no cash flow is generated, and investments are wasted [2]. The cycles are mainly the result of changes in the supply and demand for shipping services. The shipper, shipowner or cargo owner assumes the risk or a part of it, which forms industrial shipping. When shipowners take on risk, the business becomes highly speculative. The main elements influencing decision-making are: probability, strategy, psychology and luck. If shippers take on the shipping risk, they are assured of their future transportation needs. It is possible to implement the strategy in this case either with the help of a fleet of own ships to meet your transportation needs, or with the help of time charters before construction with independent ship owners. With a cargo guarantee, owners can buy ships and make a profit while keeping their costs below the contract margin.

However, it is important to note that industrial shipping is a policy, not a requirement. This means that things can

change over time, and a trade that used to be organized in an industrial way can turn into a freight market trade. Commercial shipping makes the shipowner a subcontractor, not a speculator, in the risks of shipping.

In addition to the above, there is also the risk of inflation for shipowners, currency fluctuations, ship breakdowns, as well as the shipper's ability to fulfill its obligations to the shipowner.

Shipowners, adopting one strategy or another, choose to trade their vessels in the open spot market or more defined modes of operation, essentially making money by speculating on the risks of shipping. For investors with access to capital and an aggressive attitude to shipping risk, only an office, a telex and a small number of buy/sell and charter solutions are required. Since the sums involved in this game are significant, it is natural that the transportation cycle is at the center of attention of the players active in the freight transportation markets [3].

There are four characteristic phases in the cycles:

- the through phase. The phase has three characteristics: excess capacity, freight rates fall to the point where freight barely covers or does not cover the operating costs of the least efficient vessels in the fleet, negative cash flow is created for shipowners due to persistently low freight rates and limited credit. Negative cash flow causes some shipowners to run out of cash, forcing them to sell their vessels at bargain prices because there are few buyers in the market. At this point, the price of old vessels that were in use falls to the level of the scrap price, which creates a high activity in the scrapping market.

- the recovery phase. An increase in freight rates to a level that exceeds operating costs, followed by a reduction in spare tonnage. The market remains uncertain and unpredictable.

- the peak/plateau phase. Balance of supply and demand. Freight rates are usually at a high level (significantly exceeding operating costs), the peak can last from several weeks to several years. Peak duration depends on supply and demand pressure. Ships are operating at full speed, banks are eager to lend to shipowners. Operational state-of-the-art ships are selling at prices higher than newbuild prices, used prices are higher than book value, and shipyard order books are filling and expanding at an increasing rate.

- the collapse phase. Excess supply over demand. A downturn is usually caused by fundamental factors such as the business cycle, but there are factors that can accelerate a crash. The delivery of vessels ordered at the top of the market and the clearing of time-consuming port congestion can accelerate the transition to this stage. Freight rates are falling, vessels are slowing their operating speed, and spot vessels are building up in key ports. However, liquidity is still high and the mood in the market is confused and changes with every increase in freight rates.

Historically, the following sources of financing and development of maritime business can be traced (figure):

Conservative approach. Financing at the expense of owner's capital – retained earnings and small amounts of debt.

Financing of vessels with highly leveraged loans Long-term contracts, time charters as an incentive to order large vessels specialized in their specific service. The cash flows from the con-

tracts are used as collateral to finance the purchase of the vessel. The development of new administrative structures as the single purpose company, a company

that only owns a ship, and the registration of ships in jurisdictions with flag of convenience with low tax.

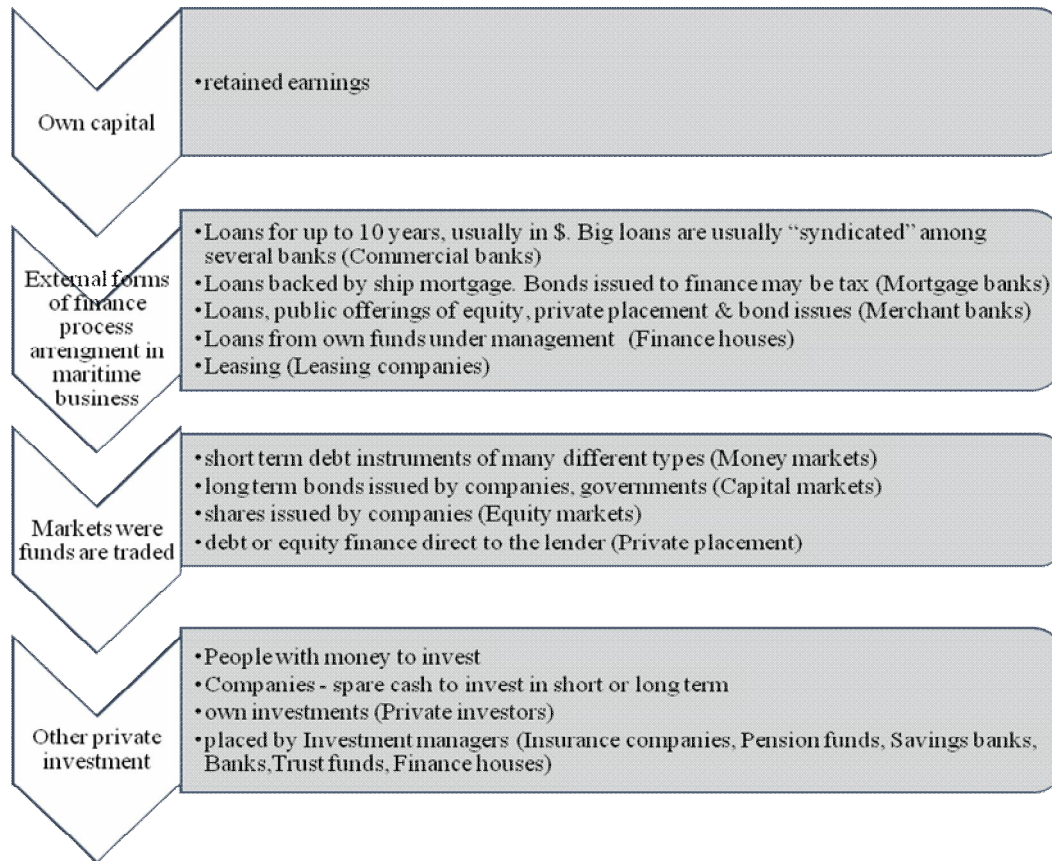


Figure 1. Sources of financing in maritime business

Source: Own elaboration

Financing a vessel with a first mortgage on the hull as the main and with a small additional security. The ship is considered as floating immovable property. Cash flow from time charters is not sufficient security as inflation and accidents can make the time charter less attractive. Vessels operating on the tramp market are usually more profitable than those on time charter. The cost of

loans is considered stable or steadily growing. The lack of a direct connection between supply and demand for ships and handling equipment is characteristic, which can create a market collapse (example 1973). Reinforcement of charter financing has its drawback – new shipbuilding was limited by the availability of charters. A small amount of equity.

Creation of self-liquidating shipping funds.

Attracting temporarily free capital of the population, which is usually not related to the shipping business. A very famous form is the Norwegian company K/S, where many small investors invested their money in the ship. Advantages: The investment was tax-free, given that the money was reinvested over a period of time, and this at a time when taxes in Norway were very high. This made K/S companies very attractive to private investors, and the concept became successful despite the unconventional structure.

Thus, the source of financing of shipping companies or port infrastructure, or investment funds, can be savings of various origins. These can be both private and corporate savings, some of which are owned by individuals or companies. However, the bulk of these savings (about 80%) are managed by professional investment managers such as insurance companies, pension funds, savings banks, financial institutions, trust funds, mutual funds and commercial banks. All these institutions take care of the money on deposit and can be labeled under the name of institutional investor group. In a very broad sense, the professional managers of these institutions have a choice between two options: to invest or borrow the money they are assigned to manage. An investor invests in a business venture in exchange for a share of potential profits. The most common way for an investor to get their money back is to resell their equity stake. On the other hand, the lender advances money over a predetermined period in exchange for regular interest payments. At the end of the period, the loan is fully returned to the lender. This dis-

inction has important implications because the investor and the lender have very different perspectives on the business. Investors are interested in the potential benefits of a business because they take risks for profit. Investors are not certain that they will get a return on their investment, although they expect it to some extent. They are also not sure about the size of the profit, but theoretically there is no upper limit. Investors focus on potential profits from the business. Creditors receive their return in the form of interest payments. The main interest is the potential disadvantages of the business. These different points of view determine the difference in attitude and calculations on a potential business project.

Getting access to financial markets usually requires maritime businesses to turn to intermediaries. Commercial and mortgage banks borrow their funds in the financial markets and then lend to ship owners or port operators. Banks make a profit by adding a margin, a spread, to the interest rate offered to the company. Banks use their special knowledge to determine investment opportunities in the project of buying a ship or building a terminal with acceptable risk. Investment banks help companies with sufficient credit ratings to issue bonds, stocks and private placements [4]. There are at least 200 institutions worldwide that have some form of specialized expertise in some aspect of maritime finance, often through dedicated departments.

An important factor for determining the forms and methods of financing in the maritime business, as mentioned above, is the calculation of the relationship between risk and expected profitability. One way to formalize such a re-

relationship can be described by the capital asset valuation model, or CAPM. The underlying logic is that the higher the risk of an asset, the higher the expected return that particular asset should have. A standard way to measure risk is to measure the historical variance of an asset's return [5].

$$\beta_i = \frac{f(R_i, R_m)}{\sigma^2(R_m)}. \quad (1)$$

When valuating price a common technique is to discount the expected future free cash flows with an adequate interest rate, and thereby get a fair price/value of the share. The adequate interest rate referred to is usually the Weighted Average Cost of Capital or rWACC.

The rate shows that debt usually is cheaper than equity. One reason behind this is that interest payments for loans usually are deductible from the corporate tax, and that dividends are not.

Conclusions. The bottom line is that in a shipping or port business, equity investment is riskier than debt investment. Given the logic in models like the CAPM, the expected return on equity, r_E , should be higher than the expected return on debt, r_D , even in a world without corporate taxes. Understanding the logic of rWACC and knowing the dependence, the investor should come to the idea of fully financing the company. This is logical, since debt is cheaper than equity and is not subject to taxation. But this approach is significantly limited in terms of implementation. The answer is that, first of all, it is legally impossible to finance a company without equity. Then the logical extension is «finance with as much debt as is legally possible to get the

To measure the risk and return of the asset in relation to the markets risk and return we can use Formula 1. This relationship is described by the β variable given in Formula 1 and depends on the profit or return on capital function and the root mean square deviation from the market average return.

cheapest financing». However, this is not the way to get the cheapest financing. The explanation lies in the basic difference between debt and equity. The payment of interest on borrowed capital is a separate obligation from the payment of dividends. This means that a high level of company leverage ensures a high level of debt service. This is good during the peak phase of the cycle. But it won't work at other stages. Therefore, the significant impact of maritime business cycles is felt, and the amount of investment is a significant barrier. High leverage can be destructive if the company's cash flow is insufficient to pay for debt service. A high level of leverage can cause a company to default on its debt service and, in the long run, lead to the company's bankruptcy. One conclusion is that a company wants to be highly leveraged in good times and low in bad times. This is not news to investors and lenders, and they take this into account when investing in or lending to a firm. This means that higher leverage increases the risk of an investment due to a higher level of debt service and an increased probability of default, and the risk of not receiving the expected return on investment.

The conclusion is that there is a leverage point where both require each

other, hence the optimal debt ratio. However, it is difficult to accurately calculate this particular point because it is unique to each case.

It should also be concluded that the limitations of modern forms of

investment come down to the limitations of institutional financing in the maritime sphere. The solution may be to use the positive experience of collective financing (mutual funds, k-funds), but based on the blockchain system.

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