“Capital Structure in Shipping with a Focus on Bonds”

Master Thesis of the Postgraduate Program
Shipping in Transport and International Trade – NA.M.E.

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Supervisor: Theodore Syriopoulos

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Abstract

The purpose of this thesis is to analyze the methods by which shipping companies are financed and how their capital structures were formed in the pre and post global economic crisis of 2008. Major emphasis is placed on financing shipping companies buying bonds in order to establish whether this method of financing is prosperous for shipping companies as well being profitable for investors. Furthermore, this paper investigates the different factors have affected the default of rating bonds.

The shipping industry, in the wake of the global economic crisis, has accepted many alterations to the ways of financing. Additionally, it can be mentioned that the proportion of financing by bonds has risen throughout the last decade making it a really significant fact for appraisal.

Annual reports from the period of 2009 to 2016 have been used to establish the profitability and sustainability reported from the sample of shipping companies evaluated, in conjunction with data from stock markets for the regression analysis in order to obtain results for the default of rating bonds.

The findings of this thesis present the viewpoint that companies are constantly turning to new funding methods and as a result of the economic upheaval, their preference is equity rather than debt financing. The issuance of bonds is a method of financing that has been on the rise throughout the eight years of analysis. The determinants that affect the spread price of new high yield bonds are the age of the firm, the gearing, the credit rating, the Baltic Dry Index and the float.

Keywords: Capital structure in shipping; Financial crisis in shipping; Shipping types of finance; High yield bonds; Determinants of spreads
1 Introduction

Despite all the adverse conditions and economic crises that have occurred successively worldwide, from the past until today, shipping has been an industry that will exist as long as there is a need to transport goods across the globe. Changes in the shipping industry have arisen and will continue to arise as the global economy changes and, in particular, as the variables change that define the economic cycle of the shipping industry. What is it, however, that contributes to the economic wellbeing of a shipping company?

It is clearly nothing more than the proper management of their capital structure. In order for a shipping company to be viable and even more profitable, it must find its optimal capital structure based on its own needs and conditions that prevail not only in its own country but also globally, as one of the attributes of the shipping industry is its international character.

In this master thesis, apart from the historical review of the theories that have arisen to date, methods of financing the capital structure that existed before are presented as well as their changes in the present day, with particular importance for the financing of the capital structure with bonds. The financing of shipping companies with bonds is increasing and that curious fact is the motivating reason to conduct this study.

This paper presents the model created to examine the question of what factors affect the price spreads of high new yield bonds as well as the financial analysis of the sample of companies used to determine whether the issue of the bonds played a significant role and with which method they prefer to be funded.
2 Literature Overview

The purpose of this chapter is to present and describe the main categories of shipping finance as well as to make a historical reference to the definitions of capital structure and finally, to state the most significant theories that have been developed till today for the capital structure.

2.1 Capital Structure

Every shipping firm has its own financing needs and follows the strategy that suits it the most. The unanswered question of what the optimal capital structure for shipping companies is remains, as there is not a magic formula for it. There are various written sources referring to the capital structure definition, stated below, but first, the main categories of capital sources in shipping finance will be clarified.

There is a debate between economists that in shipping finance there are only two main categories; equity and debt finance. However, I support the opinion of Costas Th. Grammenos and Nikos P. Papapostolou (2012)\(^1\) who maintain that the main categories of capital sources in shipping finance are three; equity finance, debt finance and the combination of the two which translates into mezzanine finance. Equity financing means the company raises money by selling its ownership rights either to the owner’s equity, the company’s retained earnings or to equity offerings, either public or private. On the other hand, debt financing occurs when a company gets a bank loan or export finance or bond issues, whether public or private placements, or leasing and promises to repay the amount lent over time with interest. Mezzanine financing allows a business to obtain capital through preference shares, warrants, or convertibles without offering any collateral and if the business defaults on the lending. The lender can then convert his loan into an ownership.

Depending on which decade we are focused on, the shipping companies are led towards another capital structure by the market. So, it is of paramount importance to have an overview of the literature of theories that have been created as a useful tool for choosing a financing capital source and then to arrive at a conclusion which relates to the optimal capital structure that shipping firms apply to our decade analysis.

Durand D. (1959)\(^2\) was the first in 1952 to provide capital structure theories by presenting two Approaches:

1. The Net Income Approach (NI) which suggests that the firm’s value increases by decreasing the overall cost of the capital, which is measured in terms of Weighted Average Cost of Capital (WACC).

Net income approach can be represented by the following formula:

\[
WACC = \frac{EBIT}{\text{Value of firm}}
\]

\(^1\) Talley W. K. (2012)
\(^2\) Durand D. (1959)
where Earnings Before Interest & Taxes (EBIT) is an indicator of a company's profitability, calculated as revenue minus expenses, excluding tax and interest.

And as Value of firm = Value of equity + Value of debt with a judicious mixture of debt and equity, a firm can arrive at an optimum capital structure at which the value of the firm is the highest and the overall cost of capital is the lowest.

As Durand confirms, the only way, for a company to succeed in this, is to erase the proportion of debt as equity which is a more expensive financing source.

2. The Net Operating Income Approach or NOI, states the irrelevance of capital structure in calculating the value of the firm. The cost of capital for the firm does not change. No matter what the degree of leverage is, the total value of the firm will remain constant.

Net operating income approach can be represented by the following formula:

\[
WACC = \frac{EBIT}{\text{Value of firm}}
\]

The value of Equity (Residual) = Value of firm – Value of debt,

where the value of Equity (Residual) = Value of firm – Value of debt.

In addition to Durand’s perspective, in 1954 Harris (1988)\(^3\) presented another dimension in decision making of capital structure by his definition of capital structure with asset values, bank solvency and the availability of credit to the business community.

Many researchers followed with other important studies like Dobrovolsky in 1955 who tried to ascertain which financial choices are the best and what their advantages are. Dobrovolsky (1955)\(^4\) began to consider that debt financing has enough prospects of success in a firm if it takes into account interest rates, deducts tax income on interest fluctuations and retains her profits.

However, Modigliani and Miller (1958)\(^5\) came in contrast with the Net Operating Income Approach supporting that the firm’s value is independent of its debt to equity ratio. Their theory claims that a perfect capital market remains constant to the changes in the capital structure that has no taxes, no bankruptcy costs, no asymmetric information.

Schwartz (1959)\(^6\) confirmed that every firm has a single optimal capital structure, depending on her own internal and external risk.

Donaldson (1961)\(^7\) attempted to prove that firms develop their capital structures based on their preference for funds against the cost of funds, and this preference was based on availability and access to funds over other factors.

Modigliani and Miller (1963)\(^8\) started rethinking the role of taxes and found that levered firms valued higher than unlevered firms.

Thus, the idea of an optimal capital structure was conceived; that a mix of debt and equity would maximize the value of a firm as the cost of capital (WACC) decreases. That was

---

\(^3\) Harris M. & Raviv A. (1988)
\(^4\) Dobrovolsky S. (1955)
\(^5\) Modigliani F. & Miller M. H. (1958)
\(^6\) Schwartz Eli (1959)
\(^7\) Donaldson G. (1961)
\(^8\) Modigliani F. & Miller M. H. (1963)
the beginning of the static trade-off framework approach to capital structures deriving first from Kraus and Litzenberger (1973)\(^9\).

Myers (1984)\(^{10}\) was the person who succeeded in summoning up two frameworks that define movement in the capital structure as follows:

1. In 1977, he developed the static trade-off framework, in which the firm is viewed as setting a target debt-to-value ratio and then gradually moving towards it. Furthermore, this framework values the company as the value of the firm is unlevered with the present value of the tax advantages minus the present value of bankruptcy and agency costs.

2. In 1984, Myers in cooperation with Majluf (1984)\(^{11}\) developed the pecking order framework, in which the firm prefers internal to external financing and debt to equity, if securities are issued. In the pure pecking order theory, the firm has no well-defined target debt-to-value ratio. It is so because of the existence of the asymmetric information problem between the firm and likely finance providers.

Haugen and Senbert (1988)\(^{12}\) developed a theory of bankruptcy and agency costs and the significance of optimal capital structure in reference to internal and external financial instruments.

At the same time, Titman and Wessels (1988)\(^{13}\) related six measures of financial leverage to define the determinants of capital structure choice, which were long-term, short-term and convertible debt.

Schlosser (1989)\(^{14}\) made a model building approach attempting to define the capital structure as the ratio debt to total capital of the firms.

In 1991, Brealey and Myers (2000)\(^{15}\) supported that the combination of equity, debt and a mix of securities of a corporate nature gives the definition of capital structure.

Bos and Fetherston (1993)\(^{16}\) defined the capital structure as the ratio of total debt to total assets at book value.

Rajan and Zingales (1995)\(^{17}\) used the ratios of total liabilities to total assets, total debt to total assets, total debt to net assets and total debt to capital to measure capital structure.

Damodaran (2001)\(^{18}\) supported that everything depends on the maximization of the firm’s value consequently, the combination of debt or equity which maximizes the value of a firm is the optimal capital structure.

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\(^9\) Kraus A. & Litzenberger R.H. (1973)
\(^{10}\) Myers Steward C. (1984)
\(^{11}\) Myers Steward C. & Majluf N. S. (1984)
\(^{12}\) Haugen Rand & Senbert L. W. (1988)
\(^{13}\) Titman S. & Wessels R. (1988)
\(^{14}\) Schlosser M. (1989)
\(^{15}\) Brealey R. S., Myers St. C., Partington G. & Robinson D., (2000)
\(^{18}\) Damodaran A. (2001)
Bevan and Danbolt (2002)\textsuperscript{19} supported that the possible determinants of the capital structure choice are company size, profitability, tangibility, growth opportunities, non-debt tax shields and dividend.

Meanwhile, Bhaduri (2002)\textsuperscript{20} defined capital structure as the firm’s way of financing her assets.

Brigham and Daves (2004)\textsuperscript{21} studied how the combination of debt and equity to raise the capital structure of a company can be chosen and that was the explanation of what the capital structure is.

Vasiliou, Eriotis and Daskalakis (2007)\textsuperscript{22} supported that a contributing factor of capital structure is the types of assets owned by a firm explaining that the asset structure of a firm consists of tangible and intangible assets.

Karadeniz, Kandir, Balcilar, and Oner (2009)\textsuperscript{23} considered that the first step before choosing the capital structure of a firm is to evaluate the various costs and benefits associated with the use of both debt and equity.

Fourati and Affes (2013)\textsuperscript{24} drew the conclusion that new entrepreneurial activities are more likely to have some external debt in their capital structure if they have more tangible assets that serve as collateral and if they have a legal form in incorporation.

Hsieh and Szarvas (2016)\textsuperscript{25} supported that in an imperfect market, the optimal capital structure can be anywhere from zero to 100% debt, depending on the expected cash flows and the weighted average cost of capital at each debt ratio.

At this point, it is also important to mention the studies for capital structure that have been published since 2006 and concerning the shipping industry and on which this master’s thesis is focused.

Arvanitis et al. (2011)\textsuperscript{26} led them to conclude that European shipping companies are in favor of the pecking order theory as their study ended up with a negative relationship between size and profitability against lending and a positive relationship between tangible assets and the leverage ratio.

Wolfgang et al. (2013)\textsuperscript{27} noted that the traditional capital structure variables exert a significant impact on the cross-sectional variation of leverage ratios, but the magnitude of their impact is different in other industries and is related to the peculiar characteristics of the shipping industry.

Paun and Topan (2016)\textsuperscript{28} supported the idea in their empirical study that the pecking-order theory was rejected as there were no determinants for the optimal capital structure

\textsuperscript{19} Bevan A. A. & Danbolt J. (2002)
\textsuperscript{20} Bhaduri S. N. (2002)
\textsuperscript{22} Eriotis N., Vasiliou D. & Ventoura-Neokosmid Z. (2007)
\textsuperscript{23} Karadeniz T., Kandir J., Balcilar R. & Oner N. (2009)
\textsuperscript{24} Fourati H. & Affes H. (2013)
\textsuperscript{25} Hsieh C. & Szarvas T. (2016)
\textsuperscript{26} Arvanitis H. St., Tzigkounaki S. Irakleia, Stamatopoulos V. Th. & Thalassinos I. El. (2011)
\textsuperscript{27} Wolfgang Dr., Gounopoulos D., Merikas A., Schröder H. (2013)
\textsuperscript{28} Paun Cr. & Topan M. V. (2016)
and confirmed the validity of the trade-off theory and that there are various relevant factors for the optimal capital structure related to the company size, profitability, taxation, etc. for the international shipping industry.

In total, there are not many published studies to assess the impact of the financial crisis on capital structures and specifically in the shipping industry; and therefore, this lack of research is one of the main reasons for focusing this master’s thesis on that topic.

2.2 Trade-Off Theory

As it has already been mentioned, in 1963 Modigliani and Miller developed an irrelevance theory and 14 years later Myers surfaced with another theory of capital structure, which is called Trade-off theory, which serves to cover the gaps. Undoubtedly, the need for the Trade-off theory arose because Modigliani and Miller’s theorem does not exist in the real world of finance as there are no perfect and efficient markets. This utopia of perfect and efficient markets was rejected with various imperfections including taxes, financial distress cost and agency costs by the Trade-off theory.

The trade-off theory states that the optimal capital structure is a trade-off between interest tax shields and cost of financial distress:

\[
\text{Value of firm} = \text{Value if all-equity financed} + \text{PV (tax shield)} - \text{PV (cost of financial distress)}
\]

Where PV is the Present Value.

The Figure 1 below shows the graph of the Trade-off theory. The market value of a firm is illustrated on the vertical (y) axis and the debt level on the horizontal (x) axis. The horizontal fixed line on the graph shows the value of an unlevered firm that is the value of the all-equity financed firm. The red curve shows the present value of tax shields and the blue curve shows the firm value as a function of debt level. The difference between the red and the blue curve shows the costs of financial distress. As can be inferred, the present value of the interest tax shields initially increases as the debt level of the firm increases, until the point where there is the prospect of financial distress due to the soaring additional borrowing. In addition, as the amount of borrowing increases there are many possibilities that the full tax shield is not able to protect the firm as it takes positive earnings to save corporate taxes. The more that firm’s debt level rises, the more the cost of financial distress rises, too. The desired optimal capital structure of the Trade-off theory occurs when the firm maximizes its value and that eventuates when an optimal debt policy exists.

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29 [https://www.ebrary.net/](https://www.ebrary.net/) (n.d.)
In other words, capital structure, according to the Trade-off Theory, is based on a trade-off between tax savings and distress costs of debt, meaning that if companies have tangible assets and an abundance of taxable income, they should also have high target debt ratios. This is the way to show why there is a difference between capital structures within various industries, while lower debt ratios of profitable companies within the industry cannot be explained. Surprisingly, the trade-off theory predicts the opposite, as lucrative companies have a higher scope for tax shields, meaning that they should have higher debt levels.

2.3 Pecking Order Theory

Apart from the Trade-off theory, another “rival” theory was created, namely the Pecking order theory. The term of Pecking order was given by Myers and Majluf (1984) but effectively Donaldson (1961) first made this hypothesis, which can be found in his study. Donaldson argues that “Management strongly favored internal generation as a source of new funds even to the exclusion of external funds except for occasional unavoidable ‘bulges’ in the need for funds”. This hypothesis explains why there is a hierarchy of financing sources. The additional evidence added with the pecking order theory is the asymmetric information that arises between insiders and outsiders of the firm and that is the reason why the management of the firm prefers internal over external financing. This theory supports internal finance until the limits of covering all the costs.

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30 Myers St. C. (1984)
31 Donaldson G. (1961)
are exceeded, so then the firm needs to seek sources of external finance. However, the safest security that a firm can be issued is debt and then equity according to Myers in 1984. Notably, the Pecking order theory does not lead towards an optimal leverage ratio because of the presence of internal and external equity. According to research done by Shyam-Sunder and Myers (1999)\textsuperscript{32} it was agreed that the Pecking order theory has much more time-series explanatory power than the Trade-off theory. Nevertheless, this theory has its critics, too, from Frank and Goyal (2002)\textsuperscript{33} who maintain that it is only suitable for larger firms because the smaller ones usually do not opt for internal, but rather favor external financing to the research carried out by Chen (2004)\textsuperscript{34} suggesting that the Pecking order theory differs throughout the globe, giving the example of Chinese firms which favor equity financing over debt financing.

### 2.4 Market-Timing Theory

The Market-timing theory of capital structure, namely the “Window of opportunity” hypothesis, was first developed and tested by Rajan and Servaes (1995)\textsuperscript{35} on an original idea by Myers (1984). This theory, proposed by Baker and Wurgler (2002)\textsuperscript{36} suggests issuing shares at high prices, then repurchasing outstanding shares when prices decrease. Managers aiming to time the market would subsequently take advantage of temporary fluctuations in the cost of equity capital relative to other forms of capital available. It must be noted though that Baker and Wurgler (2002) believe the market-timing theory to be ineffective and difficult to be applied to markets due to their inefficiency. Modigliani and Miller (1958) oppose this argument with their irrelevance theory which suggests that capital markets are efficient and integrated. According to Huang and Ritter (2005)\textsuperscript{37}, the Pecking order theory is limited to the assumption of a semi-strong form of market efficiency. Taggart (1997)\textsuperscript{38} refers to several firms that favor market-timing as they tend to issue seasoned equity offerings instead of debt when their market values are high. Furthermore, Loughran et al. (1994)\textsuperscript{39} and Pagano et al. (1998)\textsuperscript{40} through their surveys conclude that market-timing can be found in cases of initial public offerings (IPOs). A survey conducted by Graham and Harvey (2001)\textsuperscript{41}, shows evidence in which two-thirds of interviewed Chief Financial Officers (CFO) admit to timing the equity market.

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\textsuperscript{32} Shyam-Sunder L. & Myers S. C. (1999)
\textsuperscript{33} Frank M. Z. & Goyal V. K. (2002)
\textsuperscript{34} Chen J. J. (2004)
\textsuperscript{35} Rajan R. & Servaes H. (1995)
\textsuperscript{36} Baker M. & Wurgler J. (2002)
\textsuperscript{37} Huang R. & Ritter J. R. (2005)
\textsuperscript{38} Taggart R. A. (1977)
\textsuperscript{39} Loughran T., Ritter J. R. & Rydqvist K. (1994)
\textsuperscript{40} Pagano M., Panetta F. & Zingales L. (1998)
\textsuperscript{41} Graham J. R. & Harvey C. R. (2001)
3 Shipping Finance

This chapter aims to clarify the importance of knowing the demand and supply in the Shipping Industry, analyzing the periods of the maritime world that we are interested in. Subsequently, we will be able to comprehend how the variables of shipping demand and supply affect the Capital Structure of shipping companies. It presents how a shipping firm can be financed, how the financial crisis has influenced the capital structure of the shipping industry and finally how the major sources of shipping industry are formed pre and post crisis.

3.1 The Reasons Causing Uncertainty to Investors in Shipping Finance

The Shipping Industry is distinguished by its enormous size and its complexity. These two features of the shipping industry relate to the variables that affect both demand and supply. These variables also comprise the model that is used by economists as key-technique in analyzing markets. The distinctive characteristics of the shipping industry make investors cautious and hesitant to finance because they look for lower-risk, asset-based industries which have consistent growth and high yields.

Another considerable feature for investors of the shipping industry is the high volatility of the revenue flows, which are asset values. The shipping industry has its own shipping cycle which is defined as a “mechanism devoted to removing imbalances in the supply and demand for ships. If there is too little supply, the market rewards investors with high freight rates until more ships are ordered. When there are too many ships it squeezes the cashflow until the owners of the oldest ships give up the struggle and ships are scrapped. Looking at it from this perspective, the cycles last as long as it is necessary to do the job. It is possible to classify this cycle by length, but this is not very helpful as a forecasting aid. If investors decide that an upturn is due and decide not to scrap their ships, the cycle lasts longer”42.

The world economy is the main, important, unpredictable factor that leads the shipping cycle. As it is inferred from the Line Graph 1 below, the indicator of the average Gross Domestic Product of all, in total 264, countries in the world from 2003 to 2008 had the biggest prices reaching the average annual 6.18% in 2004 and 6.03% in 2007. Right after 2008 when the global financial crisis began, and in 2009 it reached zero levels of 0.18% and tried to recover, having a sudden increase in 2010 to 4.54%, which couldn’t stabilize, but decreased gradually year after year until 2016, to 3%. This historical fact made banks and other organizations acquire stack to continue financing the shipping firms with the same convenience, raising the criteria of terms and conditions for borrowing them.

42 Stopford (2009)
In addition, another variable that affects the demand for sea transport is the seaborne commodity trades. The seaborne trade refers to the relationship between maritime trade and industrial economy and it is separated into two categories of changes; short-term and long-term changes. The Line Graph 2 shows a steady growth of the world seaborne trade in total. From 2003 until 2008 the world seaborne trade increased, whereupon it reached the peak of the biggest amount of 8.286 million metric tons. In 2009, after the global financial crisis a decrease can be observed, but then the line continues to have an upward trend as it reaches the maximum amount of 10.282 million metric tons in 2016.
Shipping demand is also defined by the distance of a transport as well as the distance which is determined by the time needed for a transport to be completed; the bigger the distance, the more time it takes. Distances in maritime transportation change constantly so the shipping demand also changes. As the demand for imports increases, more distance suppliers become available, the cost being offset to a large extent by the economies of scale obtainable from the use of large ships.

There are factors such as political events, climate change, wars, new resources and price changes in trade that differ from cycle to cycle as they are unique and often accelerated by an unpredictable event, so their impact on the shipping market is extremely intense. Lorange (2010) said that "In general, political stability is a condition for economic stability and prosperity, as well as for investment attractiveness and meaningful economic value creation". The most important factor that affects the shipping market is economic crises, which have negative impact on business cycles. The most recent crisis was in 2008 which led to a sharp decline of the rhythms of world economic growth. As the crisis unfolded, its intensity and extent have been steadily increasing, forcing governments, central banks, analysts, investors, entrepreneurs and consumers to constantly review their perceptions and expectations until recently.

The low cost of transport of products also plays its role. Raw materials are transported from region to region only when the cost of transporting is more beneficial to the demander. The most trusted indicator showing the cost of transporting crude products such as iron ore, coal, agricultural products and building materials by sea is the Baltic Dry Index (BDI). As it is observed from the Line Graph 3, BDI closed with the lowest price when the global economic crisis occurred. Since then, the BDI is at an all-time bottom to a severely depressed demand for iron ore and coal and a glut of carriers.

Line Graph 3: Baltic Dry Index. Source: Lloyd's List Intelligence (2018).
The supply of maritime transport is slower to demand changes because an order of a ship takes about a year to be completed and the delivery may take approximately two to three years if the shipyards are busy. Furthermore, the lifespan of a ship is no more than about 15 to 30 years, so when the demand is low there are ships that are not used. In addition, the shipowners play the most significant role as they are the first to determine the order of a ship, its capacity and its scrap. Secondly, charterers are also important as they influence the shipowners by setting the time limits of their requirements. Thirdly, banks and financial institutes may influence the offer through investments as well. Authorities and organizations are responsible for regulating and influencing supply through environmental and safety related legislation.

“A key feature of the shipping market model is the mechanism by which supply adjusts when ship demand does not turn out as expected”. Over the last several years the number of vessels has declined but the carrying capacity has increased because the dead weight of recent ships is bigger than in the past. As can be observed from the Line Graph 4 below, from 2003 to 2016 the world fleet size has never stopped having an upward trendline and has specifically increased by 114%. Owners of shipping firms try to forecast the needs of markets and that sometimes leads them to make wrong decisions, lending more funds than are needed.

Another important variable for the supply of maritime transport is the fleet productivity which is measured in tons miles per deadweight. “Although the fleet is fixed in size, the productivity with which the ships are used adds an element of flexibility”. The factors that comprise the productivity of a ship are the speed of the ship which is determined by

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43 Stopford (2009)
44 Stopford (2009)
the time the ship needs to transport goods, its average time at the port, the utilization and use of the deadweight and the time a ship is at sea.

The level of shipbuilding production should be in line with existing needs. However, the biggest difficulty is to manage that supply and demand are in balance. The perfect scenario would dictate that orders be placed based on an estimate of future demand, but this cannot be predictable.

Another variable that affects shipping supply is the growth rate of the fleet which depends on the balance between deliveries of new ships and losses due to ship scrapping or natural causes. Scrapping depends on the balance of several factors that can interact in many ways, mainly the age of the ship, technical obsolescence, scrap prices, current earnings and market expectations.

Freight revenue is the ultimate regulator the market uses to motivate decision makers to adjust capacity in the short-term and to find ways to reduce their costs and improve their services in the long-term. There are two basic price systems in the shipping industry, those being the liner and bulk market.

Exactly for these reasons, investors’ decisions for financing are even harder. Financial techniques have thus changed from one decade to another following the trend of the shipping cycle as detailed below.
4 Types of Shipping Finance

Every business needs funds to start-up, capital to expand or money to hold onto for liquidity. The amount of money that a business needs to be financed is the key-factor that is questioned by an investor. The financial needs of a business vary according to the type and size of the business.

Shipping firms gain the most earnings basically, if not all, from their fleet’s utilization. They are capital intensive, requiring large amounts of capital.

Shipping companies are always looking for funding for different reasons. There are two types of funding that they are trying to find; short-term and long-term. Short-term funding is aimed at increasing working capital, which mainly serves the repair or conversion of existing vessels or to meet cash requirements. And on the other hand, long-term funding that involves huge sums is mainly for the construction of a new ship or the purchase of a second-hand one, with the intention of increasing its fleet.

While considering the size of a shipping company and its needs, the appropriate option for financing is distinctive. The traditional financing method which is no other than through banks still exists and will continue to exist as long as shipping companies depend on all levels and on a daily basis from them. However, the global economic situation has brought about a lot of changes, giving space to new financing methods, prompting a new era for the financing of shipping companies.

4.1 Equity Financing

Equity Financing is the method which can be applied to any shipping company as long as it is listed on the Stock Exchange. The shipping companies therefore issue shares and sell them to raise their capital. Equity Financing may refer to the financing of an individual with little purchasing power or up to many individuals with tremendous purchasing power, such as initial public offerings (IPOs).

4.1.1 Initial Public Offering (IPO) and Follow-On Public Offering (FPO)

Shipping companies trying to raise funds resort to IPOs, which are basically a way to issue their shares to stock market investors for the first time. Usually shipping companies that do this to finance IPOs are big, successful companies, in which cash flows, net asset value, revenues, operating profits and the total value of the company play an important role.

The process for a shipping company to be funded by IPOs involves two stages; Pre-IPO and Post-IPO, where some specifications are required, and needed when the company initially prepares for IPO funding and then continues trade as a public entity. The introduction of IPOs in the Stock Market requires the reporting of the company and stringent specifications, as it is a time-consuming process from about six to twelve months. However, after completing these two phases successfully by entering through the IPO into the equity capital markets, the shipping company can continue to purchase its own shares publicly via Follow-on Public Offerings (FPOs).
Most shipping companies turn to equity markets because they are an attractive option for companies with income inflows and growth prospects. The negative thing about this funding method is that it takes time and effort to get a private company not only to become public but more so to remain public. In order for IPOs to reach the investing public, they must be of good quality and stock prices must be profitable against other corporate shares. This is also the difficulty in this kind of financing method since shipping companies pay low dividends to investors as shipping is subject to the commercial and shipping cycle that has high and low profits. Investing in IPOs is high-risk and low-return for investors.

Graph 1 shows the number of Initial Public Offerings (IPOs) and Follow-On Public Offerings (FPOs) issued in shipping between 2008 and 2017.

![Graph 1: Initial Public Offerings (IPOs) and Follow-On Public Offerings (FPOs) in Shipping, in numbers. Source: Clarksons Research (2018).](image)

It is noticed, therefore, that after the financial crisis of 2008 and up until 2014, the methods of financing through IPOs and FPOs started to increase, with certain fluctuations every year. Throughout the 2008 to 2017 period, most of the IPOs and FPOs had been issued in the years 2013 and 2014.

Also, analyzing Graph 2, depicting IPOs and FPOs in thousands of dollars, it is noticeable that the years in which the value of IPOs and FPOs is the highest does not necessarily correspond to that with most issues. In 2010 and 2013 it seems that the value of IPOs is the highest compared to the other years and to the FPOs in 2009 and 2014 respectively.
Overall, the approach to financing through IPOs and FPOs has grown to around eight times as much throughout this decade, occupying an important place in shipping finance methods.

4.1.2 Special Purpose Acquisition Company

Another source of funding is SPACs, which are public funds, i.e. IPOs that are created with the purpose of acquiring specific vessels or an operating company. In the shipping industry, those who create such special purpose acquisition companies are either shipowners or managing directors. These companies act as Special Purpose Vehicles (SPV) to enter the equity capital markets.

The time horizon for the proposals of acquisition targets by the management of the SPAC course vary but range from approximately 18 to 24 months. It is clearly a time-consuming process, which makes this source of finance difficult to carry out but has many premiums for investors. Shareholders of SPACs are the ones who take responsibility for accepting or rejecting acquisitions. Therefore, if they themselves do not consider that a takeover is not advantageous in SPAC it is dissolved and the whole amount of the investment returns to the investors from which they came.

Otherwise, if they accept a takeover, the principals retain 20% of the company. Hedge funds are common SPAC investors, as the option value of investing in the SPAC from the beginning is high because the investors have approval rights on proposed acquisitions. SPACs usually have various standard structures from which the sponsors can opt, but their common characteristic is that they offer units instead of stocks. Units consist of common shares and warrants, both traded freely in the market.
This method of financing has emerged in the shipping industry over the last few years and has a lot of advantages as it is the fastest way to go public, has lower capital costs than IPOs and needs less bureaucratic procedures. However, the difficult part of this process is to make the right choice of acquisition since much will be judged by it, including the reputation of the shipping company as well as the investor's risk.

4.1.3 Private Equity
This type of financing by Private Equity is a method applied by many shipping companies, which do not want to be listed on the public exchanges. The practice of this method is very old, and the investor of this funding is usually the owner of the shipping company or long-term shareholders who do not want to lose their shares by dividing the public through the Stock Exchange, but rather aiming to obtain substantial or complete control of the company in the hopes financing of gaining high returns.

With this method of Private Equity financing, shipping companies remain private and increase their liquidity by implementing their development plans without having to give any reason to outsiders. The process against other funding methods is simple and straightforward without bureaucratic issues.

Financing investors are actively involved in the business as they form the Board of Directors, have the right to vote and consider all its strategic decisions. In other words, they are active partners of the business.

PE funds operating in shipping have some features that companies have to consider closely, like risk. To compensate for risk, PE funds frequently demand a high Internal Rate of Return (IRR) which may vary from 15 to 20 percent. Additionally, there is no exit policy which falls within a certain period of time, like three to five years for a short investment horizon expanded to a period of ten years for long term investments.

As we can observe in the following Graph 3, financing through private equity before the financial crisis existed but at ranges of very low levels. From 2010 to 2013 there is an upward trend since the amount of funding through private equity almost quadrupled. In contrast, however, from 2014 onwards it appears again that shipping companies do not prefer this financing and resort to other means as the total amount of financing through private equity from 2013 to 2015 is reduced by seven times.
In total, however, the amount of private equity funding from 2008 to 2015 increased by 11% in the shipping industry.

4.2 Debt Financing

It could be said that until the last decade, Debt Financing traditionally referred to bank financing through bank loans, but this term now also includes other sources of financing, such as lending markets financing through leasing, and capital markets financing through bonds. This approach to financing is the most attractive for shipping companies as they increase their capital with only the debt to guarantee how they will be able to repay the amount, in addition to the interest or the coupon rate, respectively, within a certain time period.

4.2.1 Commercial Loans

Any shipping company may apply for a loan through a bank or syndicate of banks. The issue is that to approve the loan it is required to meet some specifications. Commercial banks are interested in a successful loan plan, which in this case is the profitable exploitation of the ship. For the shipping company-borrower to be able to apply for a loan, the loan plan should promise to yield stability during the life of the loan and be able to generate enough surpluses to serve the capital and interest payments according to the loan program agreed.

The criteria asked by the lender-bank to approve a loan are becoming increasingly rigorous; due to the important role played by the global financial crisis and red loans. But the most basic criteria for granting a loan are the company's reputation in the market and the banking history of the company, i.e. the history of the relationship with other banks. The success of its history is based on the good cooperation between all the banks and the
reputation of the client which it affects positively because it is believed that greater security is provided in this way. The bank also controls the type and age of the ship, examines the type of chartering, the flag states, and the classification society. Finally, the bank examines the borrower's history to know whether it can meet its obligations. Newcomers in the shipping industry are not funded unless they show a positive evolutionary path first. Owners of a single ship are not funded due to a low cash plan.

If the above factors are favorable, then the loan is approved and approximately 60% of the total value of the ship is granted. An older practice was that the loan covered 80% of the value of the ship, but this level has been reduced in an attempt to limit the risk to which the bank is exposed. The interest rate on the loan is based, in most cases, on the London Interbank Office Rate (LIBOR) plus a rate of 0.5-2.5%. The duration of the loan ranges between three and eight years, with a tendency towards imposing as short a duration as possible. Regardless of the presentation of the application and the positive response on the part of the bank, the provision of certain forms of collateral is given. The most common form of collateral for the bank is the imposition of the first preferred mortgage on the ship; in other cases, the mortgage on another ship of the same company is a way of even securing personal guarantees that the same shipowner can offer.

In this form of finance, through a commercial loan, the shipping company is not exposed to the public and has no risk of losing control. On the other hand, it is negative point that it does not cover one hundred percent of the money it needs, and the necessary condition is the collateral and the risk-taking mortgage on its property.

Interestingly, Graph 4 below shows the trend of financing shipping companies by geographical regions in Europe, America and Asia and Australia between 2010 and 2015. As can be seen, in Europe, bank financing fell by 47% between 2010 and 2015. In contrast, in the same time period in America it increased by 39% and in Asia and Australia by 48%.

So, while it would be expected that the proportion of bank loans would have been increased, instead it has been reduced by 13% as the amount that was available, from USD 446.79 billion it has decreased to USD 397.84 billion.

4.2.2 Financial Leasing

The institution of Financial Leasing as a financing technique for shipping companies has been established internationally in the last few decades and a significant proportion of the investments that have been increased are being made through this institution. In this type of financing, the ship is purchased by a financial institution and leased on a long-term contract to the shipowner who gives him full control over the operation of the ship. The financial institution retains the ownership of the ship while the shipowner is responsible for its management. This mode of financing has no wider application within the maritime industry. The lease agreement is in the form of a bareboat charter.

The leasing is of interest because after a long-term lease of an asset, in this case a ship, it enables the company to acquire ownership. It is a financial tool with which for tax purposes, the supplier retains ownership of the ship and leases the ship to a shipping company for a fee.

The leasing usually covers either the whole of or the longest duration of the ship's economic life and the rent is calculated as the interest-rate loan installment that would be required from the beginning for its acquisition. Thus, the user immediately assures the possibility of using an asset of his choice, without reserving the necessary redemption capital, and the leasing company places its capital with interest. After the termination of the contract the tenant becomes the owner of the ship. The lease may include compensation clauses if the lessee makes extraordinary payments by reducing the period of validity of the contract.

The main advantage of this form of financing is the non-payment of capital by the lessor-ship owner. The shipowner only provides the know-how and acquires the use and not the ownership of the ship. These contracts last for 15 to 20 years and upon expiry of the contract the ship is bought by the shipowner for a symbolic amount. In addition to the above advantage, leasing provides the shipowner with tax advantages, improving its liquidity, protecting itself against inflation and planning its costs. The most significant disadvantage of this form of financing is the imposition of a higher interest rate than that of bank lending.

4.2.3 Bonds

While it may seem hard to fathom, bonds have actually existed for centuries and the first known bond recorded on stone dates as far back in history as around 2,400 B.C. and served as a way to guarantee the payment of the grain. Nevertheless, by 2005 bond financing in the shipping industry held only a very small three percent of the "pie" as the main sources of finance.

The economic crisis is responsible for creating changes in the way shipping companies are funded. The leverage of increasing bond preference is the low interest rate
environment. This has given them the "push" to penetrate the debt capital markets, since the terms for issuing a bank loan are now prohibitive.

A bond is a borrowing instrument that represents a legal obligation on the issuer, in this case shipping company, to pay the holder a certain coupon interest rate at periodic intervals and to repay the borrowed capital at its maturity date. The maturity of a bond is the time that elapses between the issuance of the bond and its maturity. The face value or par value of a bond is the specified value stated on the security and which the holder will receive when the asset expires. The yield to maturity is the rate of return to the bondholder who bought the bond at the current market price and will hold it until its maturity.

The issue that investors are thinking about is the uncertainty that characterizes the shipping industry due to cyclicality, volatility and high leverage, as bonds are a long-term investment with a time horizon of at least three years. An economic downturn in the market, for example, may increase the probability of default of shipping bonds. Thus, in the shipping industry, we find bonds that are high yield bonds or speculative bonds because of their high returns to others but also because of the high risk of default of payment.

A credit rating is a assessment and prediction about the creditworthiness of an obligor as to the ability to fulfill a specific financial obligation or a specific category of obligations, or a definite financial program. An evaluation is made of the guarantor, insurers, and other financial structures involved in the obligation as to their creditworthiness, in conjunction with the currency of tender being taken into consideration. The assessment made looks at the capability and willingness of the obligor to adhere to the financial commitments when due and reviews other factors and terms like collateral security and subordination financing which may affect whether payments are met or defaulted on.

Two of the most trusted companies that provide credit ratings and help risk practitioners across industries and regions respond to an evolving marketplace with confidence: Moody's Analytics and S & P Global Ratings. All shipping companies are analyzed and evaluated by these two companies and the bond rating standards are presented in Table 1 below.

*Table 1: Bond Rating Standards*

<table>
<thead>
<tr>
<th>Moody’s 45</th>
<th>S &amp; P’s 46</th>
<th>Characteristics</th>
<th>Comment</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aaa</td>
<td>AAA</td>
<td>Highest grade</td>
<td>Maximum safety</td>
<td>Investment grade</td>
</tr>
</tbody>
</table>

45 Moody's appends numerical modifiers 1, 2, and 3 to each generic classification from Aa through Caa. The modifier 1 indicates that the obligation ranks in the higher end of its generic rating category; the modifier 2 indicates a mid-range ranking; and the modifier 3 indicates a ranking in the lower end of the generic rating category.

46 Ratings from ‘AA’ to ‘CCC’ may be modified by the addition of a plus (+) or minus (−) sign to show relative standing within the major rating categories.
<table>
<thead>
<tr>
<th>Grade</th>
<th>Rating</th>
<th>Description</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aa</td>
<td>AA</td>
<td>High grade</td>
<td>Slightly lower standards</td>
</tr>
<tr>
<td>A</td>
<td>A</td>
<td>Upper medium</td>
<td>Favorable but possible future problems</td>
</tr>
<tr>
<td>Baa</td>
<td>BBB</td>
<td>Medium grade</td>
<td>Moderate security and protection</td>
</tr>
<tr>
<td>Ba</td>
<td>BB</td>
<td>Moderate protection</td>
<td>Contain speculative elements</td>
</tr>
<tr>
<td>B</td>
<td>B</td>
<td>Potentially undesirable</td>
<td>Low assurance of future payments</td>
</tr>
<tr>
<td>Caa</td>
<td>CCC</td>
<td>Danger of default</td>
<td>Dangerous elements present</td>
</tr>
<tr>
<td>Ca</td>
<td>CC</td>
<td>Likely in or to default</td>
<td>Highly speculative</td>
</tr>
<tr>
<td>CC</td>
<td>C</td>
<td>Lowest class</td>
<td>Extremely poor prospects</td>
</tr>
<tr>
<td>C</td>
<td>D</td>
<td>Bottom most grade</td>
<td>Unlikely to attain any standing</td>
</tr>
<tr>
<td>NR</td>
<td>ND</td>
<td>Not ranked</td>
<td>No evaluation available</td>
</tr>
</tbody>
</table>

*Source: Fabozzi (2009)*

The quality of the credit for bond ratings is arrived at from several quantitative and qualitative elements, not all of which will be mentioned here. First of all there are the financial ratios which also include the debt ratio and EBITDA coverage ratio; subordination provisions which involves debt to another bond; mortgage provisions which are the security of bonds with collateral; guarantee provisions by a third party; maturity of bonds which entails a high risk at a longer maturity rate; antitrust actions which would be taken against the user; sinking fund which guarantees a systematic repayment; regulations which involves whether the issuer and is regulated or not and the consequences; stability in earnings and sales; overseas operations that figure the percentage of earning and operations overseas; accounting policies, with conservative
approaches; product safety and product liability; environmental factors like expenditures incurred in preventing pollution; product liabilities which involve safety of products; labor unrest which includes tensions and problems; pension liabilities including unfunded pension exposures.

Finally, it can be argued that the covenant-lite structure of the securities of an unsecured nature, having no collateral and backing would significantly increase their appeal in the bond market. In the case of shipping bonds, most of them are senior unsecured notes which are at the lowest end of the debt pecking order and come with incurrence covenants rather than the maintenance financial covenants. That type of financing is attractive to shipping companies because they don’t have to come up with collateral and at the same time investors who take an unsecured risk on the company are reimbursed with higher coupons.

However, with figures in Graph 5 below, it is noticed that after 2008, shipping companies issued several bonds, with a peak in 2009. In fact, while in 2008 only nine bonds were issued, in 2009 there were 86 issued, almost 10 times more. And of course, this method of bond financing has been established and made most attractive to shipping companies since they continued to issue bonds from 2010 until 2017. In 2015 and 2016, there appears to have been a small reduction in bond issuance, but in 2017 the number of bond issuers rose again to nearly the same 2014 levels.

![Graph 5: Shipping bonds, in numbers. Source: Clarksons Research (2018).](image)

Overall, throughout this decade long as the amount of funds available through bonds to finance shipping companies has increased by 25% while the number of bonds issued per year seems to have a downward trend.
4.2.3.1 Green Bonds

The shipping industry does not stop finding other methods of financing such as green bonds for projects that they want to implement now that the trend leads to a more eco-consciousness. Currently the global shipping industry is putting out effort towards reducing emissions in view of the IMO’s 2020 sulfur cap.

“A green bond is a bond specifically earmarked to be used for climate and environmental projects. These bonds are typically asset-linked and backed by the issuer's balance sheet and are also referred to as climate bonds”\(^47\).

The intention behind green bonds, which are designated bonds, is to support and finance climate-related and special types of environmental projects which are aimed chiefly at preventing pollution, making energy more efficient, finding solutions for clean transportation, developing technologies that are environmentally friendly, protecting aquatic and terrestrial ecosystems, fishery and forestry, creating sustainable agriculture as well as water management. They are not unlike conventional bonds, but they are different in the respect that profits must be invested in projects that specifically benefit the environment. However, with green bonds resources from domestic and capital markets can be called up to be used towards environmentally friendly projects such as climate change adaptation and renewables.

To make green bonds more appealing than similar taxable bonds as an investment, monetary incentives such as tax credits and tax exemptions are offered. This creates a stimulus to engage in issues affecting the environment such as renewable energy sources and climate change. Approval for the green bonds status is given if there is verification by a third party, like the Climate Bond Standard Board, which ascertains that the intentions of the company will contribute to the betterment of the environment.

So far, there have been two shipping companies globally that have issued Green bonds. The first to invest was Japan’s Yusen Kaisha (NYK) which finalized the bond on 24 May 2018 at USD 92 million, with five-year bond benefits from the second party opinion of Vigeo Eiris.\(^48\) Next was Evergreen, the expansive shipping company from Taiwan which issued the first of their own green bonds in alignment with their policy of green finance which supports their goals for environmental sustainability. The focus of Evergreen’s bonds, which have a five-year maturity rate and a yearly yield of 0.86%, will be on finding energy efficient solutions and advances in emission reductions which will ultimately reduce the environmental footprint of shipping operations.

In conclusion, funding methods in the shipping industry are increasingly on the rise, with a new proposal for financing Green Bonds on the pipeline. Other shipping companies are expected to follow in this direction soon.

\(^{47}\) [https://www.investopedia.com/terms/g/green-bond.asp](https://www.investopedia.com/terms/g/green-bond.asp)

\(^{48}\) [https://www.climatebonds.net/files/reports/cbi_briefing_nyk_shipping_green_bond_june_2018_0.pdf](https://www.climatebonds.net/files/reports/cbi_briefing_nyk_shipping_green_bond_june_2018_0.pdf)
5 The Financial Crisis and Capital Structure in Shipping Industry

This chapter reports on the impact of the financial crisis on the capital structure in the shipping industry, detailing how the sources of finance have been modified before and after the financial crisis.

The most crucial economic situation of the last decade is the financial crisis that greatly changed the scope of choosing the financing sources of a firm. The influence of the financial crisis on a company’s capital structure is now the basic issue that concerns many researchers.

The analyst Fosberg (2012)\(^49\) states that the financial crisis of 2008 brought about the reduction in the supply of bank loans towards non-financial companies. The lack of confidence between banks led to lending at highly unfavorable rates, eventually leading to a supply shortage in the debt market. As the financial crisis escalated, it became even more difficult for large borrowers of capital to acquire not only new loans, but also loans for restructuring purposes, such as share buybacks.

Ivashina and Scharfstein’s survey (2010)\(^50\) proves that the financing of projects became difficult to achieve due to the slow process of getting loans. It is understandable that, during a financial crisis there is less demand for external financing, as investment opportunities are rare and because of hesitation towards project funding.

As a result of the Mokhova and Zinecker study (2014)\(^51\), leverage ratios are expected to plummet during a recession. Kahle and Stulz (2013)\(^52\) mention in their research that during the financial crisis equity markets suffered from a supply shock as equity buyers favored quality bond markets, meaning that shareholders raising equity capital were greatly affected, as significant wealth transferred from shareholders to debtholders.

Within China capital structure determinants showed no change during the pre and post 2008 financial crisis as referred to by Zhang and Mirza (2015)\(^53\). In contrast tax, non-debt tax shields, tangibility, economic development and inflation showed a significant change in the post crisis period. Thus, the pecking order theory is probably appropriate to explain capital structure of Chinese firms after the financial crisis because most assumptions regarding this theory offer a satisfactory explanation.

The findings of Zhang and Mirza (2015) are in accordance with those of Harrison and Widjaja (2013)\(^54\) who also believe the Pecking order theory to have the most explanatory power during and after a crisis. Iqbal and Kume (2014)\(^55\) also studied the effects of the 2008 financial crisis on the firm’s capital structure focusing on firms located in the UK, France and Germany, and found a dissimilarity between their approach towards the

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\(^{49}\) Fosberg R. H. (2012)  
\(^{50}\) Ivashina V. & Scharfstein D. (2010)  
\(^{51}\) Mokhova N., & Zinecker M. (2014)  
\(^{52}\) Kahle K. M. & Stulz R. M. (2013)  
\(^{54}\) Harisson B. & Widjaja T. W. (2013)  
\(^{55}\) Iqbal A. & Kume O. (2014)
financial crisis and the two articles mentioned previously, which refer to the 2006-2007, 2008-2009 and 2010-2011 periods as the pre, during and post crisis periods respectively. The approach by Young and Semmler (2011)\textsuperscript{56} infers that the post-crisis period will be affected by the European sovereign debt crisis which began in Greece and reached its climax in May 2010.

The capital structure of shipping firms has been influenced the most by the financial crisis. Frankly, the most considerable reason why entrepreneurs desiring to establish a shipping firm face so many obstacles is because in order to set up and to increase a fleet, one needs an enormous amount of capital. The ratio by which equity and debt can be used in corporate finance—in other words, financial leverage or gearing—is an important element of the capital structure of any company, especially in shipping companies.

The Chart Pie 1 below illustrates how shipping firms preferred to finance their capital structure in 2005. Since the financial crisis, the major source of finance is syndicated debt, predominantly bank loans with 39 percent of the whole; a big difference from the other sources. A percentage of 34, in the category “others”, follows and consists of diversified financing instruments, such as bilateral loans, shipyard credit, governmental contributions, and internal equity finance. It is also important to mention that a very strong place is held by the non-ship mortgage source of finance with ten percent. The Norwegian Association of Local and Regional Authorities (K/S) and the German K/G fund system follow with five percent, a statistic that cannot be ignored. In last place, with the smallest section of the chart pie, at three percent, are the IPOs, that are respective shares of global equity markets, bonds, ship-equity funds and tax lease investors.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{chart.png}
\end{figure}

\textsuperscript{56} Young B. & Semmler W. (2011)
The global financial crisis in 2008 had a strong impact on the banks’ lending capacity and the Basel Committee on Banking Supervision increased regulations under Basel III and the upcoming implementation of Basel IV\(^{57}\), so the need for funding has led to different financing sources for shipping. The most tangible example is the bankruptcy of Hanjin Shipping, South Korea’s largest shipping group, which entered into receivership in September 2016, as it was unable to find new financing or to restructure its existing debt.

From 2005 until 2017 many changes can be observed in the way shipping firms prefer to form their capital structure. The primary source remains bank debts, but the percentage has decreased by 15 percent, an unquestionably big amount of the chart pie. As it is noted from the Chart Pie 2 below, the following sources of finance in the shipping industry are private equity and shareholders, selected by 15 percent and 14 percent respectively. A big change in finance can also be noted by the increased proportion of bonds and finance leases, 13 per cent up from 3 per cent and 11 per cent up from 3 per cent, compared to 2005. Export credit and government support are the next choices of financing capital structure of shipping firms with 7 per cent and 6 per cent respectively. And last place is held by other ways of funding such as hedge funds and sovereign wealth funds with a smaller percentage of 6 and 3, respectively.

6 Financial Ratios Analysis of Shipping Companies

The purpose of this chapter is to analyze important indicators of the sample of shipping companies, chosen to create the model, to better understand their capital structure, their development and their need for bond financing at the date of issue.

The selected ratios are profitability ratios for profitability analysis and liquidity ratios, and solvency ratios for credit risk analysis of shipping companies.

Profitability analysis presents business efficiency from the perspective of the future investor. The ratios that show if a company is attractive and profitable for investors are many but, in this thesis, only two are chosen and these are the Return On Equity ratio (ROE) and Return On Invested Capital (ROIC).

On the other hand, credit risk analysis presents business creditworthiness and the ability to fulfil its obligations helping the part of a creditor or lender. The liquidity ratios that are used are Current Ratio and Cash Ratio and the solvency ratios are Debt to Equity and Debt Ratio.

The sample of shipping companies was random, and no factor was considered in its choice. The sample of 12 shipping companies was collected because this data was publicized in the Wharton database. However, as it appears from the line graphs below, some data was not found for Hoegh Lng Holdings, Matson Inc. and Overseas Shipholding Group Inc because the annual reports were not published for the years 2009-2011.

The period of analysis of the financial statements of the shipping companies, starts immediately after the financial crisis from the years 2009 to 2016. The analysis of this period is of considerable interest in observing how shipping companies were affected by the global economic crisis.

The financial analysis of ratios is done for each company separately. In this way, it will be understood where the company is superior and where it lags, and not only that. In this analysis the aim is to discover whether or not the issuance of bonds for each business played an important role in its capital structure.

58 The list of shipping companies in the sample is presented in the Appendix A, in Table 6, alphabetically.
6.1 A.P. Moller - Maersk A/S

**Line Graph 5: Return On Invested Capital (ROIC)**
- A.P. Moller - Maersk A/S

**Line Graph 6: Return On Equity ratio (ROE) in %**
- A.P. Moller - Maersk A/S

ROE indicates that from 2009 to 2016 is increasing its profitability by using the funds of its owners with efficiency. On the other hand, the ROIC indicates that there is a fall in the returns generated by its invested capital and this is due to the drop-in revenues coupled with the small increase in operating expenses of the company.

The issue of its bonds was made in 2015 and 2016 when revenues and net income began to decline, so the company needed financing in order to fund its capital.

**Line Graph 7: Cash Ratio**
- A.P. Moller - Maersk A/S

**Line Graph 8: Current Ratio**
- A.P. Moller - Maersk A/S

The current ratio shows that the company can and will cover its current liabilities with stability over the course of the eight-year period. Also, the cash ratio shows that cash adequacy is increasing.

Consequently, the issue of bonds in 2015 and 2016 helps the company arrive at a satisfactory financial position.
The D/E has a downward trend until 2015, but this is not a concern for lenders as the total debt is declining and the total equity is rising, indicating that the company is focusing on equity financing. Debt ratio also follows the same path, and this is a sign that borrowing is declining.

Bonding in 2015 helps fuel the rise in indicators in 2016 bringing them to the highest levels.

### 6.2 Carnival Corporation & Plc

ROE shows an upward trend, which means that the return on equity of the company is rising. ROIC has many fluctuations and this is due to the ups and downs of the company's revenue.

Overall, profitability is stable and bond issuance in the years 2012 and 2013 gives the company a boost to generate higher returns.
Current ratio stands for a steady course of business coverage but for marginal levels throughout. Cash ratio confirms that the company's liquidity is high only in 2015 compared to the rest of the years.

In general, the adequacy of cash is low and bond issuance is the year when indices are at the lowest levels because of the need for funding.

D/E trend reveals a firm's stability in the lenders' business as its debt is constantly decreasing and equity gradually collapsing. Debt ratio also fluctuates as the D/E since the debt is reduced, and the value of total assets increases, which means that the ratio of borrowing to total capital of each form is constant.

Bonds are issued at lower index prices to boost the company's capital.
6.3 Diana Shipping Inc

From 2009 until 2014, the net income of the company constantly decreases while at the same time total equity increases. In 2015 and 2016, the opposite is the case, and so the trend of the ROE is rising sharply. The trend of the ROIC moves in small upward levels. The company appears to be starting to raise its return on equity by 2015 with the issue of its bond by using its funds properly to generate better returns in the future.

Current ratio has a steep downward trend from the beginning of the period to the end. The same is true in the cash ratio. This means that the liquidity of the company and its ability to meet its obligations is diminishing.

In 2015, the time of the issuance of its bond, until 2016, it does not seem to help the financial position of the company.
D/E has a large upward trend since the index from the beginning of the period to the end is doubled. Also, Debt ratio is gradually increasing.

Although the indicators show that the company is continuously financed in a variety of ways throughout the time, the debt and total equity increase, and the company issues a bond in 2015, which seems to provide security to its lenders.

### 6.4 Hapag-Lloyd A G

ROE shows that the company only managed to achieve returns in the years 2010 and 2015 with the use of total equity, as in the remaining years the company only gained losses. On the other hand, the ROIC had a steady course throughout the period since the company had revenue which even increased.

The issue of the stock in 2010 helped the company to have the largest net income of all eight years.
Current ratio has a downward trend which shows that the company is in denial in meeting its obligations. Cash ratio also follows the same trend, and this suggests that the cash flow is difficult.

The issuance of the bond in 2010 helps the company to rebound, but not for long, since at the end of the eight years the indices fall to the same level as before.

D/E shows that the company prefers external borrowing at the end of the period by reducing the percentage of total equity. Debt ratio also has the same behavior however, the value of total assets increases the percentage of debt ratio is smaller than D/E.

The company appears to provide security to its lenders and, after the issuance of its bond in 2010, only to borrow, and not finance by equity.
6.5 Hoegh Lng Holdings

It is noticed that ROE has many fluctuations and moves to negative levels in most years as net income happens in 2012 and after the issuance of its bond in 2016. On the other hand, ROIC has positive values, although tension is down. Revenue grows, but the company's invested capital is also rising.

The company is making a great effort to invest its funds efficiently, and the issuance of its bond in 2015 seems to help revive it.

Current ratio has a downward trend, but it appears that the company can and does meet its current liabilities even though they are constantly growing. On the contrary, the cash ratio has a steady upward trend indicating that the cash is sufficient to meet the company's current liabilities.

The issuance of the bond in 2015 seems to act as a tonic injection for the financial position of the company since it is the year when the indices receive the lowest prices in the eight years.
D/E has a downward trend but nevertheless moves to high levels, which means that the company provides great security to its lenders. Debt ratio follows the same trend as it shows that there is a good relationship to loans to all the capital of each form of the company, even though the total debt is increasing.

The company is capable of meeting its long-standing obligations and decides in 2015 to issue a bond to further increase its capital by making investments.

### 6.6 Matson Inc

ROE has an upward trend during the period meaning it achieves profits. ROIC also has an upward trend and this shows that the company is optimally using its capital to generate returns.

The issue of the bond is in 2015 culminating in the price peak of both indicators, which indicates that the company needs immediate funding to keep its indices at the same level.
Current ratio shows that the company can and will meet its obligations marginally and the best year for it was in 2014 with the highest index value. Cash ratio follows the same path, indicating that its liquidity was declining after 2014.

In 2015, its counterpart appears to have needed immediate funding to prevent her indicators from reaching negative values.

D/E shows that the trend is upward, and the company provides security to its lenders. Debt ratio also follows the same trend as the D/E, indicating that the degree of protection received by its creditors is rising.

The company increases both total debt and total equity as the issue of its bond in 2015.
6.7 Navios Maritime Hldgs Inc

Until 2012, ROE shows that the company could generate returns using its own funds. After 2013 and until the end of the period, the company shows losses and therefore the index values are negative. On the contrary, ROIC has a stable price apart from 2013 and 2014, where it generated the highest returns with its funds.

The company, in the years that issued its bonds in 2009, 2011 and 2012, has a high degree of success in its profitability.

Current ratio shows that it has a stability in its ability to meet its current liabilities successfully over the course of the eight years. Cash ratio also has a steady trend indicating that its cash is enough to meet its current liabilities, with the highest cash flow being in 2014.

The issuance of all three bonds of the company was made at the beginning of the period meaning that the company affected by the financial crisis wanted to maintain its good financial position.
D/E shows that the venture provides security over time to its lenders and has been trying even more in the last few years, catching the peak in 2016. Debt ratio has many ups and downs without major price fluctuations because total debt and total equity equalize the index value with their upgrades.

The years 2009, 2011 and 2012 issued bonds which are the company's ability to meet its long-term liabilities.

6.8 Norwegian Cruise Line

The trend of the ROE is upward, and this shows that the return on equity of the company is steadily increasing as net profit increases. ROIC is not fluctuating and this shows that the company maintains a good return on its income with the invested capital, generating good and stable returns to its investors.

The issuance of the bond in 2015 is made before the business reaches the peak of the period.
Current ratio shows that the company is capable of meeting its current liabilities but year after year its ability is diminishing. Cash ratio also has the same trend, and this indicates that the problem is due to its liquidity difficulty.

The company chooses to issue its bonds in 2015 to improve its financial position against its obligations.

D/E shows that there was a downward trend until 2013 but the index values are satisfactory, indicating that the lenders of the company are safe from defaulting. Debt ratio equally follows the same course, expressing a very good relationship to its loans to all capital of all forms.

The company obviously demonstrates that in 2015 it issued its bonds because it needed an impetus to increase its index values.
6.9 Overseas Shipholding Group Inc

In 2009 and 2015, ROE has positive values since in the other years the company shows losses. In 2009, 2014 and 2015, ROIC also records positive values since the remaining operating expenses are more than revenue.

The issuance of the bond in 2010 and 2014 shows that the company needed an increase in its capital.

Current ratio shows that the company satisfactorily fulfills its current liabilities. Moreover, this is also apparent from the cash ratio, which indicates that the company has liquidity.

The issuance of its bonds in 2010 and 2014 seems to help the business improve its financial position in order to meet its obligations.
D/E has a lot of fluctuations and this shows that the company is constantly borrowing funds. The same is true of the debt ratio which follows the same course.

The issuance of bonds in 2010 and 2014 seems to be a lifeline for the enterprise.

6.10 Precious Shipping Pcl

ROE up to 2013 has positive prices but then it gets the downside reaching the lowest price of the season after it suffers losses. ROIC has an opposite slope, which means that even though it has no net income, it uses its funds to generate returns; with the sole exception of 2016, when its revenues are also declining dramatically.

The company, which in 2016 has the lowest index prices, decides to be funded through a bond to raise its funds.
Current ratio shows that there is a downward trend that means that the company loses its ability year after year to meet its obligations. The cash ratio trend is a true copy of the current ratio, so the problem is the decrease in the company’s liquidity.

In 2016 the company issues a bond to cope with its everyday obligations and improve its financial position.

D/E has a steadily rising trend because the total debt is rising far more than total equity. Debt ratio behaves throughout the period in exactly the same way and this shows that the company increases its funds with financing.

In 2016, in addition to the total debt, the total equity increases with the issuance of its bond.
6.11 Qatar Shipping Company

ROE has a downward trend, and this is due to the fact that total equity is growing. On the contrary, ROIC has an upward trend indicating that the company manages and uses its funds effectively to generate returns.

The company, in the eight-year period, issues bonds three times and this seems to help its potential.

Current ratio has an upward trend, noting that 2014 could cover up to 19 times its current liabilities with current assets. On the other hand, the cash ratio is highly fluctuating in its prices, and this is due not to the company's lack of cash, but rather to the large increase of current assets.

The issue of bonds only has positive effects on the financial position of the company.
D/E shows that there is an upward trend indicating that the security of the lenders of the company is increasing. Debt ratio also follows the same line indicating that the ratio of total debt to total equity is improving.

The issue of bonds in 2009, 2011 and 2016 greatly increases the share of the total equity of the company.

6.12 Teekay Corporation

ROE shows that after the economic crisis, the business has taken a downside as it has suffered losses and has begun to recover from 2012 onwards. ROIC also follows an upward trend after 2012 and this shows that the business is starting to use its funds effectively to generate returns to investors.

The bond issue in 2015 is when the company has regained its forces.
Current ratio has an upward trend, and this shows that while its current liabilities are rising, its current assets are also rising. On the contrary, the cash ratio has a downward trend indicating that the company's liquidity is decreasing year after year.

In 2015, the company issues the bond to improve its financial position.

D/E expresses that throughout the period the firm has consistently provided great security to its lenders. Debt ratio also shows that the ratio of total debt to total assets is stable.

The bond is issued in 2015 is because the company has the capability to meet its long-term obligations.
6.13 Results

All ratios of the company samples assessed were satisfactory with minor exceptions. Companies whose results are precarious due to the large fluctuations in their index prices and the lack of data are the Qatar Shipping Company and the Overseas Shipholding Group Inc.

The Return On Equity index is the one that showed negative prices in some years for Hapag-Lloyd A G, Navios Maritime Hldgs Inc, Precious Shipping Pcl, Hoegh Lng Holdings, Overseas Shipholding Group Inc and the Teekay Corporation. On the other hand, Matson Inc, Diana Shipping Inc, Carnival Corporation & Plc and A.P. Moller - Maersk A/S noted excellent values. The companies with the best values of Return On Invested Capital were Hapag-Lloyd A G, Norwegian Cruise Line, A.P. Moller - Maersk A/S and Carnival Corporation & Plc, and the ones with the worst values were the Overseas Shipholding Group Inc and Qatar Shipping Company. In conclusion, our profitability ratios have shown that the companies that are more attractive to investors due to their efficient use of total equity and their high profitability are A.P. Moller - Maersk A/S and Carnival Corporation & Plc.

Regarding credit risk indicators, companies that are preferable to lenders due to their liquidity and good debt ratios on all their funds are the Diana Shipping Inc and the two cruise companies Norwegian Cruise Line and Carnival Corporation & Plc. This also suggests that the cruise industry has benefited from this period, with an increase over previous years.

The companies that have issued most of the bonds are the Qatar Shipping Company with ten bonds, A.P. Moller - Maersk A/S with five bonds and the Carnival Corporation & Plc with four bonds. From the financial analysis of the companies whose data was researched it has been concluded that the capital structure of companies with equity financing are A.P. Moller - Maersk A/S, Carnival Corporation & Plc, Diana Shipping Inc, Hapag-Lloyd A G, Navios Maritime Hldgs Inc, Precious Shipping Pcl and Qatar Shipping Company. On the other hand, companies funded under the debt financing method are Hoegh Lng Holdings, Matson Inc, Norwegian Cruise Line, Overseas Shipholding Group Inc and the Teekay Corporation. Therefore, sixty percent of the sample studied prefers equity financing to debt financing.
7 Determinants of Spreads on High Yield Bonds of Shipping Companies

This chapter aims to examine which factors most affect the price spread of new high yield bond offerings of shipping companies. It presents the data that has been collected and analyzes the methodology that has followed. Finally, a review of the results is made.

The inspiration for this regression analysis came from the Research of Costas Th. Grammenos and A. G. Arkouliš59 who also investigated the same subject with some variations. The first difference was that the period of analysis was shorter, from 1993 to 1998, and this master thesis, however, is concerned with a longer period, from the years 2009 to 2016, taking into consideration the many changes to the global economy. In addition, the sample of the companies was different, consisting of data from different companies and as well as from a different number of companies. Independent variables used were Rating, Term, Float, Gearing, Fleet age and Laid-up tonnage. However, for this master thesis the model tests Rating, Float, Gearing, Firm age and BDI. The conclusions of the Grammenos and Arkouris research were different from the conclusions yielded in the analysis conducted in this master’s thesis.

7.1 Data Characteristics

The selection is comprised of the shipping companies which issue bonds made with no specific criteria because of the limited data for bonds issuing that could be found. However, the survey has been conducted successfully with a sample consisting of an adequate number of 31 issues of bonds from 12 shipping companies.

The data was drawn from the Wharton Research Data Services and Clarkson Research Services.

The period that is examined is from the beginning of the economic crisis in 2009 until the year 2016.

The shipping companies that are included in our analysis are of different types and categories such as tankers, bulkcarriers, containers, gas and passengers; all of which are operating on different Stock Exchanges.

Table 2 illustrates all the variables that are considered important and tested for the model. Every value of variables is in average price.

It is observed that during the period from 2009 to 2015 the average float fluctuated at the same levels noting an upward trend with the highest amount at USD 531.40 million in 2016, twice as high as that in other years.

Spread, which is measured in basis points, had its lowest rates in 2013 and the highest in 2010.

Price of coupon which is measured in percentage had many fluctuations during the period with the highest price in 2010 and the lowest in 2016, which conflicts with the average float.

The term for the average maturity of bonds issues in years, apart from 2009 which had the highest value, shows a stable condition with prices between five to seven years.

Gearing, which is the debt to equity ratio, had the best price in 2014 and the worst in 2009, affected by the worldwide economic situation.

Firm age and the operating years of a company show that the oldest company in the sample is approximately 75 years old while the youngest is 24 years old.

Finally, Baltic Dry Index prices are the closing annual prices of the market and shows that there is an abrupt downturn in the global economy, apart from 2013 when it seemed that there was a boost.

Table 2: Characteristics of shipping high yield bond offerings by year of issue, 2009-2016.

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of issues</th>
<th>Ave. float ($ million)</th>
<th>Ave. Spread (basis points)</th>
<th>Ave. Coupon (%)</th>
<th>Ave. Term (years)</th>
<th>Ave. Gearing</th>
<th>Ave. Firm age (years)</th>
<th>BDI</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>6</td>
<td>163.71</td>
<td>314.33</td>
<td>6.04</td>
<td>11.83</td>
<td>0.28</td>
<td>24.00</td>
<td>3,005</td>
</tr>
<tr>
<td>2010</td>
<td>2</td>
<td>191.61</td>
<td>644.00</td>
<td>8.94</td>
<td>7.50</td>
<td>0.95</td>
<td>57.00</td>
<td>1,773</td>
</tr>
<tr>
<td>2011</td>
<td>3</td>
<td>183.93</td>
<td>411.30</td>
<td>6.06</td>
<td>7.75</td>
<td>0.42</td>
<td>24.00</td>
<td>1,738</td>
</tr>
<tr>
<td>2012</td>
<td>2</td>
<td>195.90</td>
<td>466.50</td>
<td>5.38</td>
<td>5.00</td>
<td>0.73</td>
<td>34.00</td>
<td>699</td>
</tr>
<tr>
<td>2013</td>
<td>2</td>
<td>188.44</td>
<td>137.50</td>
<td>2.58</td>
<td>5.00</td>
<td>0.39</td>
<td>44.00</td>
<td>2,277</td>
</tr>
<tr>
<td>2014</td>
<td>1</td>
<td>178.92</td>
<td>450.00</td>
<td>7.50</td>
<td>7.00</td>
<td>1.59</td>
<td>68.00</td>
<td>782</td>
</tr>
<tr>
<td>2015</td>
<td>8</td>
<td>228.41</td>
<td>325.80</td>
<td>5.47</td>
<td>7.80</td>
<td>0.50</td>
<td>74.63</td>
<td>478</td>
</tr>
<tr>
<td>2016</td>
<td>7</td>
<td>531.40</td>
<td>346.43</td>
<td>2.93</td>
<td>6.14</td>
<td>0.71</td>
<td>52.43</td>
<td>961</td>
</tr>
<tr>
<td>All issues</td>
<td>31</td>
<td>232.79</td>
<td>386.98</td>
<td>5.61</td>
<td>7.25</td>
<td>0.70</td>
<td>47.26</td>
<td>1,464</td>
</tr>
</tbody>
</table>

Table 3 provides data for the sample of a model with an allocation based by the S&P Global rating category with scores from AA+ until CCC+. There were some bonds issues that were rated by Moody’s, but the corresponding evaluation was made by the S&P Global rating category.

22% of the sample of bond issues of the sample scores AA-, which is a very high grade of Table 1: Bond Rating Standards. These bonds have slightly lower standards, but their classification takes an investment grade. The biggest proportion of the sample at 64.5% consists of high yield bonds and only the 3% is assumed as junk bond with score CCC+. The highest amount of average float of USD 430.40 million was by high yield bonds with BBB rating and the slowest USD of 178.92 million was by the junk bond with CCC+ rating. Spread biggest and smallest prices also noted by high yield bonds with BB+ and BB- respectively.
Table 3: Shipping high yield bond offerings by rating category (S&P Global), 2009-2016.

<table>
<thead>
<tr>
<th>S&amp;P Global rating category</th>
<th>Number of issues</th>
<th>Average float ($ million)</th>
<th>Spread (basis points)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA+</td>
<td>2</td>
<td>228.41</td>
<td>173.82</td>
</tr>
<tr>
<td>AA</td>
<td>1</td>
<td>352.61</td>
<td>531.40</td>
</tr>
<tr>
<td>AA-</td>
<td>7</td>
<td>259.00</td>
<td>197.19</td>
</tr>
<tr>
<td>B+</td>
<td>2</td>
<td>206.17</td>
<td>360.50</td>
</tr>
<tr>
<td>B</td>
<td>3</td>
<td>228.41</td>
<td>246.00</td>
</tr>
<tr>
<td>B-</td>
<td>2</td>
<td>182.71</td>
<td>644.00</td>
</tr>
<tr>
<td>BB+</td>
<td>1</td>
<td>531.40</td>
<td>65.00</td>
</tr>
<tr>
<td>BB</td>
<td>3</td>
<td>228.41</td>
<td>470.00</td>
</tr>
<tr>
<td>BB-</td>
<td>2</td>
<td>179.80</td>
<td>697.00</td>
</tr>
<tr>
<td>BBB+</td>
<td>4</td>
<td>276.04</td>
<td>271.00</td>
</tr>
<tr>
<td>BBB</td>
<td>3</td>
<td>430.40</td>
<td>593.30</td>
</tr>
<tr>
<td>CCC+</td>
<td>1</td>
<td>178.92</td>
<td>450.00</td>
</tr>
<tr>
<td>All issues</td>
<td>31</td>
<td>232.79</td>
<td>386.98</td>
</tr>
</tbody>
</table>

7.2 Regression Analysis

The modeling method that has been used is the Least Squares Regression. Spread price and is the researching variable which depends on specific factors that are continually changing.

In order for the model to be perfect, many tests with several variables were preceded by other statistically significant ones and some others not. Table 4 represents the dependent and independent variables, that are used in our “perfect” model, with their short titles which describes each of them.

Table 4: Descriptions of test variables.

<table>
<thead>
<tr>
<th>Short title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spread</td>
<td>Spread between an issue's offering yield and same day yield on a treasury security with the same maturity</td>
</tr>
<tr>
<td>Firm age</td>
<td>Average firm age (years)</td>
</tr>
<tr>
<td>Gearing</td>
<td>Long-term debt/total shareholder’s equity</td>
</tr>
<tr>
<td>Rating</td>
<td>S&amp;P Global rating scale</td>
</tr>
<tr>
<td>BDI</td>
<td>Baltic Dry Index</td>
</tr>
<tr>
<td>Float</td>
<td>Principal amount at issue ($million)</td>
</tr>
</tbody>
</table>
Table 5 below displays the results obtained from the perfect regression model, regarding determinants of spread price.

R-squared, which predicts the success of future outcome, receives the value of 0.57 (57%), which is a first indication of a relatively satisfactory regression, and therefore fluctuations of independent variables can explain our dependent variable to a large extent. Adjusted R-squared also receives a very satisfying value of 0.48 (48%) and shows that considering the sample size and number of variables it is adequate.

The F-statistic equals the value of 6.33 and in combination with the probability value of the F-statistic that is lower than the common alpha level of 0.05, this means that the group of variables is jointly significant.

Table 5: Least Squares Regression model for new issue spread of shipping high yield bonds, 2009-2016.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spread</td>
<td>-243.2324</td>
<td>163.5116</td>
<td>-1.487555</td>
<td>0.1499</td>
</tr>
<tr>
<td>Age</td>
<td>2.775130</td>
<td>1.013631</td>
<td>2.737810</td>
<td>0.0115</td>
</tr>
<tr>
<td>Gearing</td>
<td>-201.6493</td>
<td>51.55841</td>
<td>-3.911084</td>
<td>0.0007</td>
</tr>
<tr>
<td>Rating</td>
<td>48.28637</td>
<td>13.04127</td>
<td>3.702582</td>
<td>0.0011</td>
</tr>
<tr>
<td>BDI (-1)</td>
<td>0.115129</td>
<td>0.042340</td>
<td>2.719169</td>
<td>0.0012</td>
</tr>
<tr>
<td>Float</td>
<td>0.636761</td>
<td>0.285620</td>
<td>2.229402</td>
<td>0.0354</td>
</tr>
</tbody>
</table>

Furthermore, all coefficients of these variables are statistically significant to a confidence level of 95%, as indicated by their Probability values. The smaller the probability value, the higher the significance; without which it means that it is not equally considerable if the value is lower than the common alpha level of 0.05.

Another result of the estimation that will ensure the reliability of the outcome is the t-Statistic. The absolute value of the t-Statistic for every independent variable is bigger than the critical value which is equal to 1.96. Furthermore, this result also demonstrates that all the independent variables are statistically important.

The Standard Error results are also efficient because the values are small enough and they show that the sample is representative.
7.3 Results

Overall, the outcome of the model is trustworthy as the results of the regression analysis follow all the necessary applications.

The order of sequence of the most significant variable to the least important for spread pricing of new high yield bond offerings of shipping companies is: Gearing, Rating, Age, BDI and Float. The only variable that is excluded is the Term which was expected to indicate how the maturity of bonds over the years affects the spread price, but it was statistically insignificant.

Gearing calculated that by dividing a company’s long-term debt by its shareholders' equity, it can be connected to the Debt to Equity ratio that measures the company's financial leverage. The model detects a negative relationship between gearing and spread pricing; if the gearing is increased by one unit then the spread price is decreased by 201.65 units. This hypothesis is attributed to the fact that gearing expresses the security that is provided to the investors by the company. So, if the company causes uncertainty for investors because it cannot cover its liabilities, then this implies a higher risk premium for high yield bonds.

The credit rating is an implicit forecast of the likelihood of the investor defaulting. The better the rating that a bond issue receives, the lower the risk payment to be defaulted. The model proves that there is a positive relationship between the credit rating of bonds and spread pricing. If the bond issue gets one higher grade in the rating scale, the spread price is increased by 48.28 units.

The variable of firm age has not been considered in other papers until now. On the other hand, the age of the fleet has been frequently studied without proving that it has any significant effects on the spread pricing of bond issues. The model for this paper considers the variable of the age of shipping companies very important because one company that has been established earlier than another has a better reputation and is more reliable for the investors in the market. The older the shipping company, the better the yields on the bonds issued by it. Every year a company ages the spread price is increased by 2.78 units.

The Baltic Dry Index is characterized as a “leading economic indicator” in that it measures the transportation cost of raw materials used for production of finished goods. During the global economic crisis, the BDI had been directly affected as it is also noted in Line Graph 3 and that this is proof of its major importance in its place in the model. Results of the coefficient of the model shows that there is a positive correlation between BDI and spread pricing; if the BDI increases for one unit the spread price is increased by 0.11 units. However, many researchers have documented another indicator in their models that is similar to BDI and this is laid up tonnage.

The term of float translates to the principal amount of a bond outstanding at issue. The model shows that the float which represents the liquidity in pricing a high yield bond has a positive relationship to spread pricing; one extra dollar of float adds 0.63 units. Past publications are opposed to this model hypothesis however, it can be supported that the bigger the amount of a bond issue, the more uncertainty it can cause the investor to raise the levels of defaulting.
8 Conclusion

This thesis examines the development of the capital structure of shipping companies giving emphasis to the equity financing of bonds, after the stock market crash of 2008, and during the period 2009-2016. The research was conducted using financial statement analysis and a dynamic model using ratios and panel data.

There is a two fold aim in the research and evaluation of this data. The first is to bring to light the determinants of spreads on the high yield bonds of shipping companies. The second is to investigate how effective the bonds may be in targeting the capital structure ratio.

The financial analysis of the companies in our sample shows that bonds play an important role in the capital structure of shipping companies and in general the proportion of companies that prefer bonds, and financing with equity, including those who just have no other choice due to the restrictions in lending as a result of the financial crisis, is bigger than those that prefer debt financing.

According to the assessment retrieved from the regression model, it is implied that spread pricing is affected by the credit rating, the gearing, the float, the date of the company’s establishment as well as from the Baltic Dry Index. On the other hand, the variable of Term appears as not statistically significant, indicating that the years of maturity are not of significant importance.

The question of what makes up the optimal capital structure of a shipping company is an unending one. Shipping companies seek new types of financing so therefore, more extensive and continued research is in demand. The next suggested subject for research in this area is the determinants of spreads in the green bonds of shipping companies, the upcoming trend.
9 References


10 Appendices

Appendix A

Table 6: List of Shipping Companies of the sample.

<table>
<thead>
<tr>
<th>List of Shipping Companies</th>
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<tbody>
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<td>11</td>
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<td>12</td>
</tr>
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</table>

Appendix B

Profitability Analysis

Profitability Ratios

Return On Equity ratio (ROE) = \( \frac{\text{Net Income}}{\text{Shareholder's Equity}} \times 100 \)

Return On Invested Capital (ROIC) = \( \frac{\text{Revenues} - \text{Operating Expenses}}{\text{Invested Capital}} \times 100 \)
Credit Risk Analysis

\textbf{Liquidity Ratios}

\textbf{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}

\textbf{Cash Ratio} = \frac{\text{Cash and Cash Equivalents}}{\text{Current Liabilities}}

\textbf{Solvency Ratios}

\textbf{Debt to Equity} = \frac{\text{Debt}}{\text{Equity}}

\textbf{Debt Ratio} = \frac{\text{Debt}}{\text{Assets}}

\textbf{Appendix C}

\textit{Table 7: Shipping High Yield Bond Issues, 2009-2016.}

<table>
<thead>
<tr>
<th>Date of Issue</th>
<th>Company's Name</th>
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<tbody>
<tr>
<td>2/4/2009</td>
<td>Qatar Shipping Company</td>
</tr>
<tr>
<td>2/4/2009</td>
<td>Qatar Shipping Company</td>
</tr>
<tr>
<td>22/10/2009</td>
<td>Navios Maritime Hldgs Inc</td>
</tr>
<tr>
<td>17/11/2009</td>
<td>Qatar Shipping Company</td>
</tr>
<tr>
<td>17/11/2009</td>
<td>Qatar Shipping Company</td>
</tr>
<tr>
<td>17/11/2009</td>
<td>Qatar Shipping Company</td>
</tr>
<tr>
<td>24/3/2010</td>
<td>Overseas Shipholding Group Inc</td>
</tr>
<tr>
<td>1/10/2010</td>
<td>Hapag-Lloyd A G</td>
</tr>
<tr>
<td>13/1/2011</td>
<td>Navios Maritime Hldgs Inc</td>
</tr>
<tr>
<td>29/11/2011</td>
<td>Qatar Shipping Company</td>
</tr>
<tr>
<td>29/11/2011</td>
<td>Qatar Shipping Company</td>
</tr>
<tr>
<td>27/6/2012</td>
<td>Navios Maritime Hldgs Inc</td>
</tr>
<tr>
<td>29/11/2012</td>
<td>Carnival Corporation &amp; Plc</td>
</tr>
<tr>
<td>Date</td>
<td>Company Name</td>
</tr>
<tr>
<td>------------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td>31/1/2013</td>
<td>Carnival Corporation &amp; Plc</td>
</tr>
<tr>
<td>9/10/2013</td>
<td>Carnival Corporation &amp; Plc</td>
</tr>
<tr>
<td>5/8/2014</td>
<td>Overseas Shiplholding Group Inc</td>
</tr>
<tr>
<td>28/5/2015</td>
<td>Hoegh LNG Holdings</td>
</tr>
<tr>
<td>8/6/2015</td>
<td>DIANA SHIPPING INC</td>
</tr>
<tr>
<td>28/9/2015</td>
<td>A.P. Moller - Maersk A/S</td>
</tr>
<tr>
<td>28/9/2015</td>
<td>A.P. Moller - Maersk A/S</td>
</tr>
<tr>
<td>30/9/2015</td>
<td>Matson Inc.</td>
</tr>
<tr>
<td>10/11/2015</td>
<td>Norwegian Cruise Line</td>
</tr>
<tr>
<td>16/11/2015</td>
<td>Teekay Corporation</td>
</tr>
<tr>
<td>24/11/2015</td>
<td>A.P. Moller - Maersk A/S</td>
</tr>
<tr>
<td>22/1/2016</td>
<td>Precious Shipping PCL</td>
</tr>
<tr>
<td>17/2/2016</td>
<td>Carnival Corporation &amp; Plc</td>
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<td>18/3/2016</td>
<td>A.P. Moller - Maersk A/S</td>
</tr>
<tr>
<td>18/3/2016</td>
<td>A.P. Moller - Maersk A/S</td>
</tr>
<tr>
<td>25/5/2016</td>
<td>Qatar Shipping Company</td>
</tr>
<tr>
<td>25/5/2016</td>
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