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Essays on Corporate Financial Management in Shipping: Capital Structure and M&As Choices, Interactions between Corporate Decisions, and Funding Conditions on M&As Quality

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Declaration of Original Authorship

I confirm that this is my own work and the use of all material from other sources has been properly and fully acknowledged.

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Abstract

This thesis provides a comprehensive understanding of corporate financial management in the shipping industry by conducting three in-depth analyses on shipping finance. The first analysis is focused on the relations between capital structure and inorganic investment decisions in the shipping industry by utilising a series of state-of-the-art methods. The study reveals how financial leverage has an impactful effects on shipping companies' Mergers and Acquisitions (M&As) decisions. Deviations from target leverage display a strong association with the probability of being an acquirer, while deal size, method of payment and deal outcomes are strongly affected. Excessive debt in the financing mix decreases the likelihood of consummating acquisitions but increases the deal quality, indicating direct policy implications for several actors in the shipping industry.

The second analysis regards the interactions between investment, financing, and payout choices in the shipping industry. The study highlights the importance of utilising a correct methodology when explaining the relations between the three important corporate policies. Failing to consider the endogeneity and simultaneity leads to a severe underestimation of the co-determination of investment, financing, and payout. Simultaneous equations approach is found to be the best approach to unearth the relations, while financial constraints and the phases in the shipping cycles cause significant divergences in how the three corporate decisions interact with one another. The co-determination of corporate decisions in shipping companies is found to be much more pronounced, emphasising how capital intensiveness and high debt reliance can expose significant interactions between investment, financing, and payout.

The third analysis revisits the acquirer returns in the shipping industry by taking aggregate funding conditions into account. The study begins by investigating how different phases of aggregate

funding conditions affect the deal quality in the shipping industry. The acquirer returns are found to be decreasing with improving funding conditions, implying that shipping companies are less cautious in selecting targets in favourable funding conditions. However, industry-level earnings seem to significantly moderate the negative relationship, emphasising the impact of a positive shock to the industry on the M&As market in the shipping industry. Shipping M&As are found to be vulnerable to global economic policy uncertainty along with favourable funding conditions, implying that M&A returns are hampered by uncertainty. However, M&A record and free cash flow (FCF) levels seem to have a positive impact on M&A returns in accommodative funding environments.

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Chapter I

Introduction

1.1. Research motivation

The shipping industry is the lifeblood of international trade and world economy. About 80% of international trade by volume is handled by some 55,000 merchant vessels on the sea.[1] World seaborne trade reached 11 billion tons in 2019 and is projected to touch as high as 17 billion tons by 2030[2], rendering the shipping industry an integral part of international trade. The annual income that is generated by the operation of merchant vessels is estimated as over a half trillion US Dollars, contributing the prosperity of nations all around the world. Shipping is one of the most cyclical industries with several idiosyncrasies that differ it from other industries. The most remarkable characteristics include the demand for shipping services being derived from global economy and international trade, the extreme volatility in freight rates and asset prices, the sensitivity to uncertainty in international demand and supply forces, as well as its capital intensity and strong reliance on debt capital (Alexandridis et al., 2018).

High capital intensity in the shipping industry is almost exclusively associated with vessel purchases which are sophisticated and high value assets that can cost over $200mil to build. The capital expenditures to total assets ratio is 8% for an average shipping company, placing shipping among the top 8th percentile in all industries.[3] High asset tangibility associated with the investment-driven nature and risky equity environment have naturally led shipping

[1] The shipping industry's share in international trade and the number of merchant vessels are derived from UNCTAD (2015) and EuroSender (2020).

[2] The figure is derived from International Chamber of Shipping.

[3] The figure is calculated by using data from Compustat Global and North America for all publicly listed shipping companies.

companies to rely heavily on debt capital. In fact, debt financing accounts for more than 80% of all external capital needs of shipping industry, although shipping companies rarely take advantage of a tax shield. An average shipping company exhibits a mean leverage ratio of 41%, which is 61% higher than all industrial companies from G7 countries (Drobetz et al., 2013). As of 2019, the total exposure of the top 40 banks to the shipping industry was almost $295bil, emphasising the significance of the availability of external financing. However, the capital intensity and high asset tangibility do not guarantee an unlimited debt capacity since high leverage levels increase expected costs of financial distress. Furthermore, the excess volatility in asset prices has an adverse impact on the collateral values, restraining the access to debt capital. In an industry shaped by a challenging environment, corporate financial management associated with investment financing decisions is of pivotal importance for shipping companies to survive by securing enough funds to continue to invest.

Over the past three decades, the shipping industry has witnessed a significant surge in the consolidations, with many companies actively participating in Mergers and Acquisitions (M&As) market to gain competitive advantage. Because of the over-supplied and highly fragmented structure of the industry, shipping companies view M&As as a vital path to complement organic growth. Aiming for operational and financial synergies, diversification of asset base, and market share enhancement, shipping companies spent more than $560bil for M&A deals over the past 10 years. M&As typically require external funds since they involve significant amounts of capital (Bharadwaj and Shivdasani, 2003), and shipping M&As are no exception. In fact, the primary source of financing M&As in the shipping industry is shown to be borrowings (Alexandridis and Singh, 2016), emphasising the vital position of fund availability to pursue inorganic growth opportunities.

The challenging investment and capital raising environment along with other peculiarities make the shipping industry a natural laboratory to study its financial aspects. To this end, this thesis aims to extend the previous literature on corporate financial decisions in shipping and to unearth novel patterns of shipping companies' organic and inorganic investment behaviour.

1.2. Overview and research contribution

The theme of the first empirical chapter of this thesis is the relationship between firm-level financial constraints and M&As in shipping. The corporate finance literature has documented that beyond a certain threshold, financial leverage can hamper a firm's ability to raise capital, and as a result, has a bearing on its corporate investment policy. The new and more restrictive financing landscape in the shipping industry has put the management of capital structure under the spotlight as a key driver of investment policy, financial health, and thus, firm success. Considering the capital intensity and heavy reliance on debt financing in the shipping industry, the first chapter examines for the first time the link between financing policy of shipping companies and their inorganic corporate investments. The chapter borrows a very well-known concept, target leverage, from the corporate finance literature and links it with M&A deals in shipping. The results are suggestive of the fact that shipping companies strictly follow a target leverage. Less frequently, they deviate from the target leverage by using excess debt in their capital structure. This imbalance results in a lessened M&A activity, acquiring smaller targets, and utilising less cash. Companies with excess debt in their capital structure undertake better acquisitions, pointing to the disciplining effect of debt financing.

Having uncovered how capital structure choices affect M&As in shipping in the first chapter, the second empirical chapter looks at the corporate decisions in shipping from a wider perspective. Early literature on corporate decisions suggest that investment, financing, and

payout are typically interrelated via a decision-making process that aims to channel inflows and outflows of funds. Several studies empirically tested the interactions between the three important corporate decisions, with some shortcomings. Most studies focus on a single market and rely on rather short sample periods which potentially fail to capture the dynamic property of policy interactions. Moreover, they utilise either cross-sectional or time-series data which might obscure the true nature of policy interactions. The shipping industry is an excellent testing ground to study the co-determination of corporate policies because of its idiosyncrasies. Apart from the peculiar characteristics that are discussed earlier in this chapter, another notable feature of the shipping industry is the persistence in dividend payouts. Despite the fact that the shipping industry is within the bottom 38% percentile of all industries in terms of dividend payouts, 75% of companies still pay at least some dividends to avoid the adverse impacts of information asymmetry. The dividend behaviour of shipping companies along with the rough investment-financing decisions creates a challenging policy setting environment. The results of the chapter suggest that investment, financing, and payout decisions are strictly interrelated. However, the interactions seem to be obscured when it is analysed via single equations, unlike simultaneous equations that exhibit the relationships explicitly. The study also reveals that the interactions between investment, financing and payout are more pronounced in the shipping industry and they also appear to be contingent on financial constraints and market conditions.

The availability of debt capital to a shipping company is not only a function of its firm-level financial constraints. The corporate finance literature has provided evidence that the aggregate funding conditions fluctuate substantially over time, affecting how much banks can lend (Bernanke and Blinder, 1992). They also have an impact on the stock market returns (Acharya and Pedersen, 2005), implying that aggregate liquidity has a distinct impact on companies'

investment policies and their outcomes. Emphasising the debt-oriented capital structures in the shipping industry, the last empirical chapter of this thesis is dedicated to the relationship between aggregate funding conditions and how investors price a shipping company's M&A activities. While accommodative funding conditions might ease the financial restrictions by allowing more companies to pursue positive net present value (NPV) inorganic growth opportunities, unfavourable funding conditions associated with contractionary monetary policy might hamper the ability of companies to make M&As investments. On the other hand, favourable funding conditions might exacerbate potential agency costs or incentivize companies to invest in riskier asset classes. The empirical tests in the last chapter show that there is a negative relationship between funding conditions and acquirer returns. This key result suggests that shipping companies tend to make value-destroying acquisitions under accommodative funding conditions.

The final chapter of this thesis also reveals that some company and industry characteristics have an impact on market reaction when they are interacted with funding conditions. First, the results suggest that favourable funding conditions along with high economic policy uncertainty causes a much more deepened negative reaction from the market. Second, the results show that deals in the most favourable funding conditions and in a high industry-earnings period are value enhancing, pointing to the neoclassical explanations of merger waves. Third, the acquisition histories of shipping companies are found to have a moderating effect on the negative market reaction in favourable funding conditions. Finally, free cash flow (FCF) levels are associated with higher acquirer returns in favourable funding conditions due to an involvement of the disciplining effect of bank loan.

Chapter II

General Literature Review

2.1. Theories of corporate investment

The corporate investment decision is one of the most pivotal policies set by companies that include acquisitions of fixed assets or companies related to productive capacity. The net present value (NPV), that use the early arguments of Irving Fisher and John Maynard Keynes as a base, is one of the most well-known techniques to evaluate the feasibility of an investment opportunity by taking the present value of cash inflows and outflows into account. Graham and Harvey (2001a) report that 74.9% of the CFOs always follow the NPV technique as an investment appraisal tool. However, questions have been raised about the employment of NPV as an investment criterion. Berkovitch and Israel (2004) emphasise the prevalence of informational and agency considerations and argue that the use of NPV leads to inefficient capital budgeting outcomes. It is further reported that companies use a modified version of the NPV, where they decide to undertake an investment only when the net present value of the sum of cash inflows and outflows exceeds a threshold that is different than zero. In a similar vein, de la Mare (1975) criticises the use of NPV because of the assumption of the cash flows are realised at the end of each period, which is rarely usual in most business practices. The drawbacks of the NPV stated in the literature lead to the development of more multifaceted investment theories, such as Tobin's Q theory, accelerator theory and real options theory.

Introduced by Clark (1917), the accelerator theory argues that companies make investments to adjust their capital stocks to a desired level that is a function of the expected demand for their products. In other words, the accelerator theory depends on the notion that investment is determined by the growth in output. Initial accelerator theories assume that companies make adjustments in their capital stocks spontaneously, where expectations are static (Baddeley, 2003). Following theories that relax this assumption are introduced to account for the lag

structures in sophisticated investment decision-making (Harrod, 1939). Furthermore, Diamond (1962), Chenery (1952), and Bo and Lensink (2005) empirically prove that the current and lagged growth in output is a significant determinant of investment.

Sharing similar elementary units, Jorgenson and Siebert (1968) emphasise the importance of the relative factor costs. Specifically, unlike basic accelerator theory, Jorgenson and Siebert (1968) do not make the assumption of fixed capital-output ratios and argue that the investment will be affected by the relative factor costs while adjusting the capital stock. Although this approach takes into account the marginal returns over costs, it has a limitation: it assumes capital stock adjustments are realised instantaneously. Furthermore, as it is argued in Baddeley (2003), Jorgenson and Siebert (1968) do not involve expectations and uncertainty in their model by assuming that investment decisions are instantly reversible.

Theories that assume static expectations about investment crucially understate the dynamic nature of investment decisions. In fact, investment is progressive, and it should reflect uncertainty and expectations about the future. In response to the inefficient way the accelerator theories handle the dynamic nature of the investment, Q models were introduced that integrate uncertainty and expectations into the investment decision. The caveat of Q models is that the sentiment about the future cannot be directly observed (Baddeley, 2003). However, Chirinko and Chirinko (1993) show that there are available proxies for expectations to be consolidated into the investment models. Conceivably, Tobin's (1969) paper constitutes a base for Q theory as it is suggested that stock market valuations would be a good proxy for the benefits of investment. Assume MC is the market capitalisation of a company, and RC is the replacement cost of the capital stock. Tobin (1969) argues that MC/RC can be used to obtain a tool that reflects the incentive to undertake investments. The intuition behind the tool is simple: the

investment takes place when adding another unit in capital stock increases the market value of the company more than the cost of adding that marginal unit, which makes MC/RC bigger than one. It can be argued that Tobin's Q encompasses all aspects related to a company's investment decisions, so it is a significant determinant of investment activity. Indeed, Erickson and Whited (2000), Aggarwal and Zong (2006), Jovanovic and Rousseau (2014), Ascioglu et al. (2008) and Gulen and Ion (2016) empirically proved that Tobin's Q ratio is a significant determinant of investment. However, Lensink and Murinde (2006) show that Tobin's Q is a highly insignificant determinant of investment and they further argue that Tobin's Q suffers from severe measurement errors. In fact, Abel (1980) observes that the stock market does not measure a company's physical capital instead it measures the value of the firm, whereas expectations about the future value of investments are reflected in the physical capital. Furthermore, Baddeley (2003) argues that even if market information is a good proxy for the present value of expected cash flows, managers' views about that might differ. Given that it is the managers' perspective that matters since managers make the ultimate decision about an investment, the market value might disqualify the reliability of Q theory.

Since Jorgenson and Siebert's (1968) investment theory does not account for uncertainty and Q theory suffers from measurement-related errors, the literature on the determinants of corporate investment develops a more overarching model that incorporates uncertainty and the irreversible nature of the investment. Dixit and Pindyck (1994) debate that investment decisions can be viewed as financial call options and the opportunity cost is embedded in exercising the option. The intuition behind the argument is that it is beneficial to wait for more information about the expected success of the investment and market conditions before deciding whether undertake the investment or not (Carruth et al., 2000; Baddeley, 2003). Under

uncertainty, information is regarded as highly valuable, therefore, the benefits of waiting are significant. However, more uncertainty and waiting time to exercise an option increase the opportunity cost. Leahy and Whited (1996) use the variance of asset returns as an uncertainty measure and show that an increase in uncertainty translates into a decrease in investment activity. Caballero and Pindyck (1996) develop an uncertainty measure by calculating the standard deviations of marginal profitability for 20 two-digit manufacturing industries. They conclude that industry-wide uncertainty has a negative impact on investment. Guiso and Parigi (1999) use survey data on the rate of growth in demand to measure the perceived uncertainty of Italian manufacturing companies. They show that demand uncertainty has a negative impact on investment, and it slows down capital accumulation.

Another strand of the investment literature studies the impact of financial frictions on the company's investment activity. Modigliani and Miller's conceptual framework suggests that under perfect capital markets, a company's financing decision is independent of its investment and company value as internal and external funds are interchangeable. However, this framework severely underestimates financial imperfections such as information asymmetry, bankruptcy, and taxation. Relaxation of the strict assumptions of Modigliani and Miller's irrelevance theory underpins the base of financing constraints theory of investment. Myers and Majluf (1984) emphasise the impact of asymmetric information by arguing that companies can be financially constrained when external fund providers have less information about the current value of assets in place than the management. In other words, when management has superior information about the company, outsiders can interpret the will of issuing new equity as a signal that the company is overvalued. Investors, in return, will require a higher rate of return which will translate into increased cost of external financing and withdrawal from some

valuable investments. Furthermore, information asymmetry is also shown to be impactful on debt financing, thus investment. Stiglitz and Weiss (1981) show that asymmetric information may lead to credit rationing in debt markets. In a similar vein, Goswami et al. (1995) argue that a company's optimal debt structure is directly linked to the distribution of informational asymmetry.

Fazzari et al. (1988) argue that the investment activity of a company is affected by the availability of internally generated funds and access to external debt finance. In the same direction, introducing the financial frictions, Hovakimian et al. (2001), Fama and French (2002) and Flannery and Rangan (2006) show that companies that carry more debt relative to their target leverage are less likely to issue debt. Furthermore, Uysal (2011) and Agyei-Boapeah et al. (2018) finds that overleveraged companies are less likely to execute mergers and acquisitions (M&As).

2.2. Shipping investment decisions and key drivers

Shipping is one of the most capital-intensive where sizeable investments dominate the industry in an effort to provide additional capacity for worldwide cargo transportation service. Over the last 30 years, shipping companies spent $733bil for capital expenditures and acquisitions in total.[4] In the shipping industry, ensuring operational profitability, sustainable firm growth and corporate success through efficient investment decisions is of crucial importance since the main source of the revenue is ownership of large and long-term assets (Drobetz et al., 2019). The ultimate aim of the investment appraisal process in the shipping industry is to undertake

[4] The figure is estimated by using annual data from Compustat Global and North America for companies that operate within the ship-owning, logistics and shipping services and port industries.

value-enhancing investments while considering important industry factors, such as freight rates, the trends in newbuilding and scrapping, demand for shipping services, bunker fuel prices and vessel prices (Alexandridis et al., 2018). Furthermore, Lambertides and Louca (2008) argue that the performance in the shipping industry is more sensitive than it is in other industrial sectors because of the volatility in bunker prices and unpredictable trends in global trade, which emphasises the necessity of efficient investment decision making. Accordingly, a considerable literature has grown up around the theme of the drivers of investment in the shipping industry.

In one strand of the investment literature in the shipping industry, the behaviour of investors has been the subject of a number of studies. Berg Andreassen (1990) classifies shipowners according to their risk perception and analyses their investment behaviour. It was stated that, under normal circumstances, risk averter has significantly less capacity than the risk lover. Goulielmos and Psifia (2006) identify a persistence in freight rates and argue that shipping investors and bankers should consider that persistence while making an investment decision. In another study, Greenwood and Hanson (2014) report that shipping companies overinvest during the boom period. Similarly, Merikas et al. (2008) show that the investment decision depends on the market cyclicality and expectations and suggest that the ratio of second-hand/newbuilding prices could be utilised as a tool for making an investment choice between newbuilding and second-hand vessels. However, Bulut et al. (2013) argue that shipping investors tend to place newbuilding orders during times of high vessel prices.

In another strand of the literature, studies attempt to investigate the determinants of investment in the shipping industry. Xu and Yip (2012) report that the current supply of the market, trade volume and freight rates are significant determinants of investment in the shipping industry.

Similarly, Fan and Luo (2013) show that investment decisions are driven by market conditions. It is further reported that large companies continue to invest to maintain their market shares. The impact of free cash flow (FCF) is also shown to be an important indicator of investment. Yeo (2018) shows that FCF leads to increase the investment activity in the shipping industry while a negative relationship is reported between leverage and investment. In a similar vein, Alexandridis et al. (2020) report that positive deviations from the target leverage have a negative impact on the company expansion through inorganic investment, e.g., mergers and acquisitions (M&As). The authors argue that overleveraged shipping companies are less acquisitive, and they undertake smaller targets, which is an important indicator that the shipping industry is notably plagued by financial constraints. In a further exploration of company characteristics and investment relationship, Drobetz et al. (2019) show that ownership concentration boosts the positive effect of freight rates on investment.

Investment in the shipping industry is a multifaceted decision that is driven by numerous factors, which renders the investment valuation a demanding task. Along these lines, Evans (1984), Goss (1987) and Albertijn et al. (2016) provide examples of how shipping companies utilised well-known investment appraisal techniques, e.g., NPV and IRR. In a survey-based study, Cullinane and Panayides (2000) find that IRR is the most utilised investment appraisal tool among UK-based shipping companies. Further, considering the limitations of NPV and IRR techniques, Celik et al. (2009) and Rousos and Lee (2012) develop an instrument to appraise investment opportunities. The tool developed by Celik et al. (2009) includes defining performance and technical characteristics of the investment and calculating the relative importance of performance characteristics. Considering market-based data and charterer's perception, it is argued that a high level of managerial efforts is required for undertaking

investments in the shipping industry. Similarly, Rousos and Lee (2012) formulate a multicriteria shipping investment evaluation model that considers the financial and risk characteristics of the investment.

2.2.1. Mergers and Acquisitions in shipping

Mergers and Acquisitions have attracted massive interest from a range of disciplines over the past 30 years (Cartwright and Schoenberg, 2006). However, there is a relatively small body of literature that is concerned with M&As in the shipping industry. Accordingly, the aim of this chapter is to analyse shipping literature on M&As.

There are several reasons for investigating M&As in the shipping industry. Das (2011) and Alexandrou et al. (2014) argue that large shipping companies engage in M&As due to slow nature of the alternative option of growing organically when considering the need for global structure of shipping operations. Harford (2005) and Andreou et al. (2012) suggest that because of the economic circumstances affecting the industry, industry shocks and market timing can drive further deals. Furthermore, focusing on an individual industry, such as shipping, could help mitigating possible inter-industry variations (Andreou et al., 2012).

Prior studies have investigated M&As in the shipping industry from different perspectives. In this review, current literature is divided into two broad streams including: (i) studies dealing with the motivations and the environmental factors being a reason for M&As, (ii) studies focusing on the economic and financial implications of M&As in the shipping industry.

With regard to the first stream, Brooks and Ritchie (2006) examine the overall pattern of maritime transportation related M&As from 1996 to 2000, on a global scale. They argue that M&As provide strategic advantages different from alliances, while emphasising that each

phenomenon has its own unique benefits. However, Midoro and Pitto (2000) consider M&As in the liner shipping industry as the simplest way to establish a proper organisation, while within a strategic alliances, each party is trying to protect its role and impact. Furthermore, Heaver et al. (2000) position M&As a different place than alliances since merged companies are seeking profit maximisation or enhancement of the logistics chain. Another key finding of the study conducted by Brooks and Ritchie (2006) is that they find that 40% of the M&As are cross-border deals within the investigated period and the shipping industry is following a growth strategy particularly by means of strategic and synergistic consolidation. Similarly, Das (2011) suggests that as the competition increases in the liner shipping industry, the companies are more likely to prefer acquisitions instead of partnerships.

Fusillo (2009) studied structural factors determining M&As in the liner shipping industry with 54 M&A deals. The core aim of the study is to reveal structural features of the liner shipping industry that indicate more proper projections of future consolidation activity. Fusillo (2009) classifies M&As under two headings behavioural, which are deals in an industry based on market misvaluations, and neoclassical, which supports the idea that a merger wave can be followed by the industry shocks such as changes in technological or regulatory environment. The study applies the neoclassical theory of mergers to the US liner shipping sector. The study shows that passage of OSRA3 in the US and the abolition by the EU of the exemption rivalry and liner conference system (Yeo, 2013), which disrupted cooperative dependence amongst shipping companies will cause more M&As deals and further levels of market concentration (Federal Maritime Comission, 2001). Fusillo (2009) also states that there is a positive (negative) relationship between excess capacity (freight rates) and M&As in the liner shipping

industry, which contradicts findings of Alexandridis and Singh (2016) indicating there is a 50% correlation between the value deals and freight rates.

In an investigation into the motives of horizontal M&As and the impact of geographic distance between acquiring and target firms on synergy effects generated by M&As in the liner shipping sector, Yeo (2013) takes the information asymmetry into account which decreases synergistic gains (Böckerman and Lehto, 2006) and finds that geographic closeness between parties has a great importance on takeover flows by examining 120 deals between 2016 and 2017. Specifically, deals between firms which are located close to one another are more prevalent because of increasing information cost with distance. Further, the study provides evidence that larger firms have higher probability for engaging in cross-border and inter-regional M&As.

Syriopoulos and Theotokas (2007) analyse the Stelmar Shipping case to show inadequate corporate governance structure may turn a firm into a takeover target. Stelmar Shipping, which is tanker shipping company, followed a dynamic growth strategy and became a publicly listed company from a family-owned firm. The case study showed that deficient corporate governance was a part of the reason for the company to become a target with other reasons including the conflicts between company founders and shareholders.

Merikas et al. (2011) analyse target and acquirer firms in the shipping industry to find out if two parties can be differentiated from each other in terms of their different financial characteristics. The study analysing 37 targets and 23 acquirers between 1994 and 2009 shows that most of the M&As in shipping have a “disciplinary role” because the acquiring firms are aware of that they are acquiring undervalued assets, mostly cheap vessels, with the aim of producing higher profit margins through a more efficient management. Specifically, the study indicates that the targets are less profitable and inefficient companies in contrast to the

acquirers who are more profitable. Further, the acquirers tend to ignore targets whose financial leverages are high in comparison to their capital.

The review of the first stream of the shipping literature on M&As has demonstrated that companies engaging in M&As aim to utilise possible operational and financial synergies including economies of scale and market share enhancement. Furthermore, sector-specific regulatory changes are found to be influential. Geographical distance between parties involved a deal, corporate governance structures of the companies, and financial performance are also analysed and proved to shape M&As in the shipping industry in various degrees.

Having investigated the first stream of the shipping literature on M&As, the remainder of this chapter reviews the studies focusing on the economic and financial implications of M&As in the shipping industry, which was named the second stream within the scope of this literature review.

Business combinations in the shipping industry aim to serve efficient corporate growth and improved operational performance (Alexandridis and Singh, 2016), as in other industries. However, given the highly complicated process of an acquisition or a merger, expected outcomes of a deal might not be realised. Accordingly, a large and growing body of literature has investigated the issue of value creation through M&As within the scope of corporate finance. Detailed examination of research evidence of value creation through M&As by Bruner (2004) showed that target companies capture the vast majority of value created through M&As, while deals are found to be value destroying for acquirers more often than they are value creator. Although this finding is in line with Alexandridis et al. (2012), which provides evidence from the sixth merger wave, Alexandridis et al. (2017) show that M&As create more value for acquirers post-2009 than ever before.

There are relatively few studies dealing with value creation through M&As in the shipping industry and what is known about this area is largely based upon empirical studies that investigate valuation effects by utilising event studies, which measures cumulative abnormal returns of parties involved in a deal around announcement of acquisitions.

The first systematic investigation of the effects that the announcement of M&As might have on the share price of the firms involved is reported by Panayides and Gong (2002). The aim of the study is to empirically study the reaction of the stock market to the announcement by publicly-listed liner shipping firms of a merger or an acquisition. The fundamental assumption underpinning the use of stock market data to evaluate the impacts of M&As is that expectations about possible dividend streams and future profits are reflected in share prices. Therefore, the standard market model in an event study is utilised to achieve the research aim. The sample of the study comprises four liner shipping companies, P&O Containers, Royal Nedlloyd Line, Neptune Orient Lines, and American President Lines, and two deals completed in 1997. Panayides and Gong (2002) report abnormal returns for individual firms from day -5 to +5 and average cumulative abnormal returns calculated over the 11 days around the deal announcements are 83.06% for the acquirers and 148.06% for the targets. The transactions were amongst the very first consolidation steps in the liner shipping industry and they provided solid synergy benefits for the firms involved (Alexandridis and Singh, 2016).

Syriopoulos and Theotokas (2007) not only provide evidence that deficient corporate governance structure might be one of the reasons of a company becomes a target, but they also examine the impact of three bids for acquiring Stelmar Shipping on shareholder value and report negative (positive) cumulative abnormal returns for bidders (targets) over different event windows. The greatest CAR is found to be 22.13% (when OMI bids to acquire Stelmar) when

calculating from day -10 to +10, while the lowest CAR is calculated during the same event window and reported as -22.40% (OSG bid for Stelmar). The findings of the study are in line with general M&As literature.

Samitas and Kenourgios (2007) conduct a study aiming to investigate the behaviour of tramp shipping companies' stock returns, when they announce a merger or an acquisition. Like the studies discussed above, Samitas and Kenourgios (2007) also applies event study. The study examines a seven-year period between 2000 and 2007, which is an exceptional period in the shipping industry. Data of the study are collected from NASDAQ and NYSE and the study covers 15 deals. Selected firms have different market capitalisations and authors argue that this provides a representative sample. Similar to Syriopoulos and Theotokas (2007), the authors use different event windows. The results stated that acquirers did not manage to create value for their shareholders around announcement dates.

In their uncomprehensive investigation on the impact of M&As on long-term business performance and synergy effects, Choi and Yoshida (2013) analyse two cases from the Japanese shipping industry. The results of the study show that the firms achieved the improvement of their strong financial position and profitability by advancing their asset utilisation ratio, profitability ratio, and financial leverage ratio, by means of M&As.

The main disadvantage of the studies discussed so far is their sample size, which is unsatisfactorily small and fails to provide generalisable conclusions. Furthermore, evidence from studies comprising a narrow span of years can be affected by economic conditions which are peculiar to an individual period. Accordingly, more recent studies with larger data sets and a wider span of years covered have tried to offer results which can be attributable to the

industry. The rest of this chapter is focusing on analysing those studies to draw a more generalisable picture of the shipping M&As literature.

Darkow et al. (2008) analyse the value implication of 200 logistics M&As deals that took place between 1991 and 2006, by using event study methodology. The study investigates value creation in acquirers, targets and combined entities and it is found that significant positive abnormal returns are realised. Using the [-20, +20] event window, CAR for acquirers is found to be 1.81% and 14.81% for targets. However, the significance level increases for acquirer CARs if the event window [-1, +1] is chosen. In contrast to the previous studies, Darkow et al. (2008) examined subsamples and identified that horizontal deals are more successful than those follow a diversification strategy. They also reported that cross-border mergers outperformed national mergers.

Andreou et al. (2012) conduct a study focusing on the valuation effects of M&As in the freight transportation industry, which includes not only sea transportation but also other modes of transportation such as rail and truck. The sample comprises M&As from the Securities Data Corporation's (SDC) database. The time period used is between 1980 and 2009 and the final sample consists of 285 deals. The study estimates CARs for the shareholders of acquirers and targets. It is reported that CARs for acquiring and target companies are found be 2.3% and 24.5%, during the event window [-10, +1], respectively. One interesting result reported in this study is that vertical integrations offer higher synergistic gains than horizontal integrations, which contradicts Darkow et al. (2008) who suggest the opposite. A possible explanation for this difference might be that different time periods covered and/or event windows.

Finally, Alexandrou et al. (2014) perform the most comprehensive study on valuation effects covering 1,266 deals in the shipping industry from 1984 to 2011. The study avoids sample

selection bias by including M&As from all countries and covers more than 25 years, therefore, it reports findings that are robust to fluctuations prevailing in the economic environment. The study also examines deal characteristics such as cross-border vs. domestic integration, focusing vs. differentiation strategy, cash-financed vs. stock financed deals, private vs public targets, and their relationship with the value created. Alexandrou et al. (2014) divide the whole sample into three different categories according to Standard Industry Classification (SIC): (i) Freight Transportation group, (ii) Passengers, Ferries, Marinas and Services group, (iii) Marine Cargo Handling group. This classification enables the authors to analyse valuation effects by different sectors. Event period returns for acquirers and targets are found be 1.2% and 3.3% over the same event window [-3, +1]. One important finding of the test which is performed to find out value creation differences among different regions and sectors is that equity markets evaluate acquirers and targets positively during the announcement period in all regions and sectors. Regarding any possible differences between cross-border or domestic deals, it is reported that market reacts positively to the announcements regardless of deals being cross-border or domestic. Furthermore, it is observed that horizontal deals are more value enhancing, while vertical transactions are better on a small scale. Even though Fuller et al. (2002) suggest that shareholders of acquiring companies gain when they acquire a private firm and lose when they acquire a public firm, Alexandrou et al. (2014) report that bidder firms gain in either case. CARs to acquirers buying a public target, however, are significantly higher than CARs realised by acquirers of private targets. Tests investigating CARs and valuation effects by method of payments show that both acquirers and targets realise significant and positive CARs in either case, while cash-financed deals create more value than stock-financed deals. Finally, the

largest value creation for acquirers is detected in the passengers, ferries, marinas, and services sectors.

2.3. Theories of corporate financing

The discussions of corporate financing behaviour commences with Modigliani and Miller's irrelevance theory. Modigliani and Miller (1958) suggest that the value of a company is independent of how productive assets of the company are financed under perfect capital markets. In other words, internal and external funds are totally interchangeable in a world where there is no taxation, bankruptcy and agency costs and information asymmetry. Relaxing the assumptions of Modigliani and Miller's irrelevance theory, the literature provides three alternative theories that attempt to explain the financing behaviour of companies.

The trade-off theory argues the trade-off between the benefits and costs of debt is the main determinant of capital structure choices (Kraus and Litzenberger, 1973; Frank and Goyal, 2008). Drobetz et al. (2013) explain the two sources of the cost of debt through tax-bankruptcy and agency perspectives: the tax benefits of debt should be balanced against the cost of bankruptcy and financial distress, while the agency cost of debt should be taken into account, which is typically rooted in underinvestment.

The pecking order theory explains corporate financing behaviour with another market imperfection, asymmetric information. Specifically, the pecking order theory does not render an optimal leverage ratio, but it asserts that a company's capital structure decision is an output of the process of minimising adverse selection costs (Myers and Majluf, 1984). According to the conjectural framework, companies tend to use internally generated funds in the first place, and they prefer to raise debt over equity when external funds are required.

In the third strand of the capital structure literature, Baker and Wurgler (2002) explore the relationship between market timing and capital structure. The market timing theory posits that the decision of capital structure depends on the market valuation of debt and equity. Specifically, it argues that companies prefer to issue debt during the times of the cost of debt is relatively low and, along similar lines, prefer to raise equity when equity valuations are auspicious.

2.4. Financing choice in the Shipping Industry

The idiosyncratic characteristics of the shipping industry including capital intensity, asset tangibility and risky equity environment, typically lead shipping companies to rely heavily on debt financing in their capital structures. Drobetz et al. (2013) show that shipping companies follow a target capital structure considering a set of company-specific factors. Their study finds that the standard determinants of capital structure exert a stronger impact in the shipping industry in comparison to other industrial companies. In all alternative specifications, they report a positive and highly significant relationship between asset tangibility and financial leverage ratio, which can be attributable to the high collaterasible value of tangible assets against debt. They also find that profitability, operating leverage, and asset risk are negatively associated with the financial leverage ratio, which corroborates the arguments of the trade-off theory. Furthermore, dividend-paying status is found to be inversely related to the financial leverage ratio, although the relationship lacks statistical significance in almost all specifications. Another important finding of the study suggests that shipping companies adjust their capital structures swiftly in comparison to non-shipping companies. This is an important indicator that the cost of being overleveraged is more pronounced in the shipping industry (Alexandridis et al., 2020).

The literature on the capital structure also suggests that the financing choice of shipping companies can be affected by different market conditions in the shipping industry. Merika et al. (2015) investigate the determinants of capital structure in the shipping industry during different phases of the business cycle and report that there is a negative relationship between profitability and financial leverage ratio in the aftermath of the 2008 crisis. Size, asset tangibility and corporate performance are also found to be significant determinants of the financial leverage ratio.

Drobetz et al. (2016) explore the effect of unanticipated cash-flow changes on the financing and investment decisions of shipping companies during different market conditions. It is found that high asset-value fluctuations lead shipping companies to be more sensitive to cash flow changes. In addition, financially healthy companies are able to issue debt even in the aftermath of the 2008 financial crisis, while financially weak companies are unable to raise funds irrespective of market conditions. In a more recent study, Alexandridis et al. (2020) establish a connection between capital structure and M&As in the shipping industry. Specifically, it is reported that overleveraged companies are less acquisitive and tend to undertake smaller acquisitions. Moreover, staying above the target leverage is shown to be inversely related to the probability of financing an M&A deal with pure cash. It is further argued that the reported relationships are more pronounced in the shipping industry than the rest of the market. Overall, these findings can be considered as an early example of how perfect market proposed by M-M may not exist in the shipping industry because of even more pronounced market imperfections.

2.5. Theories of dividend payout

The amount of profits to be distributed and the amount to be reinvested in a company is determined by the dividend payout policy (Barros et al., 2019). The discussion on the

relationship between company value and dividend payout policy can be traced back to the irrelevance theory of Miller and Modigliani (1961). They argue that company value is not affected by the dividend payout policy and dividends and capital gains are absolute substitutes. Subsequent studies relax the assumptions of the irrelevance theory by recognising the market imperfections that may lead to connections between company value and dividend payout theory.

One strand in the dividend payout literature is focussed around the market imperfection that is rooted in the different tax treatments between dividend income and capital gains. Dahlquist et al. (2014) find that companies are inclined to prefer dividends when the taxation treatments of capital gains and dividends are equal. On the other hand, Elton and Gruber (1970) suggest that investors tend to prefer buybacks when the tax treatment difference between them is high. The intuition behind the different behaviour under the two different scenario is that dividends are ordinarily taxed at a higher rate than capital gains. Supporting the tax-induced clientele effect, Lewellen et al. (1978) show that shareholders in high tax brackets buy low-dividend yielding securities.

The market imperfection of information asymmetry between company insiders and outsiders brings about another perspective to the dividend payout theories. Miller and Rock (1985) state that managers use payout policy to convey information to outside investors about the value of their company. Specifically, it is argued that the payout policy of a company reflects managers' expectations of the company's future. Accordingly, an increase in dividend payout will be perceived positively by outsiders, and vice versa. The proposed relationship is studied and supported by John and Williams (1985) and Makhija and Thompson (1986) among others.

Baker and Wurgler (2004) argue that since the dividend payout irrelevance theory is proposed by Miller and Modigliani (1961), the only market imperfection that is not scrutinised is the market efficiency. Accordingly, they argue that current investment demand for dividend-paying companies is an important determinant of dividend payout decisions. Specifically, the theory postulates that managers are inclined to *"cater"* to investors' appetite by distributing dividends when investors put a relatively higher stock price on dividend payers, and vice versa. In order to empirically test the theory, Baker and Wurgler (2004) develop a proxy for the premium that investors pay, which is calculated as the difference between average market to book ratio of dividend payers and nonpayers. It is reported that the proxy for dividend premiums are significantly and positively associated with the aggregate rate of dividend distribution. Baker and Wurgler (2004) claim that the catering model is an elementary unit in the whole discussion of dividend payout. However, Denis and Osobov (2008) criticise the foundations of the catering model since only weak evidence is provided in favour of the relation between dividend premium and the tendency to pay dividends.

2.6. Dividend payout choice in the shipping industry

Although market imperfections introduced in the previous section render dividend payout policy related to company value, there remains a paucity of evidence on dividend payout policy in the shipping industry. Giannakoulis (2016) suggests that although shipping companies tended to adopt a high payout strategy in response to the appetite of investors for high yield before 2008, the collapse of the shipping market left companies no choice but to cut their payout. In fact, over the last 30 years, shipping companies' dividends to total assets ratio

averaged only 1.2%.[5] Otto and Scholl (2015) explain that the dividend payout decision may be encumbered by the restrictions of the negative covenants in the shipping industry.

In their study of the determinants of capital structure in the shipping industry, Drobetz et al. (2013) argue that more than 75% of the shipping companies pay out dividends, which does not support notion that shipping companies face financial constraints. However, it is further argued that dividend-paying shipping companies may purposely pay dividends and allow capital markets to monitor them so as to obtain equity at reasonable costs. In an alternative reasoning, Drobetz et al. (2013) suggest that investors may have incentives to prefer dividends because most shipping companies enjoy tax exemption, which echoes the arguments of tax treatment theory of dividends discussed in the previous section. In another study, Yeo (2018) looks at the impact of free cash flow (FCF) on investment and dividend decisions. Their empirical results show that the uncertainty in FCF leads shipping companies to cut dividends to maintain investments.

[5] The figure is estimated by using annual data from Compustat Global and North America for companies that operate within the ship-owning, logistics and shipping services and port industries.

Chapter III

Corporate Financial Leverage and M&As Choices: Evidence from the Shipping Industry

3.1. Introduction

The shipping industry is one of the most capital-intensive. Shipping companies' CAPEX-to-Assets ratio averaged around 8% between 1990 and 2018, placing the sector among the top 8th percentile of all sectors.[6] In deep-sea freight transportation, capital investments are almost exclusively associated with vessel purchases, which are in turn financed with debt at more than 40% of capital employed for the average firm (Drobetz et al., 2013). The idiosyncratic characteristics of the shipping industry including the high asset tangibility and equity risk environment, have naturally led to more debt-driven capital structures. More recently, the sector has reached critical levels of borrowing with the world's top 40 banks having a $345bil exposure to the shipping industry (Petrofin, 2018), and an estimate of $150bil of loans provided by European banks alone considered distressed (Reuters, 2017).[7] The high capital intensity and reliance on debt financing associated with shipping companies, coupled with the financial constraints brought forward by the new financing environment, suggest that the success of a shipping company is highly sensitive to its debt policy since deviations from target capital structures can lead to a high cost of financial distress (Drobetz et al., 2013). The corporate finance literature has provided ample evidence that a high degree of leverage in a firm's capital structure can hamper its ability to raise more capital (Hovakimian et al., 2001; Fama and French, 2002; Flannery and Rangan, 2006) and, as a result, limit its flexibility in devising corporate investment policy (Harford et al., 2009; Uysal, 2011; DeAngelo et al., 2011). The impact of financial leverage on corporate investment policy can be

[6] The figures are estimated by using data from Compustat Global for firms that operate within the ship-owning, port, logistics and shipping services sectors.

[7] "Key developments and growth in global ship-finance", Petrofin Global Bank Research, September 2018. "European banks struggle to solve toxic shipping debt problem", Reuters, 24 July 2017.

more pronounced in the shipping industry due to its idiosyncrasies, making it a natural laboratory to study the effects financing policy on corporate investment.

Due to an over-supplied and highly fragmented market, the shipping industry has more recently seen a remarkable wave of consolidation. Between 2008 and 2018, the total value of mergers and acquisitions (M&As) in the sector was more than $566bil, corroborating the view that M&A investments are increasingly viewed as a vital path to growth (inorganic), along with CAPEX (organic growth) which is typically linked to the sale and purchase (S&P) and newbuilding markets.[8] M&As often require external funds as they involve significant amounts of capital (Bharadwaj and Shivdasani, 2003; Harford et al., 2009). Alexandridis and Singh (2016) show that a primary source of financing M&As in the shipping industry stems from borrowings. Consistent with highly levered firms being more constrained in raising additional funds (Myers, 1977; Harford et al., 2009; Martynova and Renneboog, 2009; DeAngelo et al., 2011), the degree of financial leverage has been identified as an important driver of inorganic corporate investment (Uysal, 2011). Since M&As have directly measurable outcomes and constitute an increasingly important corporate growth vehicle for shipping companies, they provide a fruitful testing ground to examine the impact of financial leverage on shipping companies' corporate investment decisions and their outcomes.

To this end, we employ a comprehensive sample comprising 542 firms, 6,695 firm-year observations and 535 acquisition deals in the ship-owning, port, logistics and shipping services

[8] The figure has been estimated using M&A data from Thomson SDC and includes all mergers and acquisitions that took place in the shipping industry over the period between 2008 and 2018.

sectors for the period 1990-2018.[9] We compute *abnormal leverage* using a two-step estimation procedure, which involves first gauging the target leverage for a given firm based on a number of factors and then take the leverage deviation from its target leverage (see Uysal, 2011; Hovakimian et al., 2001).[10] Shipping companies aiming at growing their asset base should be expected to actively adhere to an optimal capital structure and avoid deviations from their target (Drobetz et al., 2013). Our findings corroborate this, although we also document marginally larger extremes in abnormal leverage compared to the overall market as captured in Uysal's (2011) study.

We first investigate whether abnormal debt levels can affect the decision to pursue an acquisition. Consistent with our hypothesis we find a negative relationship between excess leverage in shipping companies and the likelihood to consummate M&As. The magnitude of the effect is not negligible; one standard deviation increase in abnormal leverage results in a 98 basis points decrease of the probability to pursue an M&A deal, which is 38 basis points larger than the one reported by Uysal (2011) for the entire market. We also investigate whether excessive leverage has an impact on deal size as well as the acquisition financing mode. We find that a one standard deviation increase in acquirer excess leverage decreases deal size by $51mil and the probability of paying for a deal with

[9] In our initial tests we include both shipping services and the logistics sector, since they are still within the 26th percentile across all industries in terms of capital expenditures scaled by total assets. Excluding these subsectors from our analysis leave the direction of our results and key conclusions unchanged as discussed in the robustness section.

[10] Following the literature negative values of abnormal leverage are linked to underleveraged firms and positive values are associated with overleveraged firms (see Uysal, 2011; Harford et al., 2009).

cash by 779 basis points, which is three times more pronounced than the effect reported the entire market by Uysal (2011).

Finally, debt has been shown to exert a disciplinary effect on corporate investment by mitigating the agency cost of financial flexibility, which has been linked to the management team pursuing value decreasing projects (Jensen and Meckling, 1976, Harris and Raviv, 1991 and Grossman and Hart, 1982). Accordingly, we expect that acquisitions by overleveraged (underleveraged) shipping firms can be more (less) favourably perceived by the market. Consistent with our conjecture, we find that an increase of one standard deviation in abnormal leverage increases the cumulative abnormal return to the acquiring firm around the acquisition announcement by 90 basis points, corresponding to a $6.33mil gain for the average acquirer in our sample. This result corroborates the role of debt as an effective internal control mechanism; financially restricted firms are incentivised to focus on the most profitable investment opportunities and are, thus, more cautious in selection of acquisition targets.

Our study contributes to the general corporate finance and shipping finance literature in the following ways. First, it establishes that the impact of financial leverage on corporate investment decisions is more pronounced in sectors with higher financial distress costs such as the shipping industry. This can be attributed to the high cash flow volatility and degree of financial leverage in the sector as well as its capital-intensive nature, which can hamper profitability when a firm is forced to forgo valuable growth opportunities. Second, beyond shipping firms following a target capital structure (Drobetz et al., 2013), we establish for the first time an important link between corporate financing and investment decisions in the shipping industry. The fact that higher debt levels are shown to have a negative effect on acquisitiveness and a positive effect on the quality of corporate investment has direct implications for shipping companies, their management teams and

shareholders, especially for firms with inorganic investment plans in place. A key implication is that financial flexibility should not be viewed as panacea by corporate boards in the shipping industry since it can in fact be detrimental for a firm's investment choices and shareholder value. The significance of the study is also underpinned by the fact that consolidation in the shipping industry has become a popular path toward simultaneously delivering corporate growth as well as a lower degree of market fragmentation. Existing literature on acquisitions in the shipping industry (see e.g. Alexandrou et al., 2014; Alexandridis and Singh 2016) has documented evidence that specific deal and firm characteristics can affect acquisition outcomes. To our knowledge, this is the first study documenting a link between financial leverage and important acquisition characteristics such as the financing mode of a deal, as well as value creation from M&As in the shipping industry. Accordingly, a significant contribution stems from our finding that excess leverage can have a value enhancing role in the shipping industry through its influence on the quality of inorganic investment decisions.

The rest of the paper is organized as follows: Section 2 reviews the related literature and sets our hypotheses. Section 3 presents the data and empirical analysis. Section 4 reports results and discuss the findings. Section 5 discusses the robustness tests. Section 6 concludes the paper.

3.2. Related Literature and Hypotheses Development

3.2.1. Theories of corporate financing choice

One of the main objectives of corporate financing policy is to preserve financial flexibility (Graham and Harvey, 2001b). Financing policies tend to be in line with the aim of securing capital funding for investment in a system where financing frictions can inhibit a company's ability to undertake profitable investment projects (Almeida and Campello, 2010). In a world where

financing frictions are negligible, companies can finance all positive net present value projects by accessing the capital markets (Miller and Modigliani, 1958, 1963). Yet, frictions, such as information asymmetry and distress costs, can limit the capacity of companies to issue more capital. For instance, Bessler et al. (2011) report a negative relationship between information asymmetry and the probability of issuing equity. Lack of financing can lead to missed growth opportunities and, subsequently, to a vicious circle of financing restrictions and distress costs. Therefore, companies aim to adopt an optimal level of debt in their capital structure in order to avoid spiralling financing costs.

The corporate finance literature provides three alternative theories to explain capital structure dynamics. First, the trade-off theory postulates that companies set their capital structure as a function of the costs and benefits of debt (Kraus and Litzenberger, 1973). This theory implies that the decision to raise debt aims at upholding the optimal leverage ratio for the firm. Second, the theory of pecking order (Donaldson, 1961; Myers and Majluf, 1984) posits that companies prioritise their financing sources based on the cost of financing, which tends to increase with asymmetric information. Accordingly, the prediction is that internal financing is used first, then debt, followed by equity only as a last resort. Finally, the market timing theory assumes that firms set their capital structure mix by opting for financing methods which maximise shareholder value (Baker and Wurgler, 2002). The market timing theory advocates that the time-varying fluctuations of equity valuations provide incentives for firms to opt for equity capital when equity valuations are favourable and, similarly, opt for debt capital when the cost of debt is relatively low.

Deviation from the optimal capital structure has been shown to negatively affect company value. This is one of the main predictions of the “trade-off” theory; companies that maintain leverage close to optimal levels are more likely to maximise shareholder value (Modigliani and Miller,

1958; Myers 1977). Conversely, companies that fail to adhere to optimal leverage levels face adversities such as higher financing costs and insolvency. Since the executive team sets the capital structure policy, deviations from optimal leverage are considered signs of managerial inefficiency (Agyei-Boapeah et al., 2018). In other words, efficient managers that are focused on the long-term value maximisation objective are expected to minimise financing costs by adopting an optimal (target) capital structure.

Financial risks are not exclusive to overleveraged companies, since extremely conservative or aggressive debt policies can decrease a firm's debt capacity (Myers, 1977). On one hand, overleveraged firms face the direct financial costs of failing to serve their debt, as well as other indirect costs, such as operational disruptions from retracted credit lines and business partners. On the other hand, underleveraged firms are exposed to the risk of missed growth opportunities due to underinvestment and managerial conservatism (Van Bins et al., 2010), leading to a competitive disadvantage. It is worth noting that overleveraged firms can also forego growth opportunities due to financing restrictions (see e.g. Kayhan and Titman, 2007). While both over- and under-leverage can lead to a firm entering an adverse feedback loop, impeding its growth potential, and compromising its financing capacity (Shenoy and Koch, 1996), the cost of overleverage is shown to be more pronounced than that of under-leverage (Van Bins et al., 2010).

3.2.2. Financing choice in the Shipping Industry

Among the studies focusing on the capital structure of shipping companies, Drobetz et al. (2013) show that shipping firms consider a set of firm-specific factors when setting a target capital structure. Their study demonstrates that the standard drivers of capital structure play a more pronounced role in the shipping industry relative to other sectors. They find a positive relationship between asset tangibility and leverage, which they attribute to the fact that tangible assets, can be

more easily liquidated to compensate creditors in the case of bankruptcy. They also find that profitability, asset risk, and operating leverage are inversely associated with the financial leverage and that shipping companies adjustment their capital structures more rapidly than non-shipping companies. This is an intuitive outcome in light of the evidence in the general corporate finance literature that the larger the magnitude of overleverage, the higher the speed of leverage adjustment (Flannery and Rangan, 2006).

The relationship between capital structure and its drivers can be affected by different market conditions during the various stages of the business cycle. For instance, Merika et al. (2015) investigate 117 publicly listed shipping companies and report a negative relationship between profitability and leverage following the 2008 crisis. The study corroborates that company size, asset tangibility, and corporate performance are prominent determinants of the financing choice. In addition, Drobetz et al. (2016) examine the link between unexpected cash flow changes and financing choices in different market conditions. They find that the financing decisions of shipping companies are more sensitive to cash flow volatility relative to the manufacturing sector due to the high asset-value fluctuations in the sector. Nevertheless, they document that financially weak shipping companies tend to experience constraints in issuing long-term debt regardless of the economic environment, whereas their financially sound peers were able to raise debt even in the aftermath of the 2008 crisis. This suggests that despite the market-wide impact of a crisis, corporate financing policy is primarily affected by idiosyncratic firm characteristics.

3.2.3. Inorganic investment and financing choice

Debt capacity and financial flexibility are important for organic growth and they have been shown to drive inorganic investments, such as M&As. Typically, acquisitions are sizable investments involving a substantial amount of capital that is frequently sourced through external funding (see

e.g., Moeller et al., 2004; Bharadwaj and Shivdasani, 2003). The extant literature has identified a number of M&A financing method determinants. For instance, Faccio and Masulis (2005) report a positive (negative) relationship between financial leverage (asset tangibility) and the share of cash in the financing mix. In a similar vein, acquirers with low spare debt capacity prior to a deal are more prone to use equity financing (Martynova and Renneboog, 2009) and less likely to offer cash as part of the deal consideration (Hu and Yang, 2016; Harford et al., 2009). Financing restrictions have also been shown to negatively affect the acquisitiveness of companies, as well as limit the size of the deals pursued (Uysal, 2011). Further, companies may be able to issue debt faster than equity, which suggests spare debt capacity can entail a strategic advantage when the deal completion timing is an issue (see e.g. Dikova et al., 2010; Agyei-Boapeah et al., 2018).

Corporate governance related issues can also affect the financing choice. Acquirers with concentrated ownership structure may decide to use debt financing in deal-making in order to maintain the ownership status quo (Amihud et al., 1990). This ownership-based dilemma is more pronounced for high-growth firms, where dilution of ownership can lead to existing shareholders foregoing considerable future value (McConnell and Servaes, 1990). The M&A financing choice can also be driving shareholder wealth creation considerations. For instance, stock-financed acquisitions have historically been associated with negative abnormal returns for acquirer shareholders (see e.g., Travlos, 1987), while unsustainable debt levels resulting from an acquisition can also destroy acquirer shareholder value (Harrison et al., 2014). Overall, there is ample evidence that capital structure policy can affect deal financing decisions and outcomes.

Another strand of literature has examined the impact of deviations from target leverage on inorganic investments. When companies are unable to fund sizable investments with internal funds, they are left with the choice of raising debt or issuing equity. The relationship between

financing constraints and M&As decisions has been examined by corporate finance studies. Harford et al. (2009) show that overleveraged companies tend to use less cash in M&As deals. In a more comprehensive study, Uysal (2011) investigates the impact of deviations from target leverage on M&As decisions. He finds that overleveraged firms are less likely to make acquisitions and tend to acquire smaller targets and use less cash in the financing. Overall, these studies point to a negative association between excess leverage and the firm's ability to execute its inorganic investment plans as well as its ability to fund these projects with debt.

3.2.4. M&As in the Shipping Industry

In more recent years, inorganic investment in the form of Mergers & Acquisitions (M&As) has gained pace becoming a fundamental source of growth for shipping companies. As a result, there is also a growing body of literature examining M&As in the shipping industry. These studies have predominantly focused on either the drivers and motives behind shipping M&As (see Brooks and Ritchie, 2006; Midoro and Pitto, 2000; Heaver et al., 2000; Das, 2011; Fusillo, 2009; Alexandridis and Singh, 2016) or their economic outcomes (see Panayides and Gong, 2002; Syriopoulos and Theotokas, 2007; Samitas and Kenourgios, 2007; Merikas et al., 2013; Choi and Yoshida, 2013; Darkow et al., 2008; Andreou et al., 2012; Alexandrou et al., 2014). A common finding in the literature is that acquiring firms aim at capitalising on operational and financial synergies, such as economies of scale, as well as from increasing their market share. Further, it has been shown that shipping M&As create value for both target and acquirer shareholders, while the bulk of the gains tend to be captured by target companies. The literature has pointed to specific deal and firm characteristics as key drivers of Shipping M&As. Alexandrou et al. (2014) examine the most comprehensive sample covering 1266 M&A deals in the shipping industry and report that cumulative abnormal returns (CARs) for acquiring firms are higher in domestic, all-cash, and

Table 3.1. Summary of studies focusing on the economic implications of M&As in the shipping industry.

Study	Sample characteristics	Key findings
Panayides and Gong (2002)	Two deals in the liner segment between 1995 and 1999.	CARs of 83.06% for acquirers and of 148.06% for targets [-5, +5].
Syriopoulos and Theotokas (2007)	Three bids for one firm in the tanker shipping segment in 2004.	Greatest CAR found to be 22.13% for the target and the lowest CAR of -22.40% calculated for one of the bidders using different event windows.
Samitas and Kenourgios (2007)	15 deals taking place between 2000 and 2007 in the tramp shipping segment.	Acquirers did not manage to create value for their shareholders around announcements.
Darkow et al. (2008)	200 deals in the logistics industry between 1991 and 2006.	CARs for entire acquirers and targets found to be 1.81% and 14.81% using event window [-20, +20], respectively.
Merikas *et al*. (2011)	60 companies between 1994 and 2009	Target companies are inefficient and less profitable in contrast to acquirers.
Andreou et al. (2012)	285 deals in the U.S. freight transportation industry between 1980 and 2009.	CARs of 2.3% and 24.5% calculated for acquirers and targets during [-10, +1], respectively.
Choi and Yoshida (2013)	2 cases from the Japanese shipping industry between 1998 and 1999.	Improvements in profitability and asset utilisation ratio through M&As.
Alexandrou et al. (2013)	1266 deals in the whole shipping industry from 1984 to 2011.	Event period returns for acquirers and targets found to be 1.2% and 3.3% over the same event window [-3, +1].
Alexandridis and Singh, 2016	6296 deals in the shipping industry from 1990 to 2014.	High freight rates tend to be linked to upsurge in acquisition activity.

diversifying deals as well as when the acquisition involves a public target. Table 3.1 provides a summary of the samples and findings of key studies in the shipping M&A literature. Despite the

link between capital structure and M&A outcomes, existing literature has not examined their relationship in the context of the shipping industry.

3.2.5. Hypotheses development

Although the literature has provided some valuable insights on M&As and their economic and financial implications, to the best of our knowledge, there is no study that investigates the connection between capital structure decisions and M&A choices in the shipping industry. Deviations from target leverage and their impact on inorganic growth are expected to be particularly important for firms in the shipping industry for at least the following reasons. First, the high capital intensity (CAPEX-to-Assets ratio of 8.3% in our sample) and reliance on debt financing (more than 80% of ship financing in 2017 was through bonds and loans (Alexandridis et al., 2018)) suggest that the success of a shipping company is highly sensitive to its debt policy and that deviations from target capital structure can lead to a high cost of financial distress.[11] Second, the withdrawal of a number of traditional financing players from the market due to the heightened volatility in freight rates and asset prices has led to a financially constrained environment for shipping firms, with significant implications for availability of financing for capital investments. Third, due to an oversupplied, fragmented market, consolidation in the shipping industry has been at an ultimate peak with over $132.3bil invested in M&As during the past 5 years, a large portion of which tends to be financed with debt. Since the average investment required for an acquisition deal is typically larger than the amount required to undertake a single

[11] See Appendix B for a graph depicting the capital intensity of the shipping industry against Compustat Global and North America deciles.

organic investment, the M&A market provides a fruitful testing ground to examine the impact of leverage deviations on firm investment.

Accordingly, an overleveraged shipping firm is expected to face stronger headwinds in raising debt to finance its inorganic investment plans since the likelihood that it becomes insolvent is higher than in other markets. Such adverse scenario could deter creditors from financing shipping deals, and thus highly levered shipping companies should be less likely to consummate acquisitions. Conversely, companies that have undershot their target leverage can be expected to have more access to debt financing, hence being better placed to take advantage of the fast-paced rate of consolidation in the shipping industry to improve their competitiveness. Accordingly, we formulate our first hypothesis:

H1. There is a negative relationship between abnormal leverage and the probability of a firm undertaking an acquisition.

If financial leverage can influence a company's ability to undertake acquisition investments, then it should also affect the size of investments it pursues. Overleveraged acquirers are restricted by their capacity to issue any type of capital. In the case of debt issuance, they may be restricted by debt covenants (Daher and Ismail, 2018) or unwillingness of creditors to provide capital to a company with significant fixed obligations. In the case of equity issuance, investors may require steep discounts when buying into the company in order to increase the expected value of their share in a highly leveraged firm. In both cases, acquirer managers are restricted in the amount of capital they can raise, rendering the pursuit of large investments challenging. Due to these financial frictions, acquirers with excess leverage are expected to conduct smaller deals (see e.g. Uysal, 2011). Given the idiosyncrasies of the shipping industry and the more restricted financing environment, the adverse effect of overleverage on the size of investments could be more

pronounced in this case. Conversely, underleveraged acquirers may be better positioned to tap into the limited capital provided by creditors in the shipping market, therefore being less restricted in pursuing larger acquisitions. The fact that the average shipping M&A deal has increased in size by 14.20% during the last 5 years, makes this an interesting angle to examine.

This leads us to our second hypothesis:

H2. There is a negative relationship between acquirer abnormal leverage and deal size.

Departures from the optimal capital structure can also affect financing decisions. Overleveraged acquirers are less likely to utilise pure cash in the payment consideration (Uysal, 2011), since cash deals are frequently financed with issuance of debt (see e.g. Khoo et al., 2017). Conversely, higher debt levels in the capital structure lead to more equity in the payment mix (see e.g., Faccio and Masulis, 2005; Martynova and Renneboog, 2009). The restrictive financing environment in the shipping industry has led to a wave of stock-for-shock or ships-to-stock deals during the last few years. Thus, the question of whether deviations from optimal leverage can have an impact on financing choices becomes central, especially given the evidence pointing to more favourable M&A outcomes in cash deals. Along these lines, acquirer returns are typically higher for cash deals (Gorbenko and Malenko, 2017), while stock offers have been linked to losses for acquirers (see e.g. Moeller et al., 2005). In the shipping industry, cash deals have been shown to outperform stock deals (Alexandrou et al., 2014). For the reasons above, we conjecture that a shipping firm's capital structure will have an impact on the M&A financing method. Accordingly, we formulate the following hypothesis:

H3. There is a negative relationship between abnormal leverage and the probability of an acquirer utilising cash in the acquisition offer.

Leverage has been advocated as an effective passive internal control mechanism that can help alleviate agency costs by incentivising management to make decisions in favour of shareholder value (see e.g., Jiraporn and Gleason, 2007). On one hand, firms with sizable debt obligations have a higher cost of capital, while an unexpected change in their profitability could also lead to a failure of servicing their debt and push them closer to insolvency. In such circumstances, the executive team has more of an incentive to adopt corporate policies that will maximise firm value, since any value destroying projects can pose an existential threat for the company. On the other hand, firms with spare debt capacity or free cash flow are shown to be more prone to pursuing self-serving investments that can ultimately be detrimental for shareholders (Jensen, 1986). Along these lines, the literature has pointed to a positive relationship between financial leverage and the quality of corporate investment decisions (Uysal, 2011; Hu and Yang, 2016). The reliance on debt financing and prevalence of cash flow volatility in the shipping industry can potentially increase the financial distress costs from having excessive leverage in the balance sheet, which can in turn induce more managerial restraint in inorganic investment choices and deter overinvestment. Accordingly, we formulate the following hypothesis:

H4. There is a positive relationship between abnormal leverage and acquirer stock performance around the deal announcement date.

3.3. Data and Empirical Methodology

Our sample includes internationally listed shipping companies from Compustat Global and North America and spans the period 1990 to 2018. We focus on the shipping subsectors of deep-sea freight transportation, offshore business, passenger shipping, cruise lines, port business, and

logistics and shipping services, with SIC codes between 4400 and 4412.[12] There are 627 firms that meet these criteria corresponding to 8,915 firm-year observations. We drop 1,212 firm-year observations with sales of less than $10mil and where companies have missing data for variables used for the estimation of abnormal market leverage. The final dataset used in the abnormal leverage tests comprises 542 firms and 6,695 firm-year observations. We also collect M&A deal data from the SDC M&A Database for transactions with deal value of $1mil or more. We exclude spin-offs, recapitalisations, self-tenders, exchange offers, and repurchases. Of the 542 firms in our sample, 222 consummated 535 M&A deals during our sample period. Acquirers are listed companies from 48 stock markets with the U.S. comprising 15% of the whole sample, followed by acquirers from Norway (9%) and Japan (8.5%). Around 42% of the deals are cross-border, 20% of the deals are financed with pure cash and in 85% of the cases the target company is a private firm.

The task of gauging target leverage for the companies in our sample is hindered by the fact that the actual leverage target set by a company's management is unobservable to outsiders. In order to address this issue, previous studies have utilised alternative proxy estimates of leverage targets, including the historical average leverage ratio, the industry median leverage ratio, or a fitted leverage estimate (see e.g., Hovakimian, 2004; Shyam-Sunder and Myers, 1999). Since, median industry leverage does not necessarily account for company-specific idiosyncrasies, we follow Kayhan and Titman (2007), Harford et al. (2009), and Uysal (2011) and employ a fitted leverage estimation as our primary method. Along these lines, we, estimate the target leverage ratio by

[12] The allocation of companies to the different subsectors has been performed manually by advising the "S&P Business Description" variable in Compustat and, complementary, the companies' website.

running annual cross-sectional regressions of leverage ratios on key determinants of capital structure.[13] We define abnormal leverage as the difference between the actual and fitted leverage values, which we obtain from the capital structure regressions.

We follow existing literature and employ market leverage as our leverage measure since it tends to incorporate the updated market view on company value and growth opportunities. Along these lines, Harford et al. (2009) focus on market leverage instead of book leverage since most of the theoretical predictions related to leverage are made with respect to market leverage. Borio (1990) also argues that economists typically employ market leverage as it is forward-looking. Indeed, book-leverage might be seen as backward looking, not necessarily reflecting a company's financial health and debt capacity with respect to current market conditions. Welch (2004) suggests that the book value of equity is just a "plug number" that helps balancing the two sides of the balance sheet. In fact, the book value of a company can even be negative, which may lead to measurement problems. Accordingly, Mittoo and Zhang (2008); Harford et al. (2009), Uysal (2011), Morellec and Zhdanov (2008); Agyei-Boapeah et al. (2018), and Ahmed and Elshandidy (2018), amongst others, employ market leverage as their measure of leverage deviation. Along these lines, we define market leverage as the ratio of long- and short-term debt to the market value of assets (Frank and Goyal, 2009; Drobetz et al., 2013). Table 3.2 shows the definitions of our variables.

[13] We follow the methodology of Harford et al. (2009) and Uysal (2011), who estimate target capital structure by running annual cross-sectional regressions. This method is considered superior to the pooled regression method at capturing the time-varying impact of control variables on leverage ratios. Our results remain the same when we use the pooled regression method.

Table 3.2 Variable definitions

Market Leverage	The sum of long-term debt and short-term debt over the market value of assets measured at the end of fiscal year t.
Average Market Leverage	Three-year average market leverage, for years *t-1 to t-3.*
Tangibility	Ratio of fixed assets to total book assets measured at the end of year *t-1.*
Profitability	Ratio of operating income before depreciation over total book assets measured at the end of year *t-1*.
Market-to-book Ratio	Ratio of market value of assets over book value of assets measured at the end of year *t-1*.
Operating Leverage	Ratio of operating expense over total book assets measured at the end of year *t-1.*
Asset Risk	Annualised standard deviation of a company's daily stock price returns over the year *t-1*.
Dividend-paying Status	Dummy variable equal to one if a company pays dividends in year *t-1*.
Size	Natural logarithm of total book assets measured at the end of the year *t-1.*
Acquirer Status	Dummy variable equal to one if a company is an acquirer measured at the year *t.*
Cash Ratio	Cash and cash equivalents to total assets measured at the end of year *t-1.*
Stock Return	A firm's annual stock return over the year *t-1.*
Cross-border	Dummy variable equal to one if the nation of the acquirer and target is different.
All cash	Dummy variable equal to one if a deal is financed with pure cash.
Public target	Dummy variable equal to one if target company is publicly listed.
Diversification	Dummy variable equal to one if business areas of the acquirer and target are different.
Serial Acquirer	Dummy variable equal to one if a company undertakes at least 2 acquisitions in 3 years.
CAR	Cumulative abnormal returns to the acquirer over a 5-day window (-2,+2).
Deal Size	Natural logarithm of deal value($mil) measured at *t.*
Relative Size	The ratio of the deal value (*t)* over total assets of the acquirer measured at the end of year *t-1*.
Intangibility	Ratio of intangible assets (client lists, contract rights, copyrights, goodwill, operating rights, trademarks, and tradenames) over total book assets measured at the end of year *t-1*.
M&A Liquidity	The sum of all deal values for each year divided by the sum of total assets for all companies in a given sector in year *t-1*.
HHI	Sum of the squares of the market shares of all firms sharing the same subsector in year *t-1*.

We follow previous studies (see e.g., Fama and French, 2002; Uysal, 2011) in employing a two-step estimation process. First, we estimate the target capital structure by running annual cross-sectional fractional response regressions of market leverage on the determinants of capital structure. We define the target leverage ratio as the fitted value of the regression (Eq. 3.1).

Abnormal leverage variable is then the actual leverage ratio minus the target leverage ratio (Eq. 3.2).

$$Leverage_{i.t} = \alpha + \boldsymbol{\beta X}_{i,t-1} + e_{i,t} \quad \text{(Eq. 3.1)}$$

$$Abnormal\ Leverage_{i,t} = \ Actual\ Leverage_{i,t} - \ Predicted\ Leverage_{i,t} \quad \text{(Eq. 3.2)}$$

Empirical capital structure studies, typically investigate the properties of leverage ratios by utilising ordinary least square regression models. Since leverage is defined as total debt over total debt plus equity, the leverage ratio is strictly bounded within the range [0. 1]. Since the predicted values of the dependent variables in OLS cannot be restricted within the same interval [0, 1], the OLS estimator is not necessarily an appropriate model for the estimation of target leverage (Ramalho and Silva, 2011). To highlight the issues that can arise with the use of the OLS estimator further, assume a 1 x K vector of independent variables that explain a dependent variable, y, which lies between zero and one:

$$E(y|x) = \beta_1 + \beta_2 x_2 + \cdots + \beta_k x_k = x\beta \quad \text{(Eq. 3.3)}$$

where β is a 1 x K vector that may not reflect the true properties of $E(y|x)$, such as the restriction that the leverage variable can be defined only within the interval [0, 1] in our case. This is due to the fact that there can be non-linear relationships between the explanatory variables and the dependent variable. Papke and Wooldridge (1996) argue that this drawback can be surpassed by modelling the log-odds ratio as a linear function, as long as y does not take value of zero or one:

$$E\left(\log\left[\frac{y}{1-y}\right]\middle|x\right) = x\beta \quad \text{(Eq. 3.4)}$$

The reason this approach might not seem appropriate in our case is that there are a number of firms with null leverage ratios, i.e., some companies have zero outstanding debt in a given year, as shown

in Figure 3.1. To overcome the issues that might arise using Eq. 3.4, Papke and Wooldridge (1996) develop a fractional response model (Eq. 3.5) to cope with bounded dependent variables:

$$E(y|x) = G(x\beta) \quad \text{(Eq. 3.5)}$$

where $G(\cdot)$ is a function satisfying the requirement that predicted values lie in the unit interval. The logistic function, $G(x\beta) = e^{x\beta}/(1 + e^{x\beta})$, and the probit function, $G(x\beta) = \phi(x\beta)$, are the two most popular options employed in the literature (Cook et al., 2008; Ramalho and Da Silva, 2009). The estimation procedure proposed by Papke and Wooldridge (1996) is a quasi-likelihood method which involves the estimation of β in Eq. 3.5 by maximising the Bernoulli log-likelihood function:

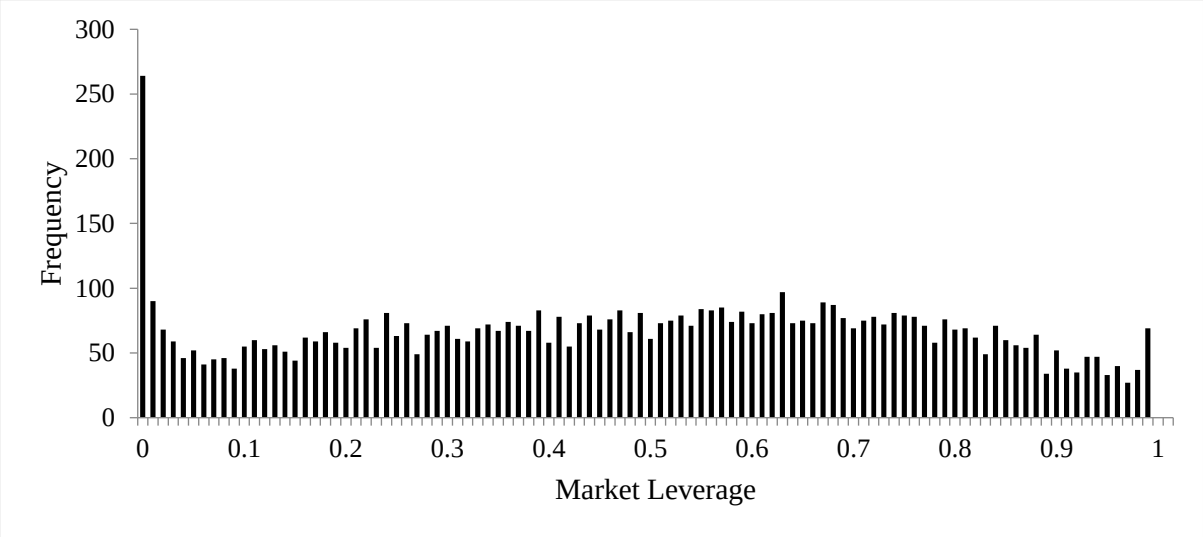
$$l_i = y_i \log[G(x_i\beta)] + (1 - y_i)\log[1 - G(x_i\beta)] \quad \text{(Eq. 3.6)}$$

Since Bernoulli log-likelihood function (Eq. 3.6) is a linear exponential family member, the quasi-maximum likelihood estimator of β will always be consistent (see Gourieroux et al. (1984) for a detailed discussion). Accordingly, we use the following model to run the capital structure regressions:

$$E\left(ML_{i,t}\middle|X_{i,t-1}\right) = G(X_{i,t-1}\beta) \quad \text{(Eq. 3.7)}$$

where ML_{it} denotes the market leverage of a company i at year t, $X_{i,t-1}$ (the 1 x k vector) refers to the explanatory variables of observation i measured at $t - 1$. $G(\cdot)$ is the logistic function fulfilling $0 \leq G(z) \leq 1 \ \forall z \in \mathbb{R}$, which satisfies the requirement that the predicted values lie within the unit interval.

Figure 3.1. Distribution of Market Leverage. The figure shows the distribution of market leverage of 6,695 firm-year observations over the period between 1990 and 2018.



We identify a set of determinants that have been shown to affect firm financing decisions. Following Harford et al. (2009) we measure the explanatory variables in year $t-1$. We include asset tangibility as a measure of a company's ability to provide collateral for the issuance of debt. Companies with high tangibility can use more debt financing since tangible assets can be used as collateral for bank loans (Jensen and Meckling, 1976). In addition, Hovakimian et al. (2001) show that firms with more tangible assets tend to be larger with a lower bankruptcy risk. As Drobetz et al. (2013) note, the association between asset tangibility and financial leverage falls within the predictions of the trade-off theory.

Trade-off theory also predicts a positive relationship between profitability and financial leverage since higher profit levels can cater towards servicing of larger debt payments. Yet, pecking order theory counter-argues that more profitable companies are able to use internal funds for capital investment, therefore predicting a negative association between profitability and financial leverage.

Similarly, there is no consensus over the role of company size on financial leverage. The trade-off theory predicts a positive relationship between size and financial leverage as larger companies tend

to be more diversified and have a lower probability of default. On the other hand, the pecking order theory points to a negative relationship between company size and leverage since information asymmetry is less of an issue for large companies, thus leading to more frequent use of equity in place of debt capital.

We also include the market-to-book ratio as a proxy for growth opportunities. The trade-off theory predicts an inverse relation between growth opportunities and financial leverage since growth firms tend to be subject to higher financial distress costs as well as higher agency costs due to potential underinvestment problems (Myers, 1977; Drobetz et al., 2013). Conversely, the pecking order theory predicts a positive relationship between growth opportunities and leverage since companies are more likely to borrow beyond their debt capacity during periods of high growth opportunities when internally generated cash flow is not sufficient (Baker and Wurgler, 2002). We also include the stock return since companies may choose to rely on equity issues and raise little debt under favourable stock market conditions (Baker and Wurgler, 2002), which suggests a negative relationship between stock return and financial leverage.

In addition to the standard capital structure variables, we introduce a set of additional control variables that may have an impact on shipping companies' capital structure decisions (Drobetz et al., 2013). Companies with more volatile asset values may be able to issue less secured debt. Therefore, we include an asset risk variable in our regression. Moreover, the trade-off theory predicts an inverse association between asset risk and financial leverage because of higher expected bankruptcy costs for companies with riskier assets. Following Kahl et al. (2011), we also include operating leverage as a proxy of fixed production costs. Higher operating leverage increases the company's exposure to the business cycle. Therefore, we expect companies with higher operating leverage to have lower levels of financial leverage. Further, companies paying

dividends tend to have lower financial leverage as dividend payments decrease the net cash flow, leading companies to resort to external financing for their operating needs (Frank and Goyal, 2009). Lemmon et al. (2008) find that an unobserved time-invariant effect drives most of the variation in leverage levels, which, can in turn, lead to relatively stable capital structures. Accordingly, we include one year lagged market leverage to control for the unobserved time invariant firm effects (see also Baker and Wurgler (2002); Uysal (2011); Hu and Yang (2016)). We also include subsector dummies in all cross-sectional regressions to control for the variation in company characteristics among subsectors.

Table 3.3 reports the descriptive statistics for our sample. Market leverage has an average of 0.47 and a standard deviation of 0.27. The relatively high standard deviation points to a wide variation in capital structures in the shipping industry. This variability can be attributed to the idiosyncratic characteristics of each company, which are the key drivers of their capital structure, according to the trade-off and pecking order theories. A direct implication of this is that some under-leveraged or over-leveraged companies in our sample can display similar leverage ratios. Abnormal leverage is almost zero on average but with a relatively high standard deviation. This suggests that, while the average company follows a target capital structure, some firms deviate from their capital structure targets. We also see that 61% of the typical firm's assets are tangible, while for the most capital-intensive firms, asset tangibility can exceed 90%. The average Market-to-Book ratio of 0.60 is lower than the ratios reported in other shipping studies (Alexandrou et al., 2014; Drobetz et al., 2016). This could be attributed to the sample differences with respect to the shipping subsectors and time periods examined. For instance, the offshore business is associated with lower market-to-book ratios relative to other subsectors over the sample period. Further, the market-to-

Table 3.3. Descriptive Statistics. The descriptive statistics show the number of firm-year observations, the mean, standard deviation, minimum, and maximum value of each variable. The data is collected from Compustat Global and North America and the frequency is annual. All variables apart from dividend-payer, all cash, public target, cross-border, diversification, and serial acquirer are winsorized at the upper and lower one percentile levels. See the Appendix A for the definition of variables.

	Observations	Mean	Std. Dev.	Min	Max
Market Leverage	6,695	0.474	0.277	0.000	0.981
Abnormal Leverage	6,111	0.000	0.114	-0.832	0.778
Tangibility	6,695	0.610	0.222	0.017	0.948
Profitability	6,695	0.092	0.068	-0.095	0.329
Operating Leverage	6,695	0.479	0.474	0.021	2.653
Total Assets ($ mil)	6,695	1480	10,100	2.07	776,000
Market-to-book	6,695	0.600	0.672	0.011	3.978
Asset Risk	6,695	0.193	0.149	0.006	0.857
Stock Return	6,695	0.113	0.568	-1.398	2.166
Dividend-payer	6,695	0.509	0.499	0.000	1.000
Intangibility	6,695	0.027	0.069	0.000	0.441
Cash Ratio	6,695	0.368	0.253	0.000	0.926
CAPEX to Total Assets	6,695	0.081	0.096	0.000	0.509
Herfindahl-Hirschman Index	6,695	0.105	0.097	0.037	0.602
Industry M&A Liquidity	6,159	0.008	0.010	0.000	0.061
All Cash	535	0.205	0.404	0.000	1.000
Public Target	535	0.151	0.358	0.000	1.000
Cross-border	535	0.418	0.493	0.000	1.000
Diversification	535	0.285	0.452	0.000	1.000
Serial Acquirer	535	0.405	0.491	0.000	1.000
Deal Size ($ mil)	371	189	563	1.06	9,260
CAR	497	0.009	0.061	-0.164	0.205

book ratio is lower during 2011- 2018, which is a period not included in the aforementioned studies.

We test the effect of abnormal leverage on shipping companies' acquisitiveness by employing a probit model as in Uysal (2011), where the dependent variable is binary and takes the value of 1 if a company undertakes at least one acquisition in year t and 0 otherwise (H1). The model is as follows:

$$P_{it}(Acquirer = 1) = \phi(\alpha_{10} + \alpha_{11} Abnormal\ Leverage_{i,t-1} + \alpha_{12} Z_{i,t-1}) \quad \text{(Eq. 3.8)}$$

where $P_{it}(Acquirer = 1)$ is the probability of firm i being an acquirer in year t. ϕ is the probit function, i.e., the inverse cumulative distribution function of the standard normal distribution. Abnormal leverage is a continuous variable defined as the difference between actual and predicted leverage. The αs represent the intercept (α_{10}), the coefficients for the abnormal leverage variable (α_{11}), and the vector of coefficients for the control variables (α_{12}).

We also investigate the impact of abnormal leverage on the size of acquisition deals completed by the acquiring firms in our sample, since higher leverage levels can hamper a firm's ability to raise sufficient funds to undertake large acquisitions (H2):

$$Log(Deal\ Value)_{it} = \alpha_{20} + \alpha_{21} Abnormal\ Leverage_{i,t-1} + \alpha_{22} Z_{i,t-1} + \varepsilon_{23} \quad \text{(Eq. 3.9)}$$

Next, we investigate if abnormal leverage has an impact on the probability of making a deal financed with pure cash (H3):

$$P_{it}(All\ Cash = 1) = \phi(\alpha_{30} + \alpha_{31} Abnormal\ Leverage_{i,t-1} + \alpha_{32} Z_{i,t-1} + \varepsilon_{33}) \quad \text{(Eq. 3.10)}$$

Where $P_{it}(All\ Cash = 1)$ is the probability of firm i undertaking a deal financed only with cash consideration, i.e., 100% cash.

Finally, we test if abnormal leverage has an impact on acquisition gains (CARs) around acquisition announcements (H4). CARs are estimated for a 5-day announcement window (-2,+2) using the standard market model (Brown and Warner, 1985). The parameters of the model are estimated from day -255 to day -45 relative to the deal announcement day.

$$CAR_{it} = \alpha_{40} + \alpha_{41} Abnormal\ Leverage_{i,t-1} + \alpha_{42} Z_{i,t-1} + \varepsilon_{43} \quad \text{(Eq. 3.11)}$$

The control variables in Equations 3.8 to 3.11 are company- and sector-specific characteristics that have been shown to affect the response variables. We include a company profitability variable to account for the accounting performance of companies, since better performing firms tend to execute more acquisitions (Harford, 1999). Large firms are also more likely to pursue more acquisitions as it is easier for them to tap into the capital markets for external financing (Moeller et al., 2004 and Uysal, 2011). Accordingly, we include a size variable defined as the natural logarithm of total assets. We also include stock returns since companies with superior stock performance can resort to acquisitions to support their fast-paced growth (Shleifer and Vishny, 2003). In addition, they may have better access to inexpensive equity capital, which could in turn facilitate deal-making. We include the cash ratio to account for companies holding more cash being more acquisitive (Jensen, 1986). We use the market-to-book ratio in order to control for growth opportunities (Jovanovic and Rousseau, 2002). We use the capital expenditures-to-total assets ratio to account for internal growth (Harford et al., 2008). Further, Uysal (2011) argues that a concentrated market offers fewer target companies to be acquired. Along these lines, we include the Herfindahl-Hirschman Index as a proxy for market concentration for each subsector. To control for M&As waves and market liquidity, we include industry M&A liquidity for six subsectors in our sample (Schlingemann et al., 2002). Since high levels of leverage does not necessarily indicate extreme overleveraging, to disentangle the impact of abnormal leverage from normal levels, we include average market leverage. We also include relative size since acquirer returns have been shown to increase with relative size (Masulis et al., 2007) while the probability of undertaking an acquisition with cash decreases for larger deals (Faccio and Masulis (2005).

In some specifications we also include deal-specific characteristics to control for the impact of target public status and target business segments.[14] In the acquisition probability models, we include asset intangibility to control for the impact of brand name, reputation, and the capability to share experience on shipping M&As. Along these lines, it has been argued that a company's intangible capital may create synergistic benefits through transfers of knowledge and experience (Huyghebaert and Luypaert, 2010) while Drobetz et al. (2019) show that the share of intangible assets in total assets has a significantly positive impact on market value and accounting performance. In equation 10, we include the standard deviation of the acquiring firm's daily stock return for the year prior to the acquisition announcement following Faccio and Masulis (2005) who argue that higher acquirer stock return volatility makes stock financing more advantageous, due to the opportunity to take advantage of issuing overvalued stock. They also argue that higher stock return volatility can make cash financing through debt less beneficial due to the higher cost of debt in this case. Finally, we include year dummies to account for changes in the macroeconomic environment.[15]

[14] We would like to note that our sample size decreases steeply when attempting to include any other variables for public targets. Indicatively, we have 55 public-target deals out of a total of 267 acquisitions in some of our models, while further, target specific/accounting variables are only available for around half of these 55 cases. Yet, our study focuses on the leverage decisions of the acquiring firms, therefore, there is limited reason to expect that target-specific information is directly relevant.

[15] See the Robustness Tests section for the results with the shipping crisis dummy instead of separate year dummies.

3.4. Empirical Results

In this section, we present the main empirical results of our analysis. We first discuss the results of the capital structure regressions and the abnormal leverage variable. We then present the results from testing our four hypotheses.

3.4.1. Capital Structure Regressions

We estimate the target leverage ratio in two stages. We first run annual regressions of leverage ratios on key determinants of capital structure (see e.g. Frank and Goyal, 2003; Uysal, 2011). Then, we estimate the target leverage as the fitted value of leverage for each firm-year observation. Table 3.4 presents the results of the capital structure regressions for a number of selected years in our sample.

The reported marginal effects for the independent variables display similar direction to prior studies (Frank and Goyal, 2009; Drobetz et al., 2013). The magnitude of the coefficients, however, varies significantly over different selected years. Asset tangibility yields a positive coefficient in all reported years, while its impact becomes stronger in 2009 reflecting the significance of tangible assets for raising debt during unfavourable market conditions. Indicatively, in 2009, a one standard deviation increase in asset tangibility is associated with 236 basis points increase in the debt ratio. Profitability displays the opposite effect on market leverage, bearing negative coefficients across all specifications. Operating leverage shows mixed results, with a negative influence on market leverage in 2014 and 2015. Specifically, in 2015, we report that one standard deviation increase in operating leverage leads to 325 basis points decrease in market leverage.

Table 3.4. Target Capital Structure Regressions. The table presents the results of capital structure regressions of leverage ratio on relevant determinants for selected sample years. Reported coefficients are average marginal effects. p-values are calculated by clustering the standard errors at the firm level and the standard errors are given in parentheses. Industry fixed effects indicate if the specification includes industry dummies for the six subsectors. Statistical significance levels of 10%, 5%, and 1% are denoted with *, **, and ***, respectively.

	1996	1997	2008	2009	2014	2015
Tangibility	0.125	0.046	0.054	0.105**	0.007	0.020
	(0.096)	(0.078)	(0.044)	(0.050)	(0.042)	(0.040)
Profitability	-0.140	-0.683**	-0.214*	-0.188	-0.328**	-0.176
	(0.219)	(0.280)	(0.109)	(0.128)	(0.156)	(0.123)
Operating leverage	0.030	0.040	-0.007	-0.015	-0.051***	-0.067**
	(0.033)	(0.030)	(0.015)	(0.017)	(0.019)	(0.027)
Asset risk	0.486**	0.506***	0.238***	-0.322***	-0.252**	0.145
	(0.234)	(0.155)	(0.070)	(0.077)	(0.100)	(0.100)
Dividend-payer status	0.011	0.002	-0.005	-0.017	0.029**	0.012
	(0.030)	(0.024)	(0.015)	(0.014)	(0.014)	(0.016)
Size	-0.008	0.002	0.064***	0.007	-0.005	0.016
	(0.028)	(0.021)	(0.011)	(0.011)	(0.014)	(0.014)
Market-to-book	-0.022	-0.055	-0.043***	-0.153***	0.010	-0.090***
	(0.047)	(0.041)	(0.013)	(0.058)	(0.031)	(0.024)
Lagged market leverage	0.947***	0.805***	0.918***	0.459***	0.710***	0.645***
	(0.119)	(0.100)	(0.062)	(0.103)	(0.055)	(0.061)
Stock return	-0.039	-0.082**	0.028	0.026*	0.046	-0.015
	(0.064)	(0.034)	(0.020)	(0.013)	(0.029)	(0.022)
Sector fixed effects	YES	YES	YES	YES	YES	YES
N	107	133	279	303	327	317
Prob>chi2	0.000	0.000	0.000	0.000	0.000	0.000
Pseudo r^2 (%)	16.22	20.33	18.41	20.58	19.94	22.17

The variable capturing asset risk provides mixed results, offering support for competing capital structure theories during different time periods. In 1997, a one standard deviation increase in asset risk is associated with 584 basis points increase in market leverage. This relationship is in line with the pecking order theory, which predicts that companies with more volatile asset values tend to use more debt due to higher adverse selection and information asymmetry costs. In contrast, following the 2008 financial crisis, we find a negative and significant association between asset risk and market leverage. This new relationship provides support for the trade-off theory, which

predicts that companies with riskier assets are inclined to use less cash because of higher bankruptcy costs (Drobetz et al., 2013). Our results on the impact of dividend-payer status, size, and stock return variables are also mixed. The coefficient of the market-to-book ratio, which might capture both market valuation and growth opportunities, is consistently negative over the years. This is in accordance with Myers (1977) predicting that companies with high growth opportunities are potentially exposed to higher cost of financial distress, and, thus, use less debt in their capital structure. The effect is economically significant. Indicatively, in 2015, a one standard deviation increase in the market-to-book ratio leads to a decrease of 608 basis points in market leverage. Finally, the coefficient of lagged market leverage is positive and statistically significant over the years, which is consistent with arguments that corporate capital structure has a stationary element (Lemmon et al., 2008; Baker and Wurgler, 2002; Uysal, 2011).

We estimate the target leverage for each firm-year observation by calculating the fitted leverage value using the regressions in Table 3.4. We then compute the abnormal leverage for each firm-year observation by subtracting each company's target leverage ratio from its market (actual) financial leverage ratio (see Eq. 3.2). Positive and negative abnormal leverage indicate over-leverage and under-leverage, respectively. Figure 3.2 shows the distribution of abnormal leverage for all firm-year observations in our sample. The slightly leptokurtic shape of the distribution indicates that the vast majority of shipping companies are successful at maintaining their market leverage close to optimal levels.

Figure 3.2. Distribution of Abnormal Leverage. The graph shows the distribution of abnormal leverage of 6,111 firm-year observations. We define the abnormal leverage as the difference between actual leverage and the fitted value of regressions predicting leverage.

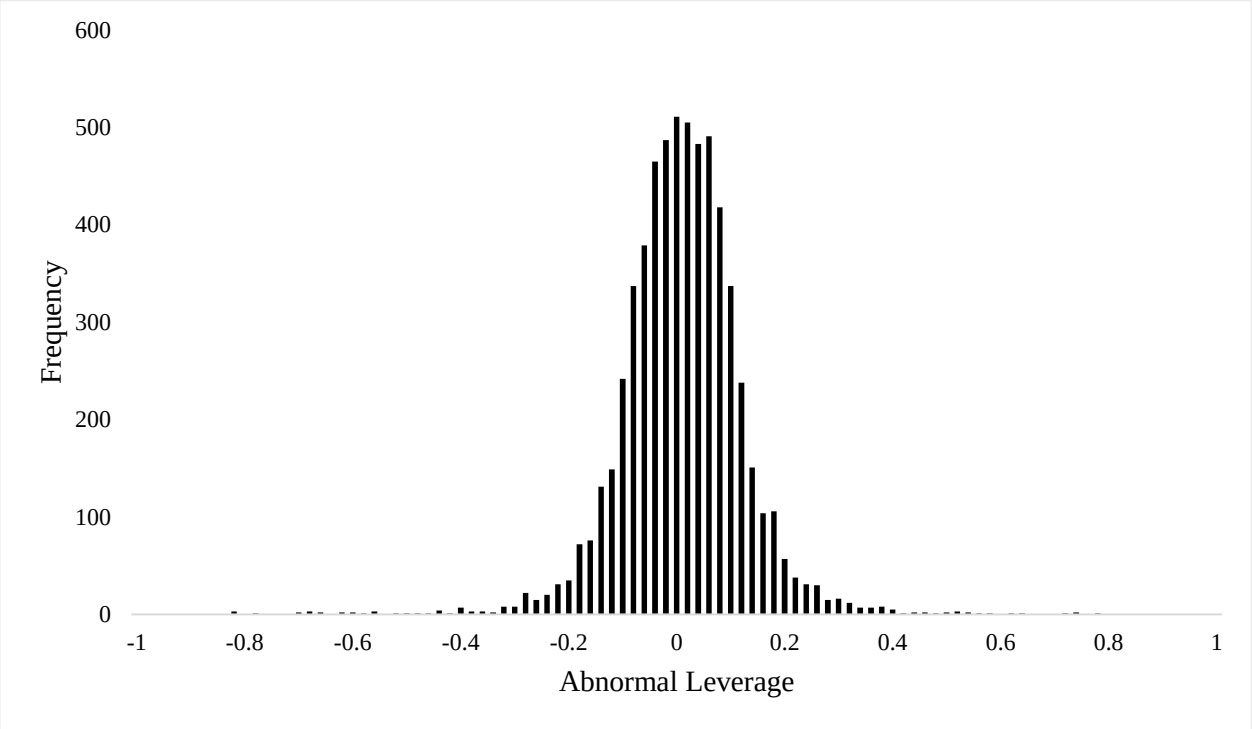
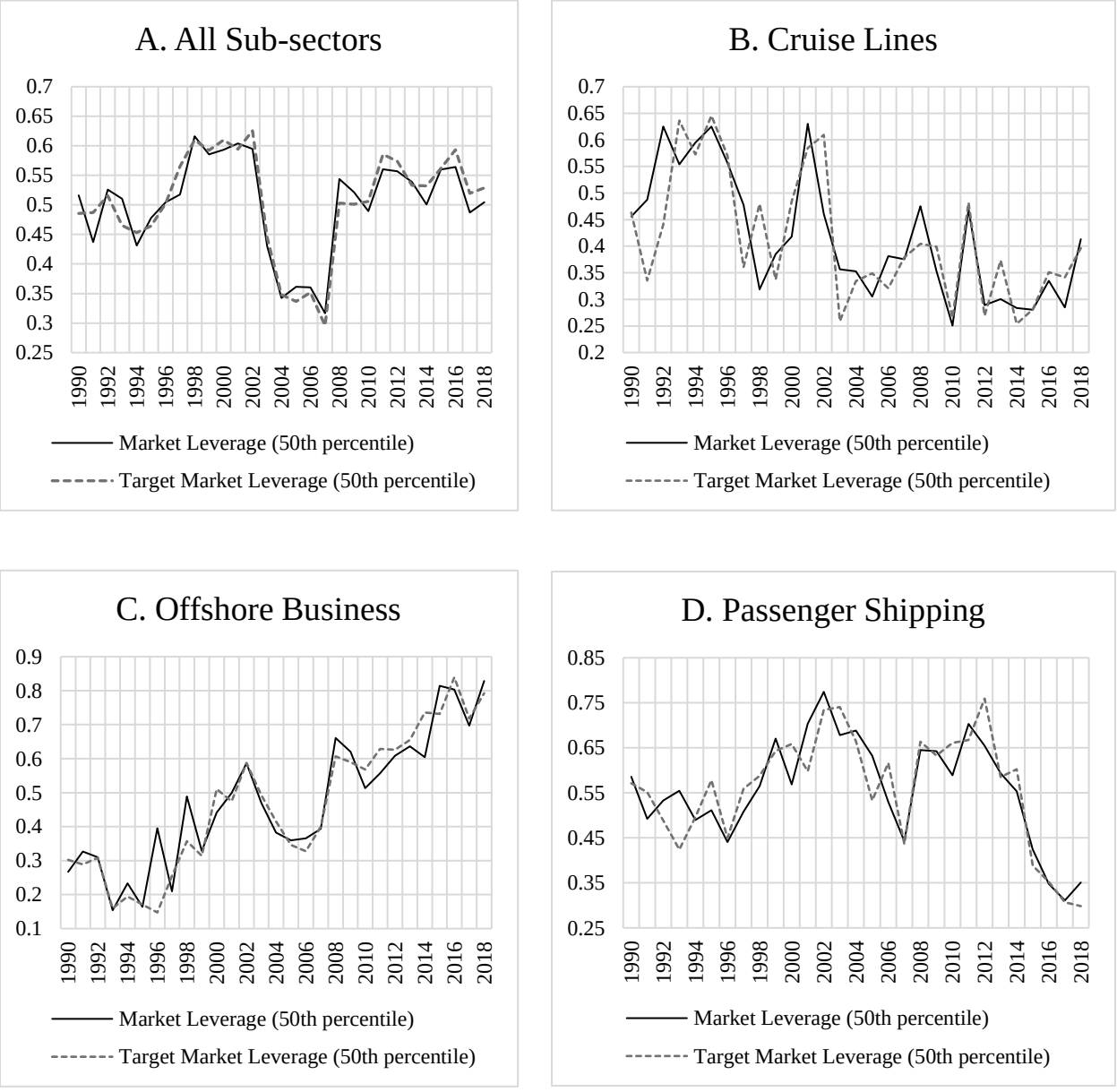
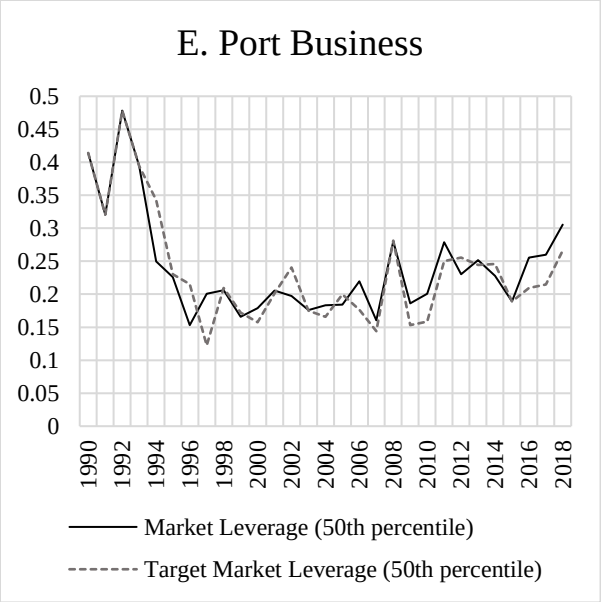


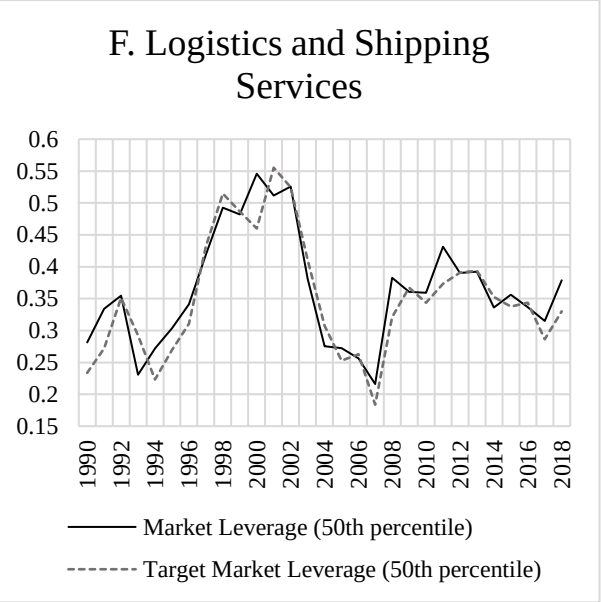
Figure 3.3. shows the evolution of target and market leverage for both the aggregate ship-owning sector and the corresponding subsectors. Panel A in Figure 3.3 shows that, overall, companies are successful at maintaining their leverage ratios close to target levels, although market conditions can lead to shifts in their capital structure policy. For instance, while the median company is over-leveraged during the pre-crisis market boom period before 2008, the median company undershoots its optimal leverage after the crisis (Panel A). This shift in capital structure policy is consistent with the prediction of the trade-off theory that a company's target leverage is expected to be lower during higher market valuation periods (Drobetz et al., 2013). The various subsectors in our sample show more volatile movements for target and market leverage relative to our entire sample, but, overall, the median company has been successful at maintaining a market leverage close to target levels. This situation could be attributed to the pressure applied by banks and other creditors to

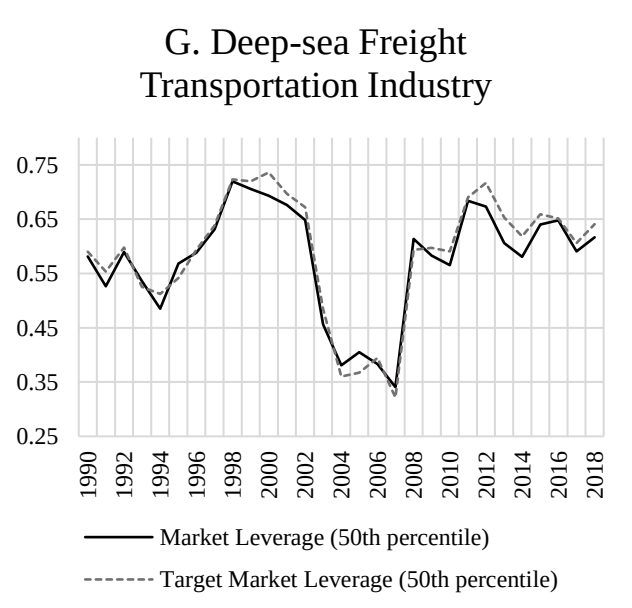
shipping companies with respect to keeping their leverage ratios close to target levels (Drobetz et al., 2013).

Figure 3.3. Evolution of target market leverage over the sample period. Figures A to G show the median values of market leverage and target market leverage over the sample period. Market leverage is the ratio of the sum of long- and -short term debt to the market value of assets and target market leverage is the fitted value of annual cross-sectional capital structure regressions.









3.4.2. Acquisition Probability Models

The link between corporate investment and financing decisions is well established in the corporate finance literature. Accordingly, the inorganic investment strategy is often driven, among other factors, by the company's capital structure policy. In this section, we present the results of the acquisition probability model using abnormal leverage as a key predictor of acquisitiveness (H1).

Panel A in Table 3.5 presents various specifications of the acquisition probability model. The binary dependent variable takes the value 1 if the company has performed an acquisition in year t and 0 otherwise. Our findings are consistent with the prediction of our first hypothesis, i.e., the probability of a firm completing an acquisition decreases with abnormal leverage. Column VI in Panel A shows that abnormal leverage has negative and significant impact on the probability of a company being an acquirer after accounting for other known determinants of acquisition activity. We find that an increase of one standard deviation in abnormal leverage in the shipping industry decreases the probability of a company consummating an acquisition by 98 basis points, which is significantly more pronounced as the effect documented for the overall market (Uysal, 2011). This is indicative of the importance of leverage for shipping companies in devising corporate policy; the propensity to pursue inorganic investment among shipping firms is more responsive to deviations from optimal leverage, possibly due to the higher tendency of shipping firms to adhere to an optimal leverage target by rapidly adjusting their leverage ratios back to the target. Furthermore, we report the predictive ability of our models. The type I and type II errors in model VI is 15% and 41%, respectively[16]. The values suggest that, for 15% of the acquirers, the model does not send a signal of being an acquirer. On the other hand, type II error of the model suggests that the model incorrectly sends a signal of being acquirer for 41% of observations that are not acquirers. Bussiere and Fratzscher (2006) argue that type II errors might be less of a problem since higher type II costs do not necessarily suggest a predictive failure of the model, but may be an indicator that although the company has the properties to become an acquirer, it does not choose to pursue an M&A deal. On the other hand, the cost of type I errors tends to be significant given that the model aims to detect acquirer firm-year observations correctly.

[16] The threshold that we use is the median of the fitted values that are obtained from the regressions.

Table 3.5. *Acquisition Probability Models.* The table reports probit regressions of the acquisition probability on the abnormal leverage and other control variables. Panel A reports the coefficient estimates based on full sample. Panel B reports the coefficient estimates based on the shipowner industry and rest of the shipping market (RoSm). The target leverage is obtained from cross-sectional regressions of capital structure based on FRM with a logit function. Abnormal leverage is the difference between actual and target leverage. The dependent variable takes the value of 1 if the firm is an acquirer in year t and 0 otherwise. Reported coefficients are average marginal effects. Columns I to III present results of the acquisition probability regressions without the main variable of interest. The abnormal leverage variable is included in models IV, V and VI. Some specifications include year fixed effects and sector-specific variables. Estimated p-values are clustered at company level and standard errors are given in parentheses. Statistical significance levels of 10%, 5%, and 1% are denoted with *, **, and ***, respectively.

Panel A. Coefficient estimates based on the entire shipping industry

	I	II	III	IV	V	VI
Profitability	0.146**	0.106	0.071	0.137*	0.097	0.061
	(0.076)	(0.069)	(0.070)	(0.076)	(0.069)	(0.069)
Asset intangibility	0.185**	0.159*	0.190**	0.193**	0.167**	0.199**
	(0.087)	(0.085)	(0.087)	(0.087)	(0.085)	(0.087)
Cash ratio	-0.015	-0.037*	-0.014	-0.016	-0.038*	-0.015
	(0.019)	(0.021)	(0.020)	(0.019)	(0.021)	(0.020)
Capex to total assets	0.009	0.012	0.018	0.027	0.032	0.038
	(0.047)	(0.047)	(0.046)	(0.048)	(0.047)	(0.047)
Size	0.066***	0.063***	0.066***	0.065***	0.062***	0.065***
	(0.010)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Market-to-book ratio	-0.000	0.002	0.000	-0.001	0.000	-0.000
	(0.009)	(0.008)	(0.008)	(0.009)	(0.009)	(0.008)
Stock return	0.009	0.006	0.010	0.002	0.000	0.002
	(0.007)	(0.007)	(0.008)	(0.008)	(0.007)	(0.009)
M&A liquidity		0.031	0.004		0.033	0.007
		(0.022)	(0.034)		(0.022)	(0.034)
Herfindahl-Hirschman index		0.040	0.007		0.041	0.004
		(0.048)	(0.070)		(0.048)	(0.070)
Average market leverage	-0.056**	-0.054**	-0.061***	-0.054**	-0.052**	-0.058**
	(0.023)	(0.022)	(0.023)	(0.023)	(0.022)	(0.023)
Abnormal leverage				-0.080**	-0.081**	-0.087**
				(0.039)	(0.037)	(0.038)
Year fixed effects	YES	NO	YES	YES	NO	YES
N	5,129	4,756	4,756	5,109	4,742	4,742
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000
Pseudo r^2 (%)	7.61	5.54	7.54	7.69	5.62	7.63
Type I error (%)	15	19	16	16	19	15
Type II error (%)	41	41	40	36	41	41

Panel B. Coefficient estimates based on the shipowners industry and the rest of the shipping market (RoSM)

	Shipowners			RoSM		
	I	II	III	IV	V	VI
Profitability	0.067	0.132*	0.061	0.073	0.094	0.075
	(0.083)	(0.074)	(0.084)	(0.109)	(0.114)	(0.108)
Asset intangibility	0.399***	0.337***	0.415***	0.152	0.136	0.161
	(0.122)	(0.123)	(0.119)	(0.105)	(0.101)	(0.106)
Cash ratio	0.011	-0.019	0.009	-0.029	-0.043	-0.032
	(0.021)	(0.022)	(0.021)	(0.038)	(0.041)	(0.038)
Capex to total assets	-0.038	-0.036	-0.014	0.174*	0.144*	0.227
	(0.058)	(0.059)	(0.057)	(0.091)	(0.086)	(0.096)
Size	0.073***	0.068***	0.071***	0.057***	0.052***	0.058
	(0.012)	(0.012)	(0.012)	(0.015)	(0.015)	(0.016)
Market-to-book ratio	-0.006	0.001	-0.006	-0.003	-0.006	-0.005
	(0.015)	(0.015)	(0.015)	(0.009)	(0.009)	(0.009)
Stock return	0.007	0.008	-0.005	0.028*	0.012	0.011
	(0.010)	(0.008)	(0.010)	(0014)	(0.014)	(0.015)
M&A liquidity				0.063*	0.030	0.063
				(0.038)	(0.034)	(0.038)
Herfindahl-Hirschman index				0.091	0.150*	0.078
				(0.106)	(0.082)	(0.106)
Average market leverage	-0.055*	-0.048	-0.048	-0.090**	-0.091***	-0.086**
	(0.033)	(0.030)	(0.033)	(0.035)	(0.034)	(0.035)
Abnormal leverage			-0.100**			-0.183***
			(0.049)			(0.064)
Year fixed effects	YES	NO	YES	YES	NO	YES
N	2,996	2,996	2,959	1,910	1,910	1,907
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000
Pseudo r^2 (%)	9.25	6.12	9.42	7.90	5.50	8.74
Type I error (%)	15	16	16	21	28	19
Type II error (%)	40	41	40	43	44	43

Several control variables are related to the propensity of a shipping company to engage in acquisitions. Size has a positive and significant effect on acquisitiveness in all models. In model VI, an increase of one standard deviation in size leads to an increase of 405 basis points in the probability of pursuing an acquisition, which is more than twice the effect reported for the overall market (Uysal, 2011). Further, the likelihood of undertaking acquisitions seems to be linked to a firm's profitability, though only in some specifications. Asset intangibility displays a positive and

significant effect on acquisitiveness across all regressions. A possible explanation is that the larger a company's intangible asset base, the greater its ability to capture synergistic benefits from delivering knowledge to the target company (Huyghebaert and Luypaert, 2010). The Herfindahl-Hirschman Index (HHI), a measure of market concentration, is not a significant determinant of acquisition likelihood, which differs from the finding in Uysal (2011). This suggests that acquirers may pursue deals regardless of market concentration levels which could be attributed to the competitive nature of the shipping industry, where shipping companies seek to enhance their market power regardless of market conditions. On a similar note, the coefficient of M&A Liquidity is also insignificant, reiterating that the typical firm in our sample will devise their investment policy regardless of market conditions. The significant and negative coefficient of average market leverage in all configurations suggests an inverse relationship between acquisitiveness and historical leverage levels. This is consistent with the view that the acquisition likelihood can be driven by both the leverage ratio and deviations from target leverage.

In Panel B, we run our regressions by utilising two alternative subsamples. In the first three columns, we report the coefficient estimates of acquisition probability based on the shipowner industry. In the last three columns, the regressions are based on the rest of the shipping market (RoSM). The intuition behind the separation of the sample is the fact that the shipowner industry is more capital intensive and highly leveraged. This divergence between the subsectors might create significant differences in the results. The full model in column III suggests that the negative and significant impact of abnormal leverage on the acquisition probability persists in the shipowner industry. We report that a one standard deviation increase in abnormal leverage decreases the probability of being an acquirer by 115 base points, which is 17 base points higher than what we reported in Panel A. On the other hand, we find that the RoSM shows the same direction with a

larger impact. Specifically, we report that a one standard deviation increase in abnormal leverage leads to a decrease of 189 base points in acquisition probability. A possible explanation of this result might be that the companies in the RoSM tend to be smaller in comparison to shipowners, which makes it more difficult for them to secure funds to undertake an acquisition. As a result, an increase in abnormal leverage might lead to a more severe decrease in the probability of an acquirer. Overall, our findings are consistent with our hypothesis that the likelihood of a firm in the shipping industry making M&A investment decreases with abnormal leverage after controlling for several other important determinants of acquisitiveness.

3.4.3. Deal Size Models

We next examine whether deviations from target leverage can affect the selection of acquisition targets. We hypothesise (H2) that deal size decreases with abnormal leverage due to overleveraged acquiring firms opting for smaller targets and/or underleveraged ones pursuing larger deals. Panel A in Table 3.6 reports the results of the deal size models. The results corroborate our expectations that deal size and abnormal leverage display a negative relationship. The magnitude of the effect is economically significant; a one standard deviation increase in abnormal leverage is associated with a decrease of 2700 basis points in deal size, which corresponds to a $51mil reduction for the average deal.[17] The coefficients of our control variables are largely consistent with existing empirical literature. Growth opportunities, cash holdings, the method of payment, the target's public status all display significant association with deal size.

[17] This is figure is based on the average deal size in our sample. See Table 3.2 for the full descriptive statistics.

Table 3.6. Deal Size Models. The table reports OLS regressions of the deal size on the abnormal leverage and other control variables. Panel A reports the coefficient estimates based on full sample. Panel B reports the coefficient estimates based on the shipowner industry and rest of the shipping market (RoSm). The target leverage is obtained from cross-sectional regressions of capital structure based on FRM with a logit function. Abnormal leverage is the difference between actual and target leverage. The dependent variable is the natural logarithm of the deal value in $ mil. Columns I to III present results of the deal size regressions without the main variable of interest. The abnormal leverage variable is included in models IV, V and VI. Some specifications include year and fixed effects and sector-specific variables. Estimated p-values are clustered at company level and standard errors are given in parentheses. Statistical significance levels of 10%, 5%, and 1% are denoted with *, **, and ***, respectively.

Panel A. Coefficient estimates based on the entire shipping industry

	I	II	III	IV	V	VI
Profitability	-2.078	-2.690	-1.862	-1.902	-2.609	-1.639
	(2.186)	(2.114)	(2.223)	(2.132)	(2.127)	(2.121)
Cash ratio	1.039***	1.312***	1.037*	1.058***	1.207***	1.064***
	(0.387)	(0.395)	(0.417)	(0.377)	(0.374)	(0.393)
Capex to total assets	-0.021	0.520	0.080	0.464	0.800	0.639
	(1.785)	(1.760)	(1.869)	(1.818)	(1.873)	(1.947)
Asset tangibility	1.328***	1.097**	1.078*	1.240**	0.968*	1.030*
	(0.503)	(0.522)	(0.546)	(0.494)	(0.516)	(0.525)
Size	1.309***	1.292***	1.263***	1.368***	1.372***	1.333***
	(0.195)	(0.220)	(0.204)	(0.197)	(0.217)	(0.204)
Market-to-book ratio	0.568***	0.713***	0.553***	0.459**	0.651**	0.433**
	(0.208)	(0.235)	(0.205)	(0.206)	(0.250)	(0.204)
Stock return	-0.131	0.045	-0.154	-0.397	-0.094	-0.469
	(0.266)	(0.232)	(0.288)	(0.300)	(0.259)	(0.330)
M&A liquidity		0.201	0.784		0.252	0.924
		(0.716)	(0.585)		(0.658)	(0.572)
Herfindahl-Hirschman index		0.809	1.187		0.666	0.810
		(0.813)	(1.339)		(0.786)	(1.304)
All cash	-0.397*	-0.395*	-0.483**	-0.441**	-0.431**	-0.530**
	(0.218)	(0.207)	(0.233)	(0.218)	(0.212)	(0.231)
Serial acquirer	-0.091	-0.078	-0.052	-0.061	-0.059	-0.013
	(0.223)	(0.214)	(0.226)	(0.221)	(0.210)	(0.224)
Cross-border	0.087	0.053	0.062	0.051	0.079	0.037
	(0.222)	(0.223)	(0.255)	(0.216)	(0.220)	(0.246)
Public target	0.426	0.514*	0.543*	0.344	0.426	0.454
	(0.277)	(0.275)	(0.289)	(0.263)	(0.263)	(0.276)
Diversification	-0.238	-0.168	-0.149	-0.260	-0.219	-0.160
	(0.260)	(0.237)	(0.261)	(0.252)	(0.226)	(0.250)
Average market leverage	-1.142	-0.973	-1.079	-1.409*	-1.086	-1.483*
	(0.715)	(0.750)	(0.783)	(0.717)	(0.744)	(0.784)
Abnormal leverage				-2.614*	-2.158*	-3.033**
				(1.348)	(1.249)	(1.468)
Constant	2.765	4.889**	3.201	6.310***	4.359**	5.927***
	(2.203)	(2.054)	(2.269)	(1.749)	(2.018)	(2.227)
Year fixed effects	YES	NO	YES	YES	NO	YES

N	295	269	269	293	267	267
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000
R^2 (%)	23.6	23.8	24.0	24.9	25.8	26.0

Panel B. Coefficient estimates based on the shipowners industry and the rest of the shipping market (RoSM)

	Shipowners			RoSM		
	I	II	III	IV	V	VI
Profitability	0.752	0.123	0.453	-3.174	-3.192	-2.141
	(3.115)	(0.875)	(3.241)	(4.506)	(3.432)	(4.262)
Cash ratio	0.793	1.204**	0.865	0.007	0.461	-0.001
	(0.647)	(0.561)	(0.638)	(0.696)	(0.610)	(0.689)
Capex to total assets	-1.393	-0.531	-0.937	0.340	0.584	0.649
	(2.435)	(2.225)	(2.432)	(2.913)	(2.691)	(2.998)
Asset tangibility	1.444	1.337	1.096	-0.289	0.110	-0.131
	(1.101)	(0.889)	(1.020)	(0.729)	(0.658)	(0.710)
Size	0.852***	0.938***	0.931***	1.657***	1.788***	1.666***
	(0.281)	(0.249)	(0.275)	(0.287)	(0.251)	(0.305)
Market-to-book ratio	0.441*	0.489*	0.264	0.387	1.202***	0.263
	(0.264)	(0.246)	(0.246)	(0.410)	(0.429)	(0.390)
Stock return	-0.220	-0.010	-0.232	0.868	0.540	0.659
	(0.300)	(0.243)	(0.448)	(0.698)	(0.519)	(0.653)
M&A liquidity				0.261	-0.354	0.266
				(0.627)	(0.533)	(0.642)
Herfindahl-Hirschman index				3.632**	2.093	3.455
				(1.598)	(1.620)	(1.620)
All cash	-0.572	-0.609**	-0.674**	-0.470*	-0.186	-0.454*
	(0.356)	(0.286)	(0.336)	(0.268)	(0.251)	(0.257)
Serial acquirer	-0.167	-0.203	-0.239	-0.346	-0.048	-0.264
	(0.315)	(0.274)	(0.343)	(0.433)	(0.365)	(0.420)
Cross-border	-0.035	0.044	-0.053	-0.402	-0.167	-0.386
	(0.366)	(0.319)	(0.365)	(0.420)	(0.360)	(0.398)
Public target	0.637*	0.529	0.591*	0.848	0.957	0.760
	(0.353)	(0.324)	(0.345)	(0.837)	(0.651)	(0.812)
Diversification	0.122	0.001	0.209	-0.384	-0.464	-0.459
	(0.362)	(0.305)	(0.362)	(0.351)	(0.422)	(0.351)
Average market leverage	-1.589*	-1.637*	-1.932**	0.650	1.276	0.040
	(0.952)	(0.875)	(0.959)	(1.048)	(0.973)	(1.109)
Abnormal leverage			-1.995			-2.572*
			(2.032)			(1.365)
Constant	7.750**	8.474	10.992	-0.843***	0.181	-0.884
	(3.120)	(2.499)	(2.972)	(0.156)	(2.483)	(3.206)
Year fixed effects	YES	NO	YES	YES	NO	YES
N	171	171	168	105	105	105
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000
R^2 (%)	29.44	19.6	30.97	55.5	47.6	65.4

Panel B in Table 3.6 reports the results of alternative subsample regressions. We report that in both shipowners industry and the RoSM, the relationship between abnormal leverage and deal size is negative. However, the negative association in the column III lacks statistical significance. This interesting finding suggests that, in the shipowners industry, abnormal leverage decreases the probability of being an acquirer but it does not exert a significant impact on deal size. This result might suggest that deal size is an important consideration in an M&A deal and they are reluctant to compromise the planned synergies by undertaking a smaller target. On the other hand, in column VI, abnormal leverage is statistically significant, suggesting that higher levels of abnormal leverage decreases deal size significantly in the RoSM. Revisiting our argument that the RoSM companies tend to be smaller, it seems that the RoSM companies find it difficult to secure funds to undertake larger acquisitions when abnormal leverage is high. Overall, our findings highlight the importance of capital structure decisions on corporate investment policy and are consistent with our hypothesis that deviations from target leverage have a negative impact on the size of consummated M&A deals.

3.4.4. Payment Method Models

According to our third hypothesis (H3), deviations from target leverage should affect the availability of debt financing for an acquisition deal and therefore the amount of cash in the payment consideration. The literature has shown that even for a firm with ample cash reserves, too much debt on its balance sheet can lead to less cash financing in order to maintain financial flexibility (Martin, 1996). Panel A in Table 3.7 reports the results of payment method regressions on abnormal leverage and other controls. The results are consistent with the prediction that excess leverage affects the payment method in M&As. Specifically, a one standard deviation increase in abnormal leverage leads to a decrease of 779 basis points in the probability of using only cash

consideration. This effect is significantly higher than the decrease of 247 basis points documented for the overall market (Uysal, 2011).

The coefficients of several control variables show occasionally inconclusive or insignificant results. Asset risk has a negative impact in all configurations, which echoes the findings of Faccio and Masulis (2005), pointing to a negative relationship between stock return volatility and cash consideration in M&A deals. Relative size is negative and significant in all configurations, implying that shipping companies are less likely to pay fully in cash, the larger the deal (Alexandridis et al., 2013; Faccio and Masulis, 2005). We also find evidence that the probability of using pure cash as a payment method decreases with higher growth opportunities or firm valuation as reflected in the market-to-book ratio. Average market leverage displays a negative relationship with the probability of paying with cash. This is consistent with our conjecture that over and above deviations from optimal leverage levels, debt-ridden companies may be restricted in using their cash reserves or raising more cash to finance an M&A deal via debt issuance. We also find that shipping companies are less likely to finance their cross-border deals with cash while the target public status has a positive and significant effect on payment method.

We report subsample regressions in Panel B. Abnormal leverage is significantly negatively associated with the probability of financing a deal with pure cash in the shipowners industry. In economic terms, we report that a one standard deviation increase in abnormal leverage marks a decrease of 1,337 base points in the probability of paying pure cash in an M&A deal. Although shipowner companies can mitigate the negative impact of abnormal leverage on deal size, it appears that abnormal leverage has a strong effect on the probabilities of paying pure cash. In contrast, abnormal leverage does not seem to exert a significant impact on payment method in the

Table 3.7. Payment Method Models. The table reports probit regressions of the acquisition payment method on the abnormal leverage and other control variables. Panel A reports the coefficient estimates based on full sample. Panel B reports the coefficient estimates based on the shipowner industry and rest of the shipping market (RoSm). The target leverage is obtained from cross-sectional regressions of capital structure based on FRM with a logit function. Abnormal leverage is the difference between actual and target leverage. The dependent variable takes the value of 1 if a deal is financed with pure cash and 0 otherwise. Reported coefficients are average marginal effects. Columns I to III present results of the acquisition probability regressions without the main variable of interest. The abnormal leverage variable is included in models IV, V and VI. Some specifications include year fixed effects and sector-specific variables. Estimated p-values are clustered at company level and standard errors are given in parentheses. Statistical significance levels of 10%, 5%, and 1% are denoted with *, **, and ***, respectively.

Panel A. Coefficient estimates based on the entire shipping industry

	I	II	III	IV	V	VI
Profitability	0.225	-0.148	0.138	0.247	-0.150	0.171
	(0.507)	(0.489)	(0.534)	(0.499)	(0.485)	(0.528)
Relative size	-0.030**	-0.029*	-0.034**	-0.035**	-0.033**	-0.041***
	(0.014)	(0.015)	(0.015)	(0.014)	(0.015)	(0.014)
Asset risk	-0.278	-0.409*	-0.457**	-0.352	-0.525**	-0.530**
	(0.220)	(0.243)	(0.225)	(0.222)	(0.247)	(0.231)
Cash ratio	0.169	0.122	0.162	0.180	0.118	0.170
	(0.129)	(0.133)	(0.126)	(0.127)	(0.131)	(0.123)
Asset tangibility	-0.013	0.017	0.011	-0.004	0.014	0.019
	(0.173)	(0.161)	(0.184)	(0.170)	(0.160)	(0.180)
Size	0.004	-0.024	-0.024	0.010	-0.020	-0.020
	(0.058)	(0.057)	(0.050)	(0.056)	(0.056)	(0.048)
Market-to-book ratio	-0.200*	-0.188*	-0.217**	-0.239**	-0.204*	-0.256***
	(0.105)	(0.110)	(0.091)	(0.113)	(0.118)	(0.094)
Stock return	0.060	0.134*	0.134	0.009	0.110	0.071
	(0.077)	(0.069)	(0.081)	(0.073)	(0.071)	(0.075)
M&A liquidity		0.663	0.426*		0.226	0.482**
		(0.546)	(0.212)		(0.165)	(0.214)
Herfindahl-Hirschman		0.050	0.776*		-0.014	0.746*
index		(1.050)	(0.442)		(0.310)	(0.440)
Serial acquirer	0.063	0.066	0.084	0.072	0.070	0.095*
	(0.055)	(0.057)	(0.055)	(0.056)	(0.058)	(0.055)
Cross-border	-0.112**	-0.134**	-0.179***	-0.116**	-0.131**	-0.182***
	(0.049)	(0.056)	(0.049)	(0.048)	(0.057)	(0.049)
Public target	0.208***	0.178**	0.253***	0.189***	0.167**	0.238***
	(0.073)	(0.076)	(0.068)	(0.072)	(0.074)	(0.066)
Diversification	0.082	0.100	0.082	0.081	0.095	0.086
	(0.059)	(0.069)	(0.063)	(0.058)	(0.069)	(0.061)
Average market leverage	-0.518***	-0.488***	-0.533***	-0.628***	-0.559***	-0.659***
	(0.158)	(0.177)	(0.167)	(0.161)	(0.185)	(0.160)
Abnormal leverage				-0.630**	-0.527*	-0.728***
				(0.250)	(0.260)	(0.258)
Year fixed effects	YES	NO	YES	YES	NO	YES

N	284	269	259	284	269	259
Prob > chi2	0.000	0.020	0.000	0.000	0.018	0.000
Pseudo r^2 (%)	16.89	11.15	21.65	18.12	11.92	23.33
Type I (%)	25	25	21	22	22	20
Type II (%)	26	26	25	26	25	25

Panel B. Coefficient estimates based on the shipowners industry and the rest of the shipping market (RoSM)

	Shipowners			RoSM		
	I	II	III	IV	V	VI
Profitability	0.709	0.649	0.774	1.844**	1.023	1.955*
	(0.652)	(0.486)	(0.671)	(0.893)	(0.830)	(1.098)
Relative size	-0.032*	-0.041**	-0.041**	-0.068***	-0.019	-0.067***
	(0.019)	(0.017)	(0.017)	(0.022)	(0.025)	(0.021)
Asset risk	0.053	-0.050	0.028	-1.104*	-0.913*	-1.071*
	(0.296)	(0.235)	(0.308)	(0.638)	(0.489)	(0.624)
Cash ratio	0.343*	0.331**	0.350**	-0.063	0.033	-0.069
	(0.178)	(0.151)	(0.167)	(0.187)	(0.186)	(0.193)
Asset tangibility	-0.141	-0.092	0.151	0.197	0.104	0.181
	(0.243)	(0.201)	(0.241)	(0.245)	(0.264)	(0.247)
Size	-0.047	-0.052	-0.028	0.052	0.045	0.053
	(0.076)	(0.078)	(0.072)	(0.096)	(0.097)	(0.096)
Market-to-book ratio	-0.159	-0.190	-0.294*	-0.274*	-0.185	-0.276*
	(0.130)	(0.117)	(0.152)	(0.157)	(0.157)	(0.153)
Stock return	0.017	0.084	-0.075	0.214	0.218*	0.245
	(0.093)	(0.073)	(0.103)	(0.174)	(0.116)	(0.242)
M&A liquidity					-0.161	0.460
					(0.267)	(0.368)
Herfindahl-Hirschman					0.418	0.332
index					(0.701)	(0.604)
Serial acquirer	0.126*	0.098	0.130*	0.001	0.066	-0.006
	(0.074)	(0.065)	(0.076)	(0.101)	(0.080)	(0.111)
Cross-border	-0.236***	-0.217***	-0.240***	0.002	-0.038	0.005
	(0.059)	(-.063)	(0.063)	(0.134)	(0.088)	(0.139)
Public target	0.202***	0.114	0.224***	0.030	0.193	0.023
	(0.077)	(0.090)	(0.073)	(0.132)	(0.158)	(0.136)
Diversification	-0.029	0.020	0.011	0.161	0.210	0.165
	(0.090)	(0.082)	(0.088)	(0.089)	(0.106)	(0.096)
Average market leverage	-0.217	-0.404**	-0.431**	-1.117***	-0.642**	-1.092***
	(0.237)	(0.192)	(0.212)	(0.276)	(0.319)	(0.327)
Abnormal leverage			-1.158***			0.175
			(0.375)			(0.884)
Year fixed effects	YES	NO	YES	YES	NO	YES
N	152	152	151	79	79	79
Prob > chi2	0.000	0.000	0.000	0.000	0.007	0.000
Pseudo r^2 (%)	26.66	13.23	30.9	34.40	14.28	34.34
Type I (%)	20	27	18	23	20	15
Type II (%)	21	25	19	26	25	20

RoSM deals. Overall, our analysis corroborates our hypothesis that the probability of utilising cash-financing in shipping M&As decreases with the acquirer's abnormal leverage.

3.4.5. Acquirer Return Models

Our analysis so far has established that a shipping company's financing policy captured in its abnormal leverage has a material impact on M&A decisions such as the likelihood to pursue a deal, the size of the deal, and the financing method. In this section, we examine whether deviations from target leverage ratios can affect deal outcomes and, in particular, their quality as measured by acquirer abnormal returns around the deal announcement. Table 3.8 reports the regressions of Cumulative Abnormal Returns (CARs) on abnormal leverage and other control variables.

In Panel A, we report that abnormal leverage has a positive effect on acquirer returns, though only statistically significant at the 10% level. Acquirer CARs increase by 90 basis points in response to an increase of one standard deviation in abnormal leverage. This increase translates into market capitalisation gains of $6.33mil for the average acquirer. The magnitude of the effect is economically important for acquiring shareholders, considering the typical deal in our sample increases shareholders' wealth by $6.87mil. This result provides support to the conjecture that debt has a disciplinary effect on corporate investment by mitigating the agency cost of financial flexibility (Jensen and Meckling, 1976, Harris and Raviv, 1991 and Grossman and Hart, 1982) leading to a focus on the most profitable investment opportunities and are more cautious in the selection of acquisition targets. Again, the effect of abnormal leverage on acquirer returns is three times more pronounced in shipping M&As relative to the overall market (Uysal, 2011).

The coefficients of several control variables such as relative size, market concentration, cross-border, public targets display mostly significant results which are consistent with much of the

Table 3.8. Acquirer Return Models. The table reports regressions of acquirer returns around the deal announcement day. Panel A reports the coefficient estimates based on full sample. Panel B reports the coefficient estimates based on the shipowner industry and rest of the shipping market (RoSm). The target leverage is obtained from cross-sectional regressions of capital structure based on FRM with a logit function. Abnormal leverage is the difference between actual and target leverage The dependent variable in the models is CAR to acquiring firms for a window of 5 days (-2, 2) around the acquisition announcement day. Columns I to III present results of the acquisition probability regressions without the main variable of interest. We include the abnormal leverage variable in models IV, V, and VI . Some specifications also include year and and industry (shipping subsector) fixed effects. Estimated p-values are clustered at company level and standard errors are given in parentheses. Statistical significance levels of 10%, 5%, and 1% are denoted with *, **, and ***, respectively.

Panel A. Coefficient estimates based on the entire shipping industry

	I	II	III	IV	V	VII
Profitability	0.073	0.124*	0.092	0.068	0.107	0.088
	(0.075)	(0.065)	(0.081)	(0.078)	(0.066)	(0.084)
Relative size	0.006***	0.006**	0.004*	0.007***	0.006**	0.005**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Size	0.004	0.001	-0.000	0.004	0.001	-0.001
	(0.008)	(0.008)	(0.009)	(0.008)	(0.008)	(0.009)
Market-to-book ratio	-0.002	-0.001	-0.000	0.001	0.002	0.002
	(0.009)	(0.007)	(0.009)	(0.009)	(0.007)	(0.009)
Stock return	-0.002	-0.002	-0.004	0.006	0.004	0.004
	(0.009)	(0.008)	(0.010)	(0.010)	(0.008)	(0.010)
M&A liquidity		0.017	0.053**		0.011	0.048*
		(0.013)	(0.025)		(0.012)	(0.024)
Herfindahl-Hirschman index		0.049	0.057		0.058*	0.068
		(0.037)	(0.059)		(0.035)	(0.058)
Serial acquirer	-0.004	-0.005	-0.007	-0.006	-0.006	-0.009
	(0.006)	(0.007)	(0.007)	(0.006)	(0.007)	(0.007)
All cash	0.007	0.009	0.004	0.008	0.010	0.006
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Cross-border	0.012*	0.013**	0.013*	0.013**	0.014**	0.013*
	(0.006)	(0.006)	(0.007)	(0.006)	(0.006)	(0.007)
Public target	-0.019*	-0.021*	-0.020*	-0.016	-0.019*	-0.018
	(0.011)	(0.010)	(0.012)	(0.011)	(0.011)	(0.012)
Diversification	0.010	0.012	0.012	0.011	0.012	0.013
	(0.009)	(0.008)	(0.010)	(0.009)	(0.009)	(0.010)
Average market leverage	-0.001	0.008	0.005	0.008	0.018	0.017
	(0.025)	(0.022)	(0.026)	(0.025)	(0.023)	(0.027)
Abnormal leverage				0.083*	0.073*	0.082*
				(0.044)	(0.039)	(0.046)
Constant	-0.071	-0.002	0.008	-0.044	-0.008	0.011
	(0.083)	(0.076)	(0.086)	(0.082)	(0.078)	(0.089)
Year fixed effects	YES	NO	YES	YES	NO	YES
N	284	259	259	282	257	257
Prob > chi2	0.000	0.005	0.038	0.000	0.006	0.029

R^2 (%)	4.20	4.30	4.71	4.80	4.80	5.20

Panel B. Coefficient estimates based on the shipowners industry and the rest of the shipping market (RoSM)

	Shipowners			RoSM		
	I	II	III	IV	V	VII
Profitability	0.085	0.104	0.050	0.201*	0.136	0.226
	(0.115)	(0.075)	(0.116)	(0.120)	(0.123)	(0.141)
Relative size	0.003	0.004	0.003	0.014**	0.012	0.013**
	(0.003)	(0.002)	(0.003)	(0.005)	(0.004)	(0.005)
Size	-0.001	0.000	-0.002	0.011	0.000	0.011
	(0.013)	(0.012)	(0.013)	(0.012)	(0.012)	(0.011)
Market-to-book ratio	-0.007	-0.002	-0.005	-0.014	-0.021	-0.017
	(0.013)	(0.009)	(0.013)	(0.018)	(0.014)	(0.019)
Stock return	-0.009	-0.003	0.015	-0.004	-0.002	-0.007
	(0.012)	(0.009)	(0.013)	(0.027)	(0.019)	(0.027)
M&A liquidity				-0.000	-0.010	-0.001
				(0.035)	(0.021)	(0.034)
Herfindahl-Hirschman index				0.148*	0.137*	0.147
				(0.088)	(0.080)	(0.090)
Serial acquirer	-0.002	0.002	-0.009	-0.008	-0.007	-0.007
	(0.008)	(0.009)	(0.009)	(0.013)	(0.011)	(0.012)
All cash	0.022*	0.017*	0.026**	-0.008	-0.007	-0.008
	(0.012)	(0.009)	(0.012)	(0.013)	(0.010)	(0.013)
Cross-border	0.019*	0.014	0.018*	0.004	0.006	0.004
	(0.011)	(0.009)	(.009)	(0.014)	(0.011)	(0.014)
Public target	-0.032**	-0.025**	-0.033**	-0.016	-0.029	-0.017
	(0.015)	(0.012)	(0.015)	(0.029)	(0.026)	(0.031)
Diversification	0.014	0.007	0.016	0.021*	0.024***	0.019*
	(0.015)	(0.012)	(0.014)	(0.011)	(0.007)	(0.011)
Average market leverage	-0.009	0.004	-0.009	-0.045	-0.055	-0.056
	(0.037)	(0.031)	(0.038)	(0.044)	(0.038)	(0.052)
Abnormal leverage			0.146***			-0.050
			(0.050)			(0.087)
Constant	-0.031	0.006	0.016	-0.070	0.049	-0.071
	(0.129)	(0.114)	(0.129)	(0.145)	(0.112)	(0.141)
Year fixed effects	YES	NO	YES	YES	NO	YES
N	168	168	165	100	100	100
Prob > chi2	0.000	0.026	0.000	0.000	0.014	0.000
R^2 (%)	23.91	7.17	27.02	47.08	21.34	47.43

empirical literature. We show that the market reaction for profitable shipping companies is positive, even though only configuration II reports statistical significance.

In Panel B, we report the coefficient estimates of acquirer CARs based on two shipping subsamples. In the shipowners regressions, we report an economically and statistically significant coefficient for abnormal leverage. This result implies that overleveraged shipowner companies display the highest caution when selecting a target to acquire. We report that a one standard deviation increase in abnormal leverage leads to an increase of 169 base points in acquirer CARs. This increase translates into market capitalisation gains of $10.6mil for the average acquirer. On the other hand, the RoSM companies do not seem to be affected from the changes in abnormal leverage. In specification VII, we report a negative but highly insignificant coefficient for abnormal leverage. Overall, after controling for a number of known acquirer return determinants we confirm our hypothesis that acquisition performance in the shipping industry increases with abnormal leverage.

3.5. Robustness Tests

In this section, we perform several additional tests to check the robustness of our results. Table 3.9 summarizes the results of the robustness tests. The literature has offered several alternative proxies for target leverage. Two frequently used alternatives to the fitted-value approach are the industry median leverage (see e.g., Hovakimian, 2004) and the 3-year mean leverage (see e.g., Shyam-Sunder and Myers, 1999). To check the robustness of our results, we re-run all tests by proxying for target leverage with both company average and median industry leverage and report very similar results with the original analysis.

Our results are also robust to alternative model functions. In addition to utilising a logit function in the fractional response model for the estimation of target leverage, we follow Papke and Wooldridge (1996), to test the sensitivity of our results to applying a probit function as an

alternative discrete outcome function. We test the impact of the two alternative functions on the estimation of target leverage, acquisition probability, and all-cash probability models and find that it makes no difference.

Table 3.9. Summary of the robustness tests. The table reports the coefficient estimates of abnormal leverage for acquisition probability, deal size, payment method, and acquirer return models for the full sample. Column I reports the original coefficients. Target leverage is industry median in column II. Column III uses probit function in fractional response regressions instead of logit function. In column IV, the target leverage is obtained from a pooled regression instead of annual cross-sectional regressions. Column V reports the results when a crisis dummy is included in the models instead of year-fixed effects. The coefficients in column VI and VII are obtained from in-sample and out-of-sample bootstrapped regressions with 25%, 50%, and 75% values, respectively. In-sample regressions randomly select 90% of the firm-year observations and estimate the models only on those observations. The process is repeated 1,250 times, with in-sample observations are randomly selected in each step.

	I	II	III	IV	V	VI	VII
	Original coefficients	Industry-median approach	Probit function	Pooled regression approach	Crisis dummy approach	In-sample bootstrap approach	Out-of-sample bootstrap approach
Acquisition probability	-0.087**	-0.085***	-0.091**	-0.081**	-0.084**		
	(0.038)	(0.020)	(0.038)	(0.038)	(0.037)		
25%						-0.094	-0.214
50%						-0.088	-0.109
75%						-0.081	-0.003
Deal size	-3.033**	-1.286*	-3.014**	-3.032**	-2.161*		
	(1.468)	(0.673)	(1.473)	(1.308)	(1.259)		
25%						-3.648	-4.665
50%						-3.133	-2.757
75%						-2.761	1.110
Payment method	-0.728***	-0.286*	-0.715***	-0.653**	-0.526**		
	(0.258)	(0.159)	(0.261)	(0.264)	(0.256)		
25%						-0.955	N/A
50%						-0.796	N/A
75%						-0.571	N/A
Acquirer return	0.082*	0.003	0.082*	0.058	0.073*		
	(0.046)	(0.021)	(0.046)	(0.046)	(0.039)		
25%						0.067	-0.096
50%						0.086	0.051
75%						0.097	0.180

In Table 3.4, we present the results of the annual cross-sectional capital structure regressions for selected years. In order to estimate abnormal leverage, we use the fitted values of individual regressions (target leverage) and subtract them from the market (actual) leverage. As a robustness

check, we utilise a single pooled capital structure regression with year fixed effects to calculate the fitted values for the estimation of abnormal leverage and find that our results remain similar.

In the original analysis, we include year fixed effects in order to control for the possibility that target deviations measured in terms of market leverage being higher during market crisis periods. We follow Drobetz et al. (2016) and define three crisis periods in our sample: (i) 1990 to 1993, (ii) 2002-2003, (iii) 2008 to 2012.[18] Instead of the year fixed effects, we include a crisis dummy in the models capturing these three periods and our results remain very similar.

In our analysis we treat the impact of deviations from target leverage as symmetric, i.e., both positive (overleverage) and negative (underleverage) deviations from target leverage contribute equally to the negative relationship we document between abnormal leverage and the probability of undertaking an acquisition. The assumption, as highlighted in our hypotheses, is that the negative relationship between abnormal leverage and the likelihood of undertaking an acquisition could stem from both inorganic investment restraint of overleveraged firms and the financial flexibility associated with underleveraged firms (in the spirit of the free cash flow hypothesis). We put this to the test by examining potential non-linearities in the documented relationship. Accordingly, we split our sample in under- and over-leveraged firms, and examine the impact of absolute leverage deviations on acquisition probability. The relationship appears to be symmetric in the sense that the coefficients for over- and under-leveraged firms have a negative and positive

[18] The sample of Drobetz et al. (2016) covers the period between 1989 and 2012. The results we report in the robustness tests with shipping crisis dummy are based on the years stated above. The results remain unchanged regardless of whether we define years 2013-2018 as crisis as or no crisis years.

sign respectively and are statistically significant (-0.217** and 0.125**, respectively). Yet, the impact of over-leverage on the overall relationship seems more pronounced.

Finally, we perform in-sample and out-of-sample regressions by using a simulation method (Grammenos et al., 2008). We randomly select 90% of our firm-year observations and rerun our regressions on the selected observations. Then, we repeat the same procedure for the rest of the observations that are not selected. The two steps are repeated 1,250 times, with the 90% of the observations are randomly selected at each step. Columns VI shows that in-sample bootstrap tests exhibit very similar results to our original results. The coefficient of abnormal leverage in acquisition probability model is visually the same as the original coefficient, while the rest of the tests report very close coefficient estimates. The coefficients that are obtained from out-of-sample tests perform well with slight differences.[19] Overall, we find that our models are robust to alternative specifications, variable constructions, and in-and-out-of-sample tests.

3.6. Conclusion

In this paper, we provide evidence that shipping companies' capital structures can affect their corporate investment decisions and in particular mergers and acquisitions, an increasingly important corporate growth vehicle for shipping companies, with directly measurable outcomes. Our evidence corroborates the findings of previous studies that firms in the shipping industry tend to follow a target capital structure, although we also document cases with significant deviations from targets. We find that the probability of a shipping firm pursuing acquisition deals decreases with abnormal leverage, a measure of divergence from optimal leverage. We also document that

[19] We do not report coefficient estimates for out-of-sample payment method tests since the model does not achieve convergence, possibly due to a very small sample size.

the extent of cash financing and the deal size decrease with abnormal leverage, consistent with our hypotheses that overleverage can impede the firm's ability to borrow further in order to finance M&A deals. Further, we document that the more overleveraged a firm, the better its acquisition deals are perceived by the market, in-line with the conjecture that the disciplinary role of debt reduces the associated agency cost, leading to superior investment decisions. The effects we document are more pronounced for the shipping industry relative to the previous findings for the overall market, which can be attributed to its idiosyncratic characteristics. Our findings have direct implications for shipping companies, their management teams and shareholders, and especially for firms with inorganic investment plans in place.

Chapter IV

Investment, Financing and Payout in Shipping: Communicating Vessels?

4.1. Introduction

Corporate financial management decisions associated with investment, financing, and payout are central to corporate performance. These corporate policies are typically interrelated through a decision-making process aiming to channel the inflows and outflows of funds to their most effective use (Mueller, 1967; Gatchev et al., 2010). Fund inflows are generated by sales and external financing, e.g. debt or equity issuance, while outflows pertain to the servicing of external financing, dividend payments, and investments (Dhrymes and Kurz, 1967). Payout and investment unequivocally compete for funds, since they are both parts of a firm's total outflows, while the top management can decide to expand the firm's capacity for payout or investment by raising external capital. Nonetheless, financial constraints can limit access to external finance and hamper a firm's ability to undertake investment projects (Fazzari et al., 1988). In such cases, potentially optimal investment and payout choices tend to be modified to meet funding constraints. The close ties among the three corporate decisions clearly portrays the need for mapping their interrelationships allowing for simultaneity in setting investment, financing and payout policies.

While the early corporate financial management literature (Modigliani and Miller, 1958; Miller and Modigliani, 1961) found that, under perfect capital market conditions, the investment decision is not a function of either the financing or payout choices, a sizeable research strand has since evolved suggesting that market imperfections can lead to interactions among such corporate policies.[20] While these studies document significant inter-relations between the three corporate financial management decisions, they suffer from some shortcomings. First, their focus is only on

[20] For more details, see Dhrymes and Kurz (1967), Mueller (1967), Jensen and Meckling (1976), McCabe (1979), Peterson and Benesh (1983) and Fazzari et al. (1988).

a single market and relies on fairly short sample periods which would fail to capture the potentially dynamic nature of policy interactions. Second, they utilise either cross-sectional or time-series data, rather than panel data analysis which comes with significant advantages (Baltagi, 2008). Third, they focus on the aggregate market, rather than more capital-intensive sectors, which can provide a more fruitful testing ground to examine corporate financial management policy interactions. Fourth, they do not account for how variations in financial constraints – a key determinant of investment activity (Fazzari et al., 1988) - can shape the inter-relationships between financing, investment and payout.

To this end, we examine the three key corporate financial policies in the shipping industry utilising a three-way simultaneous equation framework. The shipping industry provides an ideal testing ground to examine the co-determination of corporate financial management decisions for a number of reasons. First, it is one of the most investment-driven sectors; in the top 6th percentile of all industries in terms of total investment-to-assets.[21] Second, it is also among the most highly leveraged sectors with debt financing being historically an integral part of shipping companies' capital structure. The high reliance on debt capital places the industry among the top 6th percentile of all industries in terms of book leverage while the total exposure of the top 40 banks providing financing for the shipping market recently reached $300.7bil.[22] Third, the high risk of financial distress has led most shipping companies tend to adopt a target capital structure. (Alexandridis et al., 2020). This trade-off can induce a high degree of simultaneity among the investment and

[21] Estimated by using annual data from Compustat Global and North America for companies that operate within the ship-owning, logistics, and shipping services and port industries, and the rest of the market based on four-digit SIC codes.

[22] "Global shipping finance tanks, but Greek and French banks are buoyant", S&P Global, 21 October 2019.

financing decisions, especially since sizeable investment plans can trigger adjustments in the capital structure. Fourth, the high cash-flow and asset-value volatility in the shipping industry can affect not only the capacity for investment and debt-financing, but also payout decisions. Fifth, despite the fact that the shipping industry is within the bottom 38% percentile of all sectors in terms of dividend payments,[23] 75% of companies pay at least some dividend in order to mitigate the heightened information asymmetry and be able to access the equity capital market at reasonable costs (Miller and Rock, 1985; Drobetz et al., 2013). In addition, given the highly cyclical nature of the shipping industry, the sector is more susceptible to payout policy revisions in response to changes in market conditions, especially in light of the upward trend in payouts observed more recently.[24]

To this end, we examine the interactions between the three corporate financial policies within the shipping industry utilising a simultaneous equations framework. We employ an exhaustive sample comprising 643 listed shipping companies and 6,909 company-year observations in the ship-owning, port, logistics, and shipping services sectors spanning 62 countries and a 30-year period (1987-2018).[25] We also compare our findings with the rest of the market sectors by employing a secondary dataset comprising 13,892 internationally listed companies from all other sectors

[23] Based on the ratio of total dividends paid to total assets.

[24] "Here come the dividends", American Shipper, 7 November 2019

[25] We include all these shipping subsectors in our tests since Alexandridis et al. (2020) show that even the least capital-intensive subsector, shipping services and logistics, is still within the 26th percentile among all industries in terms of capital expenditures scaled by total assets. Excluding these subsectors from our tests leaves our key findings unchanged.

combined.[26] We derive the main equations for investment, financing, and payout based on common determinants identified in the literature. To highlight the importance of simultaneity, we first estimate the equations separately by utilising OLS (Dhrymes and Kurz, 1967; Fama, 1974; McDonald et al., 1975; McCabe, 1979) and system GMM (Arellano and Bover, 1995; Wintoki et al., 2012; Lee et al., 2016) where the latter treats investment, financing, and payout as endogenous. We then estimate the equations based on a simultaneous framework by utilising 3SLS to investigate possible interrelations between the three corporate financial decisions (Dhrymes and Kurz, 1967; Peterson and Benesh, 1983; Chiarella et al., 1991; Noronha et al., 1996; Lee et al., 2016).

Our single equations analysis reveals a two-way, positive, and significant relationship between investment and financing. This reflects that external debt is positively related to the level of investment in the shipping industry and/or that firms with higher investment levels tend to utilise more debt capital. In contrast, our OLS estimations show that the payout activity has no statistically significant relation with investment or financing activities, suggesting that payout policies are crafted independently. When correcting for endogeneity by using System-GMM, investment and new debt become significant determinants of payout in the shipping industry.

Our simultaneous equations framework refines the three-way relationships. Specifically, it reveals that the investment, financing and payout policies in the shipping industry are jointly determined, while their interdependencies are economically and statistically significant. We find that investment and payout are inversely related, while both are positively associated with new debt.

[26] We use Fama-French 12 industries classification to define the firm-year observations. We exclude utilities and financial companies.

Further, we show that this simultaneity behaviour is more pronounced in the shipping industry in comparison to the rest of the market; for the average firm in the shipping industry (the rest of the market), a one standard deviation increase in payout – which is 0.132 (0.205) decreases the level of investment by 0.044 (0.035). We also report that the link between investment and new debt issuance is more pronounced in the shipping industry relative to other sectors, which highlights the important role of debt in fleet expansion. Specifically, a one standard deviation increase in the level of investment in the shipping sector (the rest of the market) – which is 0.301 (0.847) increases newly issued debt by 0.231 (0.088). The positive effect of new debt on payout is also more accentuated in the shipping industry with a one standard deviation increase in new debt issuance – which is 0.431 (0.607) - increasing the payout by 0.125 (0.060) in the shipping industry (the rest of the market).[27] Such comparisons are important because they corroborate that inter-relationships among corporate financial policies are more pronounced within sectors where capital intensity and financial distress costs are prominent, such as in the shipping industry. [28]

Our results based on simultaneous equations framework provide additional insights to System-GMM. Although our results based on both estimators show a positive relationship between investment and new debt, this link becomes more pronounced under 3SLS. Second, the simultaneous equations framework points to payout being a significant determinant of investment and new debt, which is not evident when utilising the System-GMM framework. Finally, the impact of investment and new debt on payout becomes more pronounced (statistically and

[27] Investment, financing and payout are estimated as a percentage of fixed assets.

[28] Untabulated analysis suggests that in sectors such as consumer non-durables, health, and telecommunication the three policies do not appear to be jointly determined.

economically) with the simultaneous equations framework. Overall, it appears that the simultaneous equations framework is able to better capture the simultaneities inherent in the set of corporate financial policies, compared to alternative models.

Given that a large number of shipping companies are typically financially constrained (Drobetz et al., 2013), but also highly reliant on market conditions (Drobetz et al., 2016), we also investigate whether the documented relationships are affected by financial constraints and market conditions. We find that the negative relationship between investment and payout is more pronounced in the presence of financial constraints. Further, investment comprises a more significant determinant of new debt in non-crisis years, implying that shipping companies are able to raise debt capital to finance their investments in auspicious times, while, in crisis years, new debt issuance tends to be driven more by other factors.

Our study shares some similarities with Drobetz et al. (2016), although the approach taken in this study exhibits a different pattern in the interactions between investment, financing, and payout. Drobetz et al. (2016) utilise the simultaneous framework of Gatchev et al. (2010) which applies a constraint that the sources of funds must always equal to the uses of funds. Specifically, they argue that an increase of $1 in cash flow must result in a reduction of $1 in other sources of funds. This approach reports the change in sources or uses in response to an increase in cash flow. However, in this study, we establish a direct link between corporate policies in order to reveal how an increase in one of the policies affects the rest. Our study also differs itself from Drobetz et al. (2016) by using a wider range of control variables. In our regressions, we utilise a set of policy-specific control variables, while Drobetz et al. (2016) use only company size and market-to-book ratio.

Our study contributes to the general corporate finance and shipping finance literature in several ways. First, it provides consistent evidence that the investment, financing, and payout policies are simultaneously determined within the shipping industry based on an exhaustive dataset spanning 68 countries over a period of 30 years. This finding has significant policy implications for companies, investors, and creditors alike in the sector. Second, the documented 3-way relationships are significantly more pronounced than for the rest of the sectors combined corroborating that corporate financial decisions display more inter-dependencies in sectors that are characterised by high capital intensity and financial distress costs. Third, our analysis contributes to the general corporate finance literature on the dynamics of corporate policies (Yan et al., 2010; Kahle and Stulz, 2013; Campello et al., 2011; Merika et al., 2015) by establishing that the inter-relationships between investment, financing and payout are more pronounced in the presence of financial constraints and during crises. These results point to a more dynamic co-determination of the three corporate financial policies where their inter-relationships can fluctuate or even break-down through time and under different market conditions.

The rest of the paper is structured as follows: Section 2 reviews the related literature and sets a theoretical framework. Section 3 presents the data and empirical methodology. Section 4 reports the results and discusses the findings. Section 5 explains the robustness tests. Section 6 concludes the paper.

4.2. Related Literature and Theoretical Framework

4.2.1. Simultaneity of Corporate Decisions

Modigliani and Miller (1958) provide the building blocks of modern corporate finance theory. They theorise that in a perfect market environment, the profitability of investment projects is

unrelated to how these projects are financed. Moreover, they argue that the company's financing and payout choices derive from investment decisions. Due to the acknowledgement of the study as a foundational block of modern corporate finance, the majority of related studies examine the decisions pertaining to investment, financing, and payout independently, i.e., without considering the interactions between them. Nevertheless, a small but growing strand in the literature raises questions about the impact of market imperfections and explores policy interdependencies.

The early discussions on the simultaneous determination of corporate policies can be traced back to Dhrymes and Kurz (1967). They showcase the complexity of organisations by emphasizing the inter-departmental influences within a corporation; a decision made by one department is most likely to have an influence on the decisions made by other departments. More importantly, they suggest that the three corporate policies are interrelated in the context of a flow-of-funds framework. Specifically, they state that a firm relies on sales and external financing for an inflow of funds, while it is subject to outflows such as operational costs, tax, dividend payments, and investment activities. They empirically test their hypothesis by setting up a three-equation simultaneous system where investment, financing, and payout variables are treated as endogenous. They find support for the flow-of-funds hypothesis only when they consider a three-stage least squares model, which accounts for simultaneity in the determination of the three policies (McCabe, 1979; Peterson and Benesh, 1983; Chiarella et al., 1991). Studies testing the flow-of-funds hypothesis provide strong evidence against the Miller-Modigliani irrelevance theory, but the literature has yet to reach consensus. For instance, McDonald et al. (1975) find that investment and financing variables are insignificant in payout equation. They further claim that the corporate policies are strongly co-determined only in the larger capital markets, such as the United States.

Information asymmetry poses an alternative framework for flow-of-funds that can predict and justify policy co-determination. Miller and Rock (1985) state that in the presence of asymmetric information, managers tend to use dividends to signal their expectations on current and future earnings to outside investors. Accordingly, they are hesitant to cut dividends in order to avert a negative market reaction. The "stickiness" of payout policies may hamper the flexibility in using or raising funds (Myers and Majluf, 1984), therefore both, investment plans and financing needs could be affected by payout decisions.

4.2.2. Investment, Financing and Payout Decisions in the Shipping Industry

Shipping is one of the most capital-intensive sectors, since sizeable investments are required to expand the capacity for worldwide cargo transportation. The ultimate aim of investment appraisal in the shipping industry is to undertake value-enhancing investments while considering important industry factors, such as freight rates, the trends in newbuilding and scrapping, demand for shipping services, bunker fuel prices and vessel prices (Alexandridis et al., 2018). Lambertides and Louca (2008) argue that the performance in the shipping industry is more challenging than it is in other industrial sectors because of the volatility in bunker prices and unpredictable trends in global trade, which emphasises the necessity of an efficient investment decision-making strategy. Accordingly, a considerable literature has grown up around the theme of the drivers of investment in the shipping industry.

A growing body of literature attempts to identify the determinants of investment in the shipping industry. Aggregate supply and demand for transportation services, as well as freight rates, are significant investment factors (Xu and Yip, 2012). The positive effect of freight rates on fleet expansion is more distinct in companies with higher ownership concentration (Drobetz et al., 2019). Ship-owning firms also invest in order to maintain their market share (Fan and Luo, 2013).

The availability of free cash flow (FCF) is also an important factor of investment. Higher FCF levels increase investment activity and decrease debt-reliance of investment projects (Yeo, 2018). In a similar vein, positive deviations from optimal leverage levels decrease investments in inorganic growth, i.e., mergers and acquisitions (M&As) (Alexandridis et al., 2020). Moreover, a number of studies focus on investor behaviour. Risk-seeking shipowners have larger fleet sizes than their risk-averting peers during non-turbulent times (Berg Andreassen, 1990). During economic booms, virtually the whole shipping sector overinvests in increasing capacity (Greenwood and Hanson, 2014), reaffirming the cyclicality of investments in the sector (Merikas et al., 2008).

The shipping literature also has a number of studies investigating the determinants and role of debt in the capital structure. Capital intensity, asset tangibility, and risky equity environment typically lead shipping companies to rely heavily on debt financing. In a seminal study, shipping companies are shown to follow a target capital structure and, most importantly, they appear to recalibrate towards the optimal capital structure faster than other non-shipping companies (Drobetz et al., 2013). This indicates that the implications of abnormal leverage could be higher in the shipping sector. For instance, overleveraged firms are less likely to perform acquisitions and, when they do, they opt for smaller deals (Alexandridis et al., 2020). Other studies investigate the issuance of debt during extreme market conditions. After the 2008 financial crisis, financially healthy companies were able to raise debt capital, while financially weak companies had historically struggled to secure more debt financing (Drobetz et al., 2016). At the same time, companies with higher profitability were unlikely to opt for more leverage (Merika et al., 2015), leaving creditors with a smaller pool of potential debtors.

Another strand in the shipping literature investigates the determinants of payout policies. Shipping companies have been paying dividends to cater to the favourable tax treatment enjoyed by their shareholders (Drobetz et al., 2013), as well as to attract high-yield-seeking investors. Nevertheless, the 2008 financial crisis left the shipping industry scarred by liquidity crunches and foreclosures, forcing shipping companies to reduce their payouts (Giannakoulis, 2016). In the post-crisis environment of strict debt-financing, a prevalence of negative debt covenants has suppressed dividend payments further (Otto and Scholl, 2015). Dividend reductions are also employed during times of uncertainty, especially regarding the uncertainty of the free-cash-flow that could be used for investments in the future (Yeo, 2018). Still, more than 75% of shipping companies pay dividends, indicating that shipping executives may opt for transparency and access to the capital markets, even at the real risk of financial distress (Drobetz et al., 2013).

The simultaneity of corporate decisions can be more pronounced in the shipping industry for several reasons. First, shipping is one of the most investment-driven industries, therefore the implications of investment decisions should be reflected across all corporate functions. Second, capital investments in the shipping industry have been historically and primarily financed by debt. Third, the high risk of financial distress has forced shipping companies to firmly abide by a target capital structure to save debt capacity and avoid missing investment opportunities (Alexandridis et al., 2020). This trade-off offers more incentives for the investment and financing decisions to be co-determined, especially since sizeable investment plans might trigger adjustments in the capital structure. Fourth, cash-flow volatility in the shipping industry can affect not only the capacity for investment and debt-financing need, but also payout decisions. In light of these, we examine the interactions of the three corporate policies in the shipping industry within a simultaneous equations framework. Furthermore, we investigate whether the simultaneous

relationship fluctuates under extreme conditions. Specifically, we investigate the impact of financial constraints and different market conditions on policy co-determination, since most shipping companies are not only financially constrained (Drobetz et al., 2013), but also unable to raise sufficient external capital even during normal market conditions (Drobetz et al., 2016).

4.3. Data and Empirical Methodology

4.3.1. Sample of companies and Equations of Corporate Policies

Our primary sample comprises internationally listed shipping companies available in Compustat Global and North America and spans the period 1987-2018. We focus on the shipping subsectors of deep-sea freight transportation, offshore business, passenger shipping, cruise lines, port business, and logistics and shipping services, with SIC codes 4400 and 4412.[29] There are 643 companies that meet these criteria corresponding to 9,140 firm-year observations. We drop 2,231 company-year observations that have missing total assets or market information, or when total assets are less than $1mil. After applying these restrictions, our primary sample consists of 6,909 firm-year observations. Our control sample includes internationally listed non-shipping companies (rest-of-the-market, RoM) within the Fama-French 12-industry classification based on the SIC codes provided in Compustat Global and North America.[30] After applying the same restrictions with our primary dataset, the control sample yields 13,892 companies and 138,788 firm-year

[29] We allocate the companies to different subsectors manually by advising "S&P Business Description" variable in Compustat and, complementary, the companies' websites.

[30] We exclude utilities and financial firms from our control sample.

observations. We follow prior literature in formulating the empirical equations of corporate investment, financing and payout policies:[31]

$$INV_{i,t} = \alpha_{10} + \alpha_{11}ND_{i,t} + \alpha_{12}PAY_{i,t} + \alpha_{13}SIZE_{i,t} + \alpha_{14}CF_{i,t} + \alpha_{15}MTB_{i,t} + \alpha_{17}TAN_{i,t}$$
$$+\alpha_{16}AGE_{i,t} + \alpha_{18}UNC_{i,t-1} + \alpha_{19}INV_{i,t-1} + \sum_k SECTOR_k + \sum_t YEAR_t + \varepsilon_{1,i,t} \quad \text{(Eq. 4.1)}$$

$$ND_{i,t} = \alpha_{20} + \alpha_{21}INV_{i,t} + \alpha_{22}PAY_{i,t} + \alpha_{23}SIZE_{i,t} + \alpha_{24}CF_{i,t} + \alpha_{25}MTB_{i,t} + \alpha_{26}TAN_{i,t}$$
$$+\alpha_{27}OPLEV_{i,t} + \alpha_{28}UNC_{i,t-1} + \alpha_{29}FINLEV_{i,t-1} + \sum_k SECTOR_k + \sum_t YEAR_t + \varepsilon_{2,i,t} \quad \text{(Eq. 4.2)}$$

$$PAY_{i,t} = \alpha_{30} + \alpha_{31}INV_{i,t} + \alpha_{32}ND_{i,t} + \alpha_{33}SIZE_{i,t} + \alpha_{34}CF_{i,t} + \alpha_{35}MTB_{i,t} + \alpha_{36}TAN_{i,t} + \alpha_{37}LIQ_{i,t}$$
$$+\alpha_{38}SG_{i,t} + \alpha_{39}RE_{i,t} + \alpha_{310}UNC_{i,t-1} + \alpha_{311}PAY_{i,t-1} + \sum_k SECTOR_k + \sum_t YEAR_t + \varepsilon_{3,i,t} \quad \text{(Eq. 4.3)}$$

where INV is investment, ND new debt, PAY payout, $SIZE$ company size, CF cash flow, MTB market-to-book ratio, AGE company age, TAN asset tangibility, $OPLEV$ operating leverage, LIQ liquidity, SG sales growth, RE retained earnings to total equity, $FINLEV$ book leverage and UNC uncertainty[32]. In each of the equations, two of the other endogenous variables are included as independent variables to account for the fact that corporate investment, financing, and payout policies can be inter-related. Following Richardson (2006), we define investment as the sum of capital expenditures, acquisitions, research and development (R&D) expenses minus cash receipts from the sale of property, plant, and equipment (PPE). We define new debt as the difference

[31] See for example Dhrymes and Kurz (1967), McDonald et al. (1975), McCabe (1979), Peterson and Benesh (1983), Chiarella et al. (1991), Mougoué and Mukherjee (1994) and Lee et al. (2016).

[32] See Appendix A for a detailed definition of the variables.

between long-term debt at years *t* and *t-1*.[33] Payout is the total dividend paid. We scale investment, financing, payout, and cash flow variables by beginning-of-period PP&E which captures the amount of tangible assets (Cheng-few, 2006; Almeida and Campello, 2007; Bloom et al., 2007; Collins et al., 2017).

4.3.2. Control Variables

The control variables in Eqs. 4.1 – 4.3 are company-specific characteristics that have been shown to affect the dependent variables. We include firm size since smaller firms tend to be more constrained in raising capital due to higher borrowing costs and more sparse analyst coverage (Hovakimian, 2009). Regarding the relationship between size and the financing choice, the trade-off theory predicts a positive relationship between company size and debt (Frank and Goyal, 2009). However, given the effect of information asymmetry, the pecking order theory argues that information availability to outsiders is higher for larger firms, which in turn mitigates the adverse selection costs and enables the assumption of debt at a lower cost (Drobetz et al., 2013). This would lead to an inverse relationship between company size and debt levels. Similarly, there is no consensus over the role of company size on payout policy. Some studies argue that company size is an important determinant of payout policy (Barros et al., 2019). Others argue that this relationship is theoretically weak (Smith and Watts, 1992) or employ size as a control variable without any prior sign expectation on its impact on payout (Farinha, 2003). We also include cash flow as a proxy for internal financial constraints (Richardson, 2006; Hennessy et al., 2007;

[33] We do not consider short-term debt because corporate policies tend to have a long-term horizon, and hence they should affect only long-run financing decisions (see e.g. Chirella et al., 199; Mougoué and Mukherjee, 1994).

Guariglia, 2008; Hovakimian, 2009), since companies with more internal cash flow tend to rely less on external financing. [34]

Standard neoclassical investment models highlight growth opportunities as a key determinant of investment policy (Tobin, 1969; Hayashi, 1982). In addition, companies with higher growth opportunities are more vulnerable to financial distress costs, and to have less debt in their capital structures (Drobetz et al., 2013). Growth opportunities have also been linked to payout. For instance, higher growth opportunities naturally foster more investment, limiting available funds for payout.[35] Along these lines, we follow Hennessy et al., (2007) and include the market-to-book ratio as a proxy for growth opportunities in our tests, that has been previously used in the literature.

We also include asset tangibility as a control variable. Tangible assets can be used as collateral and hence allow for more debt, thus boosting investment activity (Almeida and Campello, 2007). The trade-off theory, which postulates that the choice between debt and equity is linked to a trade-off between the costs and benefits of debt (Kraus and Litzenberger, 1973), predicts a positive relationship between tangible assets and debt levels (Drobetz et al., 2013; Frank and Goyal, 2009). Asset tangibility has also been found to drive payout policy, with the likelihood of paying out dividends increasing with tangible assets (Barros et al., 2019).

[34] Similarly, more profitable companies tend to use less debt in their capital structures (see e.g. Drobetz et al. (2013) and Alexandridis et al. (2020))

[35] See e.g. Barros et al., 2019, Desai and Jin (2011) and Farinha (2003)

The impact of uncertainty on the three corporate financial decisions has also been examined in the literature.[36] Investment decisions can be viewed as financial call options where more information about the investment prospects increase the value of the option. With uncertainty, there is a trade-off for investors between the value to wait for more information on the true investment prospects and the opportunity costs associated to missing out on other investments (Dixit and Pindyck, 1994). The impact of uncertainty on investment prospects is more pronounced in industries with low market-share concentration (Ghosal and Loungani, 2000). Further, uncertainty in the stock market has a delayed negative effect on corporate investment (Ahmadi et al., 2019). It also increases the costs of financial distress (Frank and Goyal, 2009), as it exacerbates information asymmetry between borrowers and lenders. Finally, companies tend to reduce the size of their payout when faced with high levels of uncertainty (Chay and Suh, 2009). Accordingly, we include the lagged uncertainty values to mirror the manager's information environment at the time the corporate decisions were made.[37]

We also include financial decision specific determinants considered in previous studies. Company age is used in the investment equation (Eq. 4.1) to account for the company's maturity and life-

[36] See e.g. Carruth et al. (2000), Glenn and Graeme (2003), Lensink and Murinde (2006) and Bloom et al. (2007).

[37] Baum et al. (2008; 2009) argue that the use of lagged uncertainty variable is motivated by the fact that investment plans have been defined based on the previous period's observed levels of uncertainty. In other words, by including a lagged uncertainty variable, we simulate the behaviour of the management team of a company since our models have the same set of information as the management team before formulating corporate decisions.

cycle stage (Richardson, 2006). The lagged values of investment, leverage[38], and payout are also included in the same model to reflect the dynamic nature of the three corporate decisions (Guariglia, 2008; Lensink and Murinde, 2006; Richardson, 2006; Badoer and James, 2016). In financing equation (Eq. 4.2) we account for the impact of operating leverage which is shown to be inversely related to debt levels (Harrison et al., 2011; Drobetz et al., 2013; Alexandridis et al., 2020). Following Henry (2011) and Barros et al. (2019), we include a liquidity measure in the payout equation (Eq. 4.3) since payout policy can be affected by liquidity constraints. The literature on the determinants of payout also suggests that companies with higher growth rates often cut dividends in favour of allocating more funds to investment (La Porta et al., 2000). Accordingly, we follow Barros et al. (2019) and include sales growth in the payout equation. Finally, we include retained earnings to total equity ratio in the payout equation as a proxy for the life-cycle stage of the company since mature firms tend to distribute more dividends, and undertake less investment (Denis and Osobov, 2008; Chay and Suh, 2009).

Table 4.1 reports the descriptive statistics for our sample. Investment (INV) has an average of 0.154 (investment represents 15.4% of its tangible assets) and 0.381 in the shipping industry and the RoM, respectively. The documented divergence can be linked to the fact that INV is measured on a net basis accounting for divestment, and it accounts for CAPEX, acquisitions, and R&D costs. In untabulated tests, we find that although CAPEX in the shipping industry is almost high as much as in the RoM, expenditure on acquisitions and R&D is significantly lower in the shipping industry.

[38] We follow Badoer & James (2016) and include the lagged leverage to reflect the dynamic structure of new debt issuance. Including the lagged value of new debt issuance instead of lagged leverage remains our results unchanged.

Table 4.1. Descriptive statistics. The descriptive statistics show the number of company-year observations, the mean, the standard deviation, minimum and maximum values of each variable for the main (Shipping) and control (RoM) samples. The data is from Compustat Global and North America. INV denotes investment, ND new debt, PAY payout, CF cash flow, MTB market to book ratio, TAN asset tangibility, AGE company age, SG sales growth, TA total assets, UNC uncertainty, OPLEV operating leverage, LIQ liquidity, FINLEV financial leverage and RETE retained earnings to total equity. All variables are measured at the corresponding fiscal year end and are winsorized at the upper and lower one percentile levels. Statistical significance levels of 1%, 5%, and 10% are denoted with a, b, and c, respectively. See Appendix A for a detailed description of the variables.

	Shipping					**RoM**					**Diff. in means**
	N	Mean	SD	Min	Max	N	Mean	SD	Min	Max	
INV	6,355	0.154	0.315	-0.341	2.165	130,285	0.381	0.825	-0.191	6.014	-0.227 [a]
ND	6,355	0.066	0.458	-0.933	3.334	130,285	0.057	0.614	-2.054	3.933	0.009
PAY	6,355	0.037	0.124	0.000	1.011	130,285	0.077	0.196	0.000	1.454	-0.040 [a]
CF	5,536	0.317	1.319	-1.300	11.591	111,378	0.351	1.397	-6.921	7.803	-0.034 [c]
MTB	6,900	1.229	0.802	0.312	5.537	138,775	1.454	1.030	0.471	7.473	-0.225 [a]
TAN	6,908	0.597	0.238	0.002	0.953	138,758	0.319	0.203	0.006	0.879	0.278 [a]
AGE	6,909	9.639	7.027	1,000	32,000	138,788	11.683	7.973	1,000	32,000	-2.044 [a]
SG	5,313	0.052	0.265	-0.835	1.368	113,260	0.045	0.174	-0.555	0.791	0.007 [a]
TA ($mil)	6,908	1100	2050	1,000	13200	138,782	2440	6410	1,000	45400	-1340 [a]
UNC	6,488	0.032	0.022	0.004	0.154	136,315	0.062	0.124	0.010	0.659	-0.030 [a]
OPLEV	6,876	0.466	0.465	0.014	2.584	138,669	1.005	0.662	0.049	3.669	-0.539 [a]
LIQ	6,800	2.043	2.084	0.332	8.867	137,592	1.907	1.168	0.596	5.154	0.136 [a]
FINLEV	6,909	0.373	0.222	0.000	0.970	138,788	0.236	0.189	0.000	0.857	0.137 [a]
RETE	6,807	0.202	1.045	-6.487	3.272	138,689	0.183	1.745	-11.268	5.830	0.019

Furthermore, we find that shipping companies divest marginally more in comparison to the RoM.[39] This finding reflects the asset-play behaviour of shipping companies since vessels are typically

[39] We refer to CAPEX, acquisitions, and R&D as investment, and the cash receipts from sale of PPE as divestment. CAPEX to PPE ratio is 0.175 (0.208) in the shipping industry (RoM). Acquisition expenses to PPE ratio is 0.010 (0.064) in the shipping industry (RoM). R&D expenses to PPE ratio averages almost 0.000 in the shipping industry, while it has an average of 0.129 in the RoM. Finally, cash receipts from sale of PPE to PPE ratio is higher in the shipping industry (0.035) in comparison to the RoM (0.020).

Table 4.2. Variable definitions

Variable	Definition
Investment	$(\text{CAPEX} + \text{acquisitions} + \text{R\&D} - \text{sale of fixed assets})_t / (\text{PPE})_{t-1}$
New debt	$\Delta(\text{long-term debt})_t / (\text{PPE})_{t-1}$
Payout	$(\text{total dividends})_t / (\text{PPE})_{t-1}$
Cash flow	$(\text{net income} + \text{depreciation and amortisation})_t / (\text{PPE})_{t-1}$
PPE	plant, property, and equipment
Market-to-book	$(\text{market value of assets})_t$ / $(\text{book value of assets})_t$
Asset tangibility	$(\text{plant, property, and equipment})_t / (\text{total assets})_t$
Age	natural logarithm of company age, 1 being the first appearance on Compustat
Sales growth	compounded annual growth rate of sales from t-2 to t
Size	natural logarithm of total assets measured in year t
Uncertainty	the standard deviation of daily stock returns over the year t
Operating leverage	$(\text{operating expenses})_t / (\text{total assets})_t$
Liquidity	$(\text{current assets})_t / (\text{current liabilities})_t$
Retained earnings	$(\text{retained earnings})_t / (\text{total equity})_t$

traded throughout their entire life cycles. New debt (ND) averages 0.066 in the shipping industry, which is marginally higher than for the RoM. It appears that the average shipping company issues similar amounts of long-term debt to RoM firms. Payout (PAY) is significantly lower in the shipping industry (0.037), which is reflective of the heightened cash-flow volatility. Cash flow (CF) and market-to-book (MTB) in the shipping industry are lower than the RoM. Shipping companies have more tangible assets (TAN) and tend to be younger (AGE), while they enjoy higher sales growth (SG). Further, the average shipping company is smaller (TA) than RoM firms and associated with lower uncertainty (UNC) and operating leverage (OPLEV). Finally, shipping companies are subject to a higher degree of liquidity (LIQ) and leverage (FINLEV). Variable definitions are provided in Table 4.2.

4.3.3. Empirical Methodology

We employ two empirical methodologies to examine our hypotheses. First, we perform a single equation analysis, where we estimate Eqs. 4.1 – 4.3 by ordinary least squares (OLS) and system generalised method of moments (system-GMM). Second, we estimate our models allowing for simultaneity using three-stage least squares (3SLS) regressions. Our choice of estimation techniques is driven by a number of factors. First, we use OLS since it has traditionally been one of the most frequent estimators in finance studies that examine the determinants of corporate financial policies (see e.g. Dhrymes and Kurz (1967), Fama (1974), McDonald et al. (1975) and McCabe (1979)). One problem with OLS when estimating our equations is that the lagged dependent variables and other endogenous variables in Eqs. 4.1 – 4.3 will be correlated with the error terms of the models. We account for endogeneity by re-estimating our models with a system-GMM estimator (Arellano and Bover, 1995). The estimation process forms a system that combines the first-differenced equation with the level equation, where the lagged levels are used as instruments for the differenced equation, and the differences act as instruments for the level equation (Blundell and Bond, 1998). To illustrate the estimation process, let us assume a set of explanatory variables that explain a dependent variable, while some of the explanatory variables are not strictly exogenous:

$$y_{i,t} = \alpha + \beta y_{i,t-1} + \gamma x_{i,t} + \eta_i + \varepsilon_{i,t} \qquad \text{(Eq. 4.4)}$$

where β is the coefficient of the endogenous variable and γ is the coefficient of the exogenous variable. η_i represents an unobserved company fixed effect, and $\varepsilon_{i,t}$ is the error term. Taking the first-difference of Eq. 4.4 will eliminate any potential bias that may be rooted in the time-invariant

unobserved heterogeneity[40], but it will also make not strictly exogenous variables endogenous (see Roodman (2009) for a detailed discussion):

$$\Delta y_{i,t} = \alpha + \beta \Delta y_{i,t-1} + \gamma \Delta x_{i,t} + \Delta \varepsilon_{i,t} \quad \text{(Eq. 4.5)}$$

Forming a system that combines the first-differenced and level equations (Arellano and Bond, 1991; Blundell and Bond, 1998; Wintoki et al., 2012):

$$\begin{bmatrix} y_{i,t} \\ \Delta y_{i,t} \end{bmatrix} = \alpha + \beta \begin{bmatrix} y_{i,t-1} \\ \Delta y_{i,t-1} \end{bmatrix} + \gamma \begin{bmatrix} x_{i,t} \\ \Delta x_{i,t} \end{bmatrix} + \varepsilon_{i,t} \quad \text{(Eq. 4.6)}$$

Eq. 4.6 can be estimated via system-GMM since first-differenced variables can be used as instruments for the level equation, and levels can be used as instruments for the differenced equation.

System-GMM performs well on individual equations since it removes the impact of unobserved heterogeneity and uses valid instruments to estimate a stack system of equations comprising both levels and differences. However, it does not offer a solution to the simultaneity problem. In order to see if the three corporate decisions are jointly determined, we further employ simultaneous equation analysis. 3SLS estimates systems of equations including endogenous variables that serve as dependent variables of other equations in the system. The error terms are not only correlated with the endogenous variables in a specific regression, but also across all equations. 3SLS utilises

[40] Wintoki et al. (2012) argue that general corporate finance studies recognise at least two sources of endogeneity that may produce biased estimates of how an independent variable affects a dependent variable: unobservable heterogeneity and simultaneity. System-GMM handles the former by taking the first difference of the equations. However, a possible simultaneity issue will be prevalent in the equations since investment, financing and payout variables are functions of each other.

an instrumental variable approach and generalised least squares (GLS) to estimate consistent parameters and account for the correlation structure among the equations in the system. 3SLS shares the same two steps with traditional 2SLS, that are, obtaining the fitted values of the endogenous variables in the first step, and using the fitted values in place of the right-hand side endogenous variables to estimate the second step. As a third step, it estimates the coefficients of the whole system simultaneously by using the moment matrix of the structural disturbances estimated by 2SLS. (see Zellner and Theil (1962) for a detailed discussion). Accordingly, we estimate Eqs 4.1 - 4.3 using a simultaneous framework via 3SLS which allows for interdependencies across corporate financial decisions, while controlling for other determinants.

4.4. Empirical Results

In this section, we present the main empirical results of our analysis. We first report the single equation analysis where we estimate Eqs (12-14) independently using OLS and System-GMM. We then present the results from the simultaneous equation analysis, where we estimate Eqs. 4.1 – 4.3 using 3SLS that accounts for simultaneity in corporate financial decisions.

4.4.1. Single Equation Analysis

Although the main purpose of this study is to identify interrelations between the corporate policies of shipping companies, we first investigate whether the relationships between each pair of policies as a point of reference. Table 4.3 presents the results of the investment, financing, and payout regressions, where each of the models is estimated independently, i.e., without accounting for simultaneity. Panel A shows the coefficient estimates of investment, financing, and payout models. Panel B presents the differences in the coefficients obtained from OLS and System-GMM

estimators. Finally, Panel C shows the economic impact for each of the financial policies, implied by the coefficients in Panel A.

The OLS results reported in column (I) suggest that newly issued debt is significantly and positively associated with the level of investment in the shipping industry. This suggests that companies with higher levels of debt issuance tend to invest more. Specifically, a one standard deviation increase in newly issued debt (0.436) leads to an increase of 0.131 in the level of investment[41]. This finding suggests that the investment in the shipping industry is strongly driven by newly issued debt, which challenges the irrelevance proposition proposed by Miller and Modigliani (1958, 1963). However, based on the OLS estimator, the relationship between payout and investment is statistically insignificant.

For the financing equation, the OLS estimator shows a positive and significant coefficient for investment, implying that companies with higher investment outlays issue more debt. In economic terms, we find that a one standard deviation increase in the level of investment (0.311) corresponds to an increase of 0.206 in newly issued debt.[42] The payout coefficient is positive but insignificant. The results here suggest that the financing needs of a shipping company is positively linked with its investments, but not necessarily with its payout policy. Yet, we note that these results should be interpreted with caution since they do not account for potential joint determination among these financial policies.

[41] This is equivalent to a $1mil increase in new debt being associated with an increase of $0.30mil in the level of investment, estimated via OLS.

[42] This is equivalent to a $1mil increase in the level of investment being associated with an increase of $0.66mil in new debt, estimated via OLS.

Table 4.3. Single equation analysis of investment, financing and payout. The table presents the results of the single equation regressions. Panel A shows the coefficient estimates obtained from OLS and System-GMM. Robust standard errors are given in parentheses. Year- and sector-fixed effects indicate if the specification includes year and sector dummies. AR(1) and AR(2) are tests for first- and second-order serial correlation, under the null of no serial correlation. The Hansen test of over-identification is under the null that all instruments are valid. Statistical significance levels of 10%, 5%, and 1% are denoted with *, **, and ***, respectively. Panel B shows the significance test for difference in coefficients obtained from OLS and System-GMM regressions. Panel C shows the economic impact of investment, financing and payout variables on each other in response to a one standard deviation increase, where statistically significant economic impacts are reported in bold.

<u>Panel A</u>: Coefficient estimates of investment, financing and payout equations via OLS and System-GMM

	OLS			**System-GMM**		
	I	II	III	IV	V	VI
	INV_t	ND_t	PAY_t	INV_t	ND_t	PAY_t
INV_t		0.663***	0.012		0.539***	-0.105*
		(0.046)	(0.011)		(0.224)	(0.054)
ND_t	0.300***		-0.004	0.282***		0.085**
	(0.036)		(0.008)	(0.135)		(0.038)
PAY_t	0.048	0.096		-0.014	0.261	
	(0.112)	(0.218)		(0.356)	(0.508)	
$SIZE_t$	0.001	0.014***	0.001	0.005	0.024***	0.001
	(0.002)	(0.004)	(0.000)	(0.004)	(0.006)	(0.001)
CF_t	0.021**	0.020	0.027***	0.045**	0.016	0.040***
	(0.009)	(0.020)	(0.006)	(0.021)	(0.024)	(0.009)
MTB_t	0.019**	-0.015*	0.004	0.023**	-0.023*	0.005
	(0.008)	(0.009)	(0.003)	(0.010)	(0.011)	(0.004)
TAN_t	-0.013	0.043	-0.018**	0.066**	0.172**	-0.034*
	(0.021)	(0.040)	(0.008)	(0.031)	(0.084)	(0.019)
UNC_{t-1}	0.260	0.604*	-0.096***	0.210	1.434***	-0.142**
	(0.273)	(0.361)	(0.028)	(0.295)	(0.432)	(0.064)
AGE_t	-0.025***			-0.017		
	(0.007)			(0.010)		
$OPLEV_t$		-0.050**			-0.064***	
		(0.020)			(0.018)	
SG_t			-0.007			-0.002
			(0.006)			(0.009)
LIQ_t			0.001			-0.000
			(0.000)			(0.001)
$RETE_t$			0.001			0.001
			(0.000)			(0.001)
INV_{t-1}	0.153***			0.195***		
	(0.021)			(0.043)		
$FINLEV_{t-1}$		-0.147***			-0.421***	
		(0.046)			(0.095)	
PAY_{t-1}			0.650***			0.395***

			(0.061)			(0.130)
N	5,029	5,141	4,500	5,029	5,141	4,500
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000
R^2 *(%)*	28.5	25.5	73.1	27.1	23.2	61.1
Year-fixed effects	YES	YES	YES	YES	YES	YES
Sector-fixed effects	YES	YES	YES	NO	NO	NO
Number of instruments				63	56	64
AR(1)				-6.41***	-5.49***	-3.84***
AR(2)				1.40	1.63	-0.17
Hansen test (p-value)				0.195	0.887	0.678

<u>Panel B</u>: Significance test for difference in coefficients obtained from OLS and System-GMM regressions

	(INV): I-IV	**(ND): II-V**	**(PAY): III-VI**
INV		0.124	0.117**
ND	0.018		-0.089**
PAY	0.062	-0.165	

<u>Panel C</u>: Economic impact of investment, financing and payout variables on each other in response to a one standard deviation increase

	OLS						**System-GMM**					
	I		II		III		IV		V		VI	
	SD	*INV*	*SD*	*ND*	*SD*	*PAY*	*SD*	*INV*	*SD*	*ND*	*SD*	*PAY*
INV	0.307		0.311	**0.206**	0.301	0.003	0.307		0.311	**0.168**	0.301	**-0.031**
ND	0.436	**0.131**	0.448		0.431	-0.001	0.436	**0.123**	0.448		0.431	**0.037**
PAY	0.131	0.006	0.130	0.012	0.132		0.131	-0.001	0.130	0.034	0.132	

In the payout model, the OLS estimator yields a positive coefficient for investment and a negative coefficient for new debt, which is inconsistent with the theoretical predictions of the flow-of-funds and information asymmetry framework about the link between the different corporate financial policies. Still, both coefficients are statistically insignificant. Therefore, according to the single-equation results based on OLS analysis, the payout policy is deemed independent of both investment and financing policies.

As noted in section 4.3, the OLS estimator can yield coefficients that are biased due to endogeneity issues.[43] In order to account for endogeneity, we re-estimate Eqs 4.1 – 4.3 by using the System-GMM estimator. In columns (IV), (V) and (VI), the investment, financing, and payout variables are treated as endogenous. The reliability of the system GMM largely depends on the validity of instruments and serial correlation among error terms, therefore, we also report autoregressive(1), autoregressive(2), and Hansen test statistics. We show that none of the models suffers from second-order serial correlation of the first-differenced error term. We also report insignificant values for the Hansen test, which implies that the instruments are uncorrelated with the composite error term, and thus they are valid.

In the investment regression in column (IV), the significant relationship between debt and investment is reaffirmed, while the economic impact is similar to OLS and System-GMM models. Specifically, we show that a one standard deviation increase in newly issued debt (0.436) leads to an increase of 0.123 in the level of investment.[44] The payout coefficient remains insignificant, but turns negative, which is consistent with the expectations of flow-of-funds theory. In the financing regression in column (V), we confirm the positive relationship between investment and debt. Specifically, a one standard deviation increase in investment (0.311) leads to an increase of 0.168

[43] We empirically test whether investment, financing, and payout are endogenous by applying the Hausman test for endogeneity. Untabulated results show that in each regression, two of the variables are endogenous.

[44] This is equivalent to a $1mil increase in new debt being associated with an increase of $0.28mil in the level of investment, estimated via System-GMM

in newly issued debt.[45] Payout remains statistically insignificant.

After accounting for endogeneity in column (VI) using the System-GMM estimator, we find that both investment and new debt are significant determinants of payout. The investment coefficient is negative, which supports the notion that investment limits the availability of funds for payout. In economic terms, we report that a one standard deviation increase in investment (0.301) decreases payout by 0.031[46]. In contrast, new debt is positively associated with payout policy. This result suggests that shipping companies do take into account their ability to raise debt when setting their payout policy. Specifically, we document that a one standard deviation increase in newly issued debt (0.431) increases payout by 0.037.[47]

The analysis so far suggests that the results from the OLS estimator and System-GMM are to some extend comparable, but for the latter, some of the results are more consistent with our theoretical expectations. Along these lines, we check the significance of coefficient differences between OLS and System-GMM.[48] Panel B of Table 4.3 suggests that the estimator selection does not make for

[45] This is equivalent to a $1mil increase in the level of investment being associated with an increase of $0.54mil in new debt, estimated via System-GMM.

[46] This is equivalent to a $1mil increase in the level of investment being associated with a decrease of $0.10mil in payout, estimated via System-GMM.

[47] This is equivalent to a $1mil increase in new debt being associated with an increase of $0.08mil in payout, estimated via System-GMM.

[48] We follow Clogg et al. (1995) and test the significance between the difference in the coefficients by using the following formula: $z = (\beta_1 - \beta_2)/[s^2(\beta_1) + s^2(\beta_2)]^{1/2}$, where β_1 and β_2 are the coefficients of interest and s is the standard error of the coefficients.

a statistically significant difference for coefficient estimates of investment and new debt. However, in the payout regressions, the differences in the coefficients of investment (0.117) and new debt (-0.089) are significant. This suggests that controlling for endogeneity highlights the benefits of GMM in successfully capturing the impact of investment and financing on payout policy.

The majority of the control variables have the expected signs. Company size is positively associated with all corporate decisions, although it is significant only in the new debt regression. This finding supports the trade-off theory, suggesting that large companies carry a lower default risk since they tend to be more diversified (Frank and Goyal, 2009; Drobetz et al., 2013). Cash flow exhibits a positive effect in all regressions, and it is statistically insignificant only in new debt regressions. This implies that shipping companies decide to issue more debt regardless of cash-flow generation, but they invest and pay back more to investors as their cash-flow increases. Market-to-book, which is a proxy for growth opportunities, is positively associated with investment and payout but negatively with new debt. This means that shipping companies with higher growth opportunities tend to invest more (see e.g., Guariglia (2008)), while they rely less on debt capital because of higher financial distress costs (see e.g., Drobetz et al. (2013)).

Asset tangibility offers mixed results across models. The OLS estimator predicts a negative and insignificant relationship between asset tangibility and investment, while System-GMM shows a positive and significant relationship. In fact, Almeida and Campello (2007) suggest that asset tangibility, as a proxy for debt capacity, is a positive function of investment. In new debt regressions, asset tangibility is positive, but it is significant only when the model is estimated via System-GMM. This finding is in line with the trade-off theory that predicts a positive relationship between asset tangibility and new debt issuance since tangible assets can be used as collateral against debt (Drobetz et al., 2013).

Uncertainty does not appear to be a significant determinant of investment. However, it is significant in new debt and payout regressions, with a positive (negative) direction in new debt (payout) regressions. The positive impact of uncertainty on new debt suggests that higher uncertainty may lead shipping companies to carry more debt because of higher adverse selection costs (Drobetz et al., 2013). In contrast, uncertainty has a negative and strong effect on payout, which means that, under greater uncertainty, shipping companies tend to reduce dividend payments (Brav et al., 2005; Chay and Suh, 2009).

The control variables that are corporate policy specific also display the expected signs. Company age is found to be inversely associated with investment, which suggests that older companies are inclined to invest less (Richardson, 2006; Hovakimian, 2009). Operating leverage affects new debt negatively, implying that shipping companies with higher operating leverage tend to issue less debt (Alexandridis et al., 2020). Sales growth, liquidity, and retained-earnings-to-total-equity ratio do not exhibit any statistical significance in either OLS or System-GMM regressions. Finally, we show that all three corporate decisions are dynamic since the lagged values of investment, leverage, and payout are positive and significant.

4.4.2. Simultaneous Equation Analysis

In the previous section, we uncover associations between corporate financial policies by employing single equation analyses and two different estimators, where we estimate investment, financing, and dividend equations independently. We show that the System-GMM estimator yields coefficients that more accurately reflect some of the independent relationships between corporate financial policies since it accounts for endogeneity. In this section, we account for simultaneity among corporate policies and utilise a simultaneous equations framework by estimating Eqs. 4.1 – 4.3 via 3SLS. For benchmarking purposes the 3SLS analysis is performed for both firms in the

shipping industry and the rest of the market (RoM). Benchmarking against other sectors allows us to test our hypothesis that the shipping industry is a more appropriate testing ground to examine whether corporate financial policies are jointly determined due to its idiosyncratic characteristics.

Table 4.4 shows the results of 3SLS regressions. We include the same control variables as Table 4.3 but for the sake of brevity we do not report their coefficients.[49] A notable observation from our simultaneous equations analysis is that all three corporate policies appear to be jointly determined, and thus, inter-related, in the shipping industry. Specifically, the coefficient estimates show economic differences between single and simultaneous equations frameworks. Further, the simultaneity among investment, financing, and payout is confirmed in the RoM as well, although less pronounced than the shipping industry, with the differences in coefficients from the shipping and RoM samples being statistically significant.

Column (I) of Table 4.4 suggests an increase in new debt is associated with higher investment levels in shipping firms. RoM companies with higher debt issuance levels invest more too, although the estimated coefficient of new debt in the latter case is marginally larger. In the shipping industry, a one standard deviation increase in new debt (0.431), leads to an investment increase of 0.382. For the RoM sample, we show that a one standard deviation increase in new debt (0.607) marks an investment increase of 0.587.[50]

[49] We do not tabulate the coefficient estimates of control variables since they display very similar magnitudes and significance levels as System-GMM regressions in Table 4.3. The full specifications are available upon request.

[50] This is equivalent to a $1mil increase in new debt being associated with an increase in investment by $0.88mil and $0.96mil in the shipping industry and the RoM, respectively.

Table 4.4. Simultaneous equation analysis of investment, financing, and payout. The table presents the results of the simultaneous equations regressions based on the shipping industry and the RoM. Panel A shows the coefficient estimates of investment, financing, and payout equations via 3SLS. Standard errors are given in parentheses. Year- and sector-fixed effects indicate if the specification includes year and sector dummies. Statistical significance levels of 10%, 5%, and 1% are denoted with *, **, and ***, respectively. Panel B shows the significance test for difference in coefficients obtained from Shipping and RoM regressions. Panel C shows the economic impact of investment, financing and payout variables on each other in response to a one standard deviation increase, where statistically significant economic impacts are reported in bold. Panel D shows the coefficient estimates of investment, financing and payout equations based on two shipping subsamples via 3SLS.

<u>Panel A</u>: Coefficient estimates of investment, financing and payout equations via 3SLS

	Shipping			**RoM**		
	I	II	III	IV	V	VI
	INV	*ND*	*PAY*	*INV*	*ND*	*PAY*
INV		0.767***	-0.282***		0.104***	. -0.021***
		(0.073)	(0.028)		(0.004)	(0.001)
ND	0.886***		0.292***	0.967***		0.099***
	(0.050)		(0.032)	(0.022)		(0.008)
PAY	-0.331***	0.335***		-0.171***	0.127***	
	(0.069)	(0.085)		(0.015)	(0.014)	
N	4,489	4,489	4,489	97,655	97,655	97,655
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000
Control variables	YES	YES	YES	YES	YES	YES
Fixed effects	YES	YES	YES	YES	YES	YES

<u>Panel B</u>: Significance test for difference in coefficients obtained from alternative subsample regressions

	(INV): I-IV	**(ND): II-V**	**(PAY): III-VI**
INV		0.663***	-0.261***
ND	-0.081*		0.193***
PAY	-0.160**	0.208***	

<u>Panel C</u>: Economic impact of investment, financing and payout variables on each other in response to a one standard deviation increase

	Shipping				**RoM**			
		I	II	III		IV	V	VI
	SD	*INV*	*ND*	*PAY*	*SD*	*INV*	*ND*	*PAY*
INV	0.301		**0.231**	**-0.085**	0.847		**0.088**	**-0.018**
ND	0.431	**0.382**		**0.125**	0.607	**0.587**		**0.060**
PAY	0.132	**-0.044**	**0.044**		0.205	**-0.035**	**0.026**	

<u>Panel D</u>: Coefficient estimates of investment, financing and payout equations based on two shipping subsamples via 3SLS

	Shipowners			RosM		
	I	II	III	IV	V	VI
	INV	*ND*	*PAY*	*INV*	*ND*	*PAY*
INV		0.743***	-0.237***		0.833***	0.013
		(0.085)	(0.032)		(0.170)	(0.067)
ND	0.703***		0.204***	0.575***		0.035
	(0.063)		(0.033)	(0.054)		(0.060)
PAY	0.223	0.321*		-0.461***	0.658***	
	(0.155)	(0.190)		(0.045)	(0.073)	
N	2,473	2,473	2,473	2,016	2,016	2,016
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000
Control variables	YES	YES	YES	YES	YES	YES
Fixed effects	YES	YES	YES	YES	YES	YES

A notable result is the negative and significant effect of payout on investment, a relationship that the single equations analysis fails to capture. This negative association suggests that there is a trade-off between investment and payout, i.e. investment and payout seem to be competing for corporate funds. Although this relationship appears in both shipping and RoM models, the estimated coefficient of payout is significantly larger in the shipping industry and the difference is significant at 5%. This indicates that the negative impact of payout on the level of investment is more pronounced in the shipping industry. The difference between the two samples could be attributed to the limited availability of internal and external funds in the shipping industry, which can increase competition between investment and payout flows. In economic terms, we show that a one standard deviation increase in payout (0.132) decreases investment by 0.044 in the shipping industry. For the RoM, we report that one standard deviation increase in payout (0.205), decreases the level of investment by 0.035.[51] Overall, these findings are in line with the predictions of flow-

[51] This is equivalent to a $1mil increase in payout being associated with a decrease of $0.33mil and $0.17mil in the level of investment in the shipping industry and the RoM, respectively.

of-funds theory that the investment and payout policies are co-determined (Dhrymes and Kurz, 1967).

Column (II) in Panel A of Table 4.4 shows that companies with higher levels of investment issue more debt. This finding supports a well-known fact that shipping is a capital-intensive industry and the investments are regularly financed with external debt. The RoM also corroborates this positive relationship, but with a markedly smaller coefficient: Column (II) of Panel B in Table 4.4 suggests that the positive impact of investment on new debt issuance is statistically significantly larger in the shipping industry. This can reflect that a large number of firms in the RoM sample (e.g. high growth technology firms) are able to finance their investment through sources other than debt, while the financing options are relatively scarce in the shipping industry where companies tend to rely heavily on debt. The economic impact of investment on newly issued debt also highlights these differences; a one standard deviation increase in investment (0.301) leads to a debt increase of 0.231 in the shipping industry. On the other hand, a one standard deviation increase in investment (0.947) leads to a debt increase of only 0.088 in the RoM. [52]

The simultaneous equations analysis uncovers another relationship that single equations framework does not capture. In particular, payout is positively associated with new debt issuance. This relationship suggests that the debt financing decision is not merely a function of investment needs, but it is also driven by payout policy. Consequently, it highlights the importance of optimal resource allocation among investment and payout. The positive impact of payout on external debt is also prevalent in the RoM sample, but with a less pronounced effect. The payout coefficient is

[52] This is equivalent to a $1mil increase in the level of investment being associated with an increase of $0.76mil and $0.09mil in new debt in the shipping industry and the RoM, respectively.

0.335 in the shipping sample (Column (II)) and 0.127 in the RoM sample (Column (V)). The coefficients are statistically different at the 1% significance level (Panel B). A possible explanation for this is that a typical RoM company may rely less on debt to finance its payout activities. In the shipping industry, a one standard deviation increase in payout (0.132) increases debt by 0.044. In the RoM, in contrast, we report that a one standard deviation increase in payout (0.205) leads to a debt increase of only 0.026. [53]

The payout specification in column (III) shows that investment has a negative and significant effect on payout. This result confirms the trade-off between investment and payout flows, something we also report in specifications (I) and (IV). The negative impact of investment on payout holds in the RoM sample, too. However, the impact is significantly smaller, which implies that non-shipping companies are less likely to substitute investment funds for dividend payout. The difference in economic impact between shipping and RoM is significant; a one standard deviation increase in the level of investment (0.301) marks a decrease in payout by 0.085 for shipping companies. In contrast, a one standard deviation increase in the level of investment (0.847) for firms in RoM decreases payout by only 0.018.[54] The significant difference between the two samples corroborates the more pronounced trade-offs between investment and payout in the shipping industry compared to the rest of the market.

We also find that companies that issue more debt have higher levels of payout , which suggests

[53] This is equivalent to a $1mil increase in payout being associated with an increase of $0.33mil and $0.12mil in new debt in the shipping industry and the RoM, respectively.

[54] This is equivalent to a $1mil increase in the level of investment being associated with a decrease of $0.28mil and $0.02mil in payout in the shipping industry and the RoM, respectively.

that payout in the shipping industry is partly funded by debt. Given the highly volatile nature of cash flows and asset values in the sector, adding to debt (and cutting investment plans) in order to fund dividend outflows during market declines is not surprising. Although the direction of this relationship is the same for the RoM sample, the inter-relation between new debt and payout is less pronounced in this case. In economic terms, we show that a one standard deviation increase in newly issued debt (0.431) is linked to an increase in payout of 0.125 in shipping. In contrast, a one standard deviation increase in newly issued debt (0.607) increases payout by only 0.060 in the RoM.[55]

In Panel D, we rerun our regressions based on two shipping subsamples, since the shipowner industry show divergences in the coefficient estimates due to relatively high capital intensity and reliance on debt capital. Our results based on the shipowners sector show that investment and debt are significantly positively associated with each other. One notable difference from the full sample specification in Panel A is that payout does not seem to associate with investment in a significant way. We report a positive but highly insignificant coefficient for payout in the investment equation in Panel D. This results implies that an increase in payout does not affect the investment plans of the shipowner industry. On the other hand, we still report positive and significant coefficients for investment and payout in the financing equation. This results suggests that payout is positively associated with financing in the shipowners industry. Another striking finding is the that the coefficient of investment is negative and highly significant in the payout equation. It appears that the shipowner companies are able compensate an increase in payout and do not reduce the level of

[55] This is equivalent to a $1mil increase in new debt being associated with an increase of $0.29mil and $0.09mil in payout in the shipping industry and the RoM, respectively.

investment, while they take investment into account when devising a payout policy.

The RoSM results in the last three columns of Panel D report insightful results as well. First, the positive and significant association between investment and financing remains in the RoSM companies. We report a negative and significant coefficient for payout in the investment equation, which was absent in the shipowner regressions. A possible explanation for this difference is that the capital intensity of the shipowners industry. Specifically, the growth and success in the shipowners industry relies on an ongoing investment plan, therefore, shipowner companies are reluctant to change their investment plans. On the other hand, the RoSM companies which are not heavily investment-driven seem to devise their investment policies by taking payout into account. In the financing equation, we emphasise our initial finding that new debt is a positive and significant function of investment and payout. However, we do not report a significant coefficient for investment and new debt in the payout equation. Specifically, we show that the RoSM companies devise their payout policies separately without interacting with investment and financing.

Overall, our simultaneous equation analysis yields several important results. First, we report that investment, financing, and payout policies are jointly set in the shipping industry and the interrelations between them are unequivocally significant. Second, we show that single equation analysis tends to underestimate these interrelations, especially the interplay between payout and the other two corporate financial decisions. Third, not surprisingly given the capital-intensive nature of the shipping industry and its reliance on debt financing, the link between debt and investment seems to be strong. Fourth, we find that the financing decisions of shipping companies are not only driven by their investment plans, but they are also a function of the payout policy. Fifth, we confirm that the investment and dividend policies are competing for funds, which

provides support to the flow-of-funds framework of Dhrymes and Kurz (1967). Sixth, we find that most of the reported interactions between investment, financing, and payout are generally more pronounced in the shipping industry compared to the rest of the market, which can be attributed to its idiosyncrasies. Finally, we show that the properties of the interactions between the three corporate policies can vary in shipping subsectors due to sectoral idiosyncrasies.

4.4.3. Do financial constraints and market conditions drive the inter-relationships in investment, financing and payout policies?

In this section, we examine whether financial constraints and market conditions affect the co-determination of financial policies. Financially constrained firms may have limited access to external capital and, consequently, forego profitable investment opportunities (Fazzari et al., 1988; Guariglia, 2008; Almeida and Campello, 2007). The impact of missing growth opportunities on company performance creates strong incentives to sacrifice payout to shareholders to fund investing activities. This suggests that policy interactions can be more prominent for firms under financial distress. The shipping industry encompasses a significant number of financially constrained companies (Drobetz et al., 2013) making it a natural testing ground to examine the role of financial constraints in corporate financial policy interactions. To that end, we repeat our analysis by dividing our sample to more financially constrained (MFC) and less financially constrained (LFC) firms.[56]

Market conditions have also been shown to affect corporate policies. During the 2008 financial crisis, capital expenditure, corporate borrowing and payout decreased sharply as a response to

[56] See Appendix B for a discussion on the methodology we utilise to specify more financially and less financially constrained company-year observations.

liquidity scarcity.[57] The cash-flow constraints accompanying market crises may intensify competition for funds across corporate policies. In order to investigate the impact of the macroeconomic environment on policy co-determination, we further split our sample into crisis and non-crisis years.[58]

We re-estimate Eqs. 4.1 – 4.3 based on a simultaneous framework for the two sets of subsamples. Table 4.5 shows the regression results. First, we focus on the analysis of the financial-constraints sub-sets. We show that MFC companies use less debt to finance new investments, while MFC companies with higher payouts invest less in comparison to LFC . These results suggest that MFC companies rely more on internal financing and payout cuts in order to fund their investment plans. In other words, the trade-off between investment and payout policies becomes more apparent when access to external capital is restricted.

The financing models also show policy differences between MFCs and LFCs. Columns II and V in Table 4.5 show that investment is a much stronger driver of new debt for MFC companies, with the difference in coefficients being significant at the 1% level. Financially constrained firms are less likely to have excessive operating cash flow or cash reserves, as they would have otherwise used these resources for repay some of their debt and mitigate the costs of financial distress. As a result, MFCs can undertake sizeable investments only by raising external capital, since internal financing would be insufficient. This is supported by the reported economic impact of investments

[57] For CAPEX and debt decreases see Ivashina and Scharfstein (2010) and Kahle and Stultz (2013). For payout cuts see Bliss et al. (2015).

[58] We follow Drobetz et al. (2016) and define three crisis periods in our sample: (i) 1990-1993, (ii) 2002-2003, (iii) 2008-2012.

on new debt in Panel C. A one standard deviation increase in investments (0.345) leads to an increase in new debt of similar magnitude (0.332). In contrast, LFC companies have more flexibility in using free cash flow and cash reserves to finance their investments, therefore an increase in investments leads to lower increases in new debt.

A similar relationship is observed between payout and debt. MFC companies with higher payouts issue more debt in comparison to LFC companies. Companies have an incentive to distribute dividends in order to minimise future financing costs (La Porta et al., 2000) and MFCs are no exception. Specifically, MFCs are willing to burden their capital structure with more debt and risk financial distress in order to continue paying their shareholders. Similar to our earlier discussion about investments, MFCs raise enough debt to cover their payouts, while LFCs raise significantly less debt in response to payout increases, since they are able to utilise internally generated cash-flows.

Regarding the payout equations, we find that the impact of investment and debt issuance is less pronounced for MFCs. The smaller payout response to an increase in debt for MFCs indicates that these companies have operational cash-flow needs that are more important than payout. This interpretation is consistent with the going-concern view of companies, where corporations tend to manage their resources to the long-term benefit of shareholders and other stakeholders, instead of offering a short-term windfall. However, the less pronounced impact of investment on payout for MFCs underscores the importance of payout for investors, since financially constrained firms are willing to retain relatively stable payout levels, even if this means raising more debt to finance their investments.

Market conditions significantly affect policy co-determination as well. The main variables of interest hold the expected signs for both crisis and non-crisis years, but the significance and

magnitude of coefficients vary across models. Starting with the investment regressions, we report that the positive impact of new debt on investment is similar in both crisis and non-crisis years.

This finding suggests that shipping companies use external financing fairly consistently across different market conditions. The impact of payout on investment varies markedly between crisis and non-crisis years. We find that an increase in payout decreases the level of investment during crisis years, but not during non-crisis years. This outcome can be interpreted through the lenses of capital and cash flow availability. During crisis years, companies have lower operating cash-flows, while external financing becomes sparse. In such conditions, the trade-off between investment and payout becomes more pronounced. In contrast, favourable market conditions are typically associated with higher operating cash-flows and less financing constraints, making the investment-payout link weaker. We show that a one standard deviation increase in payout (0.134) decreases investment by 0.107 in crisis years. In non-crisis years, the decrease in the level of investment is only 0.001 in response to a one standard deviation increase in payout (0.131). This suggests that the Miller and Modigliani's (1961) predictions regarding dividend policy apply better to periods of positive market conditions. The results of our new debt regressions offer similarly interesting results. The significantly larger investment coefficient in Column XI indicates that shipping companies are more likely to finance their investments with debt during non-crisis years. In other words, when companies undertake sizeable investment plans during good times, companies can raise most of the required capital by issuing debt. In contrast, during crises, firms have to cover more than half of the investment plan with non-debt financing.

Table 4.5. Simultaneous equations analysis of investment, financing and payout with alternative subsamples. The table presents the results of the simultaneous equations regressions based on the following subsamples: More financially constrained, less financially constrained, crisis years and non-crisis years. Panel A shows coefficient estimates of investment, financing and payout equations via 3SLS for the four alternative subsamples. Standard errors are given in parentheses. Fixed effects indicate if the specification includes year- and sector-fixed effects. Control variables indicate if the model is estimated with control variables. Statistical significance levels of 10%, 5%, and 1% are denoted with *, **, and ***, respectively. Panel B shows the significance test for difference in coefficients obtained from Shipping subsample regressions. Panel C shows the economic impact of investment, financing and payout variables on each other in response to a one standard deviation increase, where statistically significant economic impacts are reported in bold.

Panel A: Coefficient estimates of investment, financing and payout equations via 3SLS for alternative subsamples

	More financially constrained			**Less financially constrained**			**Crisis years**			**Non-crisis years**		
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
	INV	*ND*	*PAY*	*INV*	*ND*	*PAY*	*INV*	*ND*	*PAY*	*INV*	*ND*	*PAY*
INV		0.962***	-0.179***		0.265**	-0.224***		0.495***	-0.195***		0.901***	-0.333***
		(0.099)	(0.027)		(0.107)	(0.042)		(0.135)	(0.040)		(0.084)	(0.043)
ND	0.688***		0.140***	0.833***		0.221***	0.766***		0.195***	0.859***		0.329***
	(0.048)		(0.022)	(0.098)		(0.058)	(0.170)		(0.057)	(0.046)		(0.048)
PAY	-0.588***	0.843***		-0.239***	0.176**		-0.799***	0.701***		-0.010	0.027	
	(0.141)	(0.178)		(0.070)	(0.075)		(0.166)	(0.167)		(0.076)	(0.100)	
N	2,262	2,262	2,262	2,227	2,227	2,227	1,596	1,596	1,596	2,893	2,893	2,893
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Control variables	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Panel B: Significance test for the difference in coefficients obtained from alternative subsample regressions

	(*INV*): I-IV	**(*ND*): II-V**	**(*PAY*): III-VI**	**(*INV*): VII-X**	**(*ND*): VIII-XI**	**(*PAY*): IX-XII**
INV		0.697***	0.045		-0.406***	0.138***
ND	-0.145*		-0.081*	-0.093		
PAY	-0.349**	0.667***		-0.789***	0.674***	-0.134**

Panel C: Economic impact of investment, financing and payout variables on each other in response to a one standard deviation increase

	More financially constrained				Less financially constrained				Crisis years				Non-crisis years			
		I	II	III		IV	V	VI		VII	VIII	IX		X	XI	XII
	SD	*INV*	*ND*	*PAY*	*SD*	*INV*	*ND*	*PAY*	*SD*	*INV*	*ND*	*PAY*	*SD*	*INV*	*ND*	*PAY*
INV	0.345		**0.332**	**-0.062**	0.246		**0.065**	**-0.055**	0.294		**0.145**	**-0.057**	0.305		**0.275**	**-0.101**
ND	0.526	**0.362**		**0.074**	0.292	**0.243**		**0.064**	0.445	**0.341**		**0.087**	0.422	**0.363**		**0.139**
PAY	0.098	**-0.058**	**0.083**		0.159	**-0.038**	**0.028**		0.134	**-0.107**	**0.094**		0.131	-0.001	0.003	

Panel D: Coefficient estimates of investment, financing and payout equations based on the shipowners industry via 3SLS for alternative subsamples

	More financially constrained			Less financially constrained			Crisis years			Non-crisis years		
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
	INV	*ND*	*PAY*	*INV*	*ND*	*PAY*	*INV*	*ND*	*PAY*	*INV*	*ND*	*PAY*
INV		0.808***	-0.176***		0.098	-0.098***		0.474**	-0.165***		0.836***	-0.289
		(0.114)	(0.027)		(0.137)	(0.028)		(0.189)	(0.062)		(0.095)	(0.046)
ND	0.644***		0.134***	0.489***		0.062*	0.556***		0.101	0.742***		0.255
	(0.058)		(0.022)	(0.120)		(0.034)	(0.144)		(0.085)	(0.063)		(0.043)
PAY	0.327	0.498*		0.181	0.231		-0.182	0.091		0.526**	0.577**	
	(0.255)	(0.221)		(0.198)	(0.207)		(0.227)	(0.331)		(0.203)	(0.240)	
N	1,313	1,313	1,313	1,160	1,160	1,160	890	890	890	1,583	1,583	1,583
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Control variables	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

<u>Panel E</u>: Coefficient estimates of investment, financing and payout equations based on the RoSM via 3SLS for alternative subsamples

	More financially constrained			Less financially constrained			Crisis years			Non-crisis years		
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
	INV	*ND*	*PAY*	*INV*	*ND*	*PAY*	*INV*	*ND*	*PAY*	*INV*	*ND*	*PAY*
INV		0.855***	-0.249***		0.066	-0.129		0.080	0.041		1.317***	0.161
		(0.242)	(0.070)		(0.236)	(0.315)		(0.261)	(0.071)		(0.226)	(0.104)
ND	0.529***		0.156***	0.446***		0.728***	0.438***		0.038	0.516***	0.602***	-0.096
	(0.058)		(0.043)	(0.124)		(0.274)	(0.166)		(0.053)	(0.049)	(0.102)	(0.119)
PAY	-0.413***	0.763***		-0.392***	0.338***		-0.404***	0.513***		-0.359***		
	(0.091)	(0.142)		(0.057)	(0.080)		(0.105)	(0.104)		(0.048)		
N	950	950	950	1,066	1,066	1,066	706	706	706	1,310	1,310	1,310
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Control variables	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

A one standard deviation increase in investment, which is similar in both samples, leads to new debt increase of 0.145 (0.275) in crisis years (non-crisis years).[59] This difference further highlights the dynamic environment in which policies are co-determined. The impact of payout on debt issuance also varies with market conditions. During crisis years, payout has a strong, positive, and significant effect on debt issuance, while the relationship becomes economically and statistically insignificant in non-crisis years. This discrepancy indicates that the operating cash-flow may not be sufficient to cover payout in crisis years. In contrast, companies find it easier to fund their payout with internally generated cash flow and are less dependent on external debt capital during auspicious market conditions.

The payout regressions show that market conditions also affect the interaction between policies, but to a lesser extent. We find that a decrease in payout in response to an increase in investment is less pronounced in crisis years. This finding is consistent with our results for MFCs, suggesting that shipping companies have an incentive to maintain their payout at reasonable levels even through financial hardship. A stable payout policy will help them mitigate information asymmetry and obtain equity at lower costs (Drobetz et al., 2013). An alternative interpretation of this relationship would suggest that companies may be willing to decrease their payout more during non-crisis years due to the availability of more growth opportunities, which would lead to higher capital gains for investors.

The positive impact of new debt on the payout is more notable in non-crisis years, with a highly significant difference in coefficients. This finding corroborates that shipping companies are subject to more financial flexibility in non-crisis years. In other words, companies are better able to raise debt for payout during good times, while they find it more difficult to raise debt

[59] This is equivalent to a $1mil increase in investment being associated with an increase of $0.49mil and $0.90mil in new debt in crisis and non-crisis years, respectively.

in order to maintain their payout during adverse market conditions. An alternative explanation is that shipping companies may decide to use debt to maintain the level of investment during crisis years, rather than borrowing extensively to finance their payout policy.

In Panel D and E we report the results of our subsample regressions based on the shipowner and RoSM companies, respectively. We begin by reporting how the interactions work for more financially constrained and less financially constrained shipowner companies. The first notable finding is that investment and financing are significantly and positively associated with each other for more financially constrained shipowner companies. We also show that both investment and payout are significantly positively associated with financing. Investment and financing seem to be strongly and negatively associated with payout. This implies that more financially constrained shipowner companies take investment and financing into account when devising a payout policy.

For less financially constrained shipowner companies, we report similar results with some unique relationships. First of all, we report that new debt is significantly positively associated with investment. However, investment does not seem to be a significant determinant of new debt. This result might suggest that shipowner companies that have fewer financially constraints set their financing policy separately and use internally generated funds to invest rather than relying on debt capital. We also report that investment is significantly negatively associated with payout, while new debt shows a positive direction. Although the direction of the relationship is the same as in more financially constrained companies, the magnitude of the coefficients shows strong divergences. The coefficients of both investment and new debt are significantly smaller in less financially constrained shipowner companies. This finding shows that new debt and investment drive payout at a slower degree for less financially constrained shipowner companies.

Crisis years also change how shipowner companies set their corporate policies. We show that in crisis years, the positive and significant association between investment and financing persists. However, payout is not found to be significant in investment and financing equations in crisis years. This result shows that shipowner companies in crisis years tend to use the funds to continue to invest rather than paying dividends. We also report that investment is a significant and negative determinant of payout. This results implies that in crisis years, an increase in the level of investment significantly reduces the funds available for dividends. In non-crisis years, the association between investment and financing becomes more powerful. Surprisingly, we find that payout is positively associated with investment. This result shows that shipowner companies continue to invest even when dividend payouts increase. This finding also suggests that benign market conditions mitigates the competition between investment and payout. We also find that payout is a significant determinant of financing in non-crisis years. Favourable market conditions allow shipowner companies to allocate debt financing proportionally between investment and payout. Finally, we show that neither investment nor financing is a significant determinant of payout in non-crisis years. We argue that in non-crisis years, internally generated funds will be enough for shipowner companies to pay dividends, so the need for external funds will disappear. Similarly, shipowner companies will find it easier to pay dividends even when the level of investment increases.

In Panel E, we report the coefficient estimates of investment, financing and payout for the RoSM subsample. For more financially constrained RoSM companies, we report that investment, financing and payout are significantly related to each other. Investment and financing are positively associated with each other, while financing and payout are a positive function of each other. For less financially constrained RoSM companies, we report that while new debt drives investment, investment does not affect financing. This result shows that an increase in new debt drives investment levels for less financially constrained RoSM companies,

but an increase in financing does not necessarily translate into an increased levels of investment. We also find that payout is a positive and significant determinant of new debt, but with smaller magnitude in comparison to more financially constrained RoSM companies. A possible explanation for this result is that less financially constrained companies will typically have internally generated funds in hand, therefore, they will do not rely heavily on debt capital when paying dividends. Similarly, an increase in investment does not translate into a reduced payout activity for less financially constrained RoSM companies.

Market conditions and the co-determination of investment, financing and payout have interesting relationships as well. For RoSM companies, we report that an increase in financing is positively associated with investment. However, in depressed market conditions, an increase in investment does not drive financing. Given that in crisis years internally generated funds are exhausted, it appears that RoSM companies rely heavily on to continue to pay dividends. However, in crisis years, the RoSM companies do not take investment and financing into account when devising a payout policy. In non-crisis years, we find that investment and financing are strongly associated with each other. We also report that the magnitude of the coefficient of payout is smaller in non-crisis years in the investment regression. This means that in non-crisis years payout does not affect investment as strongly as in crisis years. In new debt regression, we report that both investment and payout are positively associated with new debt. However, we show that in non-crisis years, RoSM companies devise their payout policies without interacting with investment and financing.

4.5. Robustness Tests

In this section, we report the results of several additional tests to assess the robustness of our results.[60] First, we confirm that alternative sample specifications do not significantly affect our

[60] For brevity, these additional robustness results are not reported here but are available upon request.

results. Specifically, our shipping sample consists of six shipping subsectors including logistics and shipping services, which are shown to be less capital intensive than the pure ship-owning segments (Alexandridis et al., 2020). To that end, we rerun our tests excluding the logistics and shipping services subsectors find this does not exert a significant influence on our results.

Further, we show that our results are robust to alternative variable definitions. In our initial tests, we follow Richardson (2006) and define the investment variable as the sum of capital expenditures, acquisitions and research and development expenses minus sales of property. We rerun our tests by using alternative definitions for investments in the literature: (1) the difference between capital expenditures and sales of property (Hennessy et al., 2007), (2) change in property, plant and equipment plus depreciation and amortisation (Guariglia, 2008) and (3) just capital expenditures (Almeida and Campello, 2007). Using alternative variable definitions leaves our key results unchanged.

We also demonstrate that our results are robust to alternative model functions and specifications. Two-stage least squares (2SLS) is extensively used as an alternative to 3SLS in general corporate finance literature (Dhrymes and Kurz, 1967; Fama, 1974; McDonald et al., 1975; McCabe, 1979; Petersen, 2009). Accordingly, we rerun our simultaneous equations with 2SLS and our results remain virtually the same.

4.6. Conclusion

In this study, we examine the interrelations between corporate investment, financing and payout policies in the shipping industry, using an exhaustive panel data of internationally listed shipping companies. Utilising single and simultaneous estimation techniques, we find that models accounting for endogeneity and simultaneity are able to capture important interactions between the three important corporate decisions. We document that corporate investment, financing and payout policies in the shipping industry are co-determined and thus exhibit

significant inter-relationships. First, we show interactions among investment and debt issuance, which is consistent with the sector's reliance on debt capital for investment. Second, we find that investment and payout compete for funds and are thus, negatively associated. Third, we report that both investment and payout are significant determinants of the financing policy in the shipping industry, implying that the decision to raise debt capital is not only a function of the level of investment, but also driven by the payout choices. On the aggregate, we find that the reported inter-relationships are more pronounced in the shipping industry relative to the rest of the market, which is consistent with the sector's idiosyncratic characteristics. Finally, we find that the negative relationship between investment and payout is more pronounced among financially constrained firms, while the positive association between investment and debt financing is stronger during non-crisis years. Our findings have immediate implications for management teams and shareholders of shipping companies as well as financial institutions with exposures to the shipping industry.

Chapter V

Favourable Funding Conditions: Friend or Foe of Shipping M&As?

5.1. Introduction

International shipping is an inherently capital-intensive industry. Shipping companies' average capital expenditures comprise 8% of the total assets, ranking shipping among 8th percentile of all industries (Alexandridis et al., 2020). Large capital investments that are typically associated with vessel purchases require significant amounts of capital. The high asset tangibility and risky equity environment have naturally led shipping companies to finance such large-scale investments with debt capital. Shipping companies' financial leverage ratio averages 40% (Drobetz et al., 2013), with the world's top 40 banks having a $294.4mil exposure to the shipping industry as of end of 2019 (Petrofin, 2020).[61] The investment-driven nature and reliance on debt capital make shipping companies highly vulnerable to financial distress costs, with debt policy has an immediate impact on how shipping companies choose their investments (Alexandridis et al., 2020). Given the success of a shipping company is directly linked to utilising growth opportunities, the capability of using debt capital is of pivotal importance for shipping companies.

The corporate finance literature has provided ample evidence that the funding environment varies considerably over time, influencing how much banks are able and eager to lend (Bernanke and Blinder, 1992). It is also reported that the funding environment and aggregate liquidity affect stock market returns (Acharya and Pedersen, 2005). Hence, it seems conceivable that the aggregate funding environment has a distinct impact on the investment policies of companies.

Over the past three decades, the shipping industry has witnessed a surge in consolidations, with many companies actively participating in mergers and acquisitions (M&As) market. Shipping

[61] The top three banks that have the most exposure to the shipping industry are BNP Paribas, KfW, and Exim Bank of China, with more than $50mil in total.

companies spent more than $560mil for M&As over the past 10 years,[62] emphasising that companies use M&As as an integral tool to complement organic growth. More than 70% of M&A deals are at least partially financed with bank loans (Bharadwaj and Shivdasani, 2003), placing funding conditions at the centre of decision making process of M&As. While accommodative funding conditions might ease the financial restrictions by allowing more companies to pursue inorganic growth opportunities, unfavourable funding conditions associated with contractionary monetary policy might hamper the ability of companies to make M&As investments. The impact of funding conditions on investment policy can be magnified in the shipping industry due to its highly capital and debt intensive nature, providing a fruitful testing ground to examine the relationship between funding environment and investment quality.

To this end, we examine whether funding conditions affect how investors price a company's M&A activities in the shipping industry. We focus exclusively on M&As for several reasons. First, M&As have been reshaping the shipping industry as many companies pursue inorganic growth with the aim of achieving operational and financial synergies and enhancing market-share. Second, M&As are typically large investments that have direct and observable effects on firm value. Third, the announcements of M&A deals are unanticipated, which enables us to explore how funding conditions influence acquirer announcement returns. Fourth, the market can easily perceive the prevalent funding environment and adjust its reaction towards M&A deal announcements. To test the relationship between funding conditions and acquirer abnormal returns in the shipping industry, we employ a sample comprising 352 completed acquisitions by international shipping companies. We find a negative relationship between

[62] The figure is estimated using M&A data from Thomson SDC and includes all mergers and acquisitions that took place in the shipping industry over the period between 2008 and 2018.

funding conditions and acquirer returns, suggesting that shipping companies tend to make value-destroying acquisitions under accommodative funding conditions. This result corroborates the findings in Di Maggio and Kacperczyk (2017) which report that in a low interest rate environment, companies are likely to invest in riskier asset classes. In economic terms, we report that a one standard deviation increase in our funding conditions measure[63] decreases the shareholder value by $12.5mil.

We further attempt to uncover the properties of the negative relationship between funding conditions and acquirer returns. We find that the detrimental effect of favourable funding conditions deepens when it is coupled with economic policy uncertainty. Specifically, we report that a deal in the most favourable funding conditions and in the highest uncertainty period decreases the shareholder value by $61mil. We argue that when the risk-seeking behaviour of shipping companies in favourable funding conditions merges with economic policy uncertainty, the market displays extra caution while reacting to a deal.

Next, we show that deals in the most favourable funding conditions and in a high industry-earnings period are value enhancing. We link this finding with the neoclassical explanation of merger waves that result from shocks to an industry's economic environment. Specifically, we argue that high-earnings periods allow shipping companies to better justify their motivations to pursue M&As in favourable funding conditions. The economic impact of this positive relationship is also considerable: we report that a deal in the most favourable funding conditions and in the highest earnings period increases shareholder value by $69mil. On the contrary, a deal that is negotiated under the most favourable funding conditions and in the lowest earning periods decreases shareholder value by $29.7mil. These findings verify our

[63] We utilise the average directional changes in LIBOR rates as our funding conditions measure. See Section 4.3 for a detailed discussion on the construction of the funding conditions measure.

argument that favourable funding conditions alone are not sufficient to pursue growth via M&As, and investors are not convinced that an easy-money period deal is value-enhancing.

We also show that the acquisition history of shipping companies has a moderating effect on the negative relationship between funding conditions and acquirer returns. We argue that when an acquisition is a part of a planned-growth strategy, the market rewards companies with a higher return in favourable funding conditions. In economic terms, we report that companies with three or more acquisitions in the past five years, experience a positive return in the most favourable funding conditions. This relationship translates into an increase of $54mil in shareholder value.

Finally, we reveal the impact of free cash flow (FCF) on the acquirer returns in different funding conditions. We find that companies with higher FCF levels make better acquisitions in the most favourable funding conditions. This result contradicts the notion suggesting that CEOs that are endowed with FCF tend to make value destroying acquisitions (Jensen and Meckling, 1976). However, we argue that when bank loan is involved in the financing mix, it will have a disciplining effect (Jensen, 1986; Hart and Moore, 1995; Harford, 1999), which hinders CEOs from spending the funds on negative NPV projects. We also report a striking economic impact for this relationship: we show that companies with higher FCF in the most favourable funding conditions experience an increase in the shareholder value of $64.6mil.

Our study has several implications for shipping companies that are willing to participate in the M&As market. The significant link between funding conditions and acquirer returns underpins the importance of devising solid motivations to make M&A investments in benign funding conditions. Companies that fail to justify the planned synergies might experience a backlash from the market in favourable funding conditions, especially in high uncertainty periods. On the other hand, when companies with inorganic growth intentions pursue M&A deals when

there is a positive shock to the industry's economic environment, the adverse reaction can be mitigated. Favourable funding conditions can also help shipping companies that pursue a strategic growth in the long run as the market reaction is found to be positive for serial acquirers in easy-money periods. Finally, accommodative funding conditions might moderate the agency costs of FCF through disciplining channel of debt, providing companies an opportunity to dispose FCF without experiencing an adverse market reaction.

The rest of the paper is organised as follows: Section 2 reviews the related literature and set a theoretical background. Section 3 presents the data and empirical methodology. Section 4 reports the results and discussions. Section 5 concludes the paper.

5.2. Literature review and theoretical background

Although general corporate finance theory assumes that companies in frictionless capital markets can always finance all positive NPV projects (Modigliani and Miller, 1958), Fazzari et al. (1988) argue that financial constraints hamper the ability to making investments when internally generated funds are exhausted. Restricted access to capital will typically result in missed investment opportunities that might yield a positive NPV. Given that financial constraints limit companies' ability to make potentially value-enhancing investments, a relaxation in financial constraints through favourable funding conditions might allow more companies to pursue these value-enhancing deals. However, eased financial constraints might incentive companies to make riskier investments (Di Maggio and Kacperczyk, 2017), eventually leading to a less positive or even negative NPV. Furthermore, easy access to capital through favourable funding conditions might magnify potential agency problems by providing self-interested managers with a greater flexibility to make investments, which typically results in poor outcomes (Jensen and Meckling, 1976).

The literature reports that the aggregate availability of capital is not constant over time (Becher et al., 2020). In fact, funding conditions substantially fluctuate, which affects the lending patterns of banks. For instance, Bernanke and Blinder (1992) show that banks are reluctant to lend in unfavourable funding conditions that are signalled by a contractionary monetary policy. Similarly, Jiménez et al. (2012) find that a tighter monetary policy affects both lending demand and supply, resulting in reduced loan granting. Given that monetary policy makers function under relatively fewer constraints, the impact of changing funding conditions on companies tends to be significant (Taylor, 2000). For instance, Adra et al. (2020) argues that central banks in the aftermath of 2008 financial crisis engaged in extraordinary monetary expansions, with a very limited political resistance.

The variability in funding conditions and thus the lending capacity of banks affects how companies and their investors across the markets behave. Beaudry et al. (2001) find that changes in monetary policies reduce the efficiency of resource allocation in companies. Jiménez et al. (2014) report that under lower interest rate environments banks are inclined to grant more loans to risky firms, with fewer collateral requirements. On the relations between aggregate funding conditions and stock returns, Acharya and Pedersen (2005) show that the liquidity of a stock and its required rate of return broadly depend on aggregate funding conditions. Specifically, it is reported that the required rate of return of a security decreases in illiquid markets. Similarly, Brunnermeier and Pedersen (2008) argue that the market liquidity of an asset depends on the funding liquidity of the trader, establishing a clear link between funding conditions and stock liquidity.

The studies exploring the relationship between the level of liquidity and investment policy largely focus on the firm-level liquidity, rather than aggregate availability of funds. Harford (1999) documents that excess internal liquidity typically results in poor M&A outcomes. Uysal (2011) argues that unavailability of external liquidity leads to a lowered M&A activity, with a

low proportion of cash in the payment method. Erel et al. (2019) report a higher deal likelihood for companies that have higher cash holdings. A more recent study, Becher et al. (2020), links M&As activity with aggregate funding conditions. The results suggest that funding conditions are positively associated with M&A activity and deal outcomes. It is reported that positive market reaction to M&As in favourable funding conditions is largely attributable to small bidders. However, the reaction to deals by large bidders in favourable funding conditions tends to be negative because of heightened agency problems. Furthermore, Di Maggio and Kacperczyk (2017) argue that expansionary monetary policies might create an incentive for companies to invest in riskier asset classes which are likely to receive an adverse reaction from markets. Collectively, the evidence suggests that aggregate funding availability is likely to have an impact on M&As outcomes.

In more recent years, inorganic investment through M&As has been one of the most prominent growth paths for shipping companies. The literature around shipping M&As is broadly focused on the valuation effects of deals around the announcement dates. The consensus in the literature suggests that M&As in the shipping industry create value for both acquirer and target shareholders, while target companies tend to capture a significant proportion of the gains (Panayides and Gong, 2002; Syriopoulos and Theotokas, 2007; Merikas et al., 2011; Alexandrou et al., 2014). Specific deal characteristics are shown to affect cumulative abnormal returns (CARs) in shipping. Alexandrou et al. (2014) document that acquirers in the shipping industry experience higher abnormal returns when the deal is domestic and financed with pure cash. More recently, Alexandridis et al. (2020) explore the relationship between the capital structure and M&A choices of shipping companies. The results of their study show that shipping companies with a positive abnormal leverage are less likely to perform M&As, deploy less cash in the method payment, acquire smaller targets, and make better acquisitions. Given that Alexandridis et al. (2020) consider the firm-level financial constraints on M&As by

focusing on individual acquirers' capital structures, it seems plausible that aggregate funding conditions will play an important role on how investors across markets react to M&A deals in the shipping industry. Collectively, these findings suggest that aggregate capital availability is of a pivotal importance in the shipping M&As market. The possible impact of funding conditions on M&A outcomes in shipping is twofold. First, favourable funding conditions might help shipping companies, which are typically financially constrained (Drobetz et al., 2013), pursue value-enhancing deals that might be foregone under more restrictive funding environments (Becher et al., 2020). Second, an easy-money period might incentive shipping companies to make riskier M&A deals since favourable funding conditions can be viewed as a once-in-a-lifetime opportunity (Di Maggio and Kacperczyk, 2017). This risk-seeking behaviour of shipping companies might experience a backlash from the markets, resulting in negative abnormal returns. Furthermore, easy access to capital might exacerbate potential agency costs since it increases the funds that CEOs hold (Jensen and Meckling, 1976).

Academic literature on value creation in M&As reports several characteristics that might interact with funding conditions, such as economic policy uncertainty, industry earnings, M&A record, and free cash flow (FCF). Economic policy uncertainty expose a significant risk to M&A markets since it tends to increase the uncertainty of target valuation and expected deal synergies. Indeed, Bonaime et al. (2018) find that political uncertainty is strongly and inversely associated with M&A activity, with a deepened effect for less reversible deals. In a more recent study, Adra et al. (2020) examine the impact of monetary policy uncertainty on a wide range of M&A outcomes through the real options channel. Specifically, this channel views irreversible investments as financial call options that can be exercised now or postponed to a later time in the future (Dixit and Pindyck, 1994). In a highly uncertain environment, companies await the arrival of new information and alter the investment plans accordingly. However, if a company exercises the real option and undertake that particular investment when

uncertainty is more pronounced, it faces a significant business risk that leads to unfavourable outcomes. In fact, Bhagwat et al. (2016) argue that an increase in monetary policy uncertainty should discourage firms from undertaking an M&A deal immediately. Along these arguments, Adra et al. (2020) find that higher uncertainty at the time of a deal announcement is a both statistically and economically significant predictor of a reduction in acquirer returns. Furthermore, the negative effect of monetary policy uncertainty on acquirer returns is found to be particularly evident in the times of monetary expansion since investors across markets display high caution while reacting to M&As.

Economic policy uncertainty might be particularly related to the shipping industry in several ways. First, shipping is already a volatile industry where freight rates and vessel values remain unpredictable, rendering the timing of an M&A deal fairly important (Alexandridis et al., 2018). Along with the uncertainty that is embedded in the shipping industry's dynamics, economic policy uncertainty might expose another layer of risk that eventually affects the outcomes of a deal. Second, the demand for shipping is not direct but it is derived from the demand for the products to be transported (Stopford, 2009). Specifically, high economic policy uncertainty might lead countries to alter their international trade strategies which is reflected in the level of imports and exports, and thus in the shipping industry. Therefore, a risky behaviour in undertaking M&As in favourable funding conditions might experience an even stronger backlash in uncertain periods in the shipping industry.

A merger wave driven by a positive shock to an industry might have a strong effect on market reaction in different phases of funding conditions. M&A deals tend to cluster in particular time periods which are called waves. In the shipping industry, high freight rates are shown to be linked to upsurges in M&A activity with a 50% correlation between shipowner earnings and value of deals (Alexandridis and Singh, 2016). The heightened M&A activity in the periods of high freight rates and thus high earnings is consistent with both neoclassical and behavioural

explanations of merger waves. Specifically, the neoclassical explanation argues that ample liquidity might trigger further M&A deals (Harford, 2005), while the behavioural approach predicts a link between high market valuations and M&A waves (Rhodes-Kropf and Viswanathan, 2004). In both cases, shipping companies pursue M&As to reorganise the industry after a positive shock and to take advantage of temporary misvaluations. Therefore, the better justification for participating in M&A markets in high earnings period might alleviate the negative reaction to deal announcements in favourable funding conditions.

General corporate finance literature repeatedly documents a systematic decline in abnormal returns of serial acquirers (Tunyi, 2021). The underperformance of serial acquirers are largely explained with overconfidence of CEO (Doukas and Petmezas, 2007) and organisational learning (Aktas et al., 2011). Fuller et al. (2002) report that payment methods of serial acquirers vary across different acquisitions, implying that funding conditions might have an impact on how companies choose payment methods, and thus how markets react to deal announcements. This argument might be particularly relevant to the shipping industry since companies tend to stick to a target leverage to avoid financial distress costs (Alexandridis et al., 2020). Thus, shipping companies that are active in the M&As market are expected to conserve their financial flexibility. Favourable funding conditions might ease the financial distress costs and allow shipping companies to pursue their planned growth strategies through M&As.

In the presence of capital market frictions stemming from information asymmetry between capital providers and managers, liquidity has a strategic position (Harford, 1999). Cash holdings can help companies to maintain financial flexibility even when current cash flows are exhausted and not sufficient to meet companies' investment plans. However, holding large cash reserves also has potential costs since managers can abuse the cash holdings without the presence of a control mechanism of capital markets. Jensen (1986) states that self-interested managers holding free cash flow will typically invest it in negative NPV projects rather than

paying dividends. Lang et al. (1991) and Smith and Kim (1994) among others test this hypothesis and report that acquirer companies with excess free cash flow experience lower returns around deal announcements. However, Harford (1999) argues that managers might be reluctant to payout dividends since it is costly for them to replace the funds because of market imperfections. For this reason, the market can even reward the company for retaining liquidity by holding cash (Faulkender and Wang, 2006). Furthermore, Easterbrook (1984) reports that tapping capital markets frequently helps mitigate the agency conflict. This evidence implies that accepting the control mechanism through capital markets in favourable funding conditions might alleviate the agency costs arising from free cash flow.

5.3. Data and Methodology

Our dataset covers 352 completed acquisitions announced by international shipping companies between 1987 and 2020, and recorded by Thomson One Securities Data Corporation (SDC) database. We follow Alexandrou et al. (2014) and classify our sample into three composite industries: i) Freight transportation group including 242 deals by acquirers in the industries 4412, 4424 and 4449, ii) Passengers, Ferries, Marinas and Services group including 47 deals by acquirers in the industries 4481, 4482, 4489, 4492, 4493, 4499, iii) Marine Cargo Handling group including 63 deals by acquirers in the industry 4491.

We require acquirer companies to be public since our analyses are focused on acquirer stock returns. We further exclude spin-offs, recapitalisations, self-tenders, exchange offers, and repurchases from our sample. We do not impose any restrictions regarding deal size,[64] while target companies can be either public or private. We merge the transactions with accounting

[64] Sample size in shipping M&As studies is inherently restricted by data unavailability. The most comprehensive shipping M&As study to date, Alexandrou et al. (2014), does not impose any restrictions to the sample apart from the requirement of the acquirer company being public.

and stock return data from Compustat Global and North America. Acquirers are from 33 stock markets with the U.S. comprising 21% of the whole sample, followed by acquirers from U.K. (13%) and Japan (11%). 19% of the deals are financed with pure cash and in 91% of the cases the target company is a private company. Aggregate deal activity varies considerably over time, with a noticeable peak in the pre-crisis period between 2004 and 2008. However, the M&As market loses momentum in the aftermath of market collapse in 2008, followed by a gradual rebound in more recent years.

We test whether funding conditions influence how the market reacts to a particular deal announcement via the following ordinary least squares (OLS) model:

$$CAR_{i,m,y} = \alpha_{10} + \alpha_{11}\left(\frac{\sum_{m=-1}^{-12} Directional\ changes}{12}\right) + \alpha_{12}Z_{i,y-1} + \varepsilon_{13} \quad \text{(Eq. 5.1)}$$

That is,

$$CAR_{i,y} = \alpha_{10} + \alpha_{11}(Funding\ conditions) + \alpha_{12}Z_{i,y-1} + \varepsilon_{13} \quad \text{(Eq. 5.2)}$$

where $CAR_{i,m,y}$ is the cumulative abnormal returns to company i for a deal that is announced in month m, and year y. The CARs are estimated for a 3-day announcement window (-1, +1) using the standard market model (Brown and Warner, 1985). The parameters of the model are estimated from day -255 to -45 relative to the deal announcement day. The α vectors represent the intercept (α_{10}), the coefficients for funding conditions (α_{11}), and the coefficient for the control variables (α_{12}). ε_{13} is the error term of the model.

A mortgage-backed shipping finance transaction is typically based on LIBOR plus a spread, constituting the main interest expenses of shipping companies[65]. Following Jensen and Moorman (2010) and Becher et al. (2020), we use directional changes in LIBOR rates to reflect

[65] "Are shipowners ready for higher interest rates?", Drewry Research, June 2018.

the impact of funding conditions on M&As outcomes in the shipping industry[66]. Directional changes in monetary policies have been shown to reveal the changes in the measures of both availability and the cost of capital (Jensen et al., 1996). They are also forward-looking in nature since the shifts in LIBOR rates have implications on both current investments and those planned to take place in the future. Furthermore, LIBOR rates are broadly available to shareholders, allowing us to explore whether directional changes in the rates impact how shareholders perceive a deal announcement. LIBOR rates are also exogenous to corporate decisions since companies are not able to affect changes in the rates, while changes in LIBOR rates might have a direct influence on investment and financing decisions of shipping companies.

To define aggregate funding conditions, we first detect the directional changes in monthly LIBOR rates. When the most recent change is an increase (decrease), funding conditions are viewed as unfavourable (favourable). When we do not observe a change in the monthly rates, funding conditions are viewed as unchanged. Second, a dummy variable is created where favourable, unchanged, and unfavourable funding conditions take a value of 1, 0, and -1 respectively. Finally, a continuous variable for funding conditions is generated as the average of the dummy variable over the twelve months prior (acquisition negotiation period) to the acquisition announcement date. For a deal that is completed in October 2010, funding conditions is the average of the dummy variable over the period between October 2009 and

[66] We would like to note that Jensen and Moorman (2010) and Becher et al. (2020) utilise a US-based sample. In accordance with their sample characteristics, they employ the directional changes in Federal Reserve policy rates as a measure of funding conditions. Since our sample comprises internationally listed shipping companies (See Section 4.3), we utilise the directional changes in LIBOR rates which are widely used in shipping finance transactions. We also find that the correlation coefficient between LIBOR rates and the ratio of total interest expenses to total debt in shipping to be 43.8%.

September 2010. If the variable is positive (negative), decreases (increases) in LIBOR rates are dominant in the twelve-month period, rendering the negotiation period favourable (unfavourable).

Next, we investigate if monetary policy uncertainty has a significant impact on the association between funding conditions and acquirer CARs:

$$CAR_{i,y} = \alpha_{20} + \alpha_{21}(Funding\ conditions * GEPU) + \alpha_{22}(Funding\ conditions)$$
$$+\alpha_{23}(GEPU) + \alpha_{24}Z_{i,y-1} + \varepsilon_{25} \quad \text{(Eq. 5.3)}$$

We follow Adra et al. (2020) and employ the Global Economic Policy Uncertainty Index (hereafter GEPU Index) developed by Baker et al. (2016) as a proxy for monetary policy uncertainty. The GEPU Index is a GDP-weighted average of national economic policy uncertainty indices for 21 countries.[67] Each individual national index shows the frequency of newspaper articles in a particular country that involves the terms economy, policy, and uncertainty. Given that our analysis aims to reveal a possible influence of economic policy uncertainty on the relationship between funding conditions and acquirer CARs at the time of deal's announcement, we measure GEPU in the month that the deal is announced.[68]

In a further exploration of the association between funding conditions and acquirer CARs, we account for industry earnings in our models:

$$CAR_{i,y} = \alpha_{30} + \alpha_{31}(Funding\ conditions * ClarkSea) + \alpha_{32}(Funding\ conditions)$$

[67] These countries are Australia, Brazil, Canada, Chile, China, Colombia, France, Germany, Greece, India, Ireland, Italy, Japan, Mexico, the Netherlands, Russia, South Korea, Spain, Sweden, the United Kingdom, and the United States. Our sample covers all the represented countries except Colombia.

[68] The data for Global Economic Policy Uncertainty Index starts from 1997, leaving 40 deals excluded from our regressions.

$$+\alpha_{33}(ClarkSea) + \alpha_{34}Z_{i,y-1} + \varepsilon_{35} \quad \text{(Eq. 5.4)}$$

We use the ClarkSea Index as a proxy for industry earnings in the shipping industry.[69] The ClarkSea is a cross-sector earnings index that shows the average earnings in $/day for the tanker, dry bulk, and the liner industry. The index is weighted by the number of vessels in each of the industries. Since we investigate the impact of earning levels in the shipping industry during the acquisition negotiation period, we take the natural logarithm of the average monthly index values over the twelve months prior (acquisition negotiation period) to the acquisition announcement date.

Next, we explore whether the acquirer experience influences how the market reacts to acquisition announcements under different funding conditions. Specifically, we include an interaction term between funding conditions and the number of acquisitions that a company undertakes over the past 5 years (Fuller et al., 2002):

$$CAR_{i,y} = \alpha_{40} + \alpha_{41}(Funding\ conditions * Serial\ acquirer) +$$
$$\alpha_{42}(Funding\ conditions) + \alpha_{43}(Serial\ acquirer) + \alpha_{44}Z_{i,y-1} + \varepsilon_{45} \quad \text{(Eq. 5.5)}$$

Finally, we investigate how FCF levels influence the way investors react to acquisition announcements under different funding conditions. We follow Becher et al. (2020) define FCF as industry adjusted cash flow scaled by acquirer total assets when the acquirer market-to-book ratio is not in the top quintile, and zero otherwise.

$$CAR_{i,y} = \alpha_{50} + \alpha_{51}(Funding\ conditions * FCF) + \alpha_{52}(Funding\ conditions)$$
$$+\alpha_{45}(FCF) + \alpha_{54}Z_{i,y-1} + \varepsilon_{55} \quad \text{(Eq. 5.6)}$$

[69] Albertijn et al. (2011) and Drobetz et al. (2013) use ClarkSea Index as a measure of variability in earnings and as a macroeconomic determinant of leverage, respectively.

Table 5.1. Variable definitions

CARs	Cumulative abnormal returns to acquirers over the event window around announcement day 0. The announcement event window is [-1, +1].
Funding dummy	A dummy variable takes a value of 1 (-1) if the most recent change in monthly LIBOR rates is a decrease (increase). The variable takes a value 0 if there is no change in the rates.
Funding conditions	The average of Funding dummy over the twelve months prior (acquisition negotiation period) to the acquisition announcement date.
Funding tercile 1	A dummy variable takes a value of 1 if the values lie within the first tercile of Funding conditions.
Funding tercile 2	A dummy variable takes a value of 1 if the values lie within the second tercile of Funding conditions.
Funding tercile 3	A dummy variable takes a value of 1 if the values lie within the third tercile of Funding conditions.
GEPU Index	Natural logarithm of Global Economic Policy Uncertainty Index from https://www.policyuncertainty.com/global_monthly.html
ClarkSea Index	The average of the natural logarithm of Clarksea Index values over the twelve months prior (acquisition negotiation period) to the acquisition announcement date.
M&A record	The number of acquisitions that the company undertakes over the past five years,
FCF	Industry adjusted cash flow scaled by acquirer total assets when the acquirer market-to-book ratio is not in the top quintile, and zero otherwise.
Toehold	A dummy variable takes a value of 1 if an acquirer has an ownership stake in the target company of 5% or more prior to the acquisition announcement.
Attitude	A dummy variable takes a value of 1 if the deal attitude is recorded as “Friendly” on SDC.
Cross-border	A dummy variable takes a value of 1 if cross-border flag is recorded as “Y” on SDC.
Tender	A dummy variable takes a value of 1 if tender flag is recorded as “Y” on SDC.
Public target	A dummy variable takes a value of 1 if the publicly listed status of the target is recorded as “Public” on SDC.
All other	A dummy variable takes a value of 1 if the payment method is recorded as 100% other/unknown on SDC.
All cash	A dummy variable takes a value of 1 if the payment method is recorded as 100% cash on SDC.
All stock	A dummy variable takes a value of 1 if the payment method is recorded as 100% stock on SDC.
Diversifying	A dummy variable takes a value of 1 if the target does not share the same SIC code with the acquirer.
M&A liquidity	The ratio of total deal value to total assets in a given industry and year.
HHI	The sum of squared terms of the market share percentage of companies in a given industry and year.
Size	Natural logarithm of book value of total assets.
Leverage	The ratio of short- and long-term debt to book value of total assets.
Cash	The ratio of cash and cash equivalents to book value of total assets.
Profitability	The ratio of operating income before depreciation to book value of total assets.
Market-to-book	The ratio of the market value of assets to book value of total assets.
Dividend payer	A dummy variable takes a value of 1 if the company pays dividends in a given year.
Acquirer runup	Acquirer’s annual stock return measured in the previous year of acquisition announcement.

The control variables in Eqs. (1-6) are company and deal specific characteristics that have been shown to affect acquirer CARs. We include toehold since the literature suggests that abnormal returns to acquirers around the announcement dates are higher if the acquirer owns a toehold prior to the takeover offer (Renneboog and Vansteenkiste, 2019). We also control for deal attitude since hostile offers tend to be inversely associated with acquirer returns (Schwert, 2000). We include a cross-border indicator since Alexandrou et al. (2014) argue that acquirer companies are inclined to pay more market entry premium while acquiring a foreign target, which might lead to lower abnormal returns. Short-run returns to acquirer companies are higher in tender offers (Bouwman et al., 2009), which are associated with a higher degree of confidence (Offenberg and Pirinsky, 2015). Therefore, we also include a tender dummy in our models. We further control for publicly listed status of the target since acquisitions of public targets are broadly associated with lower acquirer returns (Fuller et al., 2002). Our models also reflect the effect of method of payment. Acquisitions that are financed by cash tend to experience higher abnormal returns (Travlos, 1987), while stock acquisitions are inclined to be perceived negatively since they might give a sign to the market that the company's stock is overvalued (Myers and Majluf, 1984). We include a diversification dummy to account for the fact that diversifying deals are shown to be value-destroying (John and Ofek, 1995). To control for the liquidity of the market for M&As, we include M&A liquidity (Schlingemann et al., 2002; Uysal, 2011). We further include the Herfindahl Index (HHI) to control for the fact that a concentrated market offers less alternatives for M&As (Uysal, 2011).

Our models also account for several company specific characteristics. We include company size to control for the negative impact of company size on acquirer returns (Moeller et al., 2004). Since high levels financial leverage may restrict managers' ability to allocate resources for negative NPV investments (Harrison et al., 2014), we control for acquirer leverage in our models. We also include cash holdings since acquisitions by cash-rich companies tend to be

value destroying (Harford, 1999). We further include profitability (Adra et al., 2020; Alexandrou et al., 2014) and market-to-book ratio (Moeller et al., 2005). Since the literature suggests that dividend-paying companies experience less negative acquirer returns in acquisitions due to less information asymmetry, we include a dividend payer dummy (Turki, 2019). Finally, we include acquirer runup to account for bidder overvaluation (Faccio and Masulis, 2005). Table 5.1 shows the definitions of variables.

Table 5.2 reports the descriptive statistics for our sample. CARs have an average of 0.014, which is similar to what is reported by Alexandrou et al. (2014). Average funding conditions is -0.098, implying that our sample deals are negotiated under relatively unfavourable funding conditions. This figure shows a contrast with Becher et al. (2020) who report a positive average value for funding conditions. A possible explanation of this divergence might be the idiosyncratic dynamics of the shipping industry. Figure 5.1 shows funding conditions and ClarkSea Index over time, along with the two periods where M&A activity is more pronounced in the shipping industry. The first notable peak in the M&A activity takes place in the shipping-boom period between 2004 and 2008, where the industry is characterised by very high earning levels. A merger wave appearing in such period is consistent with both neoclassical and behavioural foundations of heightened M&A activity (Alexandridis et al., 2013). Specifically, the neoclassical explanation of merger waves predicts the availability of ample liquidity can trigger M&A deals (Harford, 2005), while the behavioural approach links M&A waves with high market valuations (Rhodes-Kropf and Viswanathan, 2004). However, the second period where increased M&A activity dominates the industry shows a stark contrast with the prior M&A wave. The more recent rebound in M&A activity can be broadly explained by low asset valuations and more magnified financial distress (Alexandridis and Singh, 2016), along with the intention of seeking efficiency improvements (Alexandrou et al., 2014). Despite different

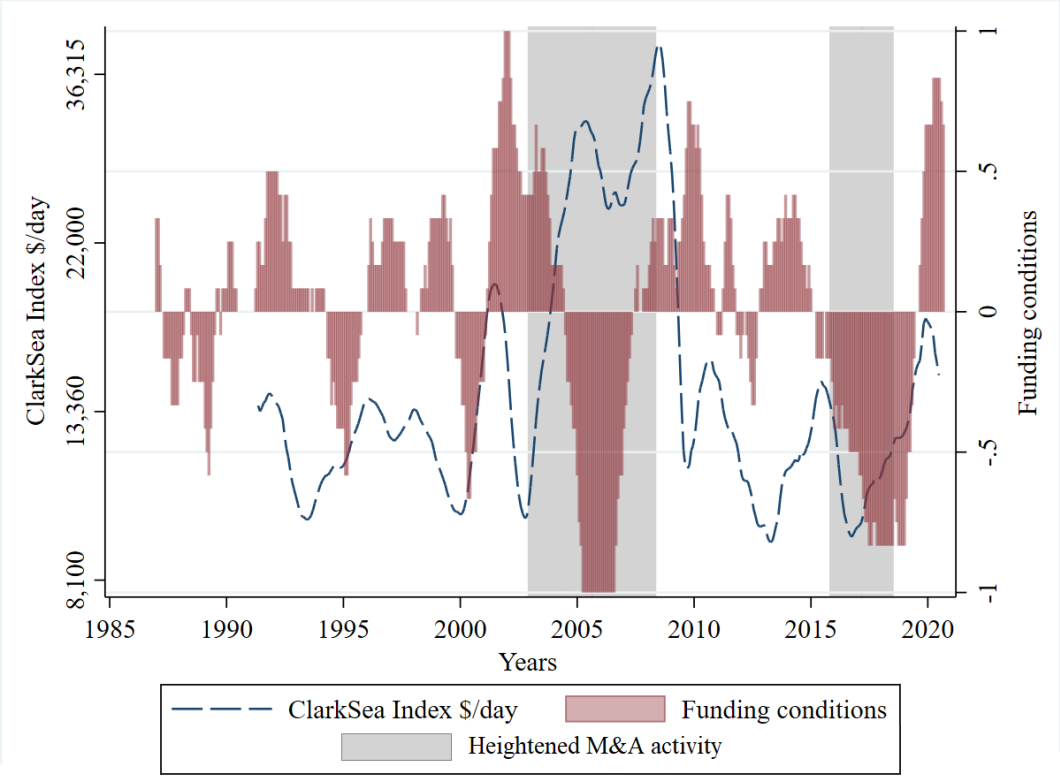
Table 5.2. Descriptive Statistics. The descriptive statistics show the number of firm-year observations, the mean, standard deviation, minimum, and maximum value of each variable. CARs are cumulative abnormal returns to acquirers that are estimated for a 3-day announcement window. (-1, +1). Funding conditions is the average of directional changes in LIBOR rates over the twelve months prior (acquisition negotiation period) to the acquisition announcement date. GEPU index is the natural logarithm of the Global Economic Policy Uncertainty Index in the month a deal is announced. ClarkSea is the natural logarithm of the average monthly index values over the twelve months prior to the acquisition announcement date. M&A record is the number of acquisitions that a company undertakes over the past three years. Deal and accounting data are collected from SDC and Compustat, respectively. All variables apart from dummies are winsorized at the upper and lower one percentile levels. See Appendix A for the definition of variables.

	N	Mean	St. Dev.	Min	Max
CARs	352	0.014	0.048	-0.099	0.204
Funding conditions	352	-0.098	0.478	-1,000	1,000
GEPU index	313	4.679	0.409	3.888	5.876
ClarkSea	346	9.611	0.413	9.112	10.591
M&A record	354	0.850	1.057	0,000	3,000
FCF	335	0.012	0.045	-0.125	0.170
Toehold	352	0.110	0.313	0,000	1,000
Attitude	352	0.980	0.139	0,000	1,000
Cross-border	352	0.439	0.496	0,000	1,000
Tender	352	0.019	0.139	0,000	1,000
Public target	352	0.082	0.274	0,000	1,000
All other	352	0.759	0.428	0,000	1,000
All cash	352	0.198	0.399	0,000	1,000
All stock	352	0.042	0.201	0,000	1,000
Diversifying	352	0.291	0.467	0,000	1,000
M&A liquidity	349	0.033	0.042	0.000	0.138
HHI	352	0.545	0.270	0.000	1.000
Size	338	6.667	1.639	2.235	9.791
Leverage	346	0.333	0.190	0.000	0.799
Cash	346	0.120	0.115	0.001	0.625
Profitability	346	0.105	0.060	-0.109	0.289
Market-to-book	308	1.348	0.637	0.536	4.977
Dividend payer	352	0.877	0.327	0,000	0,000
Acquirer runup	335	0.190	0.558	-1.313	3.005

motivations, both increased M&A-activity periods take place in an unfavourable funding environment, which justifies the negative average funding conditions in our sample.

GEPU index averages 4.679, which shows that the announcement of our sample deals are made in a relatively lower economic policy uncertainty environment (Adra et al., 2020). Average ClarkSea Index is 9.611. This implies that our sample deals are negotiated under low-earnings

Figure 5.1. Funding conditions and ClarkSea Index over time. The figure plots the moving average funding conditions and ClarkSea Index, along with the heightened M&A periods. In each month, we calculate the average of the natural logarithm of ClarkSea Index and directional changes in monthly LIBOR rates in the previous twelve-month period.



periods, which supports the notion that high earning levels might ease the pressure on companies to pursue improvements in operational efficiency (Alexandrou et al., 2014). M&A record averages 0.850, which shows that single acquirers outweigh serial acquirers in our sample. Average FCF is 0.012, implying that, on average, our sample companies have positive FCF prior to the acquisition announcement year. Acquirers with a toehold in the target companies prior to the acquisition announcement constitute 11% of our sample. 98% of the deals are friendly, and in 44% of the cases, the deals are cross-border. Only 2% of the deals are tender offers, and in the 8% of the deals the target company is publicly listed. Around 20% of the deals are financed with pure cash, while all-stock acquisitions constitutes 4% of our sample.

Around 29% of our sample deals are diversifying and M&A liquidity averages 0.033. Average HHI index is 0.545, which emphasises the high market concentration in the shipping industry.

Average leverage (33%) is significantly lower in our sample than what is reported in Drobetz et al. (2013), which shows that acquirers have lower leverage than the whole population of shipping companies. Cash holdings constitute 12% of total assets in an average acquirer, and average profitability is around 10%. Market-to-book ratio is 1.348 for an average acquirer and 87% of our sample companies pay out dividends. Finally, average acquirer runup is 19%, which implies that stock returns of our sample companies, on average, are positive prior to the acquisition announcement year.

5.4. Empirical Results

In this section, we present the main empirical results of our analysis. We first report the analysis where we investigate whether funding conditions affect shareholder reactions to deal announcements (Eq. 5.1). Second, we report the results of our analysis where we consider the impact of economic policy uncertainty on the association between funding conditions and acquirer CARs (Eq. 5.3). Third, we reveal how the level of industry earnings can shape the shareholder reaction under different funding environments (Eq. 5.4). Fourth, we uncover the influence of M&A record on the acquirer CARs, while controlling for funding conditions (Eq. 5.5). Finally, we report the analysis where we examine whether the impact of FCF levels influence how the market reacts a particular deal under different funding conditions.

5.4.1. Funding conditions and acquirer CARs

The aggregate capital availability varies considerably over time and it changes how much banks are eager and able to lend (Becher et al., 2020; Bernanke and Blinder, 1992). Given the high reliance on debt capital in the shipping industry and high capital requirements of M&As, in

this section, we investigate how the market reacts to acquisition announcements under different funding conditions.

Table 5.3 shows the acquirer returns regressions with our funding conditions measure. In the first model, we only include funding conditions as an independent variable. In the second and third models, we also control for several deal and company specific characteristics. In models IV to VI, we follow the same procedure, with the funding condition is replaced by two dummy variables. Funding tercile 2 (3) takes a value of 1 if the 12-month average of the directional changes in LIBOR rates lies withing the second (third) tercile. This structure allows us to see which particular segment of funding conditions drives the association between funding conditions and acquirer CARs more.

Starting with the first model, we report that there is a negative and highly significant association between funding conditions and acquisition announcement returns. In other words, we find that shareholders of shipping companies perceive that deals under favourable funding conditions are value-destroying. Even after controlling for deal and company characteristics, funding conditions remain both statistically and economically significant (models II and III). Becher et al. (2020) argue that agency related problems are mitigated by restrained access to capital, leading companies to select only the best targets. Applying this argument to the shipping industry, our results might imply that shipping companies tend to engage in rushed deals in easy-money periods. Furthermore, Di Maggio and Kacperczyk (2017) argues that in a low interest rate period, companies are inclined to make riskier acquisitions. Therefore, investors of shipping companies might be more cautious when reacting a deal that lacks a thorough strategy formulation and cultivation of targets process in favourable funding conditions.

Table 5.3. Funding conditions and acquirer CARs. The table shows the impact of the funding conditions on acquirer returns around the deal announcement. The dependent variable is CAR (-1, +1). The key variable of interest is funding conditions. Funding tercile 2 and Funding tercile 3 are dummy variables that take a value of 1 if average directional changes lie within the second and third terciles of funding conditions, respectively. Columns I and IV include only the key variable of interest. Models II, III, V, and IV includes company and deal specific characteristics. Estimated p-values are clustered at company level and standard errors are given in parentheses. Statistical significance levels of 10%, 5%, 1% are denoted with *, **, ***, respectively.

	I	II	III	IV	V	VI
Funding conditions	-0.012***	-0.012**	-0.012**			
	(0.004)	(0.004)	(0.005)			
Funding tercile 2				-0.000	-0.004	-0.001
				(0.006)	(0.006)	(0.006)
Funding tercile 3				-0.015***	-0.014**	-0.015**
				(0.005)	(0.006)	(0.006)
Toehold		-0.007	-0.014*		-0.007	-0.014*
		(0.009)	(0.008)		(0.009)	(0.007)
Attitude		0.032**	0.036*		0.031**	0.027**
		(0.013)	(0.014)		(0.012)	(0.013)
Cross-border		0.004	0.008		0.004	0.009
		(0.004)	(0.005)		(0.005)	(0.005)
Tender		-0.018	-0.008		-0.015	-0.003
		(0.021)	(0.021)		(0.021)	(0.022)
Public target		0.056*	0.033*		0.029*	0.032*
		(0.016)	(0.017)		(0.016)	(0,017)
All cash		0.009	0.006		0.009	0.006
		(0.007)	(0.007)		(0.007)	(0.007)
All stock		0.023	0.024		0.024	0.024
		(0.022)	(0.022)		(0.022)	(0.022)
Diversifying		-0.009*	-0.010*		-0.009*	-0.009
		(0.005)	(0.005)		(0.005)	(0.005)
M&A liquidity		0.131*	0.137*		0.126*	0.132*
		(0.067)	(0.073)		(0.066)	(0.072)
HHI		0.018*	0.028**		0.018*	0.026**
		(0.009)	(0.010)		(0.009)	(0.010)
Size			-0.003*			-0.003*
			(0.001)			(0.001)
Leverage			0.025			0.027
			(0.017)			(0.017)
Cash			-0.001			-0.005
			(0.024)			(0.024)
Profitability			-0.012			-0.006
			(0.048)			(0.047)
Market-to-book			-0.001			-0.001
			(0.005)			(0.005)
Dividend payer			-0.019*			-0.019*
			(0.010)			(0.010)
Acquirer runup			-0.002			-0.003
			(0.005)			(0.005)
C	0.012***	-0.033**	0.002	0.019***	-0.024*	0.009
	(0.002)	(0.014)	(0.025)	(0.004)	(0.014)	(0.024)
N	352	348	306	352	348	306
P-value	0.006	0.008	0.000	0.006	0.008	0.001
Adj. R^2 (%)	1.11	6.71	10.59	1.63	6.64	10.86

Further, shipping companies are already classified as financially constrained (Drobetz et al., 2013), and those that are overleveraged are less likely to engage in M&As (Alexandridis et al., 2020). On one hand, a relaxation in the funding conditions might be an opportunity for financially constrained shipping companies to pursue further growth. On the other hand, investors might not be convinced that an easy-money period alone is sufficient to seek M&A deals. In fact, out of 151 acquirers in our sample, 54 of them appear only in the favourable state of funding conditions. This figure shows that more than 35% of our sample companies are only able to undertake M&A deals when the funding environment is benign. In economic terms, we find that a one standard deviation increase in funding conditions is associated with a decrease of $12.5mil in shareholder value around the acquisition announcement.[70] The magnitude of the effect is economically significant for acquirer shareholders, considering the typical deal in our sample increases shareholder wealth by $29.1mil.

In models IV to VI, we repeat our tests where the key variables of interest are the two dummy variables that take a value of 1 if the average directional changes lies within the second and third terciles of funding conditions, respectively. In the univariate test in model IV, we show that the negative association between funding conditions and negative CARs particularly exists when the funding conditions are in the most favourable phase. We report economically and statistically significant results even after controlling for deal and company characteristics. In

[70] The figure is based on the full specification in model III in Table 2. We calculate the economic impact as the coefficient of funding conditions multiplied by the standard deviation of funding conditions multiplied by the average market capitalisation in our sample.

economic terms, we find that the shareholder value decreases by $31.2mil when a deal is negotiated under the most favourable phase of the funding conditions.[71]

The control variables in our models also show insightful results. We report a negative and significant coefficient for toehold, which contradicts the evidence from the M&As literature. Toeholds prior to the acquisition announcements are broadly associated with higher acquirer returns since they diminish the bargaining power of the target company (Renneboog and Vansteenkiste, 2019). However, Ettinger (2009) argues that acquirer companies might not be able to take advantage of the toehold if it is acquired shortly before making an offer. Furthermore, Ravid and Spiegel (1999) argue that the costs of holding a toehold might outweigh the benefits if no competitors exist during the offer process.[72] We report a positive but highly insignificant coefficient for cross-border. Tender dummy is negatively associated with acquirer CARs but the coefficient is highly insignificant. We find that the acquisition of public targets is value enhancing. This finding contradicts the M&As literature (Fuller et al., 2002), while it is in line with the shipping M&As literature (Alexandrou et al., 2014). We do not observe a significant relationship between the method of payment and acquirer CARs, although the magnitude of the coefficients show a similarity with Alexandrou et al. (2014). We find that the deals that are diversifying are negatively associated with acquirer returns, which is in line with John and Ofek (1995). We also report a positive and significant coefficient for M&A liquidity. This finding suggests that the investors of shipping companies view deals in

[71] The figure is based on the full specification in model VI in Table 2. We calculate the economic impact as the coefficient of Funding tercile 3 multiplied by the average market capitalisation in our sample.

[72] We do not observe a competition between our acquirer companies to acquire the same target in our sample. However, the limitation of acquirer companies being public and data unavailability might obscure the presence of competition.

heightened M&A activity periods value-enhancing. HHI index is also associated with higher returns, suggesting that the market reaction towards deals is positive when market concentration levels are high. Regarding the company characteristics, we find that acquirer CARs decrease with company size (Moeller et al., 2004). Leverage exhibits a positive and economically significant coefficient but lacks a statistical significance. Cash holdings, profitability, market-to-book ratio, and acquirer runup are all inversely related to acquirer returns, with highly insignificant coefficients. Finally, we report that acquisitions by dividend-paying companies are value-destroying. This finding contradicts Turki (2019) who argues that lower levels of asymmetric information associated with dividend payouts typically result in higher abnormal returns. However, an M&A deal might also cause a reduction in dividend payouts in the future years, which might result in a negative reaction.

5.4.2. Industry-level earnings, funding conditions and acquirer CARs

M&A activity in the shipping industry is typically linked to industry earnings associated with higher freight rates. Alexandridis and Singh (2016) report that there is a 50% correlation between ClarkSea index (an index of earnings for the main vessel types) and the value of deals. In this section, we analyse whether industry earnings have a moderating effect on the negative relationship between funding conditions and acquirer CARs. We argue that higher earnings levels can enable shipping companies to pursue further enhancement of market share in favourable market conditions. This better justification of seeking M&A deals might moderate the backlash from the investors in the favourable state of funding conditions. In table 5.4, we report this moderating effect channel by including an interaction term between funding conditions and ClarkSea Index.

Table 5.4 shows the acquirer returns regressions with an interaction term between our funding conditions measure and ClarkSea Index. Panel A reports the coefficient estimates of acquirer

Table 5.4. Funding conditions, ClarkSea Index, and Acquirer CARs. The table shows the impact of the funding conditions and ClarkSea Index on acquirer returns around the deal announcement. The dependent variable is CAR (-1, +1). The key variable of interest is the interaction term between funding conditions and ClarkSea Index. Funding tercile 2 and Funding tercile 3 are dummy variables that take a value of 1 if average directional changes lie within the second and third terciles of funding conditions, respectively. Panel A (B) shows the coefficient estimates of acquirer CARs for the entire sample (shipowners only). Columns I and IV include only the key variable of interest. Models II, III, V, and IV includes company- and deal specific characteristics. Estimated p-values are clustered at company level and standard errors are given in parentheses. Statistical significance levels of 10%, 5%, 1% are denoted with *, **, ***, respectively.

Panel A. Coefficient estimates of acquirer CARs for the whole sample companies

	I	II	III	IV	V	VI
Funding conditions	-0.261*	-0.264**	-0.244**			
	(0.115)	(0.109)	(0.116)			
Clarksea	0.003	0.007	0.005	-0.015	-0.012	-0.014
	(0.005)	(0.006)	(0.007)	(0.008)	(0.008)	(0.009)
Funding conditions*Clarksea	0.025**	0.026**	0.024**			
	(0.011)	(0.011)	(0.011)			
Funding tercile 2				-0.212	-0.237	-0.213
				(0.161)	(0.160)	(0.167)
Funding tercile 3				-0.244*	-0.294**	-0.293**
				(0.134)	(0.126)	(0.141)
Funding tercile 2*Clarksea				0.021	0.024	0.022
				(0.016)	(0.016)	(0.017)
Funding tercile 3*Clarksea				0.023*	0.029**	0.029**
				(0.013)	(0.012)	(0.015)
Toehold		-0.009	-0.015*		-0.010	-0.016**
		(0.008)	(0.008)		(0.008)	(0.007)
Attitude		0.033***	0.028**		0.034***	0.029**
		(0.011)	(0.012)		(0.011)	(0.012)
Cross-border		0.004	0.008		0.004	0.008
		(0.005)	(0.005)		(0.005)	(0.005)
Tender		-0.017	-0.004		-0.015	0.001
		(0.021)	(0.021)		(0.021)	(0.021)
Public target		0.033**	0.033*		0.033**	0.032*
		(0.016)	(0.017)		(0.016)	(0.017)
All cash		0.010	0.006		0.010	0.006
		(0.007)	(0.007)		(0.007)	(0.008)
All stock		0.021	0.023		0.022	0.023
		(0.022)	(0.022)		(0.022)	(0.022)
Diversifying		-0.010**	-0.011*		-0.010*	-0.096*
		(0.007)	(0.005)		(0.005)	(0.005)
M&A liquidity		0.148**	0.146		0.143**	0.140*
		(0.068)	(0.075)		(0.068)	(0.075)
HHI		0.018*	0.026**		0.097*	0.025**
		(0.010)	(0.011)		(0.086)	(0.011)
Size			-0.003*			-0.003*
			(0.001)			(0.001)
Leverage			0.026			0.027
			(0.018)			(0.018)

Cash			-0.000			-0.001
			(0.025)			(0.025)
Profitability			-0.000			0.009
			(0.050)			(0.050)
Market-to-book			-0.001			-0.001
			(0.005)			(0.005)
Dividend payer			-0.019**			-0.020**
			(0.010)			(0.010)
Acquirer runup			-0.003			-0.003
			(0.005)			(0.005)
C	-0.016	-0.104*	-0.048	0.166	0.097	0.147
	(0.056)	(0.061)	(0.077)	(0.085)	(0.086)	(0.092)
N	344	340	301	344	340	301
P-value	0.022	0.000	0.000	0.050	0.001	0.002
Adj. R^2 (%)	1.81	7.77	11.23	1.71	7.37	11.24

Panel B. Coefficient estimates of acquirer CARs for shipowner companies only

	I	**II**	**III**	**IV**	**V**	**VI**
Funding conditions	-0.393***	-0.368***	-0.342***			
	(0.123)	(0.113)	(0.124)			
Clarksea	0.005	0.013	0.012	-0.021**	-0.014	-0.015
	(0.007)	(0.008)	(0.009)	(0.010)	(0.010)	(0.011)
Funding conditions*Clarksea	0.039***	0.036***	0.034***			
	(0.012)	(0.011)	(0.012)			
Funding tercile 2				-0.325*	-0.353**	-0.337*
				(0.181)	(0.177)	(0.189)
Funding tercile 3				-0.349**	-0.366**	-0.348**
				(0.150)	(0.140)	(0.148)
Funding tercile 2*Clarksea				0.034*	0.036**	0.035*
				(0.018)	(0.018)	(0.019)
Funding tercile 3*Clarksea				0.034**	0.036**	0.034**
				(0.015)	(0.014)	(0.015)
Toehold		-0.011	-0.017*		-0.012	-0.018*
		(0.011)	(0.009)		(0.010)	(0.010)
Attitude		0.033***	0.033**		0.036***	0.037***
		(0.011)	(0.013)		(0.010)	(0.011)
Cross-border		0.009	0.010		0.008	0.009
		(0.006)	(0.006)		(0.006)	(0.006)
Tender		-0.038	-0.031		-0.035	-0.024
		(0.024)	(0.025)		(0.024)	(0.024)
Public target		0.038*	0.041*		0.036*	0.039*
		(0.020)	(0.024)		(0.020)	(0.022)
All cash		0.011	0.008		0.012	0.008
		(0.008)	(0.008)		(0.008)	(0.008)
All stock		0.020	0.019		0.020	0.019
		(0.028)	(0.027)		(0.029)	(0.029)
Diversifying		-0.005	-0.010		-0.003	-0.008
		(0.006)	(0.006)		(0.006)	(0.007)
M&A liquidity		0.084	-0.053		0.084	0.055
		(0.006)	(0.091)		(0.091)	(0.097)

HHI		0.018	0.027		0.016	0.022
		(0.016)	(0.019)		(0.015)	(0.018)
Size			-0.003*			-0.003*
			(0.002)			(0.002)
Leverage			0.001			0.002
			(0.030)			(0.021)
Cash			-0.021			-0.022
			(0.030)			(0.029)
Profitability			-0.038			-0.033
			(0.057)			(0.056)
Market-to-book			0.003			0.004
			(0.007)			(0.006)
Dividend payer			-0.009			-0.011
			(0.010)			(0.010)
Acquirer runup			0.001			0.001
			(0.006)			(0.006)
C	0.039	-0.162**	-0.120	0.226**	0.108	0.147
	(0.070)	(0.073)	(0.094)	(0.104)	(0.107)	(0.113)
N	235	232	199	235	232	199
P-value	0.011	0.001	0.013	0.001	0.000	0.004
Adj. R^2 (%)	3.33	7.61	7.53	4.24	7.83	8.81

CARs for all sample companies. Given the ClarkSea Index does not account for the earnings of passengers, ferries, marinas, services, and marine cargo handling industries, in Panel B, we repeat our tests by including only the freight transportation group which is covered by the ClarkSea Index. [73]

In the first model, we only include funding conditions, ClarkSea index and the interaction between them. In the second and third models, we also control for several deal and company specific characteristics. In models IV to VI, we follow the same procedure, with the funding conditions is replaced with two dummy variables which are interacted with ClarkSea Index.

[73] The reason we still report the tests in Panel A is that the non-ship owning industries can still be affected by earning levels in the ship owning industry. Furthermore, Alexandrou et al. (2014) include the Baltic Dry Index, a much less comprehensive proxy for earnings levels, in their likelihood of mergers models that comprise all subsectors in the shipping industry.

Starting with the first model, we find that funding condition is still negative and significant, and ClarkSea Index does not bear any statistical significance.[74] However, we report a positive and significant coefficient for the interaction term. This finding implies that industry earnings have indeed a moderating effect on the negative association between funding conditions acquirer CARs. Shipping companies under high earnings period may have an incentive to utilise M&As to complement organic growth, establish operating and financial synergies, enhance market share, and diversify the asset base. Considering the cyclical nature of the shipping industry, all these motivations might serve as a rapid process of company growth. The well-justified motivations to execute M&A deals in high earnings period appear to alleviate the negative market reaction to deals in favourable funding conditions.

In models II and III, we also control for deal and company characteristics. The interaction term remains both economically and statistically significant, enabling us to draw robust inferences on the moderating effect of ClarkSea. In order to reveal in which segment of the funding conditions the moderating effect is stronger, in models IV to VI, we rerun our models with the funding conditions dummy variables. Our analysis shows that the middle tercile of funding condition is negatively associated with acquirer CARs, but without statistical significance. However, we show that the most favourable funding condition (Funding tercile 3) is significantly negatively related to acquirer returns. This results implies once again that the negative relationship between acquirer CARs and funding conditions is broadly driven by the

[74] The interpretation of the main effects are not insightful in the presence of an interaction term since they directly depend on the values of each other. For instance, the isolated impact of funding conditions in Table 4.3 can be extracted only when ClarkSea equals to 0, i.e., when the interaction term disappears from the model. Since the variable ClarkSea cannot take a value of 0 (see Table 4.1), average isolated inferences cannot be drawn.

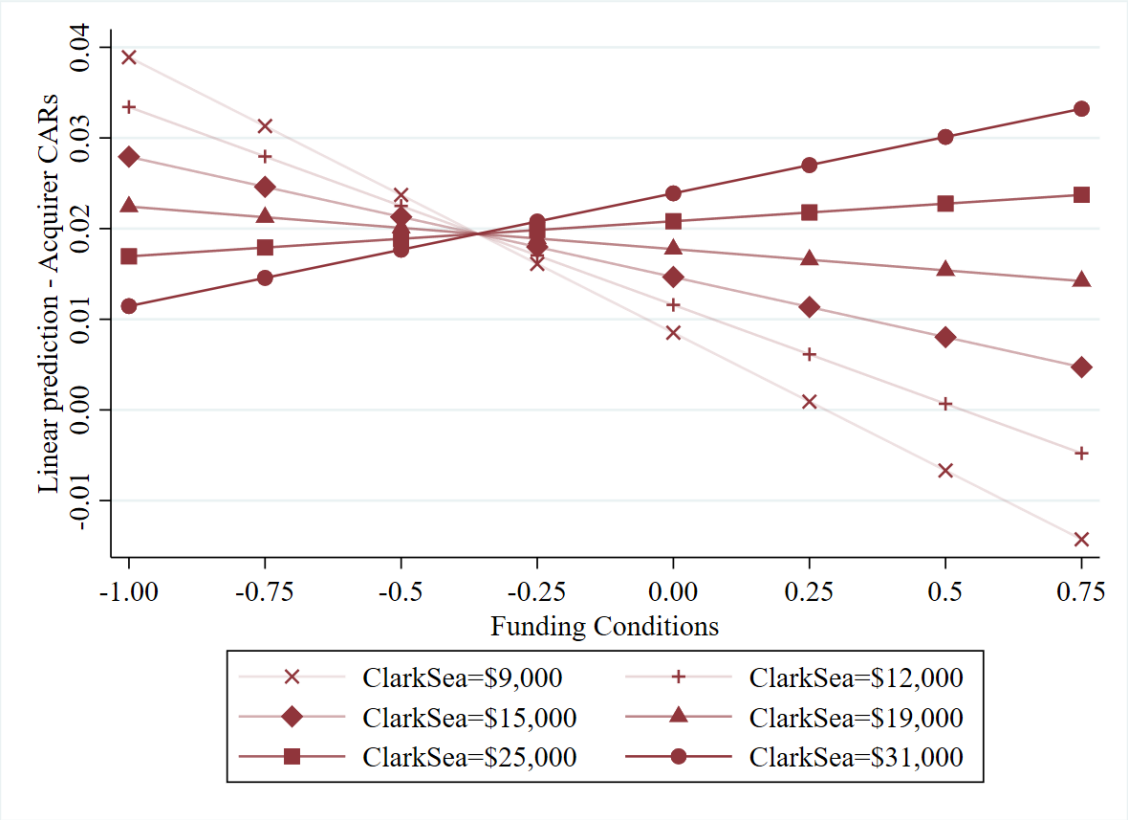
deals undertaken in the most favourable phase of funding conditions. The two interaction terms in models IV to VI show that ClarkSea index has a moderating effect on funding conditions. However, the impact is both statistically and economically stronger in the most favourable funding conditions. This results show that the market reaction is higher for a deal that is negotiated under the most favourable funding and sector conditions.

In Panel B of Table 5.4, we repeat our analysis by excluding non-shipowner companies since ClarkSea index only accounts for the earnings of shipowner companies. Funding conditions in all models remain statistically significant but they show a more pronounced economic impact. The middle tercile of funding conditions in models IV to VI becomes significant in all the three models, which was absent in the models in Panel A. This result shows that even in a relatively favourable funding conditions, the market reaction tends to be negative. It appears that the shareholders of ship-owning companies are more cautious while reacting deals that are negotiated under favourable funding conditions. Unsurprisingly, the interaction term between funding conditions and ClarkSea becomes both economically and statistically more significant. This finding suggests that ship-owning companies are able to reverse the negative market reaction in favourable market conditions if the deal is undertaken in a high earnings period. In models IV to VI, both interaction terms become significant, with Funding tercile 3 * ClarkSea being slightly more significant.

Figure 5.2 shows the predictive margins of acquirer CARs against funding conditions and ClarkSea. The figure shows that deals negotiated under the least favourable funding conditions and in the lowest earning periods experience the highest CARs, which equals to $81mil increase in shareholder value. This result suggests shipping acquirers are more careful in selecting targets when both funding and sector conditions are in the least favourable phase.

However, as funding conditions improve, shareholder value associated with M&As decreases

Figure 5.2. Predictive margins of acquirer CARs against funding conditions and ClarkSea. The figure plots the linear prediction of acquirer CARs for the interaction term Funding conditions*Clarksea in Table 3, Panel B, column III. The y- and x-axes show the values of acquirer CARs and funding conditions, respectively. The lines in the plot area represent different values of ClarkSea index.



at a great pace. In fact, a deal that is negotiated under the most favourable phase and in the lowest earnings period results in a decrease of $29.7mil in shareholder value. This figure verifies our argument that favourable funding conditions alone is not sufficient to pursue growth via M&As, and the investors are not convinced that an easy-money period deal is value enhancing.

We also show that deals that are negotiated under the least favourable funding conditions but in the highest earnings period experience less positive abnormal returns. This finding translates into an increase in the shareholder value by $23.8mil. On the one hand, seeking M&As for further growth in a high earnings period might be value-enhancing. On the other hand, high borrowing costs associated with unfavourable funding conditions might decrease the profitability of a deal. This argument becomes more explicit when the reliance on debt capital

in the shipping industry is emphasised. In fact, shipping companies are faced with high financial distress costs that pertain to high leverage levels (Drobetz et al., 2013). Borrowing in an unfavourable funding environment will typically increase expected financial distress costs and decrease financial flexibility for future investments. The heightened financial distress costs associated with unfavourable funding conditions might absorb shareholder value, even if the deal is undertaken in a high-earnings period. However, when a high-earnings period is coupled with the most favourable funding conditions, we observe an increase of $69mil in shareholder value.

5.4.3. Funding conditions, economic policy uncertainty, and acquirer CARs

General corporate finance literature suggests that M&A deals that are announced in a high economic policy uncertainty period experience a negative market reaction (Adra et al., 2020). Dixit and Pindyck (1994) argue that in the presence of uncertainty, companies either await the arrival of new information, or exercise the investment and face significant business risks that are embedded in the uncertain environment. In this chapter, we test whether economic policy uncertainty influences how a deal is perceived under different funding conditions.

Table 5.5 shows the acquirer returns regressions with an interaction term between our funding conditions measure and GEPU Index. In the first model, we only include funding conditions, GEPU index, and the interaction between them. In the second and third models, we also control for several deal and company specific characteristics. In models IV to VI, we follow the same procedure, with the funding conditions is replaced with two dummy variables which are interacted with the GEPU Index.

The first model in Table 5.5 shows a striking result that provides an insightful perspective on the relationship between funding conditions and acquirer CARs. Specifically, we report that when economic policy uncertainty is accounted for, the sign of funding conditions turns

Table 5.5. Funding conditions, GEPU Index, and Acquirer CARs. The table shows the impact of the funding conditions and GEPU Index on acquirer returns around the deal announcement. The dependent variable is CAR (-1, +1). The key variable of interest is the interaction term between funding conditions and GEPU Index. Funding tercile 2 and Funding tercile 3 are dummy variables that take a value of 1 if average directional changes lie within the second and third terciles of funding conditions, respectively. Columns I and IV include only the key variable of interest. Models II, III, V, and IV includes company- and deal specific characteristics. Estimated p-values are clustered at company level and standard errors are given in parentheses. Statistical significance levels of 10%, 5%, 1% are denoted with *, **, ***, respectively.

	I	II	III	IV	V	VI
Funding conditions	0.138***	0.115**	0.019*			
	(0.045)	(0.055)	(0.055)			
GEPU	-0.011*	-0.011	-0.007	0.007	0.005	0.010
	(0.006)	(0.007)	(0.007)	(0.009)	(0.009)	(0.010)
Funding conditions*GEPU	-0.031***	-0.027**	-0.025**			
	(0.009)	(0.012)	(0.012)			
Funding tercile 2				0.063	0.056	0.052
				(0.085)	(0.094)	(0.094)
Funding tercile 3				0.159**	0.127*	0.150**
				(0.064)	(0.067)	(0.065)
Funding tercile 2*GEPU				-0.012	-0.012	-0.011
				(0.018)	(0.020)	(0.020)
Funding tercile 3*GEPU				-0.037***	-0.030**	-0.035**
				(0.013)	(0.145)	(0.014)
Toehold		-0.007	-0.013		-0.008	-0.013*
		(0.008)	(0.008)		(0.008)	(0.007)
Attitude		0.036***	0.029*		0.037***	0.031**
		(0.013)	(0.014)		(0.013)	(0.014)
Cross-border		0.002	0.007		0.002	0.007
		(0.005)	(0.006)		(0.005)	(0.006)
Tender		-0.028	-0.012		-0.025	-0.007
		(0.021)	(0.020)		(0.020)	(0.020)
Public target		0.043**	0.036**		0.040**	0.032*
		(0.018)	(0.017)		(0.018)	(0.017)
All cash		0.005	0.006		0.004	0.005
		(0.008)	(0.008)		(0.008)	(0.008)
All stock		0.014	0.020		0.015	0.021
		(0.022)	(0.021)		(0.023)	(0.022)
Diversifying		-0.013**	-0.012*		-0.013**	-0.011
		(0.005)	(0.006)		(0.006)	(0.006)
M&A liquidity		0.157**	0.144*		0.142**	0.123
		(0.069)	(0.075)		(0.069)	(0.075)
HHI		0.029***	0.032***		0.028***	0.031***
		(0.010)	(0.011)		(0.010)	(0.011)
Size			-0.002			-0.002
			(0.001)			(0.002)
Leverage			0.032*			0.036*
			(0.018)			(0.020)
Cash			0.012			0.014
			(0.026)			(0.027)
Profitability			0.018			0.028

			(0.057)			(0.056)
Market-to-book			-0.003			-0.003
			(0.005)			(0.005)
Dividend payer			-0.017			-0.019
			(0.109)			(0.010)
Acquirer runup			-0.001			-0.002
			(0.005)			(0.005)
C	0.070***	0.017	0.028	-0.016	-0.055	-0.051
	(0.032)	(0.036)	(0.045)	(0.042)	(0.044)	(0.056)
N	312	308	284	312	308	284
P-value	0.001	0.000	0.000	0.000	0.000	0.000
Adj. R^2 (%)	2.09	9.67	11.7	2.57	9.27	12.01

positive. Furthermore, the interaction term between funding conditions and GEPU is found to be negative and highly significant. This new evidence implies that deals undertaken in a favourable funding environment and a high uncertainty period are viewed as value-destroying. It appears that companies that exercise M&A deals during periods of high uncertainty expose themselves to an additional source of risk. The interaction term remain significant even when we control for company and deal characteristics.

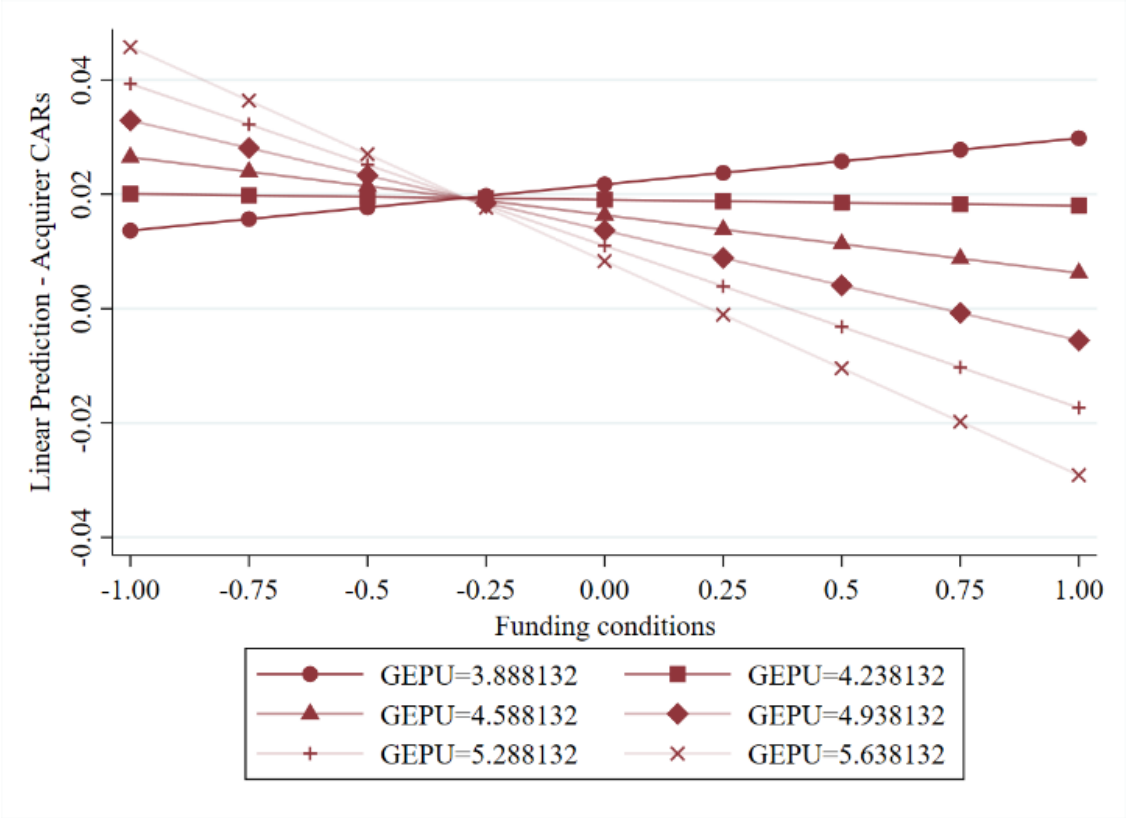
In columns IV to VI, we report that the detrimental effect of economic policy uncertainty is more magnified in the most favourable funding conditions. This result echoes findings of Adra et al. (2020) who show that the negative impact of uncertainty on M&A outcomes is particularly focused in periods of monetary expansion. In fact, Di Maggio and Kacperczyk (2017) argues that companies might have an incentive to invest in risky projects that cause considerable losses if funding conditions deteriorate. Combining these arguments and our results together, we argue that investors of shipping companies seem to display high caution when reacting deals in an uncertain environment where funding conditions might become unfavourable in the near future.

In Figure 5.3, we plot the linear prediction of acquirer CARs against different values of funding conditions and the GEPU index. It appears that shipping companies are more selective when choosing targets, and they focus on only the value-enhancing deals in an uncertain and

unfavourable funding environment. Specifically, we show that a typical deal in our sample increases the shareholder value by $95mil in an uncertain environment and unfavourable funding conditions. However, as funding conditions improve, shareholder gains gradually disappear, turn negative, and reach the lowest values. It seems that the risk perception of shipping companies shows a significant shift as funding conditions become more favourable. Shipping companies display less caution and undertake risky M&As in favourable funding conditions. When this risk-seeking behaviour is coupled with a highly uncertain environment, companies experience a backlash from the market. In economic terms, we report that a deal in the most favourable funding conditions and in the most uncertain environment decreases the shareholder value by $61mil.

We also show that deals that are negotiated under the least favourable funding conditions and in the lowest uncertainty period experience less positive abnormal returns. We argue that a low uncertainty environment might help companies to make value-enhancing M&As, while unfavourable funding conditions might decrease the profitability of a deal. We report an economic impact of $28.7mil increase in shareholder value for deals in the least uncertain times and in the most unfavourable funding conditions. However, low uncertainty environment and highly favourable funding conditions will typically result in value-enhancing deals. We argue that the negative impact of risk-seeking behaviour of shipping companies is mitigated by low uncertainty levels. Specifically, we report an increase of $62mil in shareholder value in deals under the most favourable funding conditions and in the lowest uncertainty.

Figure 5.3. Predictive margins of acquirer CARs against funding conditions and GEPU Index. The figure plots the linear prediction of acquirer CARs for the interaction term Funding conditions*GEPU in Table 4, column III. The y- and x-axes show the values of acquirer CARs and funding conditions, respectively. The lines in the plot area represent different values of GEPU Index.



5.4.4. Funding conditions, M&A record, and acquirer CARs

In this section, we explore the impact of serial acquisitions on the negative association between funding conditions and acquirer CARs. Specifically, we analyse how the market reacts to one-timers (acquirers with no bidding history in the past five years) and active buyers (acquirers with one, two, and three or more acquisitions in the past five years) under different funding conditions.

Table 5.6 shows the acquirer returns regressions with an interaction term between our funding conditions measure and M&A record. In the first model, we only include funding

Table 5.6. Funding conditions, M&A record, and Acquirer CARs. The table shows the impact of the funding conditions and M&A record on acquirer returns around the deal announcement. The dependent variable is CAR (-1, +1). The key variable of interest is the interaction term between funding conditions and M&A record. Funding tercile 2 and Funding tercile 3 are dummy variables that take a value of 1 if average directional changes lie within the second and third terciles of funding conditions, respectively. Columns I and IV include only the key variable of interest. Models II, III, V, and IV includes company- and deal specific characteristics. Estimated p-values are clustered at company level and standard errors are given in parentheses. Statistical significance levels of 10%, 5%, 1% are denoted with *, **, ***, respectively.

	I	II	III	IV	V	VI
Funding conditions	-0.019***	-0.022***	-0.021***			
	(0.007)	(0.006)	(0.007)			
M&A record	-0.001	0.002	0.002	-0.005		-0.004
	(0.002)	(0.002)	(0.002)	(0.003)		(0.004)
Funding conditions*M&A	0.006*	0.010***	0.009**			
record	(0.003)	(0.003)	(0.003)			
Funding tercile 2				-0.006	-0.012	-0.008
				(0.009)	(0.008)	(0.008)
Funding tercile 3				-0.024**	-0.027***	-0.026***
				(0.008)	(0.008)	(0.008)
Funding tercile 2*M&A				0.006	0.008	0.007
record				(0.006)	(0.006)	(0.007)
Funding tercile 3*M&A				0.009**	0.013***	0.011**
record				(0.004)	(0.004)	(0.005)
Toehold		-0.005	-0.012		-0.006	-0.012*
		(0.009)	(0.008)		(0.008)	(0.007)
Attitude		0.034**	0.027*		0.033**	0.027*
		(0.015)	(0.014)		(0.014)	(0.014)
Cross-border		0.004	0.008		0.004	0.008
		(0.005)	(0.005)		(0.005)	(0.005)
Tender		-0.013	-0.001		-0.009	0.004
		(0.021)	(0.021)		(0.021)	(0.022)
Public target		0.029*	0.032*		0.028*	0.030*
		(0.016)	(0.174)		(0.016)	(0.017)
All cash		0.009	0.006		0.009	0.005
		(0.007)	(0.008)		(0.006)	(0.007)
All stock		0.024	0.025		0.025	0.025
		(0.021)	(0.021)		(0.022)	(0.022)
Diversifying		-0.010*	-0.012**		-0.010*	-0.010*
		(0.005)	(0.005)		(0.005)	(0.005)
M&A liquidity		0.140**	0.144*		0.134**	0.139*
		(0.067)	(0.073)		(0.066)	(0.073)
HHI		0.019**	0.027**		0.019*	0.026**
		(0.009)	(0.010)		(0.009)	(0.010)
Size			-0.003*			-0.003*
			(0.001)			(0.002)
Leverage			0.025			0.027
			(0.017)			(0.017)
Cash			-0.001			-0.006
			(0.024)			(0.024)
Profitability			-0.017			-0.008

			(0.049)		(0.048)
Market-to-book			-0.001		-0.001
			(0.005)		(0.006)
Dividend payer			-0.018*		-0.019*
			(0.010)		(0.010)
Acquirer runup			-0.002		-0.003
			(0.005)		(0.005)
C	0.013***	-0.037	0.001	0.024	0.014
	(0.003)	(0.016)	(0.025)	(0.007)	(0.025)
N	352	348	306	352	306
P-value	0.045	0.005	0.000	0.025	0.000
Adj. R^2 (%)	1.17	7.49	11.16	1.57	11.30

conditions, M&A record, and the interaction between them. In the second and third models, we also control for several deal and company specific characteristics. In models IV to VI, we follow the same procedure, with the funding conditions is replaced with two dummy variables which are interacted with M&A record.

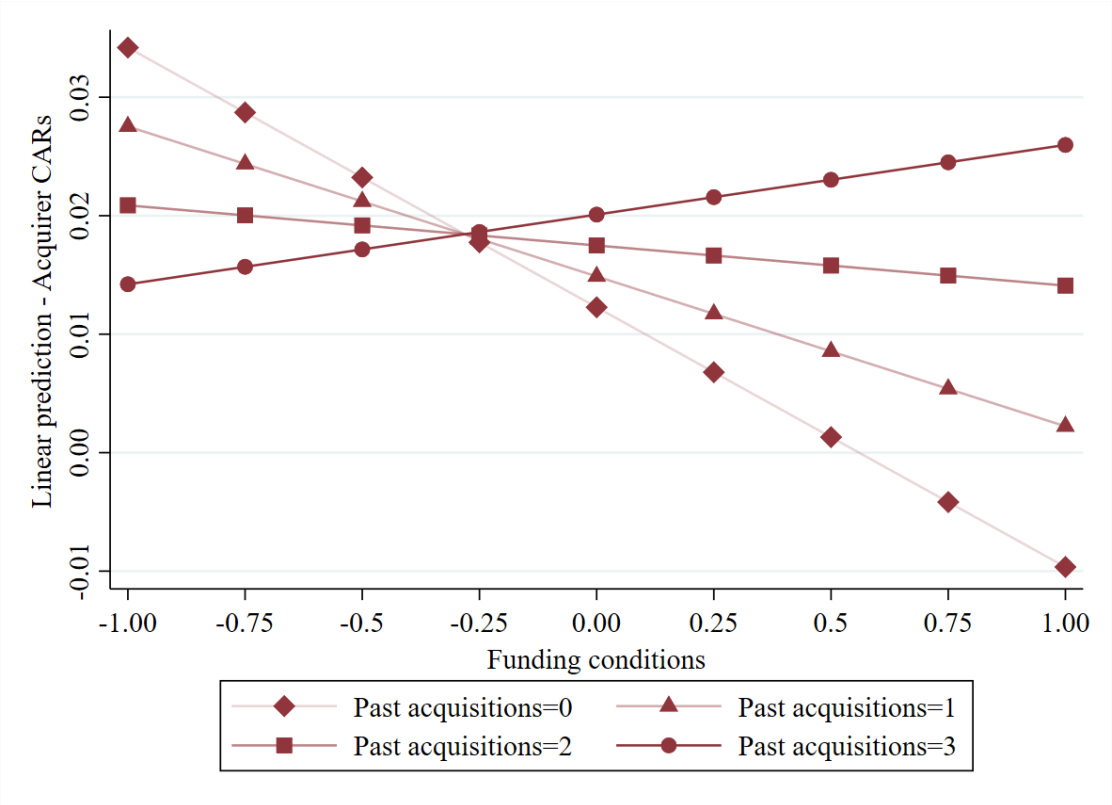
In the first model of Table 5.6, we once again confirm the negative association between funding conditions and acquirer CARs. M&A record is found to be negative but insignificant. However, we report that the interaction term between funding conditions and M&A record is significantly positively related to acquirer returns. This novel finding suggests that the market reaction tends to be positive to deals by serial acquirers. In models II and III, we control for deal and company characteristics, which does not impose any changes in our coefficient estimates. In models IV to VI, we rerun our models with separate dummy variables for M&A record. Our results show that the moderating impact of M&A record on the relation between funding conditions and CARs is particularly prevalent in the most favourable funding conditions.

Revisiting our argument that favourable funding conditions alone is not a sufficient motivation to take M&As, we argue that investors reward serial acquirers with higher returns in favourable funding conditions since the acquisition is a part of a planned expansion. In an unfavourable funding environment, however, capital markets might be sceptical of the planned synergies of another acquisition since it might exhaust the financial flexibility of the company. On the

contrary, capital markets might punish one-timers in favourable funding conditions as the motivation of the acquisition is not well-justified. In unfavourable funding conditions, investors might give the company credit for pursuing a once-in-a-lifetime opportunity.

We verify these arguments in Figure 5.4. Specifically, we report that one-timers experience the highest CARs in the most unfavourable phase of funding conditions, which translates into an increase of $71.1mil in shareholder value. However, as funding conditions improve, the market reaction experiences a dramatic decrease and reaches the lowest point. We report that acquisitions by one-timers decrease the shareholder value by $21mil in the most favourable funding conditions. We also show that as the number of M&A record increase, realised returns of acquisitions decrease in the least favourable funding conditions, which is in line with our

Figure 5.4. Predictive margins of acquirer CARs against funding conditions and M&A record. The figure plots the linear prediction of acquirer CARs for the interaction term Funding conditions*M&A record in Table 5, column III. The y- and x-axes show the values of acquirer CARs and funding conditions, respectively. The lines in the plot area represent the number of M&A record that a company undertakes over the past five years.



financial flexibility argument. We report an increase of $29.5mil increase in shareholder value for deals by serial acquirers in the least favourable funding conditions. However, shareholder gains significantly improve as funding conditions become more benign. Specifically, we report that serial acquirers experience an increase of $54mil in shareholder value in the most favourable funding conditions.

5.4.5. Funding conditions, FCF, and acquirer CARs

In this section, we analyse the impact of FCF levels on the association between funding conditions and CARs. Table 5.7 shows the acquirer returns regressions with an interaction term between our funding conditions measure and FCF. In the first model, we only include funding conditions, FCF, and the interaction between them. In the second and third models, we also control for several deal and company specific characteristics. In models IV to VI, we follow the same procedure, but replace funding conditions with two dummy variables which are interacted with FCF.

In the first model of Table 5.7, we report a negative and significant coefficient for funding conditions. FCF is positively associated with CARs but the coefficient does not bear a statistical significance. However, we find that the interaction effect is positive and significant, implying that acquirers that are endowed with FCF experience positive abnormal returns in favourable funding conditions. This finding supports the control hypothesis of Jensen (1986) arguing that debt reduces the agency costs of free cash flow by diminishing the cash flow that the management team holds. Considering the risky nature of the shipping industry and stricter debt covenants (Otto and Scholl, 2015), the disciplining effect of debt capital on how managers spend free cash flow is expected to be stronger in the shipping industry. Furthermore, debt financing mandates the management team to payout the free cash flow instead of spending it on negative NPV investments (Schlingemann, 2004), might result in positive returns in

Table 5.7. Funding conditions, FCF, and Acquirer CARs. The table shows the impact of the funding conditions and FCF on acquirer returns around the deal announcement. The dependent variable is CAR (-1, +1). The key variable of interest is the interaction term between funding conditions and FCF. Funding tercile 2 and Funding tercile 3 are dummy variables that take a value of 1 if average directional changes lie within the second and third terciles of funding conditions, respectively. Columns I and IV include only the key variable of interest. Models II, III, V, and IV includes company- and deal specific characteristics. Estimated p-values are clustered at company level and standard errors are given in parentheses. Statistical significance levels of 10%, 5%, 1% are denoted with *, **, ***, respectively.

	I	II	III	IV	V	VI
Funding conditions	-0.015***	-0.015***	-0.016***			
	(0.005)	(0.005)	(0.005)			
FCF	0.034	0.039	0.082	-0.059*	-0.152*	-0.112
	(0.058)	(0.058)	(0.072)	(0.080)	(0.083)	(0.093)
Funding conditions*FCF	0.184**	0.170**	0.191**			
	(0.084)	(0.078)	(0.087)			
Funding tercile 2				-0.006	-0.010	-0.004
				(0.007)	(0.007)	(0.007)
Funding tercile 3				-0.020***	-0.019***	-0.020***
				(0.006)	(0.006)	(0.007)
Funding tercile 2*FCF				0.296**	0.325**	0.289**
				(0.144)	(0.145)	(0.144)
Funding tercile 3*FCF				0.238**	0.224**	0.251**
				(0.106)	(0.102)	(0.117)
Toehold		-0.008	-0.011		-0.010	-0.013
		(0.008)	(0.008)		(0.008)	(0.008)
Attitude		0.024**	0.015		0.024**	0.017*
		(0.017)	(0.012)		(0.010)	(0.009)
Cross-border		0.004	0.009		0.005	0.010*
		(0.005)	(0.006)		(0.005)	(0.006)
Tender		-0.009	-0.009		-0.044	-0.001
		(0.020)	(0.020)		(0.019)	(0.020)
Public target		0.021	0.030*		0.019	0.028*
		(0.014)	(0.017)		(0.013)	(0.016)
All cash		0.009	0.005		0.010	0.006
		(0.007)	(0.008)		(0.007)	(0.008)
All stock		0.029	0.040		0.040	0.041*
		(0.025)	(0.025)		(0.025)	(0.023)
Diversifying		-0.010	-0.010*		-0.009*	-0.008
		(0.005)	(0.005)		(0.005)	(0.006)
M&A liquidity		0.115	0.125*		0.109*	0.117
		(0.067)	(0.072)		(0.064)	(0.070)
HHI		0.022	0.033***		0.020**	0.029**
		(0.010)	(0.011)		(0.010)	(0.011)
Size			-0.002			-0.002
			(0.002)			(0.001)
Leverage			0.038*			0.040*
			(0.020)			(0.019)
Cash			0.016			0.010
			(0.025)			(0.025)
Profitability			-0.017			-0.008
			(0.062)			(0.061)

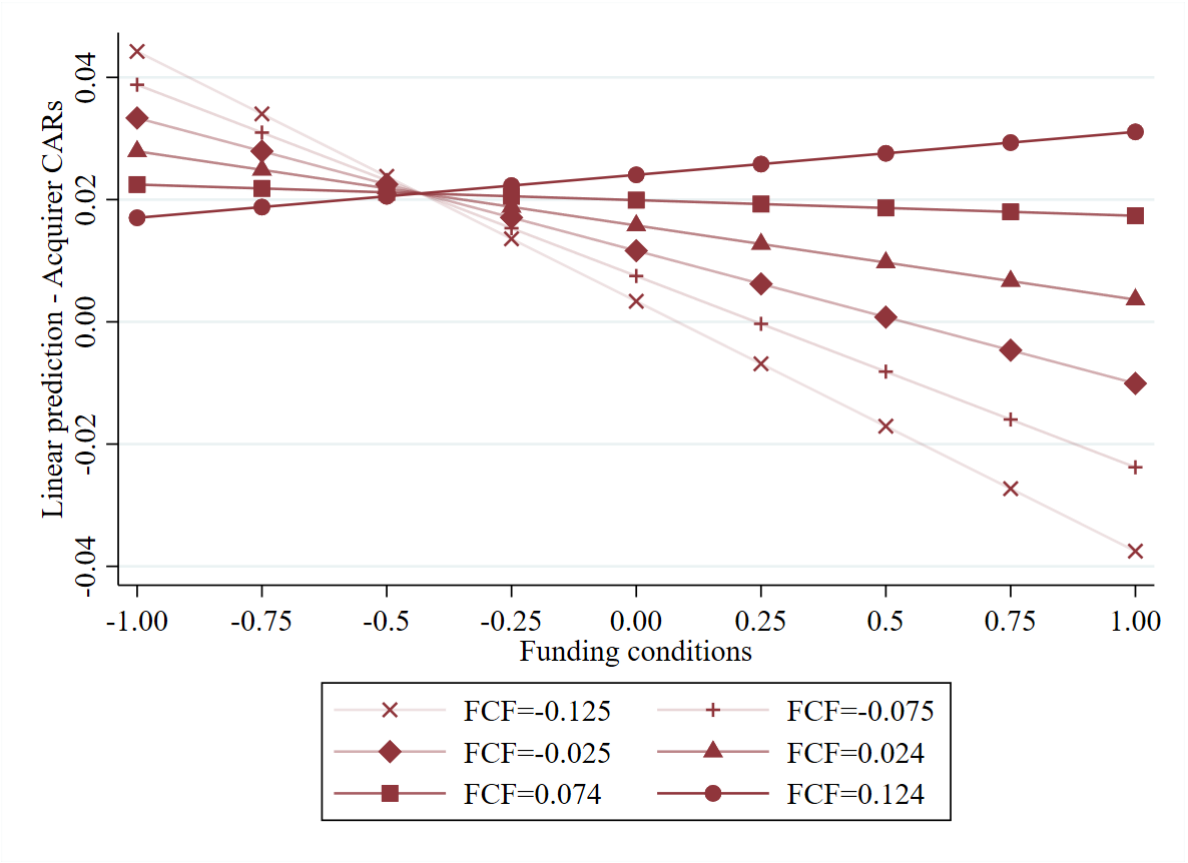
Market-to-book			-0.001			-0.001
			(0.010)			(0.005)
Dividend payer			-0.018*			-0.019*
			(0.010)			(0.009)
Acquirer runup			-0.004			-0.005
			(0.006)			(0.006)
C	0.012***	-0.025*	-0.001	0.022	-0.014	0.008
	(0.002)	(0.013)	(0.025)	(0005)	(0.013)	(0.024)
N	330	326	285	330	326	285
P-value	0.015	0.007	0.000	0.014	0.008	0.000
Adj. R^2 (%)	1.41	7.21	11.76	2.39	8.03	12.77

favourable funding conditions. The interaction term remains significant even after we control for deal and company characteristics. To see how FCF impacts acquirer gains in different phases of funding conditions, in models IV to VI, we rerun our models with the terciles of funding conditions. The most notable difference is that we report a negative coefficient for FCF, supporting the free cash flow hypothesis by Jensen (1986). Funding tercile 3 which represents the most favourable funding conditions is found to be negatively and significantly related to acquirer CARs. We report that the two interaction terms are positive and significant in our models, with a considerable difference in the economic impacts. Specially, we find that companies with FCF in moderately favourable funding conditions (Funding tercile 2) experience the highest CARs. We observe the same positive effect in the most favourable funding conditions (Funding tercile 3) but with a less pronounced economic impact. These findings imply that the disciplining effect of debt capital is more visible in the middle tercile of funding conditions, while the most favourable funding conditions might increase agency costs and result in less positive acquirer returns.

Figure 5.5 shows how FCF levels and funding conditions shape acquirer CARs. We find that the companies with the lowest FCF in the most unfavourable funding conditions make the best acquisitions. In economic terms, these deals increase shareholder value by $92mil. However, we report that companies with the lowest FCF in the most favourable funding conditions

experience the lowest CARs, with a decrease in shareholder value by $78mil. This finding suggests that the market views deals by companies that are not able to generate a positive FCF in favourable funding conditions value-destroying. On the other hand, when companies have high levels of FCF and face favourable funding conditions, they experience an increase in shareholder value of $64.6mil.

Figure 5.5. Predictive margins of acquirer CARs against funding conditions and FCF. The figure plots the linear prediction of acquirer CARs for the interaction term Funding conditions*FCF in Table 4.6, column III. The y- and x-axes show the values of acquirer CARs and funding conditions, respectively. The lines in the plot area represent different values of FCF.



5.5. Conclusion

In this paper, we provide evidence that funding conditions play an integral role in M&As in the shipping industry, with directly measurable outcomes. Our findings suggest that shipping companies tend to perform value-destroying deals under favourable funding conditions. Along with the evidence from the literature, we argue that shipping companies make riskier acquisitions, which experience an adverse reaction from the market. The negative impact of favourable funding conditions on the market reaction deepens when a deal is announced in a high uncertainty environment. However, when favourable funding conditions are coupled with a positive shock to the economic environment of the industry, the deals are viewed as value-enhancing. Further, we document that serial acquirers in favourable funding conditions make better acquisitions, suggesting that acquisition experience alleviates a possible negative reaction from the market in a benign funding environment. Finally, we show that FCF is positively associated with acquirer returns in favourable funding conditions. This finding challenges the notion suggesting that companies with higher FCF tend to make value-destroying acquisitions. We argue that the disciplining effect of debt financing moderates the negative effect of FCF on acquisition quality. Our findings have direct implications for shipping companies that are willing to make acquisitions, their shareholders, and banks that have an exposure to the shipping industry.

Chapter VI

Conclusion

6.1. Summary and concluding remarks

This thesis offers a comprehensive insight into corporate financial management in the shipping industry by studying various aspects of investment and financing decisions. Its main motivation was to extend the developing shipping finance literature and report empirical evidence on how shipping companies make investment and financing decisions in a challenging environment. This motivation has been embodied throughout the empirical chapters which focus on three unique issues within the field of shipping finance. To set a background for the empirical studies, the first chapter is dedicated to a general introduction to the thesis and a literature review on key shipping finance issues.

The first concept studied in this thesis was internal financial constraints and their impacts on M&As in shipping, which is one of the most prominent issues in the industry. The chapter tells a far-reaching story that has many implications for several industry players, including shipping companies, their management teams, shareholders of companies, and banks that actively participate in the shipping industry.

The first result of the study suggested that shipping companies follow a target capital structure but deviations from it are also prevalent. Next, the chapter reveals how the deviations from the target capital structure affect the ability of a company to undertake an M&A deal. It is reported that companies with a positive abnormal leverage are less likely to undertake M&As deals, which might have a powerful impact on the company's future since M&As are viewed as a vital path to grow. Next, the empirical results showed that companies with a positive abnormal leverage tend to acquire smaller targets, implying that capital structure has a direct impact on how acquirers choose target companies. The chapter also proves deviations from the target capital structure as a determinant of payment method in shipping M&As. Specifically, the likelihood of financing a deal with pure cash was found to decrease with a positive abnormal

leverage. The last empirical evidence of the chapter reveals that a positive abnormal leverage has a disciplining effect on how acquirers select a target company. The results show that deviations from target capital structure have a positive impact on the acquirer returns. It appears that companies that are already plagued with financial distress costs associated with high leverage levels display more caution while selecting a target, and they focus on only the value-enhancing deals.

The second concept analysed in this thesis attempted to draw a generalisable picture of the interactions between corporate financial decisions in the shipping industry. The study extends the current literature on the interrelationships between investment, financing, and dividend payout by focusing a special industry which are characterised by high investment and debt levels. Furthermore, the study meticulously chose a methodological approach that serves the aims of the empirical tests. First, the interactions between the three important corporate policies were analysed via a single equations approach, which is traditionally the most popular choice of corporate finance literature. The results only partially show that the investment and financing policies are co-determined, while obscuring a possible interaction of dividend policy. However, when the endogeneity and simultaneity are introduced in the models, the results were clearly suggestive of the existence of an unequivocal co-determination between the three corporate policies. Furthermore, the interactions were found to be much more pronounced in the shipping industry than the rest of the market, highlighting the peculiarities of the shipping industry. The chapter also took the cyclical nature of the shipping industry and the existence of financial constraints into account and reported that crisis years and financial constraints make the interactions more magnified. The overall results of the study emphasises the need of using the correct methodology while investigating the properties of investment, financing, and payout decisions, since a model that does not account for endogeneity and simultaneity can easily obscure the true relationships.

The third and final empirical chapter of this thesis looked at the financial constraints from a wider angle. The first empirical chapter analysed how firm-level financial constraints affect M&As that shipping companies execute. This final chapter considered the aggregate availability of funding and its impact on how investors price an M&A deal in the shipping industry. The main motivation of the chapter was that aggregate capital availability might allow more shipping companies to participate in the M&As market to undertake value-enhancing deals. However, the results of the empirical tests were suggestive of the exact opposite. Specifically, the results showed that M&A deals in favourable funding conditions are viewed as value-destroying. The chapter associates this finding with the changing risk perception of companies, as the literature suggests that accommodative funding environment might have an incentive on companies to invest in riskier asset classes. In a further investigation of this result, a set of company and industry characteristics were interacted with the funding conditions. The first results suggested that when favourable funding conditions are coupled with economic policy uncertainty, the negative market reaction to deals gets even more negative. This is an unsurprising result given that shipping companies can easily be affected by an uncertain environment since the demand for the industry is derived from global economics. Next, high sector earnings period is interacted with the funding conditions and the results suggested that M&A deals in a high earnings period and favourable funding conditions are actually value-enhancing. This finding implies that when a positive shock occurs in the industry, undertaking an M&A deal is welcomed by investors across markets. The chapter also accounts for the acquisition history of sample companies. The empirical test suggested that companies with an acquisition history make better acquisitions in favourable funding conditions. Investors in the shipping industry seem to award portfolio builders with positive returns when a deal is undertaken in an accommodative funding environment. Finally, the chapter takes FCF into account and show that companies with FCF experience a positive reaction from the market

when they execute a deal in a favourable state of funding conditions. At first, this finding might seem to contradict the evidence from the general corporate finance literature since it repeatedly reports that CEOs that are endowed with FCF are inclined to make value-destroying acquisitions. However, it seems that when a monitoring process is involved in the form of bank loan, the adverse reaction from market are mitigated. Overall, the findings of this chapter have direct policy implications on shipping companies that have intentions to pursue inorganic investments. Favourable funding conditions might serve as a once-in-a-lifetime opportunity for financially constrained shipping companies. However, it appears that investors of shipping companies are sceptical to deals in favourable funding conditions. On the other hand, a deal is undertaken when a positive shock is reshaping the industry and funding conditions are favourable, the reaction of investors tends to be positive.

6.2. Future research suggestions

The first empirical chapter of this thesis shows that companies with a positive abnormal leverage are less likely to undertake M&As deals. However, there might be several company, deal, and industry specific factors that might have a moderating effect on the negative relationship between positive abnormal leverage and acquisitiveness of shipping companies. Although the target capital structure of a company is a function of its characteristics, separate features of companies could be interacted with abnormal leverage to observe possible moderating effects. For instance, a highly tangible yet overleveraged company might find it easier to secure enough funds to proceed with an M&A deal. Such a study might shed light on the properties of the relationship between abnormal leverage and M&A deals in shipping.

The second empirical chapter of this thesis takes investment, financing, and payout into account and analyse their interrelationships. Further research could be performed by considering other important corporate policies, such as equity issuance and cash holdings. Furthermore, the

investment policy can be divided into separate policies like capital expenditures, acquisitions, and sale of fixed assets. Such isolation might provide insightful results on how shipping companies simultaneously set corporate policies.

6.3. Limitations

The main source of limitations of this thesis can be attributed to data availability. Of a huge number of shipping companies all over the world, only a small fraction of them are publicly listed, which seriously limits the datasets of shipping studies, and this thesis were no exception. The first empirical chapter starts with the whole population of publicly listed shipping companies to find out the factors that contribute the target capital structure. The remaining part of the chapter only focuses on the shipping companies that have made at least one acquisition over the sample period. Despite the heightened M&A activity in the shipping industry, the author was able to include deals that were initiated by a public acquirer. Furthermore, the accounting data for all public acquirers could not be obtained through the databases available when the study was performed. This resulted in dropped observations in the regressions, potentially affecting the generalisability of the results reported. These limitations and weaknesses are duly acknowledged.

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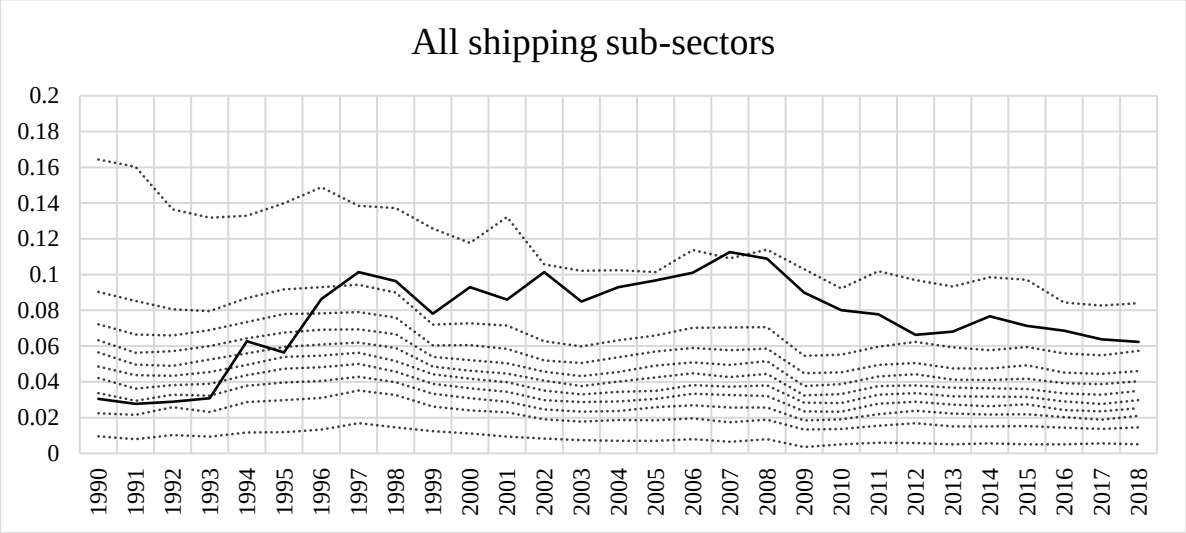
Appendix

Appendix A - Capital intensity of the shipping industry. The figure shows the capital intensity of the shipping industry against Compustat Global and North America deciles over the sample period. Capital intensity is the ratio of capital expenditures to total book assets.



Appendix B - Identification of more and less financially constrained company-year observations in Chapter 4

We utilise the abnormal leverage concept to identify more and less financially constrained companies (Hovakimian et al., 2001; Fama and French, 2002; Flannery and Rangan, 2006; Uysal, 2011; Alexandridis et al., 2020). First, we estimate the target leverage ratio by running a regression of financial leverage ratios on the key determinants of capital structure studied in prior studies[75]. Second, we define the target leverage ratio as the fitted value of the regression (Eq. 7). Third, we generate the abnormal leverage by taking the difference between actual and predicted leverage (Eq. 8), while arguing that companies with positive (negative) abnormal leverage will be more (less) financially constrained (see Alexandridis et al. (2020) for a detailed discussion on the abnormal leverage concept). Table B1 shows the coefficient estimates of the main capital structure variables.

$$Leverage_{i,t} = \alpha + \beta X_{i,t-1} + \varepsilon_{i,t} \qquad Eq.(7)$$

$$Abnormal\ Leverage_{i,t} = Actual\ Leverage_{i,t} - Predicted\ Leverage_{i,t} \qquad Eq.(8)$$

$$\begin{pmatrix} Abnormal\ Leverage > 0 & financially\ more\ constrained \\ Abnormal\ Leverage < 0 & financially\ less\ constranied \end{pmatrix} \qquad Eq.(9)$$

[75] To conserve space, we do not extensively discuss our choice of capital structure variables.

Appendix C – The capital structure regression for Chapter 4.

The table presents the results of the capital structure regression of leverage ratio on relevant determinants (Eq. 7). Reported coefficients are obtained from a fractional response regression and are average marginal effects. p-values are calculated by clustering the standard errors at the firm level and the standard errors are given in parentheses. The regression includes company- and year-fixed effects. Statistical significance levels of 10%, 5%, and 1% are denoted with *, **, and ***, respectively.

Asset tangibility	0.199***
	(0.018)
Size	0.059***
	(0.004)
Profitability	-0.422***
	(0.051)
Market-to-book	-0.073***
	(0.006)
Asset risk	-0.308***
	(0.026)
Operating leverage	-0.017
	(0.012)
Dividend-paying status	-0.030***
	(0.005)
Stock return	0.002
	(0.004)
N	5,898
Year-fixed effects	YES
Firm-fixed effects	YES
Pseudo R^2 (%)	21.31