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First-time acquisition of Sustainability-linked Debt in Shipping

Effects on Shareholder Distribution and Investor Appetite

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Abstract

The allocation of capital to green projects has increased in recent years, as companies across industries increase their commitments to become more sustainable. In a regulatory environment where sustainability and an environmental perspective have become an issue of the highest priority, decarbonization is high on the agenda. Presently, the shipping industry is facing ever greater challenges, most notably regarding fuel and energy consumption whilst committing to the sustainable energy transition. Consequently, shipping companies must make important financial decisions regarding technological improvements of their fleet in an ever-tightening sea of international regulations.

Since the Paris Agreement was signed in December 2015, the evolution of sustainability-linked finance instruments has grown exponentially. The growth in such instruments is, in part, a reflection of the pressure from regulators, consumers, and investors on businesses to prioritize ESG issues and sustainability in their strategic decision-making. As a result, shipping companies are leveraging sustainability-linked finance instruments, primarily through sustainability-linked loans and sustainability-linked bonds, to communicate their sustainability targets and compensate investors if sustainability targets are missed. The latter raises an important question concerning whether sustainability-linked debt financing attracts certain shareholders - and does it affect investor appetite?

This study addresses this question by investigating the change in shareholder distribution for institutional, family, and public investors following firms' first-time acquisition of sustainability-linked debt instruments. Employing fixed effect panel regression models and difference-in-difference models, we find evidence of increased ownership for institutional and public investors following shipping firms' first-time acquisition of sustainability-linked debt. Our findings from the difference-in-differences models suggest that institutional and public investors reallocate capital to firms that acquire sustainability-linked debt compared to peers that do not. Findings for family investors are inconclusive.

The implications of the findings are that the shareholder distribution amongst institutional and public shareholders in publicly listed shipping companies increases after the first-time acquisition of sustainability-linked debt. We also find that investor appetite is higher for firms that acquire sustainability-linked debt compared to shipping firms that do not.

Keywords: Sustainability-linked debt – shipping – shareholder distribution – investor appetite

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1. Introduction

Sustainability-linked debt (SLD) is one of the newest and fastest growing financial products on the market, where SLD has become one of the most common ways for corporations around the world to demonstrate their commitment to the environment and move forward to becoming more sustainable. The International Federation of Accountants defines sustainable debt as "a variety of fixed income instruments raising funds to finance projects that advance economic, environmental, and social objectives make up the sustainable debt market" (IFAC, 2022). Therefore, sustainable debt instruments differ from their traditional counterparts in that their proceeds finance projects that deliver environmental benefits and positive social outcomes. For the sake of simplicity throughout this thesis, we have defined the relationship between the different SLD products as shown in figure 1. As the main objective amongst the different sustainability-linked debt instruments is aimed towards sustainability improvements we thus disregard their differences, as they aim to serve the same purpose.

Figure 1: Defining SLD. Authors own creation, (2022)

Note: The figure illustrates the relationship between the different debt instruments which fall under the "umbrella term" sustainability-linked debt. Throughout this thesis, we will not differentiate between the respective debt instruments, as the use of proceeds is aimed towards sustainability-improvements for the firms acquiring the debt.

According to the International Capital Market Association (ICMA, 2021), a green bond is defined as "any type of bond instrument where the proceeds will be exclusively applied to finance or refinance, in part or in full, new and/or existing eligible green projects". A shipping firm can qualify for green bonds through the founding of a renewable energy powered vessel, or other pollution mitigation and biodiversity conservation technology. Green loans operate

similarly to that of green bonds (Mathew, 2018), but with the exception that they cannot be publicly traded like bonds. They exist solely within the private market.

Sustainability-linked bonds (SLB) and loans (SLL), tie a financial characteristic of the debt instrument, like its coupon or the loan interest rate, to a sustainability target (Migliorelli, 2021). The common component for the different debt instruments is the linking of the finance terms to the achievement of predetermined sustainability performance targets; measured through the company's key performance indicators (KPIs). Failing to fulfill the sustainability goals will come at a premium, where the opposite will be commended through a discount.

As of late, the market has been introduced to a new debt instrument, labeled as transition bonds/loans. These debt instruments were created to allow heavy emitting issuers to start implementing long-term improvements to become greener. The shipping industry has long been called "hard-to-abate" amongst other industries, as there is no current low or zero emission technology and infrastructure available (Mangset et al., 2022). Transition finance recognizes this challenge and is therefore a tool for the "hard-to-abate" business to accelerate their transition to net zero, where this, to some extent, has been achieved through SLBs and SLLs (Mangset et al., 2022).

There is limited research on how different types of investor view and respond to firms' acquiring SLD. Financial literature finds contradicting results on institutional investors depending on if short-term or long-term institutional investors are studied. Empirical evidence finds long-term/pressure-resistant institutional investors positively affect the firm's environmental performance (Cox et al., 2004; Oh et al., 2011). These long-term investors favor investments that can increase a firm's long-term value and competitive position. Like implementing an exhaust scrubber system in the fleet or other pollution mitigating technologies. The second category of investors (short-term), are more resistant to external pressures, thus showing a more short-term orientation. Contrary to the long-term investors, they seek short-term profits (Brossard et al., 2013) Further Brossard et al. (2013) found when a firm's institutional holding is dominated by the short-term type, firms have lower R&Ds ratios. As they are only looking for short-term gains, they are not interested in encouraging managers to carry out long-term eco-investments which could be financed through SLDs.

There is also a lack of consensus regarding studies on family ownership and green investing. Hsu et al., (2014) found a positive relationship between family ownership and green innovation. On the other hand, it has been pointed out by Carney (2005) that family firms have severe social and economic constrains that limit their growth and longevity, and weak risk-bearing attributes making them reluctant to risky investments, such as green innovation financed through sustainability-linked debt (Brossard et al., 2013).

Previous studies have mainly been focused on green financing without differentiating between industries and mainly focusing on institutional investors and green bonds. Our study complements financial literature by investigating the impact SLD financing has on different investor types, extending this literature to the shipping industry. Specifically, this study examines the relationship between all green debt instruments in the shipping industry and how these instruments impact the following shipping investors: institutional, family, and public investors. Thus, exploring how different investors respond to firms' green investments, financed through the different debt instruments under the umbrella term, SLD.

There are two main reasons for studying shipping investors' appetite for green financing. The main reason being that the SLD market will continue to grow, as combating global climate change becomes increasingly important in the attempt to achieve the 1.5-degree target. Additionally, policymakers, like the International Maritime Organisation (IMO), are pressuring the shipping industry to reduce its greenhouse gas emissions (GHG) to ultimately achieve net zero by 2050 (Mangset et al., 2022).

Secondly, the shipping industry has seen very little use of SLD, where only 19 firms have sustainability-linked debt instruments outstanding as of 2022 (Clarksons, n.d.). This thesis explores the impact SLD has on shareholder distribution following the first-time issuance of SLD. We aim to provide beneficial insight for stakeholders and shareholders of the shipping industry, where our thesis is centered around answering the following two research questions:

1. *Does the first-time acquisition of sustainability-linked debt in publicly listed shipping companies significantly impact shareholder distribution?*

2. *If so: is there a significant change in investor appetite for first-time acquirers of SLD compared to non-acquiring firms?*

The remainder of this thesis proceeds as follows: Chapter 2 outlines previous research done on ownership, green bonds, loans, and shipping. Chapter 3 will introduce the dataset used in our empirical analyses. Chapter 4 gives a detailed explanation of the methodology used to answer our research questions and the reasoning behind it. Chapter 5 presents the results and elaborates on the robustness of our models. Chapter 6 discusses results considering this thesis research questions, applicable economic theories, and existing theory. Lastly, chapter 7 presents the conclusion of our findings, limitations of our thesis, and recommendations for future research. References and Appendices can be found at the end of the thesis.

2. Literature Review

This chapter reviews previous literature on green loans, bonds, ownership, and firm performance in shipping.

Over the past decades, the study on green finance has only increased in numbers, a factor that is attributed to the increasing global effort to combat the climate change crisis. However, most of the studies have been devoted to green bonds and pricing of these securities. Furthermore, there are very few academic studies on green loans as most of these studies are policy reports, resulting in limited studies on how green loans impact the company's financial performance. Nevertheless, green bonds have been studied by Baker et al., (2018), Flammer (2021), Tang & Zhang (2020). Flammer (2021) and Tang and Zhang (2020) focus on corporate bonds, while Baker et al. (2018) performed a study on 19 green U.S corporate bonds as well as 2.083 green U.S municipal bonds. The findings were unanimous, suggesting that issuing green bonds attracts investors with a green preference that would otherwise not invest in the firm pre-issuance. The increase was dominated by an increase in ownership by long term, green investors, and domestic institutional investors.

Tang and Zhang (2020) performed their study on green bond issuance using data from all green bonds issued over a ten-year period, finding results supportive of an increase in institutional ownership. Their results found that institutional ownership increased by 7.90% compared with firms that issued conventional bonds, where the increase in share ownership was largest amongst domestic investors. The increase was mostly driven by pension funds and investment advisors, where subsequently there was a decrease in hedge fund holdings after the issuance. They concluded green bonds can help enlarge the investor base due to the large media exposure often received by the green bond issuer. Attracting a new investment clientele that values the firm's commitment to reduce its negative impact on the environment. Flammer (2021) also found similar results. Her findings were that green bond issuances help attract institutional investors, where the share ownership by long-term investors, domestic institutional investors and green investors increased significantly. Again, this evidence is consistent with the previous research done by Tang and Zhang (2020). As the issuance of green bonds can be used as a credible signal of the firm's commitment towards the environment and increases its attractiveness towards investors that value the environment such as long term and green investors.

Additionally, Flammer (2021) and Tang and Zhang (2020) found an increase in stock prices around the time of announcement, discovering the stock market responds positively to the announcement of a green bond issuance. Tang and Zhang (2020) found this reaction to be stronger for first-time issuers compared to repeating issuers and by financial institution issuers. Based on previous literature by Eckbo et al. (2007) the stock market is typically unresponsive to conventional bond issues. Flammer therefore determined this effect to reflect the shareholders positive reaction to the environmentally friendly announcement, consistent with previous studies done by Flammer (2013) and Krüger (2015). Hence, discovering that there are greater advantages through the issuance of green bonds compared to that of conventional bonds.

As the previous findings explore the effects of a green bond on the issuing firm, they do not differentiate between industries and therefore achieve the average market effect of the green bond issuance. How green bonds and loans impact the general market is not necessarily comparable to the shipping industry due to its capital intensive and volatile nature. However, there is relatively slim literature on green loans and bonds in the shipping industry where the existing research focuses on conventional vanilla financing.

The existing literature on shipping bank loans have mainly focused on the default risk assessment, studying qualitative factors such as owners' reputation and quantitative ones such as market share (e.g., Gavalas & Syriopoulos, 2015; Kavussanos & Tsouknids, 2016). The literature that focuses on shipping default risk agrees that the most important drivers are industry specific which is at odds with the general findings in finance literature, that argues financial characteristics of obligors are the most important default drivers (Chang et al, 2014). Dimitras et al. (2002) performed a study on 17 shipping bank loans approved over the period 1999-2001, where they found that the most important factors in the assessment of shipping bank loans default risk where firstly the ownership structure and the experience of the firm's management team, secondly, the credit history of the obligor, and lastly, the fleets characteristic. However, the results were obtained from a survey questionnaire, thus one needs to bear in mind that managers' perception of significance or relevant factors may be subjective. Lee and Pak (2018) also conducted a questionnaire-based survey on 41 shipping banks in 11 countries, where the banks ranked the shipowner's financial strength, business history and bank-firm relationship as the most important factor in ship lending decision, followed up by the collateral value. The findings can be attributed to the shipping industry's unique cyclicality

and volatility. However, there are shortcomings in the literature on default risk in shipping bank loan agreements, due to the lack of publicly available data on lucrative deals.

The literature exploring the issuance of bonds in shipping is relatively slim, as traditional bank loans are still the predominant financing source. However, Leggate (2000) and Grammenos and Arkoulis (2003) study factors explaining shipping bond spreads, where Leggate (2000) research European shipping bonds and Grammeneos and Arkoulis (2003) [GA (2003) hereinafter] focus on bonds listed by U.S companies. Leggate (2000) and GA (2003) both find negative relation between the issuers credit rating and bond coupons, where a higher credit rating would yield a lower bond coupon. However, neither study focuses on the time dimension that might change the causal relationships identified, as both performed a cross sectional study. New empirical evidence was provided by Kavussanos and Tsouknidis (2014), who performed a panel data regression consisting of 54 international shipping bonds. They reported that liquidity and the credit rating of the bond issue, volatility of the market, bond markets cyclicality and freight earnings are the main determinants of the shipping bond spreads.

The subject of ownership structure and its effect on firm performance has attracted some attention from academics over the years. Early research done by Anderson et al. (2003) found that family ownership can effectively reduce agency costs by enhancing monitoring and inciting long term commitment. Randøy et al. (2003) studied the ownership structure of publicly listed shipping companies in Norway and Sweden and found a positive relation between family ownership and performance. They concluded that shipping firms should therefore retain a high board of independence, as family ownership provides improved monitoring and enhanced discipline of managers. Hence, reducing agency costs.

However, literature researching other ownership attributes remains divided. A study done by Tsouknidis (2019) found there is a negative relationship between institutional ownership and firm performance in U.S listed shipping firms. On the other hand, Drobetz et al. (2021) found that there is a positive relationship between institutional ownership and the market value of global shipping firms. They also found that the effect of institutional ownership is stronger in shipping firms consisting of institutional investors with a short-term investment horizon. Cleary and Wang (2017) and Erhemjamts and Huang (2019) also find a positive relationship between institutional investors and firm performance, but for long-term investors. A likely explanation for the conflicting results can be explained by the shipping industry's volatile

nature, and therefore it is advantageous to have a dominant shareholder with an incentive to act where its decisions will have an impact. Supporting studies done by Tsonias et al. (2012) and Drobetz et al. (2019) found a statistically significant positive relationship between the degree of concentrated ownership and corporate performance in listed shipping companies.

As green financing in the shipping industry is still relatively new and sparsely used, there is relatively little research done on how it affects shipping firms, specifically shareholder distribution. Therefore, this study will contribute to the lack of literature of green financing and give valuable insight into the interplay between green financing and shareholder distribution.

3. Data

This chapter will first present the data which has been used to perform the empirical analysis in this thesis. Firstly, we will present the company sample consisting of the SLD issuing firms followed by the comparable companies. Further, we will explain the dependent variables and introduce the explanatory variables used in the models. The same variables were calculated for the comparable companies.

3.1 Data processing

As most financials are only published quarterly, we calculated an average between the missing months. By using monthly observations instead of yearly or quarterly data, more variation in the time series can be observed. The same approach was applied for other missing values allowing us to have a balanced dataset.

As our sample size is small, we run into the problem of skewed data. The normal distribution rule is widely used in research studies to model continuous outcomes. Unfortunately, the symmetric bell-shaped distribution often does not describe the observed data, as for our case. As stated by Feng et al. (2014), "When distribution of the continuous data is nonnormal, transformations of data are applied to make the data as "normal" as possible, thus, increasing the validity of the associated statistical analyses." The log transformation was used to transform the skewed data to approximately conform to normality. Thus, all our variables in our equations were log transformed.

Lastly, we grouped our data into three different sectors: tanker, drybulk and container. This is to track whether there are differences across sectors, but also across the sample.

3.2 The issuers

As of March 2022, there were 258[1] publicly listed shipping companies worldwide, of which 19 had acquired SLD as of October 2022 (Clarksons, n.d.). The quantitative study consists of monthly observations for 17 shipping firms gathered between the years of 2017 and 2022. This implies a panel data analysis which allows for studying several phenomena for each firm over a more extended period, requiring company data ranging across several years. Due to the inaccessibility of historical data for some of the SLD issuing companies, the sample used throughout this thesis is in its entirety comprised of 17 companies from the initial 19 which had issued SLD at the time of writing this thesis. Companies that do not have continuous historical data from January 1st, 2017, to September 30th, 2022, have been excluded[2].

After applying the above-mentioned selection process, we obtain the following company sample, as presented in table 1:

[1] Clarksons Shipping Intelligence Network

[2] Kalveness and CoolCo have been excluded from our company sample despite having issued SLD. This is due to unavailability of historical stock prices, historical distribution of shareholders and/or lack of observations post debt issuance.

Table 1: Company sample description for the issuers

Panel A - Bond issuances

Companies:	Type	Issuance date	Stock exchange	Issuance Size (mUSD)	Rate	Maturity date
Pan Ocean	Green	21.06.2022	Korea Exchange (KRX)	44	2.15%	25.06.2024
SFL Corporation	Sustainability-linked	29.04.2022	New York Stock Exchange (NYSE)	150	7.25%	12.05.2026
Odfjell	Sustainability-linked	14.01.2022	Oslo Bors	100	NIBOR3M+5.75%	21.01.2025
Panel B - Loan issuances						
Seanergy Martime	Sustainability-linked	07.07.2021	NASDAQ Capital Market	38	LIBOR+3.00%	Not disclosed
Avance Gas	Sustainability-linked	25.05.2022	Oslo Børs	555	LIBOR+1.95%	Not disclosed
U Ming Marine	Green	13.04.2021	Taiwan Stock Exchange	45	Not disclosed	Not disclosed
--"-- (second issue)	*Sustainability-linked*	*22.02.2022*	-	*70*	*Not disclosed*	*Not disclosed*
Safe Bulkers	Sustainability-linked	01.01.2021	New York Stock Exchange (NYSE)	60	Not disclosed	01.10.2026
K-line	Transition-linked	27.09.2021	Tokyo Stock Exchange (TSE)	991	Not disclosed	Not disclosed
Diana Shipping	Sustainability-linked	18.05.2021	New York Stock Exchange (NYSE)	91	Not disclosed	Not disclosed
Euronav NV	Sustainability-linked	11.09.2020	Euronext Brussels	713	Not disclosed	12.04.2024
Torm PLC	Sustainability-linked	11.11.2020	NASDAQ OMX Copenhagen Stock Exchange	150	Not disclosed	11.11.2027
Ardmore Shipping	Sustainability-linked	29.07.2020	New York Stock Exchange (NYSE)	15	Not disclosed	Not disclosed
INSW Seaways	Sustainability-linked	23.01.2020	New York Stock Exchange (NYSE)	390	Not disclosed	23.01.2025
Panel C - Bond and loan issuances						
Wallenius Wilhelmsen	Sustainability-linked bond	04.04.2022	Oslo Børs	142	NIBOR3M+4.25%	21.04.2027
--"-- (second issue)	*Sustainability-linked loan*	*16.08.2022*	-	*800*	*Not disclosed*	*Not disclosed*
A.P Møller	Green bond	25.02.2020	NASDAQ OMX Copenhagen Stock Exchange	567	Not disclosed	25.02.2025
--"-- (second issue)	*Sustainability-linked loan*	*19.11.2022*	-	*5000*	*0.75%*	*11.08.2031*
Nippon Yusen Kaisha	Sustainability-linked loan	29.11.2019	Tokyo Stock Exchange (TSE)	50	Not disclosed	29.11.2024
--"-- (second issue)	*Sustainability-linked loan*	*05.02.2022*	-	*50*	*Not disclosed*	*05.02.2025*
--"-- (third issue)	*Transition bond*	*02.07.2022*	-	*91*	*0.26%*	*29.07.2026*
--"-- (fourth issue)	*Transition bond*	*02.07.2022*	-	*91*	*0.38%*	*28.07.2028*
Hapag Lloyd	Green loan	08.02.2021	Frankfurt Stock Exchange	417	Not disclosed	08.02.2033
--"-- (second issue)	*Green bond*	*23.04.2022*	-	*353*	*2.50%*	*25.03.2028*

Note: K-line – Kawasaki Kisen Kaisha LTD, Intl Seaways – International Seaways Inc, A.P Møller – Maersk A. Reoccurring debt acquisitions by the same firm are noted in italics. The table includes the current publicly listed shipping companies which have acquired or issued SLD financing according to Clarkson (n.d.) as of October 2022. Shipping companies who should otherwise have acquired SLD financing, unaccounted for by Clarkson as of October 2022, have been excluded from our company sample. This exclusion could, for instance, be due to the debt maturing, debt defaults, and/or the firm's inability to reach the sustainability covenants associated with the debt acquired.

3.3 The comperables

To study the differences in shareholder distribution amongst firms who have not issued SLD, we assigned an applicable group based on company peers under the criteria of not having SLD outstanding as of September 30th, 2022. Information on applicable peers was provided by Bloomberg and Thomas Reuters Eikon. Deciding on comparable firms is quite challenging as no two firms are identical in terms of financials, sector, size, fleet composition, and shareholder distribution. As this thesis analyses the effects of SLD on shareholder distribution, we are naturally dependent on similar shareholder distribution amongst the SLD issuing firms and the comparable control group. In the selection process, we emphasized similarities in size, sector of operations, fleet composition, and the availability of public data. We sourced 16 applicable companies to represent each of the SLD issuing companies in the sample which makes up the control group "The Comparables". We obtain the following comparable companies, as presented in table 2:

Table 2: Matching peers for the issuing firms (The Comparables)

Panel A - Tankers					
SLD Issuing Firms:	Average Mkt. cap:	Fleet composition:	Company Peers:	Average Mkt. cap:	Fleet composition
Euronav NV	1906	Oil tankers	Scorpio Tankers	1094	Tankers
TORM PLC	632	Product tankers	DHT	798	Oil tankers
Ardmore Shipping	204	Product tankers	Nordic American Tankers	467	Oil tankers
INSW Seaways	624	Crude Tankers and Product Carriers	Teekay Tankers	402	Crude oil and product tankers
Odfjell	303	Chemical Tankers and Tank Terminals	Stolt-Nielsen Ltd	847	Chemical Tankers
Avance Gas	235	Gas tankers	BW LPG Ltd	726	Gas tankers
SFL Corporation	1312	Mix of vessels across sectors	Frontline	1344	Oil tankers
Tanker average	*745*			*811*	
Panel B - Drybulk					
U-ming Marine	1143	Dry bulk	Mitsui O.S.K Lines Ltd	4366	Dry bulk
Safe Bulkers	275	Dry bulk	Eagle Bulk	179	Dry bulk
K-Line	2493	Dry bulk	Mitsui O.S.K Lines Ltd	4366	Dry bulk
Diana Shipping	344	Dry bulk	Korea Line Corp	581	Dry bulk
Pan Ocean	1859	Dry bulk, tankers, containers and gas tankers	Star Bulk	1242	Dry bulk
Seanergy Maritime	69	Dry bulk	Genco	200	Dry bulk
Wallenius Wilhelmsen	1664	RoRo vessles, and breakbulk vessels	Golden Ocean	1221	Dry bulk
Drybulk average	*1121*			*1736*	
Panel C - Container					
A.P Møller	36067	Container, ferry, oil tankers, offshore	DSV	27254	Container
Nippon Yusen Kaisha	5305	Container	Iino Kaiun Kaisha	472	Container, gas tankers and dry bulk carriers
Hapag-Lloyd	18418	Container, cruise	Cosco	16353	Container, dry bulk
Container average	*19930*			*14693*	

Note: Overview of SLD acquiring firms and their respective peers according sorted by sector of operations. The peers are sampled based on size (avg. mkt cap for the period), sector and fleet composition under the condition of not having SLD outstanding in the period January 1st, 2017, to September 30th, 2022, according to Clarksons as of October 2022.

3.4 Variables

Thomas Reuters Eikon provides data for the dependent variables. We have used three different dependent variables to study. We ponder that the acquisition of SLD can have different effects depending on the dependent variable used to study. We have used institutional shareholders, family shareholders and public shareholders as our dependent variables. Further, each investor group consists of different sub-categories. Lastly, we log-transformed our dependent variables.

We follow Thang and Zhang (2020), Chung and Zhang (2011), and Ferreria and Matos (2008), when including the independent variables. All variables are sampled from Thomas Reuters Eikon and consequently log transformed.

We created a dummy variable for SLD. As done by Tang and Zhang (2020), we differentiate between first-time issuance/acquisition and reoccurring issuances/acquisitions. Their media attention hypothesis suggested that when a firm first announces its first green bond issuance, it will attract investors' attention. After first-time issuance the media exposure effect will have worn off since the firm has already been disclosed to the public. Thus, the SLD dummy will only account for first-time issuances, regardless of debt instrument (bond or loan). Information on issuance date was retrieved from Clarksons. This dummy will indicate whether the firm has acquired SLD in its respective months. Therefore, the dummy variable is equal to zero before any green debt acquisition, and equal to 1 every month thereafter.

We obtain the following variables as presented in table 3:

Table 3: Variables definition

Panel A

Dependent variables	**Model Designation**	**Proxy Definition**
Institutional Investors	LogInstitutional	Total holding of private equity, investment advisors, hedge fund, corporation, bank & trust, insurance companies, venture capital and research firms - %
Family Investors	LogFamily	Total holding of holding company, foundation, individuals, and other insider investors - %
Public Investors	LogPublic	Total holding of government agencies, sovereign wealth funds, endowment funds and pension funds - %

Panel B

Independent Variables		
Price	Price	Last reported closing price of the month - mUSD
Volume	Volume	Volume - mUSD
Return on Assets	ROA	Pretax ROA - %
Size	Size	Market Capitalization - mUSD
Leverage	Leverage	Total Debt over Total Assets - %
Cash	Cash	Total Cash and Short-term Investments over Total Assets - %
Return on Equity	ROE	Pretax ROE - %
Dividend Yield	Dividend	Dividend Yield - Common Stock - %
Sustainability-Linked Debt	SLD	Dummy variable: Equal to 0 before SLD acquisition and equal to 1 every month thereafter

Note: The following table represent our dependent variables with our independent variables, and their definitions. Following Thang and Zhang (2020), Chung and Zhang (2011), and Ferreria and Matos (2008) Price, Volume, ROA, Size, Leverage, Cash, ROE, and Dividend yield are included as independent variables in this thesis. Price is defined as the last reported stock price of the month. Volume is the last reported trading volume of the month. ROA is calculated by dividing pretax earnings by total assets. Size is the market capitalization of the firm. Leverage refers to leverage ratio, calculated as the firm's total debt divided by the market value of total assets. Cash is the ratio of cash and short-term investments to total assets. ROE refers to pretax income over shareholder equity. Dividend is reported as the monthly dividend yield from commons stock. SLD is a dummy variable equal to zero before green debt acquisition and 1 every month after.

3.5 Descriptive Statistics

The descriptive statistics of the data used in this thesis is presented in table 4. The table includes the variables for both the SLD issuing firms and the control group.

Table 4: Summary statistics for the issuers and comparable companies

Panel A - Dependent variables for the issuers

Variables:	Mean	Std. Dev.	Min	Median	Max	75th percentile	25th percentile	Obs.
Institutional investors	43%	28%	0%	39%	98%	66%	17%	1173
Family investors	23%	20%	0%	22%	77%	40%	1%	1173
Public investors	3%	5%	0%	1%	25%	3%	0%	1173

Panel B - Dependent variables for the comparables

Institutional investors	54%	19%	16%	54%	96%	70%	41%	1173
Family investors	10%	16%	0%	1%	54%	10%	0%	1173
Public investors	3%	3%	0%	1%	13%	4%	1%	1173

Panel C - Independent variables for the issuers

Price (USD)	116	429	0.42	6.23	3337	13.6	3.32	1173
Volume (mUSD)	43.7	118	0.01	9.04	1772	28.6	2.56	1173
ROA	2%	11%	-35%	0%	60%	3%	-3%	1173
Size (mUSD)	4318	5520	9.83	910	66534	2374	313	1173
Leverage	47%	13%	0%	48%	84%	55%	39%	1173
Cash	10%	9%	2%	8%	44%	11%	5%	1173
ROE	3%	27%	-104%	1%	102%	8%	-7%	1173
Dividend	2%	3%	0%	0%	23%	2%	0%	1173

Panel D - Independent variables for the comparables

Price (USD)	17.4	31.7	0.34	8.41	255	15.3	4.53	1173
Volume (mUSD)	152	698	0.11	11.4	7949	47.6	2.60	1173
ROA	3%	10%	-25%	2%	46%	5%	-2%	1173
Size(mUSD)	3642	4592	14.3	813	57565	2213	489	1173
Leverage	46%	12%	5%	49%	67%	54%	38%	1173
Cash	4%	18%	0%	2%	483%	5%	0%	1173
ROE	7%	20%	-40%	4%	99%	14%	-4%	1173
Dividend	3%	5%	0%	2%	26%	4%	0%	1173

Note: The data is sourced from January 1st, 2017, to September 30th, 2022. All numbers are reported in percentages unless specified otherwise. The variables Price and Volume are sourced at end-of-month close. The variables: ROA, Size, Leverage, Cash, ROE, and Dividend are all sourced on a quarterly basis. For the months in which we lack observations in-between quarters, an average is used. The dependent variables for the SLD acquiring firms (the issuers) and the control group (the comparables) are sourced from Eikon Refinitiv, which is published and updated monthly. The shareholder distribution is sorted according to investor types for both the issuers and the comparables (see table 3 for investor classification).

3.6 Summary Descriptive Statistics at the SLD Level

Panel A in table 5, gives a breakdown by sectors where sectors are partitioned according to Clarksons. As is shown, SLL is the most common sustainability-linked debt instrument amongst sectors (firms), with a total of 12 first-time issuances out of the 17 in total. Further the tanker sector was the largest issuer in dollar terms.

Panel B provides a breakdown by geographical region. As shown, Europe is by far the largest issuer in dollar terms. Further, most first-time issuances came from this geographical region.

In Panel C we provide summary statistics on the 17 sustainability-linked debt instruments. As can be seen, SLLs and SLBs are fairly large- the average issued amount (size) is 293(mUSD) and 201 (mUSD) respectively. Further the average years to maturity is 6.5 and 3.8 years with an average fixed rate of 2.48% and 4.85%.

Table 5: Summary statistics for the first-time issuances of SLD

Panel A - Sector	#SLLs	#SLBs	#SLDs	Total (mUSD)
Tanker	5	2	7	2073
Drybulk	5	2	7	1411
Container	2	1	3	1034
Sum	12	5	17	4518
Panel B - Region				
USA	5	1	6	744
Europe	4	3	7	2644
Asia	3	1	4	1130
Sum	12	5	17	4518
Panel C - Statistics				
Min size (mUSD)	15	44	15	-
Max size (mUSD)	991	567	991	-
Average size (mUSD)	293	201	247	-
Average fixed rate	2.48%	4.85%	3.66%	-
Average YTM	6.50	3.80	5.15	-

Note: Overview of sector, geographical region, and statistics at SLD level. SLD is the total of SLLs and SLBs.

4. Research Methodology

This chapter explores the methodology used to answer the two research questions presented in this thesis. The basic framework(s) and theories behind the methodology used are presented and described. Further, this chapter addresses the weaknesses associated with the methods used and their implications for our research. Lastly our specific regression model(s) will be introduced.

4.1 Fixed effects (FE) and Random effects (RE) panel regression

Panel data is structured to measure different variables for the same entities over a certain period (Wooldridge, 2020). In our case the same set of entities or units is shipping firms. Panel data possesses a combination of time series and cross-sectional data characteristics, consequently, the problem of multicollinearity and autocorrelation that exist in cross-sectional- and time series need to be addressed in the panel data (Hsiao, 2005).

There are advantages with modeling panel data over time series and cross-sectional data. For instance, panel data is more informative than time series and cross-sectional data. When utilizing panel data, the researcher automatically increases the number of observations as it allows one to observe a relatively large number of entities over a considerable period. Thus, increasing the degrees of freedom, explanatory variables, and efficiency (Baltagi, 2005). Panel datasets also allow controlling for individual heterogeneity and are more suited for studying complex dynamic behavioral models. For more advantages (and disadvantages) with panel data, reference Wooldridge (2020), Hsiao (2005), and Baltagi (2005).

There are three common techniques that can be used to analyze: Pooled ordinary least squared (POLS), fixed effects, and random effects. Selection between these methods highly depends on the objective of the analysis. As POLS suffers from omitted variable bias, we will focus on the two other methods.

Stock & Watson (2020) states that fixed effects (FE) regression is a method for controlling omitted variables when the omitted variables vary between entities but not over time. When using FE, we assume that something within the entity may impact or bias the dependent or

independent variables and we need to control for such (Torres-Reyna, 2007). An example of the latter is the sector of operations of the firm and its effect on investor preference. I.e., certain investors might prefer exposure to one sector over another (tankers, drybulk, or container). With FE, each entity has its own intercept (a_i), but the coefficients are the same for all independent variables. The term a_i is therefore known as the entity fixed effects, and the variation in these terms is due to the omitted variables that are unique for each entity. Therefore, the FE model accounts for time-invariant differences between individuals (Torres-Reyna, 2007). The FE regression model can be improved by including the time fixed effects term. The time fixed effects allow for controlling variations that vary over time but not over entities. In other words, it controls time effects whenever unexpected variation or special events may affect the outcome variable. The general equation for a two-way fixed effect is written in the following way:

$$y_{i,t} = a_i + \lambda_t + \beta X'_{i,t} + u_{i,t} \qquad (1)$$

In equation 1, $y_{i,t}$ is the dependent variable and X is a vector of independent variables, where these variables vary between firms i ($i = 1 \ldots n$) and over time t ($t = 1 \ldots n$) (Wooldridge, 2020). β represents the change in $y_{i,t}$ due to a one-unit change in $X_{i,t}$. a_i is the unknown intercept for each entity capturing unobserved, time-constant cross-sectional factors that affect $y_{i,t}$. As i denotes shipping firms in this analysis, a_i is the firm fixed effect that controls for culture and firm strategy, etc. λ_t is the time fixed effects term that is constant across the firms controlling for economic cycles, etc. Lastly $u_{i,t}$ is a time-varying error known as the idiosyncratic error.

FE cannot be used to investigate time-invariant causes of the dependent variables, as they are perfectly collinear with the entity dummy. In essence, the FE model is designed to study the causes of change within an entity, and time-invariant characteristics cannot cause such a change, as they are constant. On the other hand, the random effects model (RE) assumes that the variation across entities is random and uncorrelated with the dependent and/or independent variables (Wooldridge, 2020). Further, the model allows for time-invariant variables to take part as independent variables, contrary to the fixed effects model (Torres-Reyna, 2007). This is the advantage with RE, as you can include time invariant variables, i.e., variables that do not vary over time, like sector. Thus, individual characteristics that could influence the independent variables need to be specified in the random effects model. This makes the model prone to omitted-variable bias, since relevant variables can be left out of the model. The FE model can be represented as:

$$y_{i,t} = \beta X'_{i,t} + (e_{i,t} + a_i) \quad (2)$$

a_i is now included in the error term, where the error term is composited of $e_{i,t} + a_i$. The parameters can be explained similarly as in equation 1. $y_{i,t}$ is the dependent variable and X is a vector representing the independent variables. β represents the change in $y_{i,t}$ due to a one-unit change in $X_{i,t}$.

4.2 Difference-in-differences model

To answer our second research question, we follow the difference-in-differences (DD) approach. Hence, we are evaluating the possible changes before and after the acquisition of SLD. The DD model measures the effect of a treatment imposed on a group in the sample denominated as the "treatment group", while the other group does not receive the treatment, consequently named the "control group" (Peterson, 1989). In our case the treatment imposed is the acquisition of SLD, where companies with SLD are the treated group. Companies with no SLD make up the control group.

To obtain reliable and non-biased results, the DD regression is dependent on the parallel trend assumption to hold. The parallel trend assumption demands that the two groups have similar trends before the treatment took place. The DD regression is a good tool for testing the causal effect of a natural experiment only if clearly defined, with an appropriate control group present. Therefore, it is critical to assign a control group that passes the parallel trend before treatment. Hence, in the absence of treatment the difference between the two groups is constant over time. This is a critical assumption, but hard to satisfy. If the model does not fulfill the assumption, then there is no guarantee that the DD estimator is an unbiased assumption. However, the assumption is difficult to check (Angrist & Piscke, 2015).

Further, the DD model estimates the difference in the average potential outcome of the treated before and after treatment, subtracting the potential average outcome of the control group before and after treatment (Peterson, 1989). This is also equivalent to the estimated coefficient on the interaction of a treatment group dummy and a post-treatment period dummy (equivalent to the coefficient on δ), shown by the following regression equation:

$$y_{i,t} = \gamma + \gamma_i TREAT_i + \gamma_t POST_t + \delta TREAT_i \times POST_t + \epsilon_{I,t} \quad (3)$$

The DD model identifies the average treatment effect on the treated, under the assumption that there is two-group/two-period (2x2). However, most DD applications diverge from the canonical 2x2 set-up, where there are two units and two time periods. With one of the units receiving the treatment in the second period. As pointed out by Goodman-Bacon (2021) [hereinafter GB (2021)], most DD applications exploit variation across groups of units that receive treatment at different times. This is also the case for our data sample, given that the companies acquire SLD in different time intervals, i.e., none of the SLD issuances occur at the same time for any of the companies in our sample. Hence, we cannot apply the basic difference-in-differences design. To be able to include multiple treatment periods in the estimations we can use a more generalized difference-in-differences method (Imbens & Wooldridge, 2009), also known as difference-in-differences with variation in treatment timing (GB, 2021).

The generalized DD estimator can include multiple treatment periods and multiple treatment groups. Researchers typically implement the DD using two-way fixed effects (TWFE) model controlling for both unit-specific and time-specific shocks when the 2x2 assumption does not hold. The two-way-fixed-effect difference-in-differences model (TWFEDD) is commonly used, and the formal justification for treating it as a DD estimator is widely accepted (GB, 2021). However, GB (2021) states that practitioners should be careful when relying on the TWFEDD with treatment timing variation, as this can make the model unreliable. Again, statisticians have presented different methods to address this problem (Callaway & Sant'Anna, 2021; Baker et al., 2021; Wooldridge, 2021). We follow Sun and Abraham's (2021) proposed method, where we center each group relative to its own treatment period, ignoring "calendar time". This will prevent treated groups from getting counted as comparisons.

We have constructed the following equation:

$$y_{i,t} = a_i + \lambda_t + \gamma_i Post_i + \gamma_t SLD_i + \delta Post_t \times SLD_t + X'_{i,t}\beta + \epsilon_{i,t} \quad (4)$$

SLD is equal to 1 when the firm belongs to the treatment group (having acquired SLD) and is 0 otherwise. Post is a dummy variable and equals zero before treatment timing, and 1 thereafter. $Post_t \times SLD_i$ represents the treatment indicator, which takes the value of 1 if the firm i is treated at time t. a_i and λ_t are respectively firm and time fixed effects. X is a vector for independent variables, and ϵ is the error term.

4.3 Main Regression Models

The data panel is analyzed using the Stata 17 software where the *xtreg* command is used for all regressions. Further all regressions control for firm (a_i) and time fixed effect (λ_t). These fixed effects capture those unobserved fixed factors that are constant over time for each firm and those that are constant across each firm but differ over time.

The regression models are presented with respect to each empirical model[3].

Empirical model for hypothesis 1:

$$y_{i,t} = a_i + \lambda_t \ \beta_1 \text{Price}_{i,t} + \beta_2 \text{Volume}_{i,t} + \beta_3 \text{ROA}_{i,t} + \beta_4 \text{Size}_{i,t} + \beta_5 \text{Leverage}_{i,t} + \beta_6 \text{Cash}_{i,t} + \beta_7 \text{ROE}_{i,t} + \beta_8 \text{Dividend}_{i,t} + D_9 \text{SLD}_{i,t} + \epsilon_{i,t} \quad (5)$$

Empirical model for hypothesis 2:

$$y_{i,t} = a_i + \lambda_t + \beta_1 \text{Price}_{i,t} + \beta_2 \text{Volume}_{i,t} + \beta_3 \text{ROA}_{i,t} + \beta_4 \text{Size}_{i,t} + \beta_5 \text{Leverage}_{i,t} + \beta_6 \text{Cash}_{i,t} + \beta_7 \text{ROE}_{i,t} + \beta_8 \text{Dividend}_{i,t} + \beta_9 (\text{SLD*Post})_{i,t} + \epsilon_{i,t} \quad (6)$$

[3] When regressing equation 5 and 6, y is consequently changed out with our dependent variables: institutional, family, and public investors.

5. Empirical Results and Analysis

In this chapter, the main results obtained are presented and interpreted. This chapter first presents the main results from the fixed effect panel regression for the 17 SLD acquiring firms, where we investigate the developments in shareholder distribution following the SLD acquisitions. Second, we compare the developments in shareholder distribution against the comparables comprised of industry peers, to determine the investor preference for shipping firms having acquired SLD financing compared to similar firms who have not. Lastly, we assess the robustness of our models.

All regressions are presented as log-log regressions where our variable of interest is computed as a dummy variable. Thus, the coefficient of interest can be interpreted as a percentage change in the dependent variable(s).

5.1 Main results for SLD acquiring firms

We use the fixed effects (FE) model throughout our analysis. As explained earlier, alternative models are the random effects (RE) model and the pooled OLS (POLS) model. A Hausman (1978) test was applied to determine which model is more appropriate. When comparing the FE to RE model using the Hausman test, we find FE to be the most appropriate model. Further, the FE model is a more appropriate approach compared with POLS and RE model, when dealing with heterogeneity. In essence, it assumes that there is a correlation between the error terms and the independent variable(s), consequently removing the time-invariant characteristics of the individuals. The results from the Hausman test and the RE model are presented in Appendix 1 and Appendix 2 respectively.

Table 6 presents the results from the FE panel regression model for the following investor types: institutional, family, and public. For definition of investor types, please see Table 3. Through running a FE panel regression, we only look at the variables that change over time. I.e., the model will estimate the effect on shareholder distribution after the acquisition of SLD. We also conducted an FE panel regression model where we included dummy variables for the first-time acquisition of SLL and SLB respectively. This allows us to explore the individual effects SLLs and SLBs have on shareholder distribution in the period following the debt acquisition (the model is found in Appendix 3). However, only five out of the seventeen

sustainability-linked debt issuances were first-time bond issuances (refer to Table 5). We find the variable SLD to be a more accurate representation of the dataset and consequently its effect on shareholder distribution and investor appetite. Therefore, we will limit the discussion of the results of the model, despite its revealing properties concerning the type of debt firms have acquired.

The main results reported in column 1 from table 6, show that institutional investors increased their holdings in the period following the firm's SLD acquisition, significant at the 1% level. The results from this model suggest that institutional investors increase their holdings in shipping firms that acquire SLD by approximately 18.70% (t-statistics 3.00). In relation to our independent variables, we found very little that could explain our dependent variable. For institutional investor holdings, only two variables (Volume and Leverage) are statistically significant. Thus, giving us a week R^2. However, the sign and magnitude of the coefficients are quite intuitive. Institutional investors account for the majority of daily trading volume, thus the higher institutional investor holdings, the higher the volume. Further leverage had a negative relationship on institutional investor holdings and a positive relationship on family holdings. This is very counterintuitive, as shipping firms usually tend to use debt sources to maintain familial hegemony.

The results reported in column 2 show family investors as the dependent variable. As we find no significant results between our variable of interest (SLD) and family holdings, we will limit the discussion of this model. However, we find that the model accounting first-time issuances of SLLs and SLB, find a significant negative relationship between SLB issuance and family holdings, suggesting that family investors reduce their holdings with 43.40% in the period following the issuance of sustainability-linked bond, significant at the 1% level (Appendix 3).

The results reported in column 3 show that public investors increased their holdings in the period following the SLD acquisition, significant at the 5% level. The result from this model suggests that public investors increase their holdings by approximately 24.90% (t-statistics 2.24) in the period following the firm's SLD acquisition. Further, Price, Volume, ROA, Cash, and Dividend were significant. Where there was a positive relationship between the variables and public holdings, except for the variable ROA. As most of this category consists of funds with a conservative risk profile, the results are not surprising. Thus, we interpret these variables intuitively. Managers will invest in firms that pay out dividends as this can be accumulated back into the fund. Further, they will benefit from rising share prices, hence rising

share prices will attract public investors. Lastly, the cash ratio is a good indication of the firm's financial ability to pay off obligations through liquid assets, thus a higher cash ratio equals a lower default probability.

Table 6: Fixed Effect Panel Regression for first-time acquirers of SLD

	(1) **LogInstitutional**	(2) **LogFamily**	(3) **LogPublic**
Price	-0.0280	0.182***	0.199***
	(-0.82)	(3.39)	(3.26)
Volume	0.0684***	-0.0481	0.0700**
	(3.61)	-(1.62)	(2.07)
ROA	0.0142	-0.283**	-0.482***
	(0.20)	(-2.51)	(-3.76)
Size	-0.0647	0.0261	-0.0330
	(-1.24)	(0.32)	(-0.36)
Leverage	-0.217***	0.814***	0.124
	(-2.68)	(6.43)	(0.86)
Cash	-0.0544	0.217***	0.141**
	(-1.41)	(3.60)	(2.05)
ROE	0.0899	-0.421***	0.193
	(1.31)	(-3.92)	(1.57)
Dividend	0.0323	-0.0589	0.271***
	(1.36)	(-1.59)	(6.40)
SLD	0.187***	-0.157	0.249**
	(3.00)	(-1.62)	(2.24)
_cons	3.929***	1.645	-0.515
	(7.29)	(1.95)	(-0.54)
Firm FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Robust	No	No	No
N	1173	1173	1173
R^2	0.111	0.178	0.109

Note: This table presents the results for institutional, family, and public investors' ownership change after first-time acquisition of SLD. SLD is an umbrella term used for bonds (sustainability-linked bonds/loans, green bonds/loans, and transition bonds/loans). The SLD dummy variable does not account for differences in debt instruments. The SLD dummy captures the first-time issuance of either debt instruments as described above. Due to the data being naturally skewed, we take the logarithm of the dependent and independent variables. The data is sourced from Thomas Eikon Reuters, from January 1st, 2017, to September 30th, 2022. *t*-statistics in parentheses and * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

5.2 Parallel trend assumption

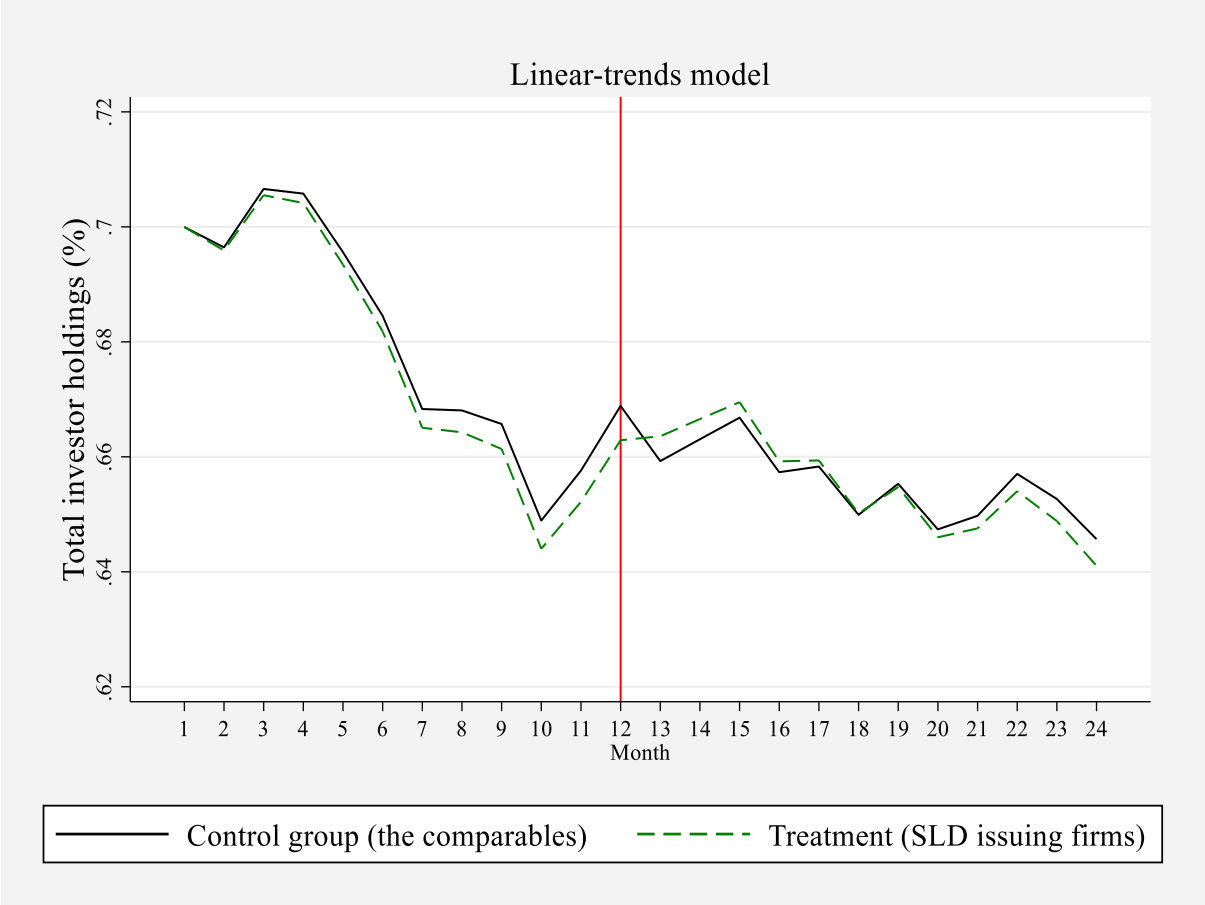
The main assumption when using the DD model is the parallel trend assumption. If the assumption is violated, the model may produce bias estimations and we cannot conclude on a causal treatment effect. The parallel trend is the most crucial assumption to interpret the results as causal. However, as we carefully sampled a control group consisting of industry peers, the likelihood of fulfilling the parallel trend assumption is higher (Ryan et al. 2019).

It is hard to prove the parallel trend assumption, as the only group which can be observed as treated is the treatment group. Thus, making the parallel trend assumption fundamentally untestable (Fredriksson & Magalhaes de Oliveira, 2019). To test the assumption, we will perform a graphic analysis when deciding if the parallel trends assumption holds.

When evaluating the pre-treatment trends, we are defining the pre-treatment period as the 12 months prior to treatment and the post-treatment period as 12 months after the treatment has occurred. In this context, the pre-treatment period is equal to the 12 months prior to the firms' acquisition of SLD, and the post-treatment period equals the 12 months following the SLD acquisition. Due to variations in treatment timing (firms acquiring SLD in different months and years) we are unable to accurately test the parallel trend without limiting the pre- and post-treatment period, hence we set the post-treatment observations equal to the minimum number of post-treatment observations available, equal to 12 months[4]. This allows us to have the same pre- and post-treatment period for all the SLD issuing companies, eliminating the treatment timing variation problem. Consequently, we can graphically plot the trends as shown in figure 2:

[4] Consequently. Avance Gas and Wallenius Wilhelmsen had to be excluded as they do not have 12 months of post treatment observations.

Figure 2: Graphical diagnostics for parallel trends



Note: The graph above compares the developments in total investor ownership in the treated group to that of the non-treated in the pre-treatment period. The red line indicates the month of treatment, i.e., the first-time acquisition of SLD for the treated firms. The graphical diagnostics does not follow calendar time; it only considers the months making up the pre- and post-treatment period for each individual firm, indifferent of the occurrence of treatment relative to calendar months and years. The total investor ownership for each group (control group and treatment group) equals the sum of the holdings for institutional, family, and public investors. The treated group consist of the 15 SLD acquiring firms, and the control group consists of 15 industry peers who have not acquired SLD. Avance Gas and Wallenius Wilhelmsen (and their respective peers: BW LPG and Golden Ocean) have been excluded, despite having acquired SLD, due to lack of observations in the post-treatment period. For specifications regarding the control group please see Table 2. The data is sourced from Thomas Eikon Reuters, in the period January 1st, 2017, to September 30th, 2022.

Visually inspecting the graph, we can see that the shareholder distribution in both the SLD issuing firms and the control group follow the same parallel trend in the pre-treatment period. We also test for parallel trends using the *estat ptrend* command in STATA, where we are unable to reject the null hypothesis that states: linear trends are parallel (prob > F = 0.88). After visual inspection and testing for parallel trends, we deem the parallel trend assumption to hold for the DD models presented next.

5.3 Difference-in-Differences model

The DD model is performed upon the SLD issuing firms and the comparable companies, which are matched through the methods as further described in chapter 3.3. To account for differences in timing for firms issuing SLD, the data was narrowed down to a period of 12 months pre and post treatment for a total of 24 months. Table 7 shows the results from the model, where SLD*Post is our variable of interest, representing the DD estimator.

The results reported in column 1 from the DD model show that institutional investors, on average, increase their holdings in SLD issuing firms compared to non-issuing firms, significant at the 5% level. The results from our model suggest that institutional increase their holdings by approximately 6.42% (t-statistics 2.03) compared to their allocation in firms who have not acquired SLD. When accounting for differences across sectors (tanker, drybulk, and container) we observe that the institutional investors increased their holdings across all sectors relative to firms who have not acquired SLD (column 1 in Appendices 4-6). Despite the increase in holdings across all sectors, the tanker sector was the only sector to hold the minimum significance threshold at the 10% level, suggesting that institutional investors increased their holdings in the tanker sector by 3.66% (t-statistics 1.88) in the year following the SLD issuance.

The results reported in column 2 show that the investor group comprised of family investors, on average, reduce their holdings in first-time SLD issuing shipping firms in the year following the SLD issuance, albeit not significant at any major significance level. When accounting for sectors (column 2 in Appendices 4-6) we observe that family investors, on average, reduced their holdings in firms operating in the tanker and container markets compared to that of the control group, significant at the 1% and 5% level respectively. The results from the models suggest that family investors reduced their holdings in firms in the tanker and container sector by 44.00% (t-statistics -2.66) and 58.40% (t-statistics -2.25) respectively. For the drybulk sector, family investors, on average, increased their holdings compared to the control group, albeit not significant on any major significance level.

The results reported in column 3 in Table 7 show that public investors, on average, increased their holdings in shipping firms following the 12 months after SLD issuance compared to the control group, significant at the 1.0% level. The result from our model suggests that public investors increase their holdings by approximately 61.60% (t-statistics 7.29) compared to

firms who have not acquired SLD in the same period. Accounting for sectors and the respective control groups (column 3 in Appendices 4-6) public investors increased their holding across all sectors, jointly significant at the 1.0% level. Results from the models in Appendices 4-6 suggest that public investors, on average, increase their holdings by approximately 51.70% (t-statistics 4.29), 76.20% (t-statistics 4.37) and 41.80% (t-statistics 3.58) compared to that of the control groups.

Table 7: Difference-in-Difference model (time restricted pre- and post-treatment)

	(1) LogInstitutional	(2) LogFamily	(3) LogPublic
Price	0.0143***	-0.0124	0.0373***
	(3.01)	(-0.56)	(2.94)
Volume	0.0123	0.123*	-0.0434
	(0.90)	(1.89)	(-1.18)
ROA	0.00840	-0.102	-0.281
	(0.12)	(-0.31)	(-1.50)
Size	0.0338*	-0.114	-0.104**
	(1.75)	(-1.25)	(-2.03)
Leverage	0.0180	-0.467	0.118
	(0.26)	(-1.44)	(0.64)
Cash	-0.00114	0.0383	-0.184***
	(-0.07)	(0.52)	(-4.45)
ROE	-0.0556	-1.191***	0.512***
	(-0.96)	(-4.35)	(3.31)
Dividend	0.0265*	-0.150**	-0.223***
	(1.89)	(-2.27)	(-5.94)
SLD*Post	0.0642**	-0.177	0.616***
	(2.03)	(-1.18)	(7.29)
_cons	3.660***	8.182***	-0.197
	(10.13)	(4.79)	(-0.20)
Firm FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Robust	No	No	No
N	720	720	720
R^2	0.085	0.129	0.205

Note: This table presents the results for institutional, family, and public investor's ownership change after-first time acquisition of sustainability-linked debt (SLD) in the 12 months prior to and after the first-time issuance of SLD. The treatment group is made up of the 15 SLD issuing firms, whereas Avance Gas and Wallenius Wilhelmsen have been excluded due to lack of post-treatment observations. Consequently, BW LPG and Golden Ocean were dropped from the control group. The data is sourced from Thomas Eikon Reuters. *t*-statistics in parentheses and * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

5.4 Robustness

We address the heteroskedasticity and autocorrelation problem by lagging the independent variables in equation 5 with robust standard errors clustered at company level, reported in table 8. An additional robustness test was applied to FE model without lagging the independent variables. The results can be found in Appendix 7. We suspect that the effects of issuing SLD will have a diminishing effect on investor appetite over time, where the effect is greater the closer the observations are to the time of issuance. We account for this by using lagged independent variables and consequently lagging the dummy variable SLD. Table 8 summarizes the three lagged FE panel regression models, with lags for up to three months.

We remember from chapter 5.1 that the first-time issuance of SLD had a significant positive effect on investor appetite for both the institutional and public investors, significant at the 1% and 5% level respectively. However, when clustering the standard errors at company level, we see that the coefficient for first-time issuance of SLD is *only* significant for the institutional investors, where the significance level is reduced to the 10% level compared to the 1% level before clustering.

We can also see from table 8 that when we lag the independent variables whilst keeping the dependent variables constant, the magnitude of the SLD coefficient and its significance (t-statistics) generally increases with the number of lagged months introduced to the model. Thus, the results from the lagged models suggest that the effect SLD issuance has on investor appetite, and consequently shareholder distribution, by and large diminish over time. As visually presented in Figure 2.

To assess the robustness of our findings from the DD model, we also clustered the standard errors at company level. For the full model, please see Appendix 8. The results from the model suggest that only the public investors, on average, increase their holdings following the issuance of SLD compared to that of the control group. However, the statistical significance is now reduced to the 5% level compared to the 1% level before clustering. For institutional investors, however, previous findings are no longer significant at any major significance level.

Table 8: Robust FE models with lagged independent variables (standard error clustered at company level)

Panel A - FE model with 3 period lags

	(1) LogInstitutional	(2) LogFamily	(3) LogPublic
$Price_{t-3}$	-0.172**	0.204	0.333**
	(-2.24)	(1.58)	(2.21)
$Volume_{t-3}$	0.0633	-0.0452	0.181*
	(1.22)	(-0.65)	(1.92)
ROA_{t-3}	0.183	-0.286	-0.363
	(1.66)	(-0.76)	(-1.20)
$Size_{t-3}$	0.0135	-0.0796	-0.116
	(0.17)	(-0.49)	(-0.81)
$Leverage_{t-3}$	0.0293	0.542*	0.127
	(0.21)	(1.84)	(0.43)
$Cash_{t-3}$	-0.0715	0.134	0.0507
	(-0.62)	(0.84)	(0.28)
ROE_{t-3}	-0.371***	-0.315	0.288
	(-3.18)	(-1.06)	(1.07)
$Dividend_{t-3}$	-0.0627	0.00532	0.278
	(-1.26)	(0.04)	(1.63)
SLD_{t-3}	0.256**	-0.302	0.293
	(2.81)	(-0.76)	(1.63)
_cons	4.234***	3.482*	-1.831
	(5.06)	(2.15)	(-0.75)
Firm FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Robust	Yes	Yes	Yes
N	1170	1170	1170
R^2	0.232	0.168	0.153

Panel B - FE model with 2 period lags

	(1) LogInstitutional	(2) LogFamily	(3) LogPublic
$Price_{t-2}$	-0.140**	0.187	0.271*
	(-2.45)	(1.37)	(2.09)
$Volume_{t-2}$	0.0655	-0.0487	0.135
	(1.37)	(-0.68)	(1.60)
ROA_{t-2}	0.166	-0.276	-0.406
	(1.04)	(-0.72)	(-1.53)
$Size_{t-2}$	-0.0149	-0.032	-0.0677
	(-0.17)	(-0.17)	(-0.48)
$Leverage_{t-2}$	-0.0952	0.685*	0.114
	(-0.75)	(1.92)	(0.39)
$Cash_{t-2}$	-0.0588	0.156	0.0841
	(-0.52)	(0.95)	(0.45)
ROE_{t-2}	-0.297**	-0.367	0.239
	(-2.32)	(-1.15)	(0.97)
$Dividend_{t-2}$	-0.0342	-0.0202	0.282
	(-0.89)	(-0.15)	(1.60)
SLD_{t-2}	0.252**	-0.255	0.32
	(2.71)	(-0.68)	(1.61)
_cons	4.508***	2.762	-1.531
	(5.23)	(1.46)	(-0.64)
Firm FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Robust	Yes	Yes	Yes
N	1171	1171	1171
R^2	0.18	0.173	0.137

Panel C - FE model with 1 period lags

	(1) LogInstitutional	(2) LogFamily	(3) LogPublic
Price	-0.0973**	0.188	0.236*
	(-2.35)	(1.20)	(2.03)
$Volume_{t-1}$	0.0715	-0.0464	0.105
	(1.51)	(-0.54)	(1.38)
ROA_{t-1}	0.15	-0.283	-0.442*
	(0.84)	(-0.71)	(-1.95)
$Size_{t-1}$	-0.0408	-0.00725	-0.0525
	(-0.44)	(-0.03)	(-0.36)
$Leverage_{t-1}$	-0.16	0.749*	0.124
	(-1.28)	(1.91)	(0.41)
$Cash_{t-1}$	-0.0461	0.185	0.119
	(-0.41)	(1.05)	(0.59)
ROE_{t-1}	-0.21	-0.386	0.206
	(-1.39)	(-1.12)	(0.88)
$Dividend_{t-1}$	-0.000379	-0.0491	0.282
	(-0.01)	(-0.39)	(1.55)
SLD_{t-1}	0.223**	-0.208	0.308
	(2.48)	(-0.59)	(1.45)
_cons	4.390***	2.398	-1.305
	(4.86)	(1.11)	(-0.54)
Firm FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Robust	Yes	Yes	Yes
N	1172	1172	1172
R^2	0.141	0.175	0.125

Note: The table summarizes the lagged FE panel regression models recalculating the model presented in table 6 for the 17 SLD acquirers from January 1st, 2017, to September 30th, 2022. The subscript *t-n* indicates the number lagged periods for the independent variables. The number of lagged periods corresponds to the number of months for the variables in the data set. The data is sourced from Thomas Eikon Reuters. *t*-statistics in parentheses and * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$***

6. Discussion

In the following section, a discussion of the results is provided in light of our research questions. The research questions posed in this thesis are:

1. *Does the first-time acquisition of sustainability-linked debt in publicly listed shipping companies significantly impact shareholder distribution?*

2. *If so: is there a significant change in investor appetite for first-time acquirers of SLD compared to non-acquiring firms?*

6.1 Hypothesis 1

The results from our FE model indicate a significant increase in institutional holdings after the issuance/acquisition of SLD. Where institutional holdings where significant at the 1% level. However, financial literature has stressed that institutional investors are not a uniformed group as they have different investment horizons, thus affecting their interest on environmental performance (Garciá-Sánches et al., 2020). In this thesis we have decided to include both short term and long-term investors in one investor category. However, some empirical findings have provided evidence where the two groups converge their interests, where short-term investors turn to a long-term perceptive to promote investments that have a positive impact on the company's long- term value. Oh et al., (2011), found this to be true to the extent to which short-term investors could not sell their shares without negatively affecting the company's stock price. Hence, in some situations short-term institutional investors pressure companies to invest in eco-innovation projects, converging their interests with long-term institutional investors. Ultimately having a unanimous positive effect on eco-innovation. This could explain our strong positive reaction from this investor group.

The positive relationship between SLD and public holdings that we have empirically obtained adds to the consensus of results from previous research. Government agencies have a long-term orientation and usually do not pursue profit objectives, and therefore play a key role in seeking sustainable development and promoting eco-innovation (del Río et al., 2010; Eng & Mak, 2003). Previous studies document a positive effect of government ownership on corporate sustainability and can boost eco-innovation (Prado-Lorenzo et al., 2009; Rees &

Rodionova, 2012). Rees and Rodionova (2012) and Dyck et al., (2018) documents a positive relationship between ownership by pension funds and endowments funds and the firm's environmental performance. This can be explained by the constant public scrutiny and regulatory pressures to which these investors are subjected to, and to fulfil their duty of maximizing their portfolios' long-term value. Making this investor group risk averse. This can also explain why this investor group has the smallest holding out of our three groups (shown in Table 4). As the shipping industry has long been classified risky due to its cyclical nature and high degree of capital intensity. Thus, the issuance of SLD serves as a signal of the firm's long-term commitment to the environment, affectively increasing the firm's long- term value, attracting public investors.

Regarding established theory within firm performance and family ownership, it is interesting to discover we find no significant relationship between family holdings and SLD. Anderson et al. (2003) explains that families is a special class of large shareholders that potentially have unique incentive structures. They argue family owners are different from other shareholders in at least two aspects; the family interests in the firm's long-term survival and the family's concern for the firm's reputation. Thus, we would expect there to be a positive relationship between family and SLD for two reasons. One, SLD can be used to signal its commitment to reduce its environmental impact, which is good for the firm's reputation. Second, SLD can be used to finance eco-innovation which contributes to increasing the company's long term-term value. As explained earlier by Carney (2005), family firms have severe social and economic constraints that limit their growth and longevity, and weak risk-bearing attributed. This could explain the negative relationship between SLD and family holdings, as they are reluctant to force managers to make risky investments, such as eco-innovation (Brossard et al., 2013). However, the coefficient is not significant.

Overall, the results reported in table 6 are in favor of our first hypothesis. As we obtained statistically significant results from two out of three investor groups. Indicating that the issuance of sustainability-linked debt has a significant effect on shareholder distribution for institutional and public investors in publicly listed shipping companies.

6.2 Hypothesis 2

Moving over to the DD analysis, the relationship between SLD for institutional and public investors remains positively significant when compared to the control group. These results are not surprising when considering the results obtained earlier. The positive relationship between the increase in institutional and public holdings following SLD issuance shows that we have empirically obtained results that add to the consensus from previous research when looking at shareholder distribution.

Tang and Zhang (2020) and Flammer (2021) present evidence that the issuance of green bonds results in an increase in institutional holdings when compared to a control group that issued conventual bonds. Tang and Zhang (2020) found this increase was mostly driven by insurance companies, investment advisers and pension funds. Where the largest impact was found amongst pension funds. We find that the coefficient of interest from the DD estimations to have the largest increase for the public investor type. Thus, the positive relationship we have obtained adds to the consensus of results from previous research.

Tang and Zhang (2020) also analyzed the different institutional sub-groups, where they found a negative relationship between hedge funds and banks after the issuance of a green bond. As we categorized short-term and long-term investors in one group, we are not able to account for individual differences amongst institutional investors. This could explain why institutional investors did not pass the robustness test, as categorizing these investors in one group can be conflicting due to different investment horizons. Thus, affecting how these investors view green financing.

We find inconclusive results when looking at the family investor group due to a lack of significant and consistent evidence. When looking at differences amongst the sectors, we found a positive increase for family holdings in the drybulk sector (however not significant) compared to the negative relationship this thesis has obtained throughout the models (only significant when considering the sectors tanker and container). This inconsistency is compliant with the contravening results from previous studies on the relationship between family ownership and green financing, as explained earlier. However, from our descriptive statistics, the firms that have acquired SLD have higher family ownership than firms that have not. Moreover, this could also be a random consequence of our control group sampling, and we do not know if the total sample of shipping firms who have not acquired SLD is higher or lower

than the mean for firms who have. Since only three of our models finds significant results for family holdings, we cannot conclude SLD has an impact on family shareholder distribution[5]. Overall, this thesis's results come out as inconclusive for this investor group, in alignment with theory, when measuring the relationship between SLD and family holdings.

In conclusion, we find that institutional and public investors significantly increase their holdings in firms who have acquired SLD, compared to shipping firms who have not acquired SLD in the same period. However, this thesis finds contradictive results regarding family holdings and first-time SLD acquisition, as the coefficients changes sign when sector is accounted for in our DD regression, albeit not significant. However, overall, our results are in line with our hypotheses, as we find a significant change in shareholder distribution for first-time acquirers compared to non-acquirers.

[5] The relationship between Family holdings and SLD is significant when accounting for SLB in Appendix 2 and accounting for the sectors tanker and container in Appendix 4 and 6.

7. Conclusion

As far as we are aware, this study is the first attempt to jointly consider the relationship between sustainability-linked debt and different investor types in the shipping industry, and to carry out an empirical analysis of such relationship. As there is meagre literature examining the relationship between investors' appetite and sustainable financing (Thang & Zhang, 2020; Flammer, 2021). This thesis contributes to the thin literature drawing on insight from previous empirical research, by analyzing the effect sustainability-linked debt has on different types of investors. Specifically, family, and public investors' appetite in publicly listed shipping firms.

The results obtained from 17 publicly listed shipping firms, that have issued SLD in the period January 1st, 2017, to September 30th, 2022, indicate a positive relationship between shareholder distribution for institutional and public investors following the first-time issuance of SLD. The fixed effect model found no significant relationship between firms acquiring SLD and family holdings.

We also employ the fixed effects model with a difference-in-differences estimation. Our findings are supported when comparing the change in shareholder distribution in the post-issuance period for the issuers and the comparable companies. The results suggest an increased investor appetite for firms acquiring SLD compared to industry peers who do not, true for the institutional and public investors. This is in line with previous findings (Thang & Zhang, 2020; Flammer, 2021). We also found that institutional investors increase their holdings in firms operating in the tanker sector. Public investors increased their holdings in all sectors. Ultimately, we found the largest impact amongst this investor type across all our models, seemingly having the largest appetite for sustainability-linked debt.

The results from the FE model show no significant effect on family holdings following the firm's acquisition of SLD. However, when controlling for sectors in the DD models, we found a significant negative relationship between the issuance of SLD and family holdings for firms operating in the tanker and container sector. Given the inconsistent relationship our models have obtained between family holdings and SLD, we are unable to rely on our findings, making it hard to conclude on the effects of SLD financing on family investors. Therefore, the findings for this investor group are deemed inconclusive.

7.1 Limitations and Future Research

When analyzing this paper´s finding, one must be aware of the several limitations this study may be subjected to. This thesis suffers from endogeneity, where the three main sources of endogeneity are omitted variables bias, causality, and measurement error.

The omitted variable bias is something that we tackle by performing extensive research on previous literature to find relevant variables that are considered to have an impact on explaining the dependent variable. However, we are still left with models with weak explanatory power. This could be due to the complexity behind investor behavior, as behavioral finance has proved, it is not only based off firms' financials. Thus, we have not accounted for all possible characteristics and are dealing with omitted variable bias. However, we do not expect this to have an impact to the extent to which we are unable to consistently estimate the coefficient of interests (SLD) as the FE model accounts for this weakness.

Perhaps the main limitation within this thesis is that we have only considered the sign (positive or negative) of the relationship between different investor groups and sustainability-linked debt. This thesis does not elaborate on what could cause such a relationship. Our results do not allow us to distinguish if a positive response by institutional and public investors is caused by actively monitoring from these investors. Or if the result was caused by these investors actively investing in companies that make proactive environmental financing strategies. Thus, this thesis does not account for reverse causality. A possible avenue for future research is to study this possibility. We also restrict our analysis to studying three investor types. Future research could perform a more in-depth study by accounting for the individual differences amongst the sub-groups. Additionally accounting for foreign investors and domestic investors. Thus, revealing a more detailed and complete picture of the relationship between investors and sustainability-linked debt amongst shipping firms.

The third source of endogeneity is measurement error. Since our independent variables are based on accounting numbers, we run into the problem of inflation and different currency ratios. To best deal with this, all numbers were converted to U.S dollars. We also estimated an average for the two months in-between the quarterly financials used as independent variables in this thesis. Hence, many of the observations in our data are estimated as such and could thus deviate from its true value.

Another important limitation is the doubt whether the parallel trends assumption is fulfilled. If this assumption does not hold; it restricts the possibility of interpreting the results as casual, ultimately limiting our empirical results. Due to lack of statistical test to conclusively reject the assumption, we are restricted to performing a graphical analysis, to evaluate if our two groups are parallel before the treatment took place. The assumption that the parallel trend holds is thus based on a subjective evaluation through visual inspection and testing as presented in chapter 5.2.

Additionally, we have restricted the period in our DD analyses to 12 months pre- and post-treatment, to a total of 24 months. This was done to eliminate the issue of different treatment timing, preventing treated groups from getting counted as comparisons, and a higher likelihood of fulfilling the parallel trend assumption. Given the assumption of an efficient market, we expect capital to move rather quickly after the issuance of SLD. However, if there are liquidity effects that manifest over a longer time, our model will not be able to capture this. We have included the DD model which accounts for the entire period in Appendix 9. Despite showing similar results as that of the 24-month restricted DD model, this model relies on a greater pretext of assumption and raises uncertainty regarding the fulfillment of the parallel trend assumption. Thus, further research on the effects SLD has on shareholder distribution and investor appetite should be performed when firms have held these instruments over a longer period, allowing for more observations in the pre- and post-issuance period. A more mature SLD market will likely grow the potential company sample size for future research, which could potentially reveal more detailed and robust findings of investor appetite for SLD-issuing shipping firms.

This thesis does not actively distinguish between the issuance of SLLs and SLBs, as we have categorized the first-time issuance of either SLLs or SLBs to fall under the same notation SLD. However, our findings from Appendix 2 reveal a more detailed pattern of ownership change following which type of debt the firm has acquired, by accounting for the first-time issuance of either SLLs or SLBs. Future research could for instance account for the type and size of the debt issued and consequently elaborate on the effects on shareholder distribution and investor appetite in the period following the issuance of the respective debt instruments.

Despite these limitations, we consider this thesis to be a good foundation for future research on shareholder distribution and investor appetite for SLD financing in the shipping industry.

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9. Appendix

Appendix 1: Hausman test

STATA output:

Institutional investors:

```
                        b = Consistent under H0 and Ha; obtained from xtreg.
         B = Inconsistent under Ha, efficient under H0; obtained from regress.

Test of H0: Difference in coefficients not systematic

    chi2(9) = (b-B)'[(V_b-V_B)^(-1)](b-B)
            = 341.33
Prob > chi2 = 0.0000
(V_b-V_B is not positive definite)
```

Family investors:

```
                        b = Consistent under H0 and Ha; obtained from xtreg.
         B = Inconsistent under Ha, efficient under H0; obtained from regress.

Test of H0: Difference in coefficients not systematic

    chi2(9) = (b-B)'[(V_b-V_B)^(-1)](b-B)
            = 335.50
Prob > chi2 = 0.0000
(V_b-V_B is not positive definite)
```

Public investors:

```
                        b = Consistent under H0 and Ha; obtained from xtreg.
         B = Inconsistent under Ha, efficient under H0; obtained from regress.

Test of H0: Difference in coefficients not systematic

    chi2(9) = (b-B)'[(V_b-V_B)^(-1)](b-B)
            = 301.38
Prob > chi2 = 0.0000
(V_b-V_B is not positive definite)
```

Appendix 2: Random Effects Regression Model for SLD

	(1) LogInstitutional	(2) LogFamily	(3) LogPublic
Price	-0.0483	0.00176	0.212***
	(-1.31)	(0.03)	(3.25)
Volume	0.0569***	-0.109***	0.0700**
	(2.95)	(-3.68)	(2.05)
ROA	0.0168	-0.240**	-0.478***
	(0.23)	(-2.20)	(-3.74)
Size	-0.0265	0.206**	-0.0209
	(-0.50)	(2.53)	(-0.23)
Leverage	-0.209***	0.820***	0.118
	(-2.60)	(6.67)	(0.82)
Cash	-0.0611	0.151***	0.135*
	(-1.58)	(2.56)	(1.95)
ROE	0.0922	-0.392***	0.183
	(1.34)	(-3.75)	(1.50)
Dividend	0.0334	-0.0415	0.265***
	(1.41)	(-1.15)	(6.27)
SLD	0.194***	-0.0999	0.241**
	(3.10)	(-1.05)	(2.17)
Container	-0.204	-2.597***	0.324
	(-0.96)	(-7.77)	(0.89)
Tanker	0.859	-2.904***	-0.973
	(1.94)	(-2.89)	(-1.61)
_cons	3.404***	2.600*	-0.232
	(5.63)	(2.50)	(-0.23)
Firm FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Robust	No	No	No
N	1173	1173	1173
R^2	0.188	0.249	0.226

Note: This table presents the results for institutional, family, and public investors ownership change after first-time acquisition of sustainability-linked debt (SLD) for the 17 SLD issuing firms using Random Effects, accounting for sector with drybulk as the reference group. SLD is a dummy variable equal to 0 before acquiring SLD and equal to 1 every month thereafter. The model does not account for multiple debt acquisitions/issuances. Due to data being skewed, we use the logarithm. All data is sampled from Thomas Reuters Eikon in the period January 1st, 2017, to September 30th, 2022. *t* statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Appendix 3: FE Panel Regression Model for first-time acquisition of SLL & SLB

	(1) LogInstitutional	(2) LogFamily	(3) LogPublic
Price	-0.0315	0.196***	0.207***
	(-0.91)	(3.64)	(3.36)
Volume	0.0648***	-0.0361	0.0750**
	(3.37)	(-1.20)	(2.19)
ROA	0.0220	-0.319***	-0.503***
	(0.30)	(-2.82)	(-3.90)
Size	-0.0630	0.00818	-0.0485
	(-1.20)	(0.10)	(-0.52)
Leverage	-0.231***	0.866***	0.149
	(-2.81)	(6.78)	(1.02)
Cash	-0.0599	0.240***	0.153**
	(-1.54)	(3.95)	(2.20)
ROE	0.0910	-0.416***	0.201
	(1.32)	(-3.88)	(1.64)
Dividend	0.0342	-0.0678*	0.265***
	(1.43)	(-1.82)	(6.25)
SLL	0.158**	-0.0901	0.255**
	(2.51)	(-0.92)	(2.26)
SLB	0.231**	-0.434***	0.0472
	(2.46)	(-2.96)	(0.28)
_cons	3.958***	1.588	-0.512
	(7.34)	(1.89)	(-0.53)
Firm FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Robust	No	No	No
N	1173	1173	1173
R^2	0.111	0.183	0.110

Note: this table presents the results for institutional, family, and public investors ownership change after first-time acquisition of sustainability-linked debt (SLD) for the 17 SLD issuing firms, using Fixed-Effects, accounting for the type of debt acquired. SLL (sustainability-linked loan) is a dummy variable equal to 0 before acquiring loan and equal to 1 every month thereafter. SLB (sustainability-linked bond) is a dummy variable equal to 0 before issuance and equal to 1 every month thereafter. The dummy variables do not account for multiple debt acquisitions/issuances. Due to data being skewed, we use the logarithm. All data is sampled from Thomas Reuters Eikon in the period January 1st, 2017, to September 30th, 2022. *t* statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Appendix 2: Difference-in-Differences for Tankers in restricted period

	(1) LogInstitutional	(2) LogFamily	(3) LogPublic
Price	0.00162	-0.00817	-0.00452
	(0.73)	(-0.43)	(-0.33)
Volume	0.0201*	0.225**	-0.0309
	(1.86)	(2.45)	(-0.46)
ROA	0.00548	-0.650	0.384
	(0.06)	(-0.84)	(0.68)
Size	0.227***	0.0627	0.816***
	(9.07)	(0.29)	(5.26)
Leverage	0.0457	1.112***	0.928***
	(1.07)	(3.06)	(3.51)
Cash	0.0635***	0.218	-0.153
	(3.83)	(1.55)	(-1.49)
ROE	-0.00352	0.559	-0.118
	(-0.04)	(0.82)	(-0.24)
Dividend	0.0406***	-0.00935	0.0449
	(4.98)	(-0.13)	(0.89)
SLD*Post	0.0366*	-0.440***	0.517***
	(1.88)	(-2.66)	(4.29)
_cons	2.178***	-4.636*	-9.726***
	(8.71)	(-2.18)	(-6.28)
Firm FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Robust	No	No	No
N	288	288	288
R^2	0.554	0.140	0.384

Note: The table presents the results for the 24-month restricted difference-in-differences (DD) model. The DD model compares the development in shareholder distribution for the treated group 12 months before and after the first-time acquisition of SLD to the control group within the tanker sector. Treatment group (SLD issuing firms): Euronav NV, TORM AS, Ardmore Shipping, INSW Seaways, Odfjell, Avance Gas, SFL Corporation. Control group (non-issuing firms): Scorpio Tankers, DHT, Nordic American Tankers, Teekay Tankers, Stolt-Nielsen Ltd, BW LPG, and Frontline. Data is sourced from Thomas Reuters Eikon in the period January 1st, 2017, to September 30th, 2022. *t* statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Appendix 3: Difference-in-Differences for Drybulk in restricted period

	(1) LogInstitutional	(2) LogFamily	(3) LogPublic
Price	0.264***	-0.224	0.310*
	(3.18)	(-0.74)	(1.76)
Volume	-0.0389	0.148	-0.0469
	(-1.09)	(1.14)	(-0.62)
ROA	-0.209	0.101	0.165
	(-1.28)	(0.17)	(0.48)
Size	0.00607	-0.168	-0.0951
	(0.17)	(-1.32)	(-1.28)
Leverage	0.137	-0.254	-0.123
	(0.84)	(-0.42)	(-0.35)
Cash	-0.0389	-0.125	-0.122*
	(-1.25)	(-1.10)	(-1.84)
ROE	-0.0693	-1.081**	0.678**
	(-0.53)	(-2.26)	(2.42)
Dividend	0.0426	-0.222	-0.554***
	(1.09)	(-1.57)	(-6.67)
SLD*Post	0.0695	0.343	0.762***
	(0.85)	(1.15)	(4.37)
_cons	4.052***	7.377	-1.649
	(3.60)	(1.80)	(-0.69)
Firm FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Robust	No	No	No
N	288	288	288
R^2	0.156	0.211	0.316

Note: The table presents the results for the 24-month restricted difference-in-differences (DD) model. The DD model compares the development in shareholder distribution for the treated group 12 months before and after the first-time acquisition of SLD to the control group within the drybulk sector. Treatment group (SLD issuing firms): U-Ming Marine, Safe bulkers, Kawasaki Kisen Kaisha LTD, Diana Shipping, Pan Ocean, Seanergy Maritime, and Wallenius Wilhelmsen. Control group (non-issuing firms):Mitsui O.S.K Lines LTD, Eagle Bulk, Mitsui O.S.K Lines LTD, Korea Line Corp, Star Bulk, Genco, and Golden Ocean. Both the dependent and independent variables are reported in logarithm. Data is sourced from Thomas Reuters Eikon in the period January 1st, 2017, to September 30th, 2022. *t* statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Appendix 4: Difference-in-Differences for Containers in restricted period

	(1) LogInstitutional	(2) LogFamily	(3) LogPublic
Price	-0.0716	-0.161	0.386
	(-1.01)	(-0.24)	(1.26)
Volume	0.00997	0.431***	0.0851
	(0.68)	(3.04)	(1.34)
ROA	-0.173*	-1.335	0.379
	(-1.77)	(-1.42)	(0.90)
Size	0.0650	0.329	-0.869**
	(0.81)	(0.43)	(-2.51)
Leverage	-0.120	-5.953***	-0.657
	(-1.03)	(-5.33)	(-1.31)
Cash	0.00601	-1.387**	-0.136
	(0.13)	(-3.01)	(-0.66)
ROE	-0.0496	-2.850***	-0.204
	(-0.60)	(-3.58)	(-0.57)
Dividend	-0.0501*	-0.368	-0.264*
	(-1.94)	(-1.49)	(-2.37)
SLD*Post	0.0436	-0.584**	0.418***
	(1.62)	(-2.25)	(3.58)
_cons	4.486***	35.96***	9.237*
	(5.27)	(4.40)	(2.51)
Firm FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Robust	No	No	No
N	144	144	144
R^2	0.457	0.789	0.364

Note: The table presents the results for the 24-month restricted difference-in-differences (DD) model. The DD model compares the development in shareholder distribution for the treated group 12 months before and after the first-time acquisition of SLD to the control group within the container sector. Treatment group (SLD issuing firms): A.P Møller (Maersk A), Nippon Yusen Kaisha, and Hapag Lloyd. Control group (non-issuing firms): DSV, Iino Kaiun Kaisha, and Cosco. Both the dependent and independent variables are reported in logarithm. Data is sourced from Thomas Reuters Eikon in the period January 1st, 2017, to September 30th, 2022. *t* statistics in parentheses. * $p < 0.10$, ** $p < 0.05$,*** $p < 0.01$

Appendix 5: Robustness test for SLD FE model (clustered standard error)

	(1) **LogInstitutional**	(2) **LogFamily**	(3) **LogPublic**
Price	-0.0280	0.182	0.199*
	(-0.70)	(1.01)	(1.86)
Volume	0.0684	-0.0481	0.0700
	(1.27)	(-0.44)	(0.97)
ROA	0.0142	-0.283	-0.482**
	(0.10)	(-0.67)	(-2.52)
Size	-0.0647	0.0261	-0.0330
	(-0.55)	(0.08)	(-0.18)
Leverage	-0.217*	0.814*	0.124
	(-1.76)	(1.87)	(0.40)
Cash	-0.0544	0.217	0.141
	(-0.49)	(1.13)	(0.62)
ROE	0.0899	-0.421	0.193
	(0.66)	(-1.11)	(0.83)
Dividend	0.0323	-0.0589	0.271
	(0.61)	(-0.47)	(1.51)
SLD	0.187*	-0.157	0.249
	(2.09)	(-0.47)	(1.18)
_cons	3.929***	1.645	-0.515
	(3.42)	(0.65)	(-0.22)
Firm FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Robust	Yes	Yes	Yes
N	1173	1173	1173
R^2	0.111	0.178	0.109

Note: This table reports the FE panel regression model for the 17 SLD acquiring firms with clustering the standard errors at company level. The data is sourced from Thomas Eikon Reuters, from January 1st, 2017, to September 30th, 2022. t-statistics in parentheses and * p < 0.10, ** p < 0.05, *** p < 0.01.

Appendix 8: Robustness test for DD model time restricted (clustered standard errors)

	(1) LogInstitutional	(2) LogFamily	(3) LogPublic
Price	0.0143***	-0.0124	0.0373
	(4.39)	(-0.75)	(1.15)
Volume	0.0123	0.123	-0.0434
	(0.55)	(1.48)	(-0.74)
ROA	0.00840	-0.102	-0.281
	(0.08)	(-0.15)	(-0.59)
Size	0.0338	-0.114	-0.104
	(1.05)	(-0.82)	(-1.33)
Leverage	0.0180	-0.467	0.118
	(0.21)	(-0.52)	(0.29)
Cash	-0.00114	0.0383	-0.184***
	(-0.10)	(0.21)	(-3.94)
ROE	-0.0556	-1.191	0.512
	(-0.79)	(-1.35)	(1.43)
Dividend	0.0265	-0.150	-0.223*
	(0.96)	(-1.01)	(-1.90)
SLD*Post	0.0642	-0.177	0.616**
	(1.33)	(-0.37)	(2.32)
_cons	3.660***	8.182	-0.197
	(8.77)	(1.24)	(-0.08)
Firm FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Robust	Yes	Yes	Yes
N	720	720	720
R^2	0.085	0.129	0.205

Note: This table presents the differences-in-differences (DD) model results for institutional, family, and public investor's ownership change after-first time acquisition of sustainability-linked debt (SLD), using clustering of standard errors at company level. The data is regressed based on monthly and quarterly data from January 1st, 2017, to September 30th, 2022. The treatment group consists of the 17 SLD acquiring firms and the control group consists of the 16 non SLD issuing firms in the control group. The data is log transformed and sourced from Thomas Eikon Reuters. *t*-statistics in parentheses and * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Appendix 9: Difference-in-Difference unrestricted period

	(1) LogInstitutional	(2) LogFamily	(3) LogPublic
Price	0.00615	0.0196	0.0253***
	(1.39)	(1.60)	(3.39)
Volume	0.0597***	-0.0930***	-0.0101
	(7.70)	(-4.36)	(-0.78)
ROA	-0.0448	0.431***	-0.224***
	(-1.11)	(3.89)	(-3.30)
Size	-0.0425**	0.237***	0.00623
	(-2.24)	(4.55)	(0.20)
Leverage	-0.128***	0.675***	-0.113
	(-2.76)	(5.28)	(-1.45)
Cash	0.0113	0.0138	-0.121***
	(0.85)	(0.38)	(-5.42)
ROE	0.0529	-0.498***	0.362***
	(1.63)	(-5.57)	(6.61)
Dividend	0.00567	-0.104***	-0.0336
	(0.49)	(-3.24)	(-1.71)
SLD*Post	0.0142	-0.254***	0.395***
	(0.41)	(-2.68)	(6.81)
_cons	3.999***	-2.106***	-0.0618
	(16.62)	(-3.18)	(-0.15)
Firm FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Robust	No	No	No
N	2346	2346	2346
R^2	0.079	0.070	0.067

Note: This table presents the results for the unrestricted difference-in-differences (DD) model. The DD model compares the development in shareholder distribution for the 17 treated companies (SLD issuing firms) to the 16 companies in the control group (non-acquirers of SLD). For a full description of the control group, please see section 3.3. The variables are reported in logarithm. Data is sourced from Thomas Reuters Eikon. The regression model used monthly and quarterly data from January 1st, 2017, to September 30th, 2022. *t* statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$