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Corporate Debt Decision Making in the New Age

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ABSTRACT

In an era where sustainability practices are increasingly altering corporate strategies and financial investment, Environmental Social and Governance (ESG) practices and ratings offer a way of assessing and testing what effect these metrics have. This thesis explores how ESG ratings shape corporate debt structure, particularly focusing on debt maturity and the type of debt employed by a company. The paper uses over 100 European companies and observes through multiple two-stage-least-square regressions as well as four Wilcoxon Rank Sum tests whether companies hold a preference towards long/shorter as well as bank/public debt, depending on their ESG ratings. The aim of this paper is to use traditional corporate debt theory to predict the expect relationship between ESG and corporate debt. The study finds that as expected, ESG ratings and the amount of bank debt taken on by a company follows an inverse relationship. However, the relationship between ESG ratings and debt maturity is also found to be an inverse relationship, which is contrary to what is expected using the classic literature.

Keywords: ESG ratings, corporate debt maturity, debt type, sustainable finance, corporate finance

Abbreviations: Environmental Social and Governance (ESG), Signalling Theory (ST), Stakeholder Theory (SHT), Resource Based Theory of the Firm (RBT), Transportation, Communications, Electric, Gas and Sanitary Services Industry (TCEGS), Ordinary Least Squares (OLS), Two-Step-Least-Squares (2SLS)

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CHAPTER 1 Introduction

In the contemporary corporate landscape, decision-making has evolved from traditional financial metrics, resulting in a broader range of factors that reflect the priorities of stakeholders and society at large. Companies now navigate a new framework where environmental, social, and governance (ESG) factors are increasingly important. This shift highlights a change from the exclusive focus on profitability and other typical financial metrics, recognizing that sustainable business practices can influence long-term success. As firms aim to balance financial performance with sustainability practices, ESG ratings emerge as crucial indicators, influencing various aspects of corporate strategy, including the structuring of debt. By incorporating these new metrics as a result of emerging regulatory requirements and societal expectations, corporations' debt type and term structure are increasingly changing due to the growing ESG considerations of stakeholders.

Traditionally, corporate debt has been structured based on typical measures such as credit ratings, financial performance, and interest rates (Stohs & Mauer, 1996; Diamond, 1991; Flannery, 1986). While these core drivers remain the same, ESG ratings now offer a new way of influencing these factors, namely, credit ratings and corporate reputation. Though ESG practices directly affect debt through instruments like green bonds or sustainability-linked loans, the interaction becomes more intriguing when classic debt structure theory is applied to explore their indirect influence. This paper builds on classic debt theory as discussed by Douglas W. Diamond, Mark J. Flannery, and Stewart C. Myers, exploring how ESG ratings might influence key factors they identify such as corporate reputation, credit ratings, and stakeholder impact. Furthermore, it assesses how these factors, in turn, might affect corporate debt decisions. Additionally, the study incorporates insights from contemporary scholars who examine how ESG ratings/factors influence corporate debt structures, offering a modern perspective on the effect of sustainability (Berg, Koelbel & Rigobon, 2022; Chui, Li, and Saffar, 2021). This not only highlights how ESG considerations can alter a company's debt term and type structure but also explains why these changes might occur, from the perspective of both a modern and traditional approach.

This article studies the effects of ESG ratings on corporate debt and type structure in Europe specifically. The reason for this is because of the standard Europe has set for ESG practices. Since 2014, Europe has been actively endorsing and promoting the use of sustainable practices across all industries, mandating ESG reporting for all large European Union firms. Additionally, this region holds around 45% of total ESG assets globally and is expected by 2030 to still be the largest contributor to the cause (Bloomberg Intelligence, 2024). It is clear that if a relationship were to be made between ESG ratings and corporate debt, Europe is the ideal region for investigation, as the

effect is significantly more pronounced there compared to other regions. This leads to the main research question, followed by the two sub-questions of this study:

"How do ESG ratings influence the term structure and type of debt financing adopted by companies?"

1) "Do companies with higher ESG ratings prefer longer-term debt compared to shorter-term debt?"
2) "Do companies with higher ESG ratings prefer bank-debt compared to public debt?"

By using 3 statistical techniques, namely 2 Steps Linear Least Squares (2SLS), Ordinary Least Squares (OLS) and the Wilcoxon Rank Sum test, the paper finds that an increase in a company's ESG ratings results in a preference towards public debt as predicted by the existing literature (Devalle, Fiandrino, & Cantino, 2017; Chodnicka-Jaworska, 2021; Berlin & Loyes, 1988). Note, in the context of this sample, public debt is primarily in reference to corporate bonds, commercial paper and debentures (a type of unsecured loan). However, it also demonstrates that an increase in ESG ratings decrease the maturity term of debt, which was contrary to what both the majority of traditional and modern literature had predicted (Zhou, Huang & Jiang, 2024; Padmanabhan & Huang, 2024). This finding suggests that ESG measures may not reduce information asymmetry as effectively as originally thought, due to the sceptical view certain stakeholders hold, because of a lack of benchmark comparisons, inconsistencies and difficulty to fully capture a metrics performance.

Following this, the paper will consist of 4 sections. The theoretical framework will be first, building understanding on both ESG ratings and corporate debt individually before establishing the connection between the two, leading to the predicted hypotheses. A data and methodology section follows this, establishing how the data was obtained and altered, as well as discussing which statistical tests will be employed. The remaining two sections, discussion and conclusion, will provide justification for the results obtained as well as point out how the study could have been improved and what could be done further.

The paper will add to the academic literature in two distinct ways. (1) The relationship between ESG ratings and corporate debt is investigated specifically within the European context. While a few studies, such as Devalle, Fiandrino, and Cantino (2017), and Chodnicka-Jaworska (2021), have examined similar relationships, they focus on the link between ESG ratings and credit ratings rather than exploring variables that represent the term or type of corporate debt. (2) This paper employs the non-parametric Wilcoxon Rank Sum test, which is not used in any of the other papers explored. This test proved suitable for the study as it allowed for a clear comparison between companies with lower and higher ESG scores. It is robust to outliers and does not assume any specific data distribution, making it simple to interpret and is applicable to small sample sizes.

When discussing the social relevance of this paper, integrating ESG considerations into corporate debt structure is significant as it reflects the growing demand for sustainable practices. As businesses, these companies wish to preserve their public image as well as find alternatives to unsustainable methods of production. But more importantly, the desire for improved ESG performance can be observed among certain stakeholders, particularly financiers in the context of this paper, resulting in companies aligning their financial strategies to stakeholder values.

CHAPTER 2 Theoretical Framework

2.1 ESG

2.1.1 Overview of ESG ratings and significance in corporate sustainability

In today's economy, a new dimension of company evaluation has emerged beyond traditional financial metrics. Environmental, Social, and Governance (ESG) ratings have gained prominence, assessing sustainability factors typically overlooked in financial analysis. These factors are now crucial in investment decisions, reflecting shifting priorities towards long-term societal and environmental impacts (Eccles, Lee & Stroehle, 2020). Throughout the past century, companies have traditionally prioritized corporate financial performance (CFP), focusing on profit-seeking, performance optimization, and research and development. However, in the last two decades, there has been a notable shift towards emphasizing corporate sustainability performance (CSP). This shift in focus has been spurred by various factors, including the global crises experienced during 2007-2009 and the growing concern surrounding climate change. The aim of CSP is to continue addressing the requirements of current stakeholders whilst ensuring that future generations are not inhibited by the choices made today (Alsayegh, Abdul Rahman & Homayoun, 2020). According to Berk, Guidolin, & Magnani (2023), by the end of 2022, '121 USD trillion across 5,381 investors were committed to integrating ESG data into investment choices' highlighting the increasing importance of these metrics for stakeholders. Furthermore, this rise in attention has also sparked the idea of identifying the underlying connection between CSP and CFP, with ESG data/scores acting as a measurement to discern this relationship (Drempetic, Klein & Zwergel, 2020).

2.1.2 ESG as a Measure

Transitioning to the methodology behind ESG ratings, these evaluations are developed through various approaches. However, the most widely recognized and influential ESG metrics and scores are produced by leading agencies such as MSCI, Sustainalytics, Refinitiv, and S&P Global. These companies utilize multiple metrics for each ESG pillar, providing both an overall score and specific scores for each pillar's components. For example, Refinitiv employs over 600 measures to evaluate the three ESG pillars, using 186 of these that are most comparable across industries to generate an overall score out of 100 (Refinitiv, n.d In comparison, MSCI uses a scale from CCC (laggard) to AAA (leader) for its ratings, while Sustainalytics employs a 1-100 scale, with higher numbers indicating greater exposure to ESG-related risks (MSCI, n.d.; Sustainalytics, n.d.). Moreover, whilst these agencies provide valuable and detailed information on various aspects of ESG, such as resource usage, emissions, human rights and corporate social responsibility (CSR) strategies, numerous papers have addressed the issues of convoluted scoring and the lack of standardization across ESG metrics. For example, Kotsantonis and Serafeim (2019) explain that from a sample of 50 company sustainability

reports, over 20 different ways of measuring one metric, namely Employee Health and Safety, were found. Additionally, Eccles and Stroehle (2019) discusses how these agencies balance the need for data distribution while maintaining a 'unique profile' to distinguish themselves from other vendors. As a result, there is no incentive for these distributors to standardize their values for a benchmark, leading to challenges for investors and stakeholders attempting to make informed comparisons and decisions

2.1.3 Drivers of ESG and ESG as a driver

Given the rising significance of ESG metrics, it is crucial to understand the drivers behind ESG ratings and how ESG itself can serve as a driver of corporate performance. The relationship between ESG ratings and performance has been explored extensively, considering both global trends and the specific dynamics of individual companies. These drivers differ depending on the setting and nature of the research. Daugaard and Ding (2022) employ agency and stakeholder theories, along with factors such as the political and economic context of a nation, to analyse global performance dynamics. In contrast, Barros, Matos, Sarmento, and Vieira (2022) focus on the impact of Mergers and Acquisitions (M&A) on improving ESG ratings. On the other hand, there is also a plethora of research that focuses on ESG factors as catalysts for shifting indicators in an economy/company, influencing various aspects, such as profitability, firm structure, and performance. One study by Berk, Guidolin & Magnani (2023) illustrates that steady improvement in ESG ratings can potentially lead to a decrease in the cost of equity for firms. However, the paper discusses important issues of companies taking advantage of these metrics for the sole use of achieving short-term goals like boosting stock prices. This paper assesses the latter discussion, looking at ESG ratings as a catalyst/driver, whilst assessing corporate debt structure as the resulting outcome.

2.2 Debt Theory

2.2.1 Theory Outline

When analysing a company's capital structure, it is essential to begin by outlining the Modigliani-Miller theorem (1958), which is widely recognized as the first credible theory in this field. This theorem outlines two main propositions, with the first known as the Irrelevance Theorem. It argues that under the conditions of a perfect capital market, the choice between debt and equity financing is irrelevant (Modigliani & Miller, 1958). These conditions are noted as, the absence of taxes, information symmetry and no transaction or bankruptcy costs (Ahmeti & Prenaj, 2015). The second proposition further proposes that a rise in the debt-equity ratio of a firm results in increased compensation demanded by shareholders (Giglio, 2022). However, in practice, these market imperfections influence how companies structure their debt. Taxes introduce the incentive for firms to opt for debt because of the deductibility of interest payments, whereas the risk of bankruptcy costs results in a decreased amount of debt due to the risk of defaulting (Cekrezi, 2013). Moreover, it is not

just these imperfections that are accounted for in the decision-making process for debt capital structure. The maturity term of debt—referring to the length of debt instruments—and decisions regarding whether to pursue private or public are also factors that influence how a company's debt is structured.

2.2.2 Maturity Structure of Corporate Debt

In this section, the maturity terms of debt and the types of debt undertaken, specifically self-issued debt and bank-acquired debt, will be examined. This analysis will assess whether ESG ratings can act as a catalyst for changes in the term or type structure of debt and explore the consequences of these decisions. To understand these impacts, the key drivers behind these aspects of debt should first be understood as they will prove valuable when discussing why ESG ratings might have an impact on these two concepts.

In assessing the literature on the maturity structure of corporate debt, three main drivers influence the length of debt a firm takes on: firm size, quality, and potential. Regarding firm size, it is generally accepted that larger companies have better access to financial markets and face fewer agency issues. In Myers' renowned 1977 paper 'Determinants of Corporate Borrowing', he discusses how conflicts of interest between stakeholders arise, namely monitoring costs and incentive costs, resulting in firms with large agency costs opting towards shorter-term debt. The reason for this being that long-term debt would not be as rigorously monitored within the company and by the third-party lenders (Datta, Doan, & Iskandar-Datta, 2019). However, Myers argues that because of the access to better capital markets, cash flow stability and enhanced oversight/cost efficiencies, large firms suffer far less from these issues, thus opting for longer-term debt.

Moving onto firm quality, this is closely intertwined with signalling theory and information asymmetry. In the context of debt maturity, signalling theory is used to reflect a company's financial health. Under the pretense of asymmetric information, high-quality firms often face underpriced long-term debt because investors cannot easily distinguish them from low-quality firms (Flannery, 1986). Consequently, high-quality firms prefer short-term debt to avoid undervaluation and to signal their confidence in meeting obligations quickly, thus avoiding the constraints of long-term commitments (Stohs & Mauer, 1996). Moreover, lower-quality firms would opt for long-term debt to signal stability and reduced risk, in order to mitigate potential concerns about the company as well as avoid rolling over short-term debt (Flannery, 1986).

Discussing the third driver, firm potential, Myers (1977) also discusses this in his foundational paper referencing it as a firm's 'growth opportunities', meaning the value of 'assets not yet in place'. Myers (1977) explains that the relationship between growth opportunities and maturity structure is inversely related, stating that short-term debt grants a more flexible environment to firms that aim to invest frequently in new projects and/or abandon less promising ones. Moreover, Childs, Mauer & Ott (2005) highlight the impact of debt covenants imposed on long-term debt, preventing firms from taking on

new debt until certain obligations are met on current financing. This is also discussed in Myers' paper through the 'underinvestment problem,' where he explains that firms with high growth opportunities may be forced to avoid taking on profitable projects due to financial distress and existing covenants.

2.2.3 Decision Between Bank Debt or Public Debt

Before analysing what goes into a firm's decision between bank debt and public debt, it is essential to recognize why bank debt exists as an option, despite the availability of open market financing. According to Leland & Pyle (1977) the transfer of information is crucial for creating and financing a high-quality project. By acting as a financial intermediary, banks monitor and screen the actions and activities of firms, naturally addressing the issue of asymmetric information between borrowers and lenders (Diamond, 1984). Moreover, a company's aim would, in theory, be to build a reputation so strong that third-party monitoring becomes unnecessary due to their established track record. Specifically, in the case of bank debt, it is noted that companies choosing this type of financing are often those with medium-level credit ratings or those that are just starting out (Diamond, 1991).

Regarding the latter, this can be attributed to companies establishing their track record and preferring to delegate monitoring, as mentioned. Addressing the former, Berlin and Loyes (1988) explain that high credit rating companies prefer public financing over bank debt due to less need for monitoring and more lenient covenants, offering greater financial flexibility. Low credit rating companies often choose bank debt since public financers avoid the higher risk, requiring stricter oversight. However, Diamond (1991) notes that some low-rated companies opt for public financing because they have little to lose from bad news along with the cost of monitoring is too high. This leaves medium-rated companies, which opt for bank debt to build their reputation. For these firms, the benefits of bank monitoring—such as improved liquidation policies and easier restructuring of terms—outweigh the costs, given their credit profiles (Berlin & Loyes, 1988; Bolton & Freixas, 2000; Diamond, 1991; Rajan, 1992).

However, beyond the theoretical foundations discussed by these notable scholars, other factors have been proven to both directly and indirectly influence the structure of corporate debt. Typical drivers discussed in the literature include firm size and leverage. A study conducted by Barnes & Cahill (2005) on the UK FTSE 350 found that larger firms, due to their ability to spread fixed costs, were better able to manage the issuance and flotation costs associated with public debt. Another study by Arena (2011) reinforces this finding, stating that due to flotation costs like registration and legal fees, smaller firms with less need for large debt are more likely to opt for bank debt. It should be noted, however, that traditional factors are still assessed. For instance, Barnes & Cahill (2005) did not find a significant link between firm reputation and debt structure. Additionally, Arena (2011) mentions the life cycle of a company, as discussed by Diamond (1991), as a potential reason for choosing bank debt.

Other factors that have been found to affect corporate debt structure more indirectly, include a company's board as well as the culture it fosters. Examining the former, board size has been shown to have a positive relationship with public debt due to improved internal monitoring. This enhanced monitoring reduces information asymmetry, thereby decreasing the need for third-party oversight (Ahmed, Mehmood, Ghafoor, Jamil, & Majeed, 2024). This also extends to board independence, which grants the benefit of a more objective assessment of a company's performance, thus reducing potential conflicts of interest and/or agency issues. The latter driver is similarly linked, as it revolves around how different cultures influence approaches to information sharing and relationship-building. A study by Chui, Li, and Saffar (2021) explains that companies with more egalitarian values emphasize reducing agency conflicts through equality and information sharing with all parties, thereby favoring public debt. In contrast, cultures that prioritize 'embeddedness' focus on in-group dynamics, which strengthens the bank-borrower relationship.

2.3 Link Between ESG and Corporate Debt

2.3.1 Information Asymmetry:

Before diving into the literature that examines the relationship between ESG and corporate debt structure, it is first essential to address the link between ESG and information asymmetry, as this connection forms the foundation of the relationship between the two variables. Numerous studies have proven an inverse relationship between improved ESG performance and reduced information asymmetry. The relationship has been measured using various indicators, including bid-ask spread, stock volatility, trading volume, and analyst coverage of a firm (Kim & Park, 2023; Siew, Balatbat & Carmichael, 2016; Bilyay-Erdogan, Danisman & Demir, 2024). It has primarily been attributed to the increased credibility and openness of a firm with Kim & Park (2023) explicitly mentioning stakeholder theory, while Bilyay-Erdogan, Danisman & Demir (2024) discuss concepts relating to signalling theory to offer some explanation to this relationship. Overall, this line of thought will prove valuable when observing the link between ESG and corporate debt structure.

2.3.2 ESG and Debt Maturity:

Upon understanding these two vital concepts and their foundational link, it is now possible to draw what relationships are expected between corporate debt maturity/type structure and ESG ratings. Beginning with corporate debt maturity structure, the literature here is generally in agreement that a positive relationship exists. Both Zhou, Huang & Jiang (2024) and Padmanabhan & Huang (2024) highlight this in studies conducted in the Chinese market. Although Padmanabhan and Huang emphasize a non-linear relationship, both studies show that higher ESG ratings lead to increased debt maturity due to improved information sharing, decreased default risk, and increased innovation. This

is in accordance with Flannery's (1986) explanation of higher-quality firms opting for shorter-term debt to mitigate information asymmetry, as firms with improved information sharing through higher ESG ratings are less likely to face adverse selection. Additionally, these studies argue that an increase in innovation enhances a firm's reputation, leading to higher quality and, under symmetric information, longer-term debt. It should be noted however, that this is not in accordance with what Myers (1977) posits as he believes there to be an inverse relationship between growth opportunities and debt maturity. Another study published by Nguyen, Choi, and Agbola (2021) found similar results but demonstrated that the effect varied across industries, with industries that place a higher emphasis on ESG factors displaying a more significant effect. However not all papers find a positive relationship between the two variables. Benlmlih's (2017) examines the relationship between CSR and debt maturity structure, using ESG measures from the MSCI database. The study finds an inverse relationship and explains this phenomenon with Myers' (1977) underinvestment problem. It highlights that companies with higher growth opportunities might forgo profitable projects due to shareholder pressure, driving them towards short-term debt to ensure quicker refinancing and returns. However, it should be noted that Benlmlih (2017) chooses six dimensions which encompass the CSR measure. This is significantly less than a typical overall ESG score and could be a possible explanation as to why the results differ from the other literature.

2.3.3 ESG and Debt Type:

Compared to debt term structure, debt type structure has a more convoluted relationship with ESG as it involves several intermediary factors. The literature surrounding this relationship assesses credit risk, cost of debt and corporate bond risk/performance as factors that connect these two factors. Two papers, specifically by Devalle, Fiandrino, & Cantino (2017) and Chodnicka-Jaworska (2021), highlight a positive relationship between ESG measures and credit ratings. As mentioned, Berlin and Loyes (1988) claim that companies with higher credit ratings, as influenced by strong ESG measures in this case, are more likely to prefer public debt since the need for external monitoring is less relevant for them. Both papers also explain that this decreased information asymmetry and perceived risk allow for better access to public markets, therefore also resulting in a preference towards public debt. Zhang (2021) finds similar results to these papers and also explains how it further leads to a decrease in the cost of debt due to lower borrowing rates/costs, however, Zhang (2021) states that these decreased rates and costs might incentivize companies to opt for bank debt instead of public debt. Moreover, it poses the question of if the decrease in borrowing rates outweighs the premium incurred when taking on a banks monitoring and screening services. Another more contemporary reason that could explain the impact of ESG ratings on the decision between bank and public financing is the lack of understanding by traditional financial institutions. An interesting paper published by Berg, Koelbel & Rigobon (2022) explains banks tend to fall back on traditional methods of evaluation, such as risk credit assessments, and therefore do not accurately gauge the true value of ESG performance.

Moreover, the sheer amount of ESG information published by different companies can cause banks to dismiss critical information due to conflicting scores. Thus, stakeholders who value this information more might be willing to finance the company at lower rates than these institutions would.

2.3.4 Theoretical Relationship:

While these empirical studies provide practical insights, understanding the theoretical foundation could also offer valuable insight as to how the two factors are related. The theoretical relationship between these two concepts is explored through three interconnected theories: Social Contract Theory (SCT), Signalling Theory (ST) and Stakeholder Theory (SHT), all grounded in the Resource-Based Theory of the Firm (RBT). RBT, primarily discussed by Maaloul, Zéghal, Ben Amar, & Mansour (2023) and Esteve-Pérez & Mañez-Castillejo (2008) is explained as a firm's ability to enhance themselves through the development of both tangible and intangible unique resources. According to Maaloul et al. (2023), corporate reputation is a vital intangible resource that can be enhanced through the transparency provided by sustainability report listings. Moreover, following this line of thought, it could be inferred that through Diamond's (1984) ideas, the increased transparency may result in a gradual preference towards public debt. This is further explored through Social Contract Theory (SCT), which states that by adhering to a set of social norms placed on firms, an implicit agreement is made between the firm and society, thereby improving the firm's reputation. Lindkvist & Saric's (2020) research reinforces this concept, though they refer to it as Legitimacy Theory. Additionally, as mentioned previously, ST is applied by Flannery (1986) as a method a company can use to distinguish themselves from firms not as high quality, thus influencing the decision on debt-term. Regarding SHT, it suggests that each stakeholder values sustainability information differently. By being transparent, firms can potentially secure more favorable financing terms from individuals or third parties who prioritize ESG performance (Lindkvist & Saric, 2020). This theory is particularly relevant when considering that traditional financial institutions may not value ESG performance as highly as some independent investors, who might be willing to accept a lower return in exchange for supporting sustainable practices.

2.4 Hypothesis Construction:

Upon grasping the connection between ESG scoring and how it relates and influences corporate debt structure, it is now possible to explain the two hypotheses of this paper.

Regarding ESG scores and debt maturity, it is expected that higher-rated companies will opt for longer-term debt. As mentioned, due to the decrease in asymmetric information between borrowers and lenders as well as the decrease in default probability, higher-rated firms would no longer be underpriced by institutions or financiers and would be able to prevent themselves from not meeting

any debt obligations (Flannery 1986; Zhou, Huang & Jiang, 2024; Padmanabhan & Huang, 2024). Thus, resulting in the following hypothesis.

H1 (null). An increase in a company's overall ESG score does not result in any statistically significant increase in the maturity term of its debt

H1 (alternate). An increase in a company's overall ESG score results in a statistically significant increase in the maturity term of its debt

As for ESG scores and debt type, a negative relationship between ESG scores and bank debt is expected. Firms with the highest ESG scores are often seen as reputable and trustworthy due to increased transparency and reduced perceived risk, decreasing the need for monitoring by banks (Devalle, Fiandrino, & Cantino, 2017; Chodnicka-Jaworska 2021). While higher credit ratings can lead to more favourable rates and costs from banks, independent financiers may also offer attractive terms with the added benefit of lower monitoring costs. Additionally, since banks might not prioritize ESG evaluations as much as certain public financiers, highly rated companies might prefer alternative sources of financing (Berg, Koelbel & Rigobon, 2022). Hence leading to the second hypothesis.

H2 (null). An increase in a company's overall ESG score does not result in a statistically significant decrease in the percentage of bank debt relative to total debt

H2 (alternate). An increase in a company's overall ESG score does result in a statistically significant decrease in the percentage of bank debt relative to total debt

CHAPTER 3 Data and Methodology

3.1 Data and Sample

This paper uses unbalanced panel data spanning from 2013-2022, with a total of 1,498 observations from 194 different European companies, not including financials companies. Countries these companies are located in include: Finland, Luxembourg, Sweden, Switzerland, Ireland, England, Germany, France, Netherlands, Spain, Poland, Belgium, Italy, Norway and Denmark. All data except for ESG ratings as well as the control variables Total Assets and Return on Equity were collected from Wharton Research Data Services via Compustat Capital IQ and Compustat Global (Compustat Capital IQ, 2024; Compustat Global, 2024). The other variables mentioned were obtained through Refinitiv Eikon (Refinitiv Eikon, 2024), thus the ESGS and ESGCS variables are measured according to Refinitiv's methodology.

3.2 Variables Definition

To define the key variables used in this dataset, there are two dependent variables and two independent variables of interest. The dependent variables are 'Bank Debt,' which is defined as the percentage of total debt that is bank debt, and 'Debt Term,' which is defined as the average maturity of all debt instruments issued by a company within a given year (in years). As for the variables of interest these consist of 'ESG Score' (ESGS) and 'ESG Combined Score' (ESGCS). Both scores are derived from 10 major ESG categories, each weighted accordingly. The difference between the two is that the ESGCS is adjusted ("discounted") for significant ESG controversies that affect a corporation (London Stock Exchange Group, 2023). ESG controversies are situations where a company faces public criticism for failures in sustainability performance, such as the 2010 Deepwater Horizon oil spill. As for the control variables, these will include market size, profitability, risk, and liquidity. Market size and liquidity were used because they are commonly used in similar studies, while risk, particularly the Altman Z-Score was included to introduce a variable that has been overlooked in previous research. The results will also include a set of industry and year dummies, to account for the specific effect of each industry and year. The industries consist of: (1) Construction (baseline dummy), (2) Manufacturing, (3) Mining, (4) Retail Trade, (5) Services, (6) Transportation, Communications, Electric, Gas and Sanitary Services (TCEGS) and (7) Wholesale Trade. Additionally, a variable named Country Code is used to distinguish each company's location.

Table 1: Control Variables for regressions

Control Measures	Calculation/Ratio	Source
Market Size	Total Assets (1) (Millions) Log of Total Assets (2)	Zhang, 2021; Zhou, Huang, & Jiang, 2024; Chodnicka-Jaworska, 2021
Profitability	Return on Equity Net Income/Average Shareholders' Equity (%)	Zhang, 2021; Zhou, Huang, & Jiang, 2024; Chodnicka-Jaworska, 2021
Liquidity	Current Ratio Current Assets/Current Liabilities (%)	Zhang, 2021; Zhou, Huang, & Jiang, 2024; Chodnicka-Jaworska, 2021
Risk	Altman Z-Score	

Notes: This table reports the four financial control variables, how they are calculated and the justification of their use

3.3 Wilcoxon Rank Sum

To ensure the robustness and validity of future regression analysis, four Wilcoxon Rank Sum tests will be conducted in this paper to cross-validate the results obtained. These non-parametric tests will assess whether there is a significant difference between the medians of two independent samples, with the alternative hypothesis indicating a significant change. Non-parametric tests are typically more accessible to employ due to their robustness for outliers and normality and can be more reliable when the underlying population of the data is not normal (Hollander, Wolfe & Chicken, 2013). In this study, the Wilcoxon tests will compare companies with ESG scores and ESG combined scores above or below 50, to assess differences in median values for the 'Mean Bank Debt' and 'Bank Term' variables. As mentioned above, these samples must be independent of each other and as a result the dataset was modified by collapsing at the company level. Specifically, the average value of all relevant variables for each company across all years was calculated, to mitigate any dependence/autocorrelation between observations from the same company in different years, thus ensuring that the independence assumption is met.

3.4 OLS and 2SLS Regression

In this study, a 2SLS regression will be used with instrumental variables (IV's): 'Country-Year Average ESG' and 'Country-Year Average ESGC'. These IVs represent the average ESGS/ESGCS of companies in the same country within a given year, benchmarking each company's ESG performance against its peers to isolate the impact of external ESG standards (Cheng, 2014; Li & Wang, 2022). This approach addresses potential endogeneity issues, such as omitted variable bias or simultaneous

causality between debt and ESG ratings, ensuring coefficient consistency regardless of error term normality (Wooldridge, 2010). The test's validity relies on the relevance and exogeneity assumptions. Relevance is tested by regressing the endogenous variable on the instruments in the first stage, while exogeneity requires that the instruments are uncorrelated with the error term (Wooldridge, 2010). Although exogeneity cannot be ensured through any test, there should be no underlying connection between the IV's and the dependent variable as highlighted by the surrounding literature. Robust standard errors will be used to account for heteroskedasticity, as initial clustering by industry proved unreliable due to the lack of observations of firms per industry.

Thus, this leads to the four 2SLS regressions that will be run:

1st Stage

$$Bank\ Debt: ESGSit = \beta1 * Country\ Year\ Average\ ESGSit + \beta2 * Controlsit + \varepsilon it$$
$$Bank\ Debt: ESGCSit = \beta1 * Country\ Year\ Average\ ESGSit + \beta2 * Controlsit + \varepsilon it$$
$$Debt\ Term: ESGSit = \beta1 * Country\ Year\ Average\ ESGCit + \beta2 * Controlsit + \varepsilon it$$
$$Debt\ Term: ESGCSit = \beta1 * Country\ Year\ Average\ ESGCit + \beta2 * Controlsit + \varepsilon it$$

2nd Stage

$$Mean\ Bank\ Debt_{it} = \beta0 + \beta1 * ESGS_{it} + \beta2 * Controls_{it} + \varepsilon_{it}$$
$$Mean\ Bank\ Debt_{it} = \beta0 + \beta1 * ESGCS_{it} + \beta2 * Controls_{it} + \varepsilon_{it}$$
$$Debt\ Maturity_{it} = \beta0 + \beta1 * ESGS_{it} + \beta2 * Controls_{it} + \varepsilon_{it}$$
$$Debt\ Maturity_{it} = \beta0 + \beta1 * ESGCS_{it} + \beta2 * Controls_{it} + \varepsilon_{it}$$

Additionally, this paper will conduct the same four regressions using the typical OLS approach. Comparing these results with those from the 2SLS method will highlight the impact of isolating the endogenous components of the independent variables of interest. It should be noted that OLS requires normality which this sample does not adhere to, moreover, these results should be used only to compare to the 2SLS regressions and not assessed individually. Robust standard errors were used when conducting the OLS regressions.

Thus, this leads to the four OLS regressions that will be run:

$$Mean\ Bank\ Debt_{it} = \beta0 + \beta1 * ESGS_{it} + \beta2 * Controls_{it} + \varepsilon_{it}$$
$$Mean\ Bank\ Debt_{it} = \beta0 + \beta1 * ESGCS_{it} + \beta2 * Controls_{it} + \varepsilon_{it}$$
$$Debt\ Maturity_{it} = \beta0 + \beta1 * ESGS_{it} + \beta2 * Controls_{it} + \varepsilon_{it}$$
$$Debt\ Maturity_{it} = \beta0 + \beta1 * ESGCS_{it} + \beta2 * Controls_{it} + \varepsilon_{it}$$

3.5 Limitations

Within this study, two key limitations should be noted. First, despite containing 1,498 observations, the dataset suffers from missing values for some variables. This problem arises from the issue of merging datasets, as not all data from each company could be found in both databases. As a result, the 2SLS regressions, for instance, utilize only about 467 observations from 80 firms, significantly reducing the sample size for these analyses. Thus, the reduced sample size may affect the statistical power of the hypothesis tests, potentially limiting the ability to accurately assess the causal impact of ESG on debt maturity and debt type. While it may seem questionable to include observations that are excluded from the regressions in the dataset, these observations are still valuable for the Wilcoxon Rank Sum test where both ESG and debt-related data are available. The second limitation of this paper is the external validity of the results obtained. External validity can be defined as the extent to which a study can be applied to the broader population given a sample (Findley, Kikuta & Denly, 2021). Though the sample in this paper is not small, there are numerous amounts of European companies, all of which, as of 2014, are required by the European Commission to report their environmental and social performance (European Commission, 2014). Moreover, generalizing these results and applying them to other European companies may prove challenging due to the limited scope of the sample in this regard.

CHAPTER 4 Results

4.1 Descriptive Statistics

Table 2: Descriptive Statistics

Variable	Observations	Mean	Std. dev	Minimum	Maximum	Median
Bank Debt	1,114	43.675	33.639	2.000	100	33.915
Debt Term	1,237	5.258	3.520	1	29	4.5
ESGS	892	65.824	19.323	6.1	95.580	70.21
ESGCS	892	59.277	17.092	6.1	95.10	60.21
Market Size (log of total assets)	1,230	14.860	2.746	6.201	22.565	15.061
Market Size (total assets in millions)	1,230	91,800,000	523,000,000	493,000	6,310,000,000	3,470,000
Profitability	1,100	10.365	11.580	-19.78	58.53	9.815
Liquidity	919	1.61	0.902	0.272	5.967	1.389
Risk	916	2.49	1.687	-7.637	7.752	2.246
Leverage	1,026	0.895	1.022	-1.918	5.886	0.577

Notes: This table reports the number of observations, mean, standard deviation, median and minimum/maximum values for each variable listed

Observing the descriptive statistics in Table 2, several key points can be pointed out. Firstly, the average ESGCS score is 10 points lower than the ESGS score, highlighting the consideration of ESG controversies in ESGCS, as previously discussed. Additionally, the high standard deviation of Mean Bank Debt suggests substantial variation in bank debt levels among firms. Regarding the control variables, while firms in this sample exhibit relatively higher current assets compared to current liabilities (Liquidity ratio of 1.61), they also show a higher proportion of equity relative to debt, as indicated by the Leverage ratio of 0.895. Regarding Leverage, this will not be used in any regression analysis as even though the correlation might not show it to be endogenous, is in theory threatening to the results. Additionally, the average Z-Score of this dataset is 2.49, as illustrated by the 'Risk' variable. On average a company is considered to be in the same zone when above 2.99 and so this dataset seems to consist of firms not at risk of bankruptcy. Other points worth noting include the difference in observations between variables and the difference between the two measures of Market Size.

Table 3: Correlation Matrix

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Bank Debt	1.000										
Debt Term	-0.049	1.000									
ESGS	-0.514	0.146	1.000								
ESGC	-0.327	0.017	-0.741	1.000							
Market Size (Log of TA)	-0.510	0.256	0.681	0.307	1.000						
Market Size (TA)	-0.201	0.284	0.386	-0.015	0.707	1.000					
Profitability	0.052	-0.083	-0.085	0.026	-0.140	-0.095	1.000				
Liquidity	0.163	-0.047	-0.142	-0.015	-0.368	-0.172	0.229	1.000			
Country Year Average ESGS	-0.096	0.015	0.264	0.152	0.165	0.127	-0.025	-0.058	1.000		
Country Year Average ESGCS	-0.065	-0.051	0.116	0.255	0.076	0.073	0.055	-0.041	0.207	1.000	
Z Score	0.014	-0.115	-0.114	0.073	-0.31	-0.288	0.329	0.509	-0.015	0.014	1.000

Notes: This table reports the correlation between each indicator. Any correlation above 0.7 or below -0.7 is considered to be strong and therefore a risk of multicollinearity.

Table 3 is vital in understanding how future tests will be run. The first key relationship is between Market Size (Log of TA) and ESGS. This correlation is indicated as 0.681 and therefore could be a risk of multicollinearity. Therefore, it was decided that in tests involving ESGS, the control variable for Market Size will be the untransformed measure of total assets, which has a lower correlation with ESGS at 0.386. Another area of concern is the IV Country Year Average ESGS/ESGCS, which shows correlations of 0.264 with ESGS and 0.255 with ESGCS, respectively. While these relationships are not insignificant, it may be believed that this is not strong enough to justify using Country Year Average ESG as the IV. However, based on the results from stage 1 of the 2SLS regressions and supporting literature, it was concluded that this variable is preferable over other tested measures, such as carbon emissions scores. All other correlations that are greater/less than 0.55/-0.55 are not threats to multicollinearity as these either include variables relationships to the dependent variables, or the independent variables of interest's relationship to each other.

4.2 Wilcoxon Rank Sum

Table 4: Wilcoxon Rank Sum Tests

Variable	Median For ESG < 50	Median For ESG > 50	P-value	Combined Observations
Mean Bank Debt by ESGS Group	60.31	25.59	0.000***	127
Mean Bank Debt by ESGCS Group	55.17	25.82	0.000***	127
Debt Term by ESGS Group	3.86	4.67	0.199	140
Debt Term by ESGCS Group	3.86	4.69	0.155	140

Notes: This table reports the 4 Wilcoxon Rank Sum tests performed with columns (1) and (2) outlining the median values for both groups tested. One star indicates 10%, two stars 5% and three stars 1% significance respectively.

Looking at Table 4, all results obtained were significant to some extent. Discussing Mean Bank Debt, this was significant to a 1% level in both tests and reinforced the results of the previously run 2SLS regression. The test highlights that for the sample of 127 companies, those with an ESGS/ESGCS of over 50 used bank debt over 30% less than those with a score below 50. As for the Debt Term, the results seem contradictory to those obtained from the 2SLS regressions, as the median is shown to increase when the ESGS/ESGCS is above 50. However, these results are not significant at any level, and therefore, no interpretation can be made regarding the difference in median between the two groups.

4.3 OLS

Table 5: 4 Standard OLS Regressions

	Debt Term	Debt Term	Bank Debt	Bank Debt
ESGS	-0.01	---	-0.67***	---
	(0.007)		(0.070)	
ESGCS	---	-0.01	---	-0.23***
		(0.008)		(0.074)
Market Size	8.65e-09***	0.44***	8.59e-09	-6.14***

	(2.29e-09)	(0.113)	(1.18e-08)	(0.725)
Profitability	-0.02	-0.02	-0.45***	-0.39***
	(0.012)	(0.013)	(0.090)	(0.096)
Risk (Z-Score)	0.14	0.08	1.63	0.35
	(0.093)	(0.093)	(0.150)	(1.142)
Liquidity	-0.27	-0.11	3.93	1.98
	(0.187)	(0.189)	(2.597)	(2.505)
Industry				
Manufacturing	1.64***	1.44	-24.30**	-18.42*
	(0.598)	(0.657)	(11.096)	(9.971)
Mining	1.21	0.32	-14.71	-7.39
	(0.749)	(0.904)	(12.375)	(11.770)
Retail Trade	0.70	0.26	-22.76*	-17.80
	(0.657)	(0.738)	(12.623)	(11.111)
Services	1.91***	1.67	-12.39	-8.71
	(0.667)	(0.713)	(11.368)	(10.334)
TCEGS	2.38***	1.86	-15.86	-10.33
	(0.702)	(0.814)	(11.555)	(10.463)
Wholesale Trade	-0.18	-0.80	-3.51	-1.82
	(0.606)	(0.662)	(11.197)	(10.045)
Year				

2015	0.65	0.64	1.41	0.22
	(0.804)	(0.799)	(4.808)	(5.072)
2016	0.05	0.06	5.48	2.46
	(0.744)	(0.742)	(5.442)	(5.463)
2017	-0.37	-0.36	2.68	1.73
	(0.711)	(0.708)	(8.194)	(5.326)
2018	-0.30	-0.29	8.19	4.90
	(0.699)	(0.698)	(4.863)	(5.160)
2019	-0.82	-0.82	11.41**	7.65
	(0.686)	(0.684)	(4.870)	(4.977)
2020	-0.70	-0.69	4.03	-0.37
	(0.661)	(0.660)	(4.738)	(4.978)
2021	-0.80	-0.78	0.46	-3.99
	(0.704)	(0.705)	(4.312)	(4.642)
2022	-1.14	-1.12	8.94*	4.67
	(0.712)	(0.713)	(4.629)	(4.809)
Constant	3.14***	-2.46	91.09***	162.53***
	(1.060)	(1.872)	(12.611)	(16.076)
Number of observations	448	448	431	431

Notes: This table reports 4 separate OLS regression models assessing the effect of ESG ratings on Debt Maturity and Mean Bank Debt. Columns (1) and (2) revolve around Debt Maturity with (3) and (4) being about Mean Bank Debt. This table also includes a time fixed effects but the values are not reported as they are both, not relevant and insignificant to the conclusions drawn. Standard errors are reported in parentheses. One star indicates 10%, two stars 5% and three stars 1% significance respectively.

Table 5 displays the results obtained from the four OLS regressions run. The first finding of note is that a significant effect was found for only one of the variables of interest, namely, Bank Debt. Interpreting these coefficients, an increase of 1 point in the ESGS/ESGCS score is expected to

decrease the Bank Debt by 0.66%/0.23%, on average. Moreover, a one standard deviation increase in ESGS/ESGCS (19 & 17) would result in a 12.5%/11.2% decrease in bank debt taken on by firms. As for the control variables, only Market Size and Profitability are shown to have any effect on the dependent variables, with both illustrating a negative relationship with Bank Debt and Market Size showing a positive relationship with Debt Term. Looking at the industry dummies, these seemed most significant on the ESGS/Debt Term regression with the Construction industry showing a significantly low Debt Term than most other industries in the sample.

4.4 2SLS

Table 7: 2nd Stage of 2SLS regressions

	Debt Term	**Debt Term**	**Bank Debt**	**Bank Debt**
ESGS	-0.03	---	-0.66***	---
	(0.026)		(0.255)	
ESGCS	---	-0.14**	---	-0.02
		(0.054)		(0.420)
Market Size	1.14e-08***	0.91***	8.10e-09	-6.90***
	(3.26e-09)	(0.233)	(2.14e-08)	(1.666)
Profitability	-0.02	-0.01	-0.45***	-0.39***
	(0.013)	(0.016)	(0.090)	(0.095)
Risk (Z-Score)	0.16	0.34**	1.63	-0.12
	(0.096)	(0.168)	(0.150)	(1.488)
Liquidity	-0.38*	0.20	3.96	1.68
	(0.205)	(0.313)	(2.597)	(2.505)

Industry				
Manufacturing	1.78***	-0.20	-24.32**	-16.27
	(0.626)	(1.137)	(10.836)	(10.334)
Mining	1.65**	-2.70	-14.76	-3.36
	(0.804)	(1.864)	(12.209)	(13.704)
Retail Trade	0.949	-0.23	-22.80	-17.61
	(0.675)	(1.016)	(12.370)	(10.444)
Services	1.81***	0.46	-12.38	-7.29
	(0.687)	(1.074)	(11.111)	(10.268)
TCEGS	2.43***	0.27	-15.88	-8.94
	(0.717)	(1.271)	(11.303)	(10.293)
Wholesale Trade	-0.73	-1.98	-3.43	0.47
	(0.737)	(1.314)	(11.366)	(10.671)
Year				
2014	1.07	1.28	-8.92*	-5.04
	(0.704)	(0.818)	(4.583)	(4.818)
2015	1.81***	2.93***	-7.53	-6.22
	(0.674)	(0.947)	(4.727)	(5.877)
2016	1.27**	2.10**	-3.47	-3.36
	(0.600)	(0.828)	(5.328)	(5.492)
2017	0.74	1.13	-6.24	-3.03
	(0.567)	(0.716)	(4.944)	(4.994)

	0.85	1.39**	-0.73	-0.32
2018	(0.535)	(0.703)	(4.803)	(4.959)
	0.25	0.81	2.49	2.56
2019	(0.534)	(0.643)	(4.841)	(4.692)
	0.44	1.17*	-4.89	-5.77
2020	(0.507)	(0.663)	(4.759)	(4.744)
	0.38	1.04	-8.48**	-9.28**
2021	(0.540)	(0.675	(4.258)	(4.441)
Constant	4.76**	-3.36	99.56***	167.68***
	(1.932)	(2.040)	(20.966)	(14.972)
Number of observations	448	448	431	431

Notes: This table reports 4 separate 2SLS regression models assessing the effect of ESG ratings on Debt Maturity and Mean Bank Debt. Columns (1) and (2) revolve around Debt Maturity with (3) and (4) being about Mean Bank Debt. Standard errors are reported in parentheses. One star indicates 10%, two stars 5% and three stars 1% significance respectively.

Tables 6 and 7 include all results regarding the 2SLS regressions. Table 6 is displayed to justify the relevance of the IV, as both test F-statistics exceed a value of 10, and the R squared is large enough to explain significant variation in the independent variables of interest. Looking at Table 7, in two of the four regressions, both independent variables of interest are significant to at least a 5% significance level. When interpreting the Bank Debt variable, an increase of 1 point in the ESGS/ESGCS score is expected to decrease the Bank Debt by 0.66%, on average. Similarly, for the Debt Term, an increase of 1 point in the ESGS/ESGCS score is expected to reduce the Debt Term by approximately 51 days (calculated as 0.14*365), on average. Furthermore, a one standard deviation increase in ESGS (19) and ESGCS (17) would result in a 12.5% decrease in Bank Debt and a 2 year increase in Debt Term, respectively. Observing the control variables, Market Size was relevant for both Debt Term and Bank

Debt at a 1% significance level, as expected. Profitability showed an impact on Bank Debt at the 1% level but did not for Debt Term. As for Liquidity, this had an impact on Debt Term at the 10% level, however, this was only the case when ESGS was used as the variable of interest. Regarding the industry dummies used, all sectors, excluding Wholesale Trade and retail showed significantly higher scores relative to the baseline industry, Construction, in the tests for Debt Term, under the ESGS variable. Intuitively this would make sense as the construction industry often requires long and substantial financing for its capital-intensive projects. As for Bank Debt, the industry relationships become more irrelevant with Manufacturing exhibiting a lower bank debt percentage than the baseline Construction industry.

CHAPTER 5 Discussion

5.1 Key Points:

Viewing Table 2, there are two points worth discussing. The first involves the Liquidity variable, as previously touched on in the results section. The mean value indicates that in this sample of firms, these companies do not suffer from a lack of liquidity and often possess more equity than debt. Bolton and Scharfstein (1996) and Flannery (1994) explain that companies relying on short-term debt often face liquidity risks due to the frequent need for refinancing, exposing them to higher systematic risk. Therefore, companies with longer-term debt experience less pressure from market fluctuations and are less likely to run the risk of failing to meet short-term obligations, resulting in decreased liquidity risk. Linking this to the results in this paper, the mean value of Debt Term can be observed at around 5 years which is considered long-term when compared to the time horizon over which the current ratio is measured. Therefore, companies used in this sample tend to opt for longer-term debt, possibly to mitigate liquidity risk.

The second point to clarify is the relationship between Firm Size and ESG ratings. As shown in Table 3, there is a high correlation between Firm Size (measured using the log of total assets) and the ESG score, potentially indicating multicollinearity. This relationship aligns with the existing literature, which suggests that larger firms have better access to resources for ESG investing and reporting. Furthermore, larger firms are subject to more intense scrutiny from stakeholders, which increases their incentive to adhere to ESG standards and improve their ESG scores. Other notable reasons include economies of scale, which highlight that the costs associated with improving ESG standards can be spread over a larger base (Drempetic, Klein, & Zwergel, 2020; Gregory, 2024). However, as shown before, firm size is also proven to have a significant effect on both debt maturity and type structure and therefore must be included in the regressions run on this paper, thus justifying the use of two different measures.

5.2 Establishing Valid Literature:

Before discussing the hypotheses and predicted expected relationships made, the relationships of the control variables to the dependent variables will first be examined, to determine whether the theoretical framework previously used in this paper to link ESG ratings and debt term/type structure holds true.

Regarding Debt Term, all control variables align with the previously explained theory. Market Size shows a significant positive relationship with Debt Term in both the OLS and 2SLS regressions, supporting the idea that larger firms have superior access to capital markets and lower agency costs, as

described by Myers (1977). Moreover, in the 2SLS regressions, whilst Profitability did not have any significant effect on Debt Term, both Liquidity and Risk did, in one of the regressions. These controls can be interpreted as an indicator of firm quality. Higher liquidity signals financial stability and the ability to meet immediate obligations, indicating better firm quality. Conversely, higher risk burdens the company with financial distress and interest payments, increasing the risk of default, indicating lower quality Note that in this study a higher Z-Score indicates lower risk for a company. Table 7 shows that a higher Z-Score increases debt maturity, whereas higher liquidity increases it. Using Flannery's (1986) ideas, this aligns with the theory, if firms do not hold private information. Moreover, by incorporating ESG ratings into the model, firms can be more accurately evaluated by third parties, avoiding under-pricing and making them more likely to opt for long-term debt.

Examining the Mean Bank Debt regressions, these control variables also align with the previously described theory in all regressions, though more indirectly. The theory underlying Mean Bank Debt involves a firm's reputation and its need for bank services such as monitoring and screening. Considering all four controls, each impacts a firm's reputation differently. Larger market size and profitability suggest economies of scale, greater diversification, financial stability, and consequently enhanced creditworthiness (Czarnitzki & Kraft, 2007). On the other hand, increased risk can often lead to a higher chance of defaulting, thus leading to poorer credit ratings, damaging the company's reputation. Furthermore, firms with strong creditworthiness often do not require monitoring services offered by banks, opting instead for public debt, with the opposite holding true for weakly rated firms. Thus, it is evident market size and profitability both improve reputation, which in turn negatively correlates with bank debt in the regression. As for liquidity, this relationship is not as expected. Though the relationship was not disproven, the expected relationship was not found significant. This may be due to the sample, as all other controls align with the theory described. The large magnitude of the standard errors reinforces this.

5.3 Hypotheses Answers:

Having established the validity of the previous literature connecting ESG ratings with debt term and type structure, the discussion will now examine if and why the proposed hypotheses were accepted and/or rejected.

Beginning with Debt Term, no statistically significant increase was found for the maturity term of a company's debt given an increase in ESG ratings in the OLS regressions, 2SLS regressions or the Wilcoxon Rank Sum tests; therefore, the null hypothesis cannot be rejected. In fact, the opposite was found in one of the 2SLS regressions, where an increase in ESG ratings led to a statistically significant decrease in the maturity term of debt. The primary reason for this result could be attributed to how ESG measures are currently perceived. Although surrounding literature has shown that ESG ratings

decrease information asymmetry, their impact depends on how individuals or third parties choose to use this information in assessing firms, as suggested by SHT. While ESG metrics can provide valuable information about a firm, these metrics are inconsistent across agencies and lack a standard benchmark that distinguishes one from another (Walter, 2019). Moreover, the metrics often are not able to capture the depth of the subject and thus might over/undervalue a company in some respect. Additionally, these metrics may be biased to market demand. One general example of this is selective disclosure and how firms will influence the measures they share to be perceived as more sustainable. Eccles & Stroehle (2018) discuss a more specific example known as 'survey fatigue', where companies are asked to deliver several ESG reports to different agencies and stakeholders thus, worsening the quality of the data and therefore the decision-making of certain investors. Finally, while ESG measures might reduce information asymmetry concerning non-financial indicators, it does little to address the private information held by firms regarding financial performance, which remains the most prominent aspect for investors. Linking this to debt maturity, stakeholders interested in financing these companies might not prioritize ESG-related measures for the reasons previously discussed. Therefore, due to ongoing information asymmetry, higher-rated ESG firms might be underpriced in the debt market and consequently prefer shorter-term debt (Flannery, 1986).

Moving on to Mean Bank Debt, all results illustrate a statistically significant inverse relationship between bank debt and ESG ratings, thus, the null hypothesis can be rejected. This relationship provides a simpler explanation than the previous hypothesis; however, linking the two complicates the discussion. Focusing first on the results for Mean Bank Debt, this can be attributed to ESG ratings enhancing the reputation of these companies. Firms with higher ESG scores are perceived as more sustainable and having healthier work environments, which reduces the need for intensive monitoring services by banks. Furthermore, higher ESG rated firms rely less on debt, reducing default risk, therefore requiring less oversight repayment and company health. Overall, these results indicate that the premium incurred when taking on bank debt, due to the additional services provided, is not justified for these companies, leading them to opt for public debt. The results from the Wilcoxon Rank Sum tests only support this, as a drastic difference in bank debt taken on is shown, at more than a 30% difference between firms with scores over/under 50. Considering how this relates to the discussion of the previous hypothesis, a demographic profile of this sample of companies can be made. Using the discussion from Mean Bank Debt, it can be concluded that these corporations, on average, are of higher quality and, therefore, do not typically require bank services. However, despite their higher quality, these organizations are still somewhat undervalued by public financiers due to continued information asymmetry, thus forcing them to opt for shorter-term debt.

CHAPTER 6 Conclusion

The emergence of ESG ratings and practices within the corporate landscape has completely shifted how companies approach decision-making in areas such as risk management, investment strategies, and corporate structure. Though the impact varies by industry, it is clear that a point is being reached where all companies must adhere to some form of ESG benchmark. Europe offers a compelling case study in this regard due to its strong emphasis on ESG standards. This includes broad regulations like mandatory public ESG disclosures for all companies, as well as industry-specific targets such as a 90% reduction in transport emissions by 2050.

This study aimed to assess the effect ESG ratings have on corporate debt structure, specifically, the term and type of debt taken on by a company. The paper analysed over 100 European companies from 2013 to 2022 to test if the expected relationships from existing literature held true. This analysis employed four two-stage least squares (2SLS) regressions and four Wilcoxon Rank-Sum tests. Additionally, classic debt structure theory was employed during the discussion of this paper to provide explanations and insight as to why these effects might exist regardless of if the expected relationship was found or not.

Remembering the research question proposed in this paper "How do ESG ratings influence the term structure and type of debt financing adopted by companies?" followed by the two sub questions "Do companies with higher ESG ratings prefer longer-term debt compared to shorter-term debt?" and “Do companies with higher ESG ratings prefer bank-debt compared to public debt?”. Of the results obtained it was found that for both the 2SLS regressions and the Wilcoxon Rank Sum tests ESG ratings and bank debt follow a significant inverse relationship. Regarding debt maturity, a significant effect was identified, but the relationship differed from expectations, requiring further analysis using the previously mentioned classic debt theory.

Moreover, the null hypothesis of hypothesis one was not able to be rejected as “*An increase in a company's overall ESG score does not result in any statistically significant increase in the maturity term of its debt”.* Despite this the null hypothesis of hypothesis two was able to be rejected as “*An increase in a company's overall ESG score does result in a statistically significant decrease in the percentage of bank debt relative to total debt”.*

6.1 Limitations and Suggestions for future research:

Some limitations of this paper included (1) missing values for all variables involved and (2) the lack of a substantial number of observations per industry. Regarding the former, this is a more general limitation and would be more difficult to combat. Missing values in one variable results in that

observation being excluded when the analysis is run, if that variable is used within the process. This may potentially introduce bias into the results and always leads in a decreased sample size which decreases the overall accuracy of the results. One potential suggestion that could improve this limitation would be to take the peer average of that variable in the given year in order to assign it a value. As for the latter, it would have been beneficial for the study if more observations per industry were obtained, as it was clear that the industry dummy variables explained some variation in the debt structure of companies.

Regarding further research, it would be interesting to isolate the effects of ESG ratings on debt maturity and assess how ESG ratings affect a series of debt maturity intervals to observe if there is any statistical preference in length between categories. The reason for this would be because of the unexpected results obtained in this paper. This method would allow for a more detailed analysis of how debt maturity is affected by ESG ratings across different groups rather than one large regression, potentially revealing results that would be more in line with the original theory. This method also allows for outliers to have little to no effect on the results as these would have their own category and would be tested independently from other observations. Additionally, this research would have access to a variable that could account for firm potential which this paper did not. Firm potential was one of the three key drivers of corporate debt maturity and was a limitation of this paper as no variable was used to capture this effect.

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Appendix

Table 6: 1st Stage of 2SLS regressions

Variable	R Squared	IV Used	F Statistic
ESGS (Debt Term)	0.24	Country Year Average ESGS	24.23
ESGCS (Debt Term)	0.20	Country Year Average ESGCS	15.70
ESGS (Bank Debt)	0.23	Country Year Average ESGS	31.94
ESGCS (Bank Debt)	0.18	Country Year Average ESGCS	13.10

Notes: This table reports the relevant metrics regarding the first stage of the 2SLS regressions run.

Table 8: 2SLS Regressions with Leverage

	Debt Term	**Debt Term**	**Bank Debt**	**Bank Debt**
ESGS	-0.03	---	-0.65**	---
	(0.027)		(0.265)	
ESGCS	---	-0.13**	---	-0.02
		(0.052)		(0.415)
Market Size	1.17e-08***	0.88***	5.46e-09	-6.94***
	(3.46e-09)	(0.220)	(2.32e-08)	(1.643)
Profitability	-0.02	-0.01	-0.47***	-0.43***
	(0.013)	(0.016)	(0.093)	(0.098)
Risk (Z-Score)	0.14	0.27*	2.03*	0.77
	(0.096)	(0.145)	(0.166)	(1.351)
Liquidity	-0.41*	0.11	4.37	2.52
	(0.227)	(0.283)	(2.693)	(2.422)
Leverage	-0.15	-0.32	2.33	4.66**
	(0.280)	(0.282)	(1.863)	(1.896)

Industry				
Manufacturing	1.78***	-0.05	-24.95**	-17.77*
	(0.636)	(1.095)	(10.659)	(9.868)
Mining	1.26*	-3.13	-12.78	-0.898
	(0.742)	(1.852)	(12.085)	(13.583)
Retail Trade	1.00	-0.10	-23.83*	-19.64*
	(0.696)	(0.998)	(12.316)	(10.221)
Services	1.97***	0.81	-14.38	-11.243
	(0.678)	(0.988)	(11.070)	(9.818)
TCEGS	2.44***	0.41	-16.72	-10.66
	(0.723)	(1.238)	(11.22)	(10.005)
Wholesale Trade	-0.67	-1.68	-5.06	-3.00
	(0.708)	(1.222)	(11.035)	(10.045)
Year				
2014	0.91	0.93	-8.07	-2.84
	(0.797)	(0.855)	(5.005)	(4.922)
2015	1.80	2.84***	-7.46	-5.96
	(0.676)	(0.920)	(4.733)	(5.818)
2016	1.26**	2.01**	-3.27	-2.86
	(0.598)	(0.789)	(5.346)	(5.437)
2017	0.74	1.09	-6.18	-2.89
	(0.568)	(0.693)	(4.948)	(4.919)

2018	0.82	1.29*	-0.40	0.36
	(0.541)	(0.672)	(4.833)	(4.854)
2019	0.23	0.74	2.85	3.27
	0.543	(0.620)	(4.882)	(4.644)
2020	0.42	1.10*	-4.71	-5.40
	(0.511)	(0.631)	(4.794)	(4.703)
2021	0.38	1.02	-8.72**	-9.73**
	(0.540)	(0.655)	(4.64)	(4.44)
Constant	5.04**	-2.90	96.57***	162.40***
	(2.291)	(2.023)	(22.739)	(14.924)
Number of observations	443	443	426	426

Notes: This table reports 4 separate OLS regression models assessing the effect of ESG ratings on Debt Maturity and Mean Bank Debt. Columns (1) and (2) revolve around Debt Maturity with (3) and (4) being about Mean Bank Debt. This table also includes a time fixed effects but the values are not reported as they are both, not relevant and insignificant to the conclusions drawn. Standard errors are reported in parentheses. One star indicates 10%, two stars 5% and three stars 1% significance respectively.