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ESG Ratings and Sustainable Finance: A Comprehensive Analysis of Cost of Financing for European Firms within the Stoxx Europe 100 Index

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Abstract

This dissertation investigates the relationship between Environmental, Social, and Governance (ESG) factors and the cost of debt for 92 companies listed on the STOXX All Europe 100 Index from 2018 to 2022. It addresses four key questions regarding the impact of overall ESG scores, environmental, social, and governance scores on borrowing costs. Despite negative coefficients indicating a potential inverse relationship, none were statistically significant ($p > 0.05$), suggesting that ESG performance may not consistently influence borrowing costs. Overall, while ESG considerations are important for sustainability, they may not significantly affect borrowing costs, warranting further research into the nuanced relationship between ESG and financial metrics.

Keywords: ESG, Cost of Debt, Sustainable Finance, Financial Performance, Environmental Factors, Social Factors, Governance Factors, Financial Metrics

Resumo

Esta dissertação investiga a relação entre os fatores ambientais, sociais e de governação (ESG) e o custo da dívida de 92 empresas cotadas no índice STOXX All Europe 100 de 2018 a 2022. Aborda quatro questões-chave relativas ao impacto das pontuações ESG globais e das pontuações ambientais, sociais e de governação nos custos da dívida. Apesar de os coeficientes negativos indicarem uma potencial relação inversa, nenhum foi estatisticamente significativo ($p > 0,05$), o que sugere que o desempenho ESG pode não influenciar de forma consistente os custos da dívida. De um modo geral, embora as considerações ESG sejam importantes para a sustentabilidade, podem não afetar significativamente os custos da dívida, o que justifica uma investigação mais aprofundada sobre a relação diferenciada entre as métricas ESG e financeiras.

Palavras-chave: ESG, Custo da dívida, Finanças sustentáveis, Desempenho financeiro, Fatores ambientais, Fatores sociais, Fatores de governação, Métricas financeiras

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Introduction

Liang and Renneboog (2017) have established that since the past few years, ESG measures have assumed heightened importance in global financial decision-making processes. Flammer (2021) has pointed out that besides being strong drivers of corporate performance and resilience, ESG factors also determine the investment choices made by investors as well as the market values. This new direction towards sustainable finance has motivated academics, policy makers and practitioners to delve into ESG ratings vis-à-vis corporate cost of capital more deeply.

Fama (2020) argues that increasing recognition of its impact on several aspects of corporate operations such as risk management and stakeholder engagement is indicative of the importance of ESG in financial markets. In this regard, investors are increasingly using European companies' ESG performance to determine their cost of financing, thus directing funds towards firms with sound sustainability practices (Agliardi, 2021).

However, there are some limitations cited in prior research on the relation between cost of financing and ESG scoring. For instance, a variety of studies have been done using different methodologies and sources of data which has led to conflicting results thereby making it necessary to develop an overarching framework for understanding these results better (Flammer, 2021; Unctad, 2022). Similarly, ESG research landscape involves numerous approaches, ranging from quantitative financial analysis to qualitative sustainability assessments, making it difficult to compare results and ensure methodological rigor (Soedjatmiko, 2021). Furthermore, ongoing discussions surrounding the priority of the ESG

agenda raise concerns about potential trade-offs and transitional costs in the short-run as well as adoption of ESG principles which presents challenges that involve additional expenses for companies. Understanding these complexities is important in unravelling how ESG integration will affect corporate behaviour and financial markets at large. In light of this, this thesis aims at overcoming these limitations by giving a nuanced analysis of ESG ratings and sustainable finance for European firms within Stoxx Europe 100 Index thus providing crucial insights into the development dialogue on ESG integration.

This work aims to thoroughly explore the association between ESG ratings and cost of debt in European listed companies on the Stoxx Europe 100 Index. By studying a small number of leading European firms in several sectors, we can examine the subtle dynamics supporting market participants incorporating environmental, social, governance or stakeholder considerations into their financing choices. Thus, this research focuses on understanding how differences in ESG scores impact debt costs for companies belonging to Stoxx Europe 100 Index.

In this dissertation, the drivers, mechanisms and consequences of sustainable finance's involvement in enhancing business value with respect to corporate performance are looked into from a multifaceted perspective. We will employ various quantitative methods such as econometric techniques to show causal links between financing costs and ESG key determinants of all types taking consideration to context-dependent variables.

Moreover, this work highlights the trade-offs that may exist between financial performance and adherence with ESG principles (Henisz et al., 2019). Financing costs are considered a significant measure of corporate sustainability because

they provide information for policy makers, investors or even top management who seek useful insights into an ever-changing environment related to the integration of ESG within financial markets.

We begin the analysis with a sample of 92 companies listed on the STOXX All Europe 100 Index, for a five-year period ranging from 2018 to 2022. After running several regressions, we find that the impact of Environmental Social Governance (ESG) scores on the cost of debt revealed statistically insignificant coefficients across all dimensions of ESG, including Social, Environmental, Governance, and overall ESG scores. This trend persisted even when analysing lagged ESG scores, indicating no significant association between past ESG performance and debt costs.

This work is organized as follows. Beginning with a thorough Literature Review in Chapter 1, the groundwork is laid by exploring the concepts of ESG, corporate social responsibility, sustainable finance, and the determinants of the cost of debt. This sets the stage for Chapter 2, where implications and hypotheses are presented based on the insights gained from the literature. Moving forward, Chapter 3 delves into the Data and Methodology employed, including details on sample selection, variables, and regression models used for analysis. Chapter 4 presents the Results obtained from the analysis, including the main regression outcomes and supplementary analyses. Finally, the Conclusion chapter synthesizes the findings, reaffirming the significance of the research and potentially offering avenues for future exploration in this critical intersection of ESG and financial metrics.

To summarize, this study aims at expanding our understanding of how ESG ratings and sustainable finance interact in Europe with a focus on the Stoxx

Europe 100 Index. In addition, it aims to explain by what means ESG factors impact cost of capital for European companies through critical analysis as well as empirical research that enables policies directed towards more resilient, accountable, and sustainable financial systems.

Chapter 1 - Literature Review

1.1 Environmental Social Governance

1.1.1 Introduction to ESG

Factors such as environmental, social and governance have become increasingly important in assessing a company's operations outside of financial performance, underlining a broader understanding of corporate sustainability and responsibility.

The three dimensions that constitute ESG are environmental, social and governance, each of these is important in examining the sustainability and moral implications of a company. According to Flammer (2021) and Unctad (2022), ESG refers to non-financial factors like environmental footprints, societal policies, or even modus operandi.

With regard to the environment part in ESG, it includes carbon emissions, resource consumption, and environmental management practices. This means that the firm is committed towards reducing its ecological footprint by adopting sustainable initiatives (Alessi et al., 2024).

The social sector involves various issues such as labour force manipulation, human rights standards, diversity programs, community engagements among

others. This dimension examines how companies relate with their employees, customers/client's marketplaces as well as society at large (Schumacher, 2022).

Governance aspects considered within this dimension comprise board diversity, decision-making, transparency, adherence to ethical norms. It is through strong governance systems that a company can be held accountable for its actions since this ensures that corporate resources are managed responsibly with integrity (Erragragui, 2018).

The increasingly importance of considering these factors during investment decisions arises from insights provide about firms' long-term sustainability along with risk management practices. Cornell (2021) and Agliardi (2021) stress the significance of including ESG considerations in investment strategies to enhance long term value creation while mitigating exposure related to issues having Environmental Social Governance characteristics.

1.1.2 Corporate Social Responsibility

Corporate Social Responsibility (CSR) is a wide range of initiatives, which are intended to embed social, environmental, and economic considerations in their business operations. In order to explain how these facets contribute to sustainable development, Park (2018) differentiates between sustainable finance, socially responsible investing (SRI), and CSR (Park et al., 2018). ESG ratings and sustainable bonds have been used to gauge the impact of CSR on businesses by (Anyfantaki et al., 2022).

Theory provides insights into why firms adopt CSR as well as the potential consequences it may have for them. Early economic literature as cited in Aupperle and Brammer and Millington (2008) suggested that CSR was an

unnecessary expense that potentially affected competitiveness negatively (Aupperle et al., 1985; Brammer and Millington, 2008) . However, other perspectives such as Hart's resource based view articulated in 1995 advocate for CSR as a source of competitive advantage. Pollution prevention, product stewardship, sustainable development among others are some of the strategies firms can use to enhance their competitiveness according to Hart (Hart, 1995).

Jones instrumental stakeholder theory that was developed in 1995 and Hilman and Keim version of this approach illustrate on the importance of ethical relationships with stakeholders for organizations looking forward to maintaining their competitive edge among competitors. It argues that corporations can reduce opportunistic behaviour thus heightening reputation through trustworthiness and cooperation with its stakeholders (Hillman and Keim, 2001; Jones, 1995)

Kramer and Porter speak more on shared value claiming that firm should make money as they better society too. They do this by making sure all their business endeavours fit societal needs thereby creating wealth while also resolving social issues (Porter and Kramer, 2011).

Empirical research has supported the positive financial implications of incorporating CSR in corporate strategy. Flammer investigates how various financial metrics including announcement returns, accounting performance and sales growth are linked with having any form of corporate social responsibility policy at work (Flammer, 2015). Ghoul further illustrate how CSR impacts on the costs of equity capital, mainly in "sin" industries (Ghoul et al., 2011). Furthermore, Cheng show how improved stakeholder involvement and

disclosure through corporate social responsibility initiatives can alleviate capital constraints (Cheng et al., 2014).

Moreover, CSR actions have been found to enhance company reputation, attract customers and investors with a keen eye on social good, as well as mitigate against negative financial, legal and regulatory situations (Hillman and Keim, 2001).

Overall, CSR is an important component of modern business strategies which are guided by the principles of doing ethical business comprehensively to make sure that it is sustainable in the long run. In addition, empirical evidence shows that firms can benefit from adopting CSR practices for both stakeholders and the society at large. To promote long term value creation and sustainable development going into future it is therefore crucial that companies adopt these principles into their daily operations.

1.1.3 Sustainable Finance

The prominence of sustainable finance in recent times is indicative of the increasing realization that financial markets, environmental sustainability, and social equity are interrelated. This first chapter sets the stage for a wide-ranging investigation into sustainable finance by outlining its scope within the overall context of responsible investment and sustainable development.

A recent review of literature reveals that sustainable finance is far from being a one-way street. Alessi et al (2024) inquires into investor reactions to climate-related policy choices about the impact on financial markets stemming from Paris agreement and US withdrawal (Alessi et al., 2024). Bellucci et al (2023) explore

how green patenting intersects venture capital financing, emphasizing on financial mechanisms as promoters of innovation for sustainability (Bellucci et al., 2023).

Caporin et al. (2023) provides insights into the financial implications of environmental challenges by analysing systemic risk posed by fossil fuel companies (Caporin et al., 2023). Reboredo, Ugolini, and Ojea-Ferreiro (2022) examined green bonds as a means to de-risk investments in low carbon stocks, indicating possibilities for greening financial products (Reboredo et al., 2022). The authors also present some articles discussing these tools' effectiveness in addressing climate change and their pricing dynamics respectively.

Ramelli et al (2021) show how stock prices are affected when activists act on issues such as climate change leading to responses from investors in financial marketplaces (Ramelli et al., 2021).

Overall, Sustainable Finance is an encompassing approach which involves incorporating environmental, social and governance considerations into financial decisions making. The summing up underscores different aspects of sustainable finance as documented in literature ranging from policy interventions to instruments and market behaviour. In conclusion, there should be a better understanding about what makes up sustainable finance in order to create resilient and inclusive long term environmentally friendly systems.

1.1.4 ESG Rating Methodologies

Rating methodologies for environmental, social and governance (ESG) are vital tools that evaluate firms' sustainability performance for purpose of making

investment decisions in the responsible investing era. These frameworks comprise of various criteria touching on environmental impact, social responsibility and corporate governance practices all aimed at offering investors with invaluable insights into a company's sustainability profile.

ESG ratings are constructed by selecting, weighing and aggregating specific ESG indicators to create an overall score for each firm. Nevertheless, there have been questions about the methods used by ESG data providers due to variations in ESG ratings across different providers. This has raised concerns regarding reliability and comparability (Billio et al., 2021; Sridharan et al., 2023).

Some factors contribute to rating discrepancies such as different interpretations of ESG data, measurement strategies as well as incentives tied to index construction and licensing. In addition, they face competing motives, particularly where revenues come from ESG-based index products. This study shows providers who have strong index licensing incentives assigning higher ESG ratings to companies with better stock return performance which may make the rating lose its integrity (Sridharan et al., 2023).

Additionally, there is also lack of a standardized reporting requirement for these disclosures thus it becomes difficult for ESG data providers to bring together information from many sources in a consistent manner. Without universal reporting standards the comparability and reliability of any one agency's ranking will be undermined causing investors' ability to make informed decisions difficult (Billio et al., 2021).

In response to these challenges however there is an emerging call or demand for greater transparency harmony or standardization within the methodologies

of the ESG Rating Systems. Regulatory institutions alongside other players in this industry are considering various steps towards achieving uniformity through establishing common ways of reporting as well as making sure that these assessments are credible enough so that no investor doubts them anymore. Agreement concerning standardized ESG reporting practices could improve the quality of ESG ratings, thus making them more useful for investors (Berg et al., 2019).

The European Union's (EU) ESG taxonomy comes up at this point amidst increasing reliance on ESG ratings in investment decision-making as a major step towards harmonizing ESG reporting standards and enhancing transparency in sustainable investments (Commission, 2020). The EU taxonomy is a comprehensive classification system which defines economic activities according to their environmental sustainability and sets thresholds for what constitutes a "green" investment (Commission, 2020). EU taxonomy has been developed to provide a standardized framework for evaluating the environmental sustainability of economic activities, thereby enabling informed investment decisions and reducing greenwashing. Besides, integrating the EU taxonomy into ESG rating methodologies may promote consistency and comparability of these assessments with respect to wider objectives of sustainable finance regulation and build investor trust around disclosures and investments in relation to ESG. To sum up, it should be stated that such instruments like ESG rating frameworks and methodologies serve as guiding principles in terms of assessing companies' social performance within the context of sustainability management strategies.

However, many critics argue that addressing these issues such as rating discrepancies or methodological inconsistencies is critical in ensuring reliability

and credibility of emerging ESG assessments within ever changing landscape of sustainable finance.

1.1.5 Challenges and Controversies in ESG Ratings

Various challenges and controversies exist that necessitate scrutiny by the business and academic communities due to the proliferation of Environmental, Social, and Governance (ESG) ratings. However, despite being vital tools for investors who are interested in incorporating sustainability considerations into their decision-making process, ESG ratings have a number of challenges that hamper their effectiveness and reliability.

One major challenge is the absence of standardization and consistency within ESG rating frameworks and methodologies, as we have seen above (Billio et al., 2021). Inconsistencies in ratings assigned to the same companies by different rating agencies are as a result of diverse approaches to data collection, scoring methodologies as well as weighting of ESG factors (Sridharan et al., 2023). These disparities impose difficulties on investors who want credible and comparable information regarding ESG so that they can make informed investment choices. Moreover, lack of standardized reporting requirements regarding ESG dada by firms further complicates the accuracy and reliability of ESG ratings (Commission, 2020).

Greenwashing is another significant challenge in ESG ratings where companies engage in deceptive practices to present themselves with a better image than they have relating to environmental social governance issues (Santos et al., 2023). These practices undermine the integrity of ESG ratings by overrating

scores or misrepresenting sustainability performance on firms thereby misleading both investors and stakeholders.

Furthermore, there are concerns that arise from an emphasis on short-term financial performance metrics in ESG ratings frameworks which may not adequately capture long-term sustainability risks and opportunities (Sridharan et al., 2023). Often chosen instead of qualitative aspects concerning sustainability during their construction emphasize easily quantifiable financial metrics neglecting potential future occurrences such as significant environmental or social risks.

Also, traditional methods for calculating ESG rating omitting smaller medium sized firms because of limited access to data do not allow comprehensive evaluation across the market poses a roadblock (Barro et al., 2023). This act limits the scope of ESG analysis and may potentially miss out on emerging sustainability leaders among smaller companies, making impossible to judge ESG practices of significant number of companies.

Additionally, there is a lack of consensus regarding the materiality and significance of specific ESG factors in relation to financial performance which makes it difficult to interpret and apply ESG ratings (Soedjatmiko, 2021). Some studies have shown that good levels of ESG performance result in high financial returns while others have given inconclusive or negative outcome hence leading to debates on the real effect of ESG on value creation (Sridharan et al., 2023)

1.2 Cost of Debt

The cost of debt stands as a cornerstone in corporate finance, intricately woven into financial decision-making and capital structure management strategies. The

cost of debt refers to the effective interest rate that a company pays on its borrowed funds. It is the return that lenders require on the company's debt investment, representing the cost of borrowing money. The cost of debt is a crucial component in determining a company's overall cost of capital and influences its capital structure decisions (Van Binsbergen et al., 2010).

1.2.1 Cost of debt Determinants

The cost of debt in corporate finance is a subject that needs to be explored in relation to a number of factors which determine the amount and healthiness of a firm's borrowing. A major determinant is the creditworthiness of the borrower. Financial stability, profitability, cash flow generation and credit history are some features that lending institutions will always critically look at before deciding on whether to lend or not (Van Binsbergen et al., 2010). High ratings typically translate into low costs while low ratings require higher interest rates which compensate lenders for increasing risks (Bodie et al., 2013).

Additionally, market interest rates also have an impact on the cost of debt. Market fluctuations directly affect company borrowing expenses since they are influenced by both macroeconomic conditions and central bank policies. Companies can obtain financing at terms that are more favourable when the market interest rate is low, conversely, if interest rates increase borrowing costs will rise (Van Binsbergen et al., 2010).

Moreover, other determinants include term and structure of debt instruments. Short-term types normally carry lower interests than long-term ones due to decreased default risk as well as reduced interest rate risk respectively. Moreover, different types of fixed income securities react differently with respect to changes in market conditions hence affecting the cost of borrowing (Ross et al., 2018).

Also, collateral or security pledged against debt may determine the associated borrowing costs. In most cases secured debts are charged lower interest rates because collateral provides protection against defaulting whereas unsecured debts command higher rates due to increased lender risk (Ehrhardt and Brigham, 2016).

Another factor influencing borrowing costs is market volatility and investor sentiment Economic uncertainty or market volatility may prompt investors to demand higher returns leading to increased borrowing costs for companies; however favourable market conditions can reduce costs of loan capital (Van Horne and Wachowicz, 2005).

As well, there is industry specific risk that determines borrowed funds' price tag Industries with stable cash flows and predictable earnings often attract lower borrowing costs compared to those characterized by higher volatility and uncertainty (Copeland and Weston, 1988).

In addition, regulatory environment and policy impact are other important considerations. Such factors as tax legislations or accounting regulations may affect tax deductibility of interest expenses or financial reporting practices which in turn shape how much it will cost a company to borrow funds (Fabozzi et al., 2013).

Understanding these determinants can help companies strategically manage their cost of debt, optimize their capital structure, and make well-informed financial decisions that support long-term growth and sustainability (Ross et al., 2018).

1.3 Relationship Between ESG Ratings and Cost of Debt

In recent years, a growing concern on the inclusion of ESG issues in corporate decision-making has become visible. It is clear that most of the emphasis has been put on ESG's impact on equity evaluation and investment decisions while its effect on the cost of debt continues to attract discussion (Finger and Rosenboim, 2022).

Many researchers have examined the connection between ESG performance and cost of debt resulting in mixed results. Academic work has shown that companies with higher ESG ratings are able to borrow at lower interest rates due to reduced risk as well as enhanced reputation (Ioannou and Serafeim, 2012). Additionally, companies with strong environmental, social and governance practices tend to be considered by investors as being less risky which leads to lower credit spreads and interest rates for their debts securities (Busch and Friede, 2018; Eliwa et al., 2021).

On the other hand, other studies assert that ESG rating does not have any significant impact on the price of debt. The researchers also point out that there are challenges in measuring this performance accurately and subjectivism is key when looking at ESG ratings thus leading to inconclusiveness (Goss and Roberts, 2009). Moreover, there is an ongoing debate about potential greenwashing and lack of standardization in reporting which creates doubts about accuracy of such data for creditors (Scholtens and Kang, 2013). This further complicates the interpretation of ESG ratings across sectors or even countries since there is no standard method for their computation.

The theoretical frameworks within which scholars discuss this issue offer some important insights into potential mechanisms and consequences. For example, stakeholder theory emphasizes considering all stakeholders beyond shareholders since strong ESG practices foster good relationships with different stakeholders hence reducing risks involved in business operations thereby probably lowering borrowing costs (Freeman and McVea, 2005). In essence this view suggests that companies with good practice will face fewer environmental or social controversies which can reduce their credit worthiness enabling them to get better lending terms.

Another perspective through which we can understand these issues is from signal processing theory. This implies that firms disclose ESG information to inform the external parties, especially the lenders that they are committed to sustainability and long-term prosperity (Ross, 1977). The reputational gains from disclosing ESG initiatives and achievements could lead to favourable lending terms for companies that can more effectively manage environmental, social and governance risks. Consequently, this would mean that lenders perceive such companies as low risk borrowers thereby reducing the cost of financing.

Given these complexities, empirical studies continue to investigate the relationship between ESG ratings and cost of debt to deliver finer insights towards policy makers and corporate managers. Combining theoretical analysis with empirical proof should help scholars to better understand how financial markets work when it comes financial decisions related to sustainability which eventually contributes towards development of sustainable finance.

Chapter 2: Implications and Hypothesis

The aim of this study is to explore whether companies with higher ESG ratings can lower their borrowing costs due to reduced risk exposure and an enhanced reputation from having sound ESG practices. This relationship, which has important implications for financial risk management strategies in firms, helps them align sustainability considerations with their overall financial decision-making process. This research also sheds light on the connection between ESG performance and borrowing costs, arguing that it can help organizations increase their financial performance while proactively managing environmental, social, and governance related risks.

Furthermore, this work discusses the relationship between ESG ratings and the cost of debt to examine if investors view well-performing ESG companies as less risky, hence leading to lower credit spreads on debt instruments. These findings are very useful for stakeholder engagement strategies which emphasize on transparent ESG reporting and robust stakeholder engagement initiatives. Finally, by indicating a dedication towards sustainable practices companies may establish trust from investors thereby decreasing their debt cost. Hence this study adds knowledge on how both financial risk management as well as corporate finance stakeholders perceive ESG concerns.

These conclusions could have major implications for market dynamics and regulatory frameworks governing disclosure and reporting of ESG. Therefore, policymakers must be informed about the effect of current regulatory attempts aimed at fostering sustainable finance through research such as this one that reveals the effect of these measures on the cost of public debt rankings. Moreover, it provides valuable evidence on how Euro Stoxx 100 Index-based firms make

corporate financing decisions given various factors of Corporate Social Responsibility (CSR). By providing empirical evidence on the financial outcomes from integrating environmental-sustainable-governance into business operations it contributes to existing literature about sustainability-ESG-corporate-finance nexus. Ultimately this research helps in advancing discussions around sustainable finance and responsible investment practices giving practical insights that can influence positive changes within corporations' behaviour or even legal rules themselves.

Based on the reviewed literature review presented previously in this work (Agliardi, 2021; Alessi et al., 2024; Billio et al., 2021; Flammer, 2021; Hillman and Keim, 2001; Ross, 1977; Van Binsbergen et al., 2010) we raised 4 Hypothesis.

Hypothesis 1 (H1): A firm's Overall ESG Score has positive impact on the cost of the debt (i.e., reduces a firm's borrowing costs)

The central hypothesis is that a firm's general ESG score has a positive effect on its debt expenses. This hypothesis suggests that corporations can reduce the cost of borrowing through better ESG performance in terms of environment, social and governance criteria. The study therefore sets out to examine companies' comprehensive ESG performance to establish how such practices impact the entire financial market.

If it can be generally established that a company's ESG Score leads to a lower cost of debt, it can also be expected that each of the sub-components of this ESG Score also leads to a reduction in the spread. Therefore, and focusing on the environmental component, the following hypothesis is put forward:

Hypothesis 2 (H2): A firm's Environmental ESG Score has positive impact on the cost of the debt (i.e., reduces a firm's borrowing costs)

This hypothesis narrows down to environmental aspect in ESG scores and states that there is a positive relationship between a company's environmental performance and its debt costs. According to it, firms with good environmental practices like minimizing the carbon footprints, efficient use of resources and controls for pollution gets good conditions when they are getting finances from lenders. Through empirical analysis, this paper aims at revealing how finance can be gained from being environmentally responsible.

Hypothesis 3 (H3): A firm's Social ESG Score has positive impact on the cost of the debt (i.e., reduces a firm's borrowing costs)

Accordingly, this hypothesis relates to the social part of ESG by stating that there is a positive correlation between a firm's social performance and its debt expenses. This implies that firms which have strong social initiatives including diversity as well as inclusion programs within them, community involvement or labour practices expend much less money on borrowing than others do. This research explores the social dimensions of ESG to demonstrate how socially responsible behaviour affects financially matters in the corporate sector.

Hypothesis 4 (H4): A firm's Corporate ESG Score has positive impact on the cost of the debt (i.e., reduces a firm's borrowing costs)

While focusing on governance establishments with regards to an organization's boardroom activities H4 postulates that governance policies

positively affect borrowings costs. This implies that businesses having proper governance frameworks like transparent decision-making processes and risk management measures pay less when borrowing money from banks. Through empirical investigation, this study aims at elucidating the financial benefits associated with strong corporate governance in debt markets.

Chapter 3: Data and Methodology

3.1 Sample Selection

Information on ESG and Cost of Debt was extracted from Refinitiv Eikon, a comprehensive financial data platform widely used by investors and researchers (Eikon, 2024). This dataset encompasses 92 companies listed on the STOXX All Europe 100 Index, covering a diverse range of sectors and industries across Europe. The data was collected for a five-year analyses period ranging from 2018 to 2022.

Table 1 shows that there is considerable diversity both in terms of the cost of debt and ESG scores among different nations. For instance, countries like Russia exhibit higher average costs of debt (6.2%) compared to countries like Norway, where the average cost of debt is notably lower (0.8%). This discrepancy suggests potential variations in risk profiles, economic stability, and market conditions among these nations. Furthermore, there is variability in average ESG scores across countries, with Italy boasting a high average ESG score of 89, while Russia presents a comparatively lower score of 70. Surprisingly, although their social and environmental scores tend to be high on average, governance scores seem lower. This trend demonstrates how differently companies approach sustainability and governance issues as shown by this survey data.

The dataset also highlights the prominence of certain countries within the sample. Specifically, France, Germany, Italy, Spain, Switzerland, and the United Kingdom emerge as the most heavily represented nations, suggesting their significance within the European market landscape. Moreover, the ranges of total assets and total debt across firms in the sample illustrate differences in financial

size and leverage within our dataset. These variations may reflect disparities in corporate strategies or structures of capital or rather overall health of finances within these businesses.

Table 2 reveals notable variations both within and across industries. For instance, industries like Pharmaceuticals and Industrial Automation exhibit relatively higher average ESG scores (both 91) alongside moderate to high average costs of debt (4.09% and 2.75%, respectively). This suggests a potential correlation between robust ESG practices and higher borrowing costs within these sectors. Conversely, industries such as Construction and Eyewear and Optics demonstrate lower average ESG scores (83 and 71, respectively) alongside comparatively lower average costs of debt (2.76% and 2.56%, respectively).

Social and environmental scores generally outpace governance scores across industries, suggesting a stronger emphasis on social and environmental sustainability practices compared to governance standards. Among the industries examined, financial services and oil and gas have the highest representation, with 22 and 9 companies, respectively, included in the dataset. This highlights the significance of these sectors within the European market.

Countries	Companies	Avg Cost of Debt	Avg ESG Score	Avg Social Score	Avg Governance Score	Avg Environmental Score	Total Debt (€ million)	Total Assets (€ million)
Australia	1	3,7%	89	88	97	84	15 673 €	90 790 €
Belgium	1	5,0%	78	74	83	83	74 745 €	198 974 €
Denmark	1	3,0%	80	92	58	83	3 468 €	32 451 €
Finland	1	3,2%	75	69	84	73	185 204 €	594 729 €
France	18	2,8%	81	83	76	82	652 581 €	6 225 840 €
Germany	13	3,3%	84	86	78	86	960 036 €	4 617 187 €
Italy	5	2,8%	89	89	88	92	361 443 €	2 707 357 €
Netherlands	5	3,3%	83	86	83	81	231 418 €	1 529 114 €
Norway	1	0,8%	76	72	86	76	30 057 €	147 655 €
Russia	5	6,2%	70	78	53	73	107 204 €	900 515 €
Spain	5	3,0%	84	93	68	88	443 665 €	2 740 005 €
Sweden	3	3,0%	82	87	75	84	28 855 €	104 536 €
Switzerland	8	3,3%	86	86	85	85	366 427 €	1 916 949 €
United Kingdom	25	4,3%	79	83	74	79	1 058 016 €	7 901 041 €

Table 1 - Geographical Distribution

Industry	Companies	Avg Cost of Debt	Avg ESG Score	Avg Social Score	Avg Governance Score	Avg Environmental Score
Automotive	4	3,16%	88	91	78	91
Beverages	3	3,96%	74	76	61	80
Chemicals	1	2,76%	90	94	78	92
Consumer Goods	2	3,57%	87	91	78	87
Cosmetics and Beauty	1	2,34%	85	83	84	96
Electrical Equipment	1	2,68%	77	83	77	69
Eyewear and Optics	1	2,56%	71	79	60	71
Food and Beverage	3	3,20%	78	87	66	78
Healthcare/Electronics	1	3,55%	84	94	73	81
Industrial Automation	1	2,75%	91	89	87	97
Industrial Conglomerate	1	3,95%	83	82	79	88
Industrial Gases	1	2,68%	85	93	96	71
Luxury Goods	2	2,63%	76	82	61	81
Media/Entertainment	1	2,90%	85	89	80	81
Oil and Gas	9	4,04%	82	84	83	79
Pharmaceuticals	7	4,09%	91	96	85	89
Real Estate/Property Management	1	3,29%	90	94	88	88
Semiconductor Manufacturing Equipment	1	3,55%	73	82	73	63
Software/Technology	1	2,56%	89	91	92	75
Telecommunications	6	3,90%	80	87	67	78
Tobacco	2	4,48%	86	83	88	88
Utilities/Energy	8	3,62%	75	76	73	76
Construction	1	2,76%				
Construction	1	2,52%	83	71	84	95
Financial Services	22	3,21%	84	83	83	86
Mining	5	4,83%	79	86	68	79
Retail	3	3,16%	77	86	62	86
Total Geral	92	3,57%	82	85	77	83

Table 2 - Industry Distribution

3.2 Variables and Regression models

3.2.1 Regression Model

To rigorously examine the hypotheses concerning the influence of Environmental, Social, and Governance (ESG) scores on the cost of debt, a comprehensive analysis was conducted through a series of panel data regressions. The regressions were conducted using panel data analysis techniques, specifically employing the fixed effects (FE) estimator.

Panel data analysis is advantageous as it allows for the examination of both cross-sectional and time-series variations within the data, offering more robust estimates by controlling for unobserved heterogeneity at the individual company level (Yaffee, 2003).

The fixed effects model accounts for individual company-specific characteristics that remain constant over time but may influence the dependent variable, in this case, the cost of debt. By including fixed effects, we control for these unobserved heterogeneities, such as management quality, industry-specific factors, or company-specific policies, which may affect the cost of debt (Bell and Jones, 2015).

Standard errors were clustered by firm to account for potential heteroskedasticity and serial correlation within firms, ensuring robust and efficient estimation. This clustering approach acknowledges that observations within the same firm may be correlated due to unobserved firm-specific characteristics.

The model utilized in this study is articulated as follows:

$$Costofdebti = \beta 0 + \beta 1 ESGScorei + \beta 2 Totaldebti + \beta 3 Totalassesti + \beta 4 Debtototalassetsi + \beta 5 Returnonassetsi + \beta 6 Inflationi + \beta 7 Countryriski + \alpha i \quad (1)$$

To address the hypotheses, a total of 18 regression models were estimated, each examining different combinations of ESG scores (overall, environmental,

social, governance) at three distinct time points (t, t1 and t2). These regressions aimed to scrutinize the hypotheses mentioned above.

To ensure the robustness of the findings, several control variables were incorporated into the model, including total debt, total assets, debt to total assets ratio, return on assets, inflation, and country risk. This rigorous approach aimed to provide comprehensive insights into the relationship between ESG performance and the cost of debt across different dimensions and time periods.

3.2.2 Variables

Table 3 presents the key variables used. The table includes the dependent variable, the independent variables, and the control variables.

The dependent variable, "Cost of debt," sourced from Refinitiv Eikon, encapsulates the financial outlay a company undergoes when procuring funds through debt instruments, including loans or bonds, conventionally depicted as an interest rate. This metric is denoted as a percentage. It denotes the incremental expense incurred by the company in issuing new debt presently. The computation of the cost of debt involves aggregating the weighted costs of short-term and long-term debt, ascertained based on the 1-year and 10-year reference points from an appropriate credit curve. By incorporating both short-term and long-term debt obligations, this metric offers a comprehensive assessment of the financial burden imposed on the company through debt financing, thereby providing insights into its overall capital structure and financing decisions.

The independent variables encompass Environmental, Social, and Governance (ESG) scores, each measured at different time points to analyse their impact on the cost of debt. ESG Score (t) represents the current year's

comprehensive assessment of a company's performance and risk in environmental sustainability, social responsibility, and corporate governance, sourced from Refinitiv Eikon. Lagged scores, (t-1) and (t-2), reflect the corresponding scores from the previous year and two years prior, respectively, providing insight into the trend and persistence of ESG performance over time.

Social Score (t), Social Score (t-1), and Social Score (t-2) gauge a company's social performance in various domains such Diversity, Salary Gap, Women Managers, Management Departures, Employment Creation and Total injury Rate. Likewise, Governance Score (t), Governance Score (t-1), and Governance Score (t-2) evaluate the governance practices of the company, including Audit and Compensation Committee Independence, Board Structure Type, Independent Board Members, Average Board Tenure and Board Gender Diversity. Furthermore, Environmental Score (t), Environmental Score (t-1), and Environmental Score (t-2) measure the company's environmental impact, encompassing factors such as Resource Reduction Policy, Total Energy Use, Total Water Use, Estimated CO2 Equivalents Emissions, Total Waste and Waste Recycled To Total Waste.

These independent variables collectively provide a comprehensive framework to analyse how ESG performance, social responsibility, and governance practices influence the cost of debt over time.

The control variables employed in the analysis encompass various financial, operational, and macroeconomic factors that may influence the cost of debt and ESG performance. Total Debt represents the aggregate amount of debt obligations, including both short-term and long-term debts, indicating the company's debt burden. Total Assets denote the total value of assets owned by

the company, reflecting its resource base and investment in operations. Debt to Total Assets ratio quantifies the proportion of the company's assets financed by debt, providing insights into its leverage level and financial risk. Net Income before Taxes measures the company's profitability before accounting for taxes, reflecting its operational efficiency and financial performance. Return on Assets quantifies the company's efficiency in generating profits from its assets, offering insights into its operational effectiveness. Inflation denotes the rate at which prices for goods and services are rising within the economy, influencing the purchasing power of money and financial conditions. Finally, Country Risk, sourced from Moody's, gauges the level of risk associated with investing in a particular country, encompassing factors such as political stability, economic conditions, and regulatory environment (Moody’s, 2024). These control variables are crucial in controlling for various factors that may mistake the relationship between ESG performance and the cost of debt, thereby ensuring the robustness and reliability of the analysis.

Variable Type	Variable	Source	Description
Dependent variable	Cost of debt	Refinitv Eikon	The cost a company incurs by borrowing funds through debt instruments, such as loans or bonds, typically represented as an interest rate.
Independent Variable	ESG Score t	Refinitv Eikon	Environmental, Social, and Governance (ESG) score for the current year, measuring a company's performance and risk in environmental sustainability, social responsibility, and corporate governance.
Independent Variable	ESG Score t-1	Refinitv Eikon	ESG score for the previous year (lagged one year)
Independent Variable	ESG Score t-2	Refinitv Eikon	ESG score for two years prior (lagged two years)
Independent Variable	Social Score t	Refinitv Eikon	Social score for the current year, assessing a company's social performance in areas such as labour practices, community engagement, and diversity and inclusion efforts.
Independent Variable	Social Score t-1	Refinitv Eikon	Social score for the previous year (lagged one year).
Independent Variable	Social Score t-2	Refinitv Eikon	Social score for two years prior (lagged two years).
Independent Variable	Governance Score t	Refinitv Eikon	Governance score for the current year, evaluating a company's governance practices including board structure, executive compensation, and transparency.
Independent Variable	Governance Score t-1	Refinitv Eikon	Governance score for the previous year (lagged one year).
Independent Variable	Governance Score t-2	Refinitv Eikon	Governance score for two years prior (lagged two years).
Independent Variable	Environmental Score t	Refinitv Eikon	Environmental score for the current year, assessing a company's environmental impact including energy efficiency, emissions reduction, and resource conservation.
Independent Variable	Environmental Score t-1	Refinitv Eikon	Environmental score for the previous year (lagged one year).
Independent Variable	Environmental Score t-2	Refinitv Eikon	Environmental score for two years prior (lagged two years).
Control Variable	Total Debt	Refinitv Eikon	The total amount of debt owed by the company, including short-term and long-term debt obligations.
Control Variable	Total Assets	Refinitv Eikon	The total value of all assets owned by the company, representing its resource base and investment in operations.
Control Variable	Debt to Total Assets	Refinitv Eikon	A financial ratio measuring the proportion of a company's assets financed by debt, indicating its leverage level.
Control Variable	Net Income before Taxes	Refinitv Eikon	The company's profit before accounting for taxes, reflecting its operational profitability.
Control Variable	Return on Assets	Refinitv Eikon	A financial ratio measuring the company's efficiency in generating profits from its assets.
Control Variable	Inflation	Refinitv Eikon	The rate at which the general level of prices for goods and services is rising within an economy, affecting the purchasing power of money.
Control Variable	Country Risk	Moody's	The level of risk associated with investing in a particular country, influenced by factors such as political stability, economic conditions, and regulatory environment.

Table 3 - Variables Detail (Refinitv Eikon,2024; Moody's,2024)

In terms of the dataset, it comprises 460 observations, each identified by a unique ID ranging from 1 to 92. The presence of multiple observations associated with certain IDs suggests potential repeated measures or the representation of various entities within the dataset.

Analysis of Environmental, Social, and Governance (ESG) scores reveals variations across observations. ESG scores for the periods t, t-1, and t-2 exhibit average values ranging from approximately 79 to 81, with slight fluctuations between consecutive periods. These observations imply a consistent, albeit fluctuating, level of ESG performance over time.

Similarly, Social, Governance, and Environmental scores display diversity across observations, with average scores ranging from the mid-70s to mid-80s. This suggests varying degrees of social responsibility, governance practices, and environmental sustainability among the entities represented in the dataset.

Financial metrics, including Cost of Debt, Total Debt, Total Assets, Debt to Total Assets ratio, Net Income before Taxes, and Return on Assets, demonstrate considerable variability. The Cost of Debt, averaging around 0.02, indicates a relatively low borrowing cost on average. Total Debt and Total Assets exhibit wide ranges, reflecting differences in financial scales among entities. The Debt to Total Assets ratio, averaging around 0.25, suggests moderate leverage levels. Net Income before Taxes varies significantly, encompassing negative to positive values and indicating diverse profitability levels. Return on Assets, averaging approximately 0.06, suggests a positive return on investment, albeit with notable dispersion.

Inflation rates are relatively low, with an average around 0.02, indicating a stable or subdued inflationary environment. Country Risk scores range from 1 to 11, with an average of approximately 3.61, illustrating varying levels of risk exposure across different countries.

In essence, the dataset provides comprehensive insights into ESG performance, financial metrics, and macroeconomic indicators across multiple observations. Further analysis, particularly with additional contextual information, would enhance the understanding and interpretation of the dataset's implications.

Variable	Observations	Mean	Std. dev.	Min	Max
Cost of Debt (%)	451	0,02	0,02	0,00	0,19
ESG Score t	448	81,06	10,31	20,38	95,77
ESG Score t-1	458	80,31	11,05	20,38	95,77
ESG Score t-2	460	79,27	11,63	20,38	95,74
Social Score t	448	84,08	11,86	7,77	98,14
Social Score t-1	458	83,72	12,45	7,77	98,14
Social Score t-2	460	82,97	13,11	7,77	98,20
Governance Score t	448	76,35	16,10	10,16	98,14
Governance Score t-1	458	74,92	16,94	10,16	98,14
Governance Score t-2	460	73,11	17,70	10,16	98,14
Environmental Score t	448	81,17	13,75	33,50	99,13
Environmental Score t-1	458	80,83	14,17	33,50	99,13
Environmental Score t-2	460	80,41	14,38	33,50	99,13
Total Debt (€ millions)	457	51.436,62	67.511,29	16,00	405.708,89
Total Assets (€ millions)	457	307.774,13	482.842,85	4.709,00	2.755.812,84
Debt to Total Assets (%)	457	0,25	0,14	0,00	0,69
Net Income before Taxes (€ millions)	457	6.065,71	7.741,20	-22.080,58	73.447,58
Return on Assets (%)	457	0,06	0,08	-0,20	0,50
Inflation (%)	451	0,02	0,01	0,00	0,06
Country Risk	460	3,61	2,92	1,00	11,00

Table 4 - Descriptive Statistics

Note: The ESG, Social, Environmental and Governance Score range from 0 to 100 where 100 is the best score possible and 0 the worst. Country Risk from Moody's Ranges from 1 to 21 where 1 represents the lowest risk (Aaa) and 21 represents the highest risk (C).

Chapter 4: Results

4.1 Regressions Main Results

The regression analysis assessed the impact of ESG (Environmental, Social, and Governance) scores on the cost of debt, along with other financial and macroeconomic variables as control variables. Starting with the ESG Score, we observe that the coefficient estimates for ESG Score across all time periods (t, t-1, t-2) are consistently zero and not statistically significant. For instance, in the first regression, the coefficient for ESG Score at time t is 0.000 with a p-value of 0.766, indicating that the relationship between ESG Score and the cost of debt is not statistically significant. Similarly, in the second and third regression, the coefficients for ESG Score at time t-1 and t-2 also fail to reach statistical significance, with p-values of 0.470 and 0.453, respectively. Furthermore, the adjusted R-squared values for these models, ranging from 0.257 to 0.290, suggest that ESG Score explains only a small proportion of the variability in the cost of debt.

Moving on to the individual components of ESG, namely Social, Environmental, and Governance scores, we find similar patterns. The coefficient estimates for Social Score across all time periods exhibit near-zero values with p-values well above the conventional significance level of 0.05. For example, in the fourth regression, the coefficient for Social Score at time t is 0.000 with a p-value of 0.955, indicating a lack of statistical significance. This trend persists across regressions number five and six, with coefficients for Social Score at time t-1 and t-2 failing to achieve significance as well. The adjusted R-squared values for these models hover around 0.263 to 0.293, suggesting limited explanatory power of Social Score in predicting the cost of debt.

Similarly, the coefficients for Environmental Score and Governance Score also lack statistical significance across different time periods. In Regression number seven, the coefficient for Environmental Score at time t is 0.000 with a p-value of 0.472, while the coefficient for Governance Score is 0.000 with a p-value of 0.319. However, the coefficient for Environmental Score at time t-1 exhibits a slightly lower p-value of 0.074, with statistical significance at 0.1 level. The adjusted R-squared values for these models remain relatively low, indicating that neither Environmental nor Governance scores significantly explain the variation in the cost of debt.

Examining the combined impact of Social, Environmental, and Governance scores on the cost of debt (Table 10), we observe consistent trends. Across all models and time periods, the coefficients for these scores fail to achieve statistical significance, with p-values exceeding 0.1. Despite slight fluctuations in coefficient estimates across different models, none of the coefficients are statistically significant predictors of the cost of debt. Additionally, the adjusted R-squared values for these models remain modest, suggesting limited explanatory power of the combined ESG scores.

In conclusion, the regression analysis indicates that there is no statistically significant relationship between ESG scores (both individual components and combined) and the cost of debt in the observed dataset. While ESG considerations are increasingly emphasized in investment decision-making, particularly in the context of sustainability and corporate responsibility, these findings suggest that ESG scores may not significantly influence the borrowing costs for firms in this particular sample.

Regression	Description
1st Regression	The impact on cost of debt of the ESG Total Score
2nd Regression	The impact on cost of debt of the ESG Total Score of the previous year
3rd Regression	The impact on cost of debt of the ESG Total Score 2 years lagged
4th Regression	The impact on cost of debt of the ESG Social Score
5th Regression	The impact on cost of debt of the ESG Social Score of the previous year
6th Regression	The impact on cost of debt of the ESG Social Score 2 years lagged
7th Regression	The impact on cost of debt of the ESG Environmental Score
8th Regression	The impact on cost of debt of the ESG Environmental Score of the previous year
9th Regression	The impact on cost of debt of the ESG Environmental Score 2 years lagged
10th Regression	The impact on cost of debt of the ESG Governance Score
11th Regression	The impact on cost of debt of the ESG Governance Score of the previous year
12th Regression	The impact on cost of debt of the ESG Governance Score 2 years lagged
13th Regression	The impact on cost of debt of the ESG Social, Environmental and Governance Score
14th Regression	The impact on cost of debt of the ESG Social, Environmental and Governance Score of the previous year
15th Regression	The impact on cost of debt of the ESG Social, Environmental and Governance Score 2 years lagged

Table 5 - Regression Numbering

	Fixed -Effects		
Variables	**Cost of Debt (1)**	**Cost of Debt (2)**	**Cost of Debt (3)**
ESG Score t	0.000 (0.766)		
ESG Score t-1		0.000 (0.470)	
ESG Score t-2			0.000 (0.453)
Total Debt	0.000 (0.188)	0.000 (0.167)	0.000 (0.169)
Total Assets	0.000 (0.320)	0.000 (0.455)	0.000 (0.554)
Debt to Total Assets	0.000 (0.301)	0.017 (0.300)	0.015 (0.356)
Return on Assets	-0.062 *** (0.000)	-0.064 *** (0.000)	-0.064 *** (0.000)
Inflation	0.977 *** (0.000)	0.974 *** (0.000)	0.964 *** (0.000)
Country Risk	0.003 * (0.050)	0.003 * (0.062)	0.003 * (0.066)
Adj.R-squared	0.257	0.280	0.290
N	439	447	448

Table 6 - Impact on cost of debt of the ESG Total Score (t, t-1, t-2)

Note: ***, ** and * indicate that the reported coefficients are significantly different from zero at the 1%, 5% and 10% levels, respectively

	Fixed -Effects					
Variables	**Cost of Debt (4)**		**Cost of Debt (5)**		**Cost of Debt (6)**	
Social Score t	0.000 (0.955)					
Social Score t-1			0.000 (0.413)			
Social Score t-2					0.000 (0.783)	
Total Debt	0.000 (0.200)		0.000 (0.146)		0.000 (0.154)	
Total Assets	0.000 (0.340)		0.000 (0.462)		0.000 (0.516)	
Debt to Total Assets	0.017 (0.321)		0.018 (0.259)		0.0160 (0.318)	
Return on Assets	-0.063 (0.000)	***	-0.063 (0.000)	***	-0.063 (0.000)	***
Inflation	0.975 (0.000)	***	0.976 (0.000)	***	0.965 (0.000)	***
Country Risk	0.003 (0.044)	**	0.003 (0.048)	**	0.003 (0.046)	**
Adj.R-squared	0.263		0.283		0.293	
N	439		447		448	

Table 7 - Impact on cost of debt of the ESG Social Score (t, t-1, t-2)
Note: ***, ** and * indicate that the reported coefficients are significantly different from zero at the 1%, 5% and 10% levels, respectively

	Fixed -Effects					
Variables	**Cost of Debt (7)**		**Cost of Debt (8)**		**Cost of Debt (9)**	
Environmental Score t	0.000 (0.472)					
Environmental Score t-1			0.000 (0.074)	*		
Environmental Score t-2					0.000 (0.769)	
Total Debt	0.000 (0.216)		0.000 (0.191)		0.000 (0.152)	
Total Assets	0.000 (0.409)		0.000 (0.410)		0.000 (0.526)	
Debt to Total Assets	0.015 (0.344)		0.017 (0.297)		0.016 (0.326)	
Return on Assets	-0.063 (0.000)	***	-0.065 (0.000)	***	-0.063 (0.000)	***
Inflation	0.977 (0.000)	***	0.986 (0.000)	***	0.963 (0.000)	***
Country Risk	0.003 (0.035)	**	0.003 (0.034)	**	0.003 (0.041)	**
Adj.R-squared	0.273		0.299		0.289	
N	439		447		448	

Table 8 - Impact on cost of debt of the ESG Environmental Score (t, t-1, t-2)
Note: ***, ** and * indicate that the reported coefficients are significantly different from zero at the 1%, 5% and 10% levels, respectively

Fixed -Effects						
Variables	**Cost of Debt (10)**		**Cost of Debt (11)**		**Cost of Debt (12)**	
Governance Score t	0.000 (0.319)					
Governance Score t-1			0.000 (0.185)			
Governance Score t-2					0.000 (0.540)	
Total Debt	0.000 (0.206)		0.000 (0.200)		0.000 (0.181)	
Total Assets	0.000 (0.333)		0.000 (0.459)		0.000 (0.500)	
Debt to Total Assets	0.015 (0.344)		0.014 (0.390)		0.014 (0.387)	
Return on Assets	-0.063 (0.000)	***	-0.065 (0.000)	***	-0.064 (0.000)	***
Inflation	0.982 (0.000)	***	0.974 (0.000)	***	0.962 (0.000)	***
Country Risk	0.003 (0.053)	*	0.003 (0.077)	*	0.003 (0.063)	*
Adj.R-squared	0.258		0.283		0.291	
N	439		447		448	

Table 9 - Impact on cost of debt of the ESG Governance Score (t, t-1, t-2)

Note: ***, ** and * indicate that the reported coefficients are significantly different from zero at the 1%, 5% and 10% levels, respectively

Fixed -Effects						
Variables	**Cost of Debt (13)**		**Cost of Debt (14)**		**Cost of Debt (15)**	
Social Score t	0.000 (0.972)					
Environmental Score t	0.000 (0.460)					
Governance Score t	0.000 (0.312)					
Social Score t-1			0.000 (0.367)			
Environmental Score t-1			0.000 (0.075)	*		
Governance Score t-1			0.000 (0.258)			
Social Score t-2					0.000 (0.826)	
Environmental Score t-2					0.000 (0.753)	
Governance Score t-2					0.000 (0.529)	
Total Debt	0.000 (0.233)		0.000 (0.178)		0.000 (0.174)	
Total Assets	0.000 (0.413)		0.000 (0.433)		0.000 (0.561)	
Debt to Total Assets	0.014 (0.385)		0.016 (0.313)		0.014 (0.390)	
Return on Assets	-0.063 (0.000)	***	-0.066 (0.000)	***	-0.064 (0.000)	***
Inflation	0.983 (0.000)	***	0.990 (0.000)	***	0.962 (0.000)	***
Country Risk	0.003 (0.042)	**	0.003 (0.063)	*	0.003 (0.066)	*
Adj.R-squared	0.270		0.299		0.288	
N	439		447		448	

Table 10 - Impact on cost of debt of the Social, Environmental and Governance Score (t, t-1, t-2)
Note: ***, ** and * indicate that the reported coefficients are significantly different from zero at the 1%, 5% and 10% levels, respectively

4.2 Other Analysis

To assess for collinearity issues, a correlation matrix was constructed. The correlation matrix analysis reveals that the variables ESG Score t, Social Score t, Environmental Score t, and Governance Score t are closely related measures that collectively assess different dimensions of environmental, social, and governance (ESG) performance. The correlation analysis reveals strong positive correlations between ESG Score t and Social Score t, as well as between ESG Score t and Environmental Score t, indicating that companies with higher overall ESG scores tend to also have higher social and environmental scores. Additionally, moderate positive correlations are observed between ESG Score t and Governance Score t. However, the correlation coefficients between Social Score t and Environmental

Score t, as well as Social Score t and Governance Score t, are lower, suggesting some differentiation between social factors and environmental/governance factors. These high correlations raise concerns about multicollinearity, which can undermine the reliability of regression analysis by inflating standard errors and obscuring the individual effects of predictor variables.

	Esg Score t	Social Score t	Environmental Score t	Governance Score t
Esg Score t	1.0000			
Social Score t	0.8338	1.0000		
Environmental Score t	0.7201	0.5189	1.0000	
Governance Score t	0.06856	0.3291	0.2302	1.0000

Table 11 - Correlation Matrix

Conclusion

In this dissertation, with the purpose of understanding the relationship between ESG and Cost of Debt, four main questions were raised: (i) A firm's Overall ESG Score has positive impact on the cost of the debt (i.e., reduces a firm's borrowing costs)?; (ii) A firm's Environmental ESG Score has positive impact on the cost of the debt (i.e., reduces a firm's borrowing costs); (iii) A firm's Social ESG Score has positive impact on the cost of the Debt (i.e., reduces a firm's borrowing costs)? and (iv) A firm's Corporate ESG Score has positive impact on the cost of the debt (i.e., reduces a firm's borrowing costs)? A Sample of 92 companies listed on the STOXX All Europe 100 Index, covering a diverse range of sectors and industries across Europe was collected for a five-year analyses period ranging from 2018 to 2022 was used.

Our findings reject all four hypotheses, indicating that the regression coefficients for the overall ESG score were negative across all models, indicating a potential inverse relationship with the cost of debt. However, none of these coefficients were statistically significant ($p > 0.05$), suggesting that variations in the overall ESG performance of companies do not consistently influence their cost of debt. Further disaggregation of ESG scores into environmental, social, and governance dimensions revealed similar findings. The coefficients for each dimension were close to zero and not statistically significant, indicating that specific aspects of ESG performance do not reliably affect borrowing costs. Lagged ESG scores, representing historical performance, were also included in the analysis to assess their predictive power on future borrowing costs. However, similar to current ESG scores, lagged scores did not demonstrate a significant relationship with the cost of debt, suggesting that past ESG performance does not predict future borrowing costs.

In terms, of overall implications, the findings of this dissertation indicate that while ESG considerations are increasingly important for firms in terms of sustainability and stakeholder engagement, they may not significantly impact the cost of debt. These results highlight the need for further research to explore the nuanced relationship between ESG performance and financial metrics, considering sectoral variations and evolving market dynamics. Additionally, the study underscores the importance of robust methodology and sensitivity analyses in drawing reliable conclusions from empirical research in the field of finance and sustainability.

References

Agliardi, E. (2021). Corporate Green Bonds: Understanding the Greenium in a Two-Factor Structural Model. *Environmental and Resource Economics*, *80*(2), 257–278. https://doi.org/10.1007/s10640-021-00585-7

Alessi, L., Battiston, S., & Kvedaras, V. (2024). Over with carbon? Investors' reaction to the Paris Agreement and the US withdrawal. *Journal of Financial Stability*, 101232. https://doi.org/10.1016/j.jfs.2024.101232

Anyfantaki, S., Migiakis, P., & Paisiou, K. (2022). Green finance in Europe: actors and challenges. *Economic Bulletin*, 83–106. https://doi.org/10.52903/econbull20225504

Aupperle, K. E., Carroll, A. B., & Hatfield, J. D. (1985). An Empirical Examination of the Relationship between Corporate Social Responsibility and Profitability. In *Source: The Academy of Management Journal* (Vol. 28, Issue 2). https://www.jstor.org/stable/256210?seq=1&cid=pdf-

Barro, D., Corazza, M., & Filograsso, G. (2023). *A ESG rating model for European SMEs using multi-criteria decision aiding*. http://www.unive.it/pag/16882/

Bell, A., & Jones, K. (2015). Explaining Fixed Effects: Random Effects Modeling of Time-Series Cross-Sectional and Panel Data. *Political Science Research and Methods*, *3*(1), 133–153. https://doi.org/10.1017/psrm.2014.7

Bellucci, A., Fatica, S., Georgakaki, A., Gucciardi, G., Letout, S., & Pasimeni, F. (2023). Venture Capital Financing and Green Patenting. *Industry and Innovation*, *30*(7), 947–983. https://doi.org/10.1080/13662716.2023.2228717

Berg, F., Koelbel, J. F., Rigobon, R., Sloan, M., Jay, J., Kaminski, K., Orts, E., Eccles, R., Le Pen, Y., King, A., & Busch, T. (2019). *MIT Sloan School of Management Aggregate Confusion: The Divergence of ESG Ratings Aggregate Confusion: The Divergence of ESG Ratings. * We thank*.

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Billio, M., Costola, M., Hristova, I., Latino, C., & Pelizzon, L. (2021a). Inside the ESG ratings: (Dis)agreement and performance. *Corporate Social Responsibility and Environmental Management*, *28*(5), 1426–1445. https://doi.org/10.1002/csr.2177

Billio, M., Costola, M., Hristova, I., Latino, C., & Pelizzon, L. (2021b). Inside the ESG ratings: (Dis)agreement and performance. *Corporate Social Responsibility and Environmental Management*, *28*(5), 1426–1445. https://doi.org/10.1002/csr.2177

Bodie, Zvi., Kane, A., & Marcus, A. J. (2013). *Essentials of investments*. McGraw-Hill/Irwin.

Brammer, S., & Millington, A. (2008). Does it pay to be different? An analysis of the relationship between corporate social and financial performance. *Strategic Management Journal*, *29*(12), 1325–1343. https://doi.org/10.1002/smj.714

Busch, T., & Friede, G. (2018). The robustness of the corporate social and financial performance relation: A second-order meta-analysis. *Corporate Social Responsibility and Environmental Management*, *25*(4), 583–608. https://doi.org/10.1002/csr.1480

Caporin, M., Fontini, F., & Panzica, R. (2023). The systemic risk of US oil and natural gas companies. *Energy Economics*, *121*. https://doi.org/10.1016/j.eneco.2023.106650

Cheng, B., Ioannou, I., & Serafeim, G. (2012). *CORPORATE SOCIAL RESPONSIBILITY AND ACCESS TO FINANCE*. http://ssrn.com/abstract=1847085Electroniccopyavailableat:http://ssrn.com/abstract=1847085

Commission, E. (2020). *FAQ: What is the EU Taxonomy and how will it work in practice?*

Copeland, T. E., & Weston, J. F. (John F. (1988). *Financial theory and corporate policy*. Addison-Wesley.

Cornell, B. (2021). ESG preferences, risk and return. *European Financial Management*, *27*(1), 12–19. https://doi.org/10.1111/eufm.12295

Eikon, R. (2023). *Refinitiv Eikon*. Retrieved from Refinitiv Eikon: https://www.refinitiv.com/

Ehrhardt, M. C., & Brigham, E. F. (2016). *Financial Management*.

Eliwa, Y., Aboud, A., & Saleh, A. (2021). ESG practices and the cost of debt: Evidence from EU countries. *Critical Perspectives on Accounting*, *79*. https://doi.org/10.1016/j.cpa.2019.102097

Erragragui, E. (2018). Do creditors price firms' environmental, social and governance risks? *Research in International Business and Finance*, *45*, 197–207. https://doi.org/10.1016/j.ribaf.2017.07.151

Fabozzi, F. J., Modigliani, F., Jones, F. J., & Ferri, M. G. (2013). *Foundations of Financial Markets and Institutions*.

Fama, E. F. (2020). *Contract Costs, Stakeholder Capitalism, and ESG*. http://ssrn.com/abstract=3722179Electroniccopyavailableat:https://ssrn.com/abstract=3722179

Finger, M., & Rosenboim, M. (2022). Going ESG: The Economic Value of Adopting an ESG Policy. *Sustainability (Switzerland)*, *14*(21). https://doi.org/10.3390/su142113917

Flammer, C. (2015). Does corporate social responsibility lead to superior financial performance? A regression discontinuity approach. *Management Science*, *61*(11), 2549–2568. https://doi.org/10.1287/mnsc.2014.2038

Flammer, C. (2021a). Corporate green bonds. *Journal of Financial Economics*, *142*(2), 499–516. https://doi.org/10.1016/j.jfineco.2021.01.010

Flammer, C. (2021b). Corporate green bonds. *Journal of Financial Economics*, *142*(2), 499–516. https://doi.org/10.1016/j.jfineco.2021.01.010

Freeman, R. E. E., & McVea, J. (2005). A Stakeholder Approach to Strategic Management. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.263511

Ghoul, S. El, Guedhami, O., Kwok, C. C. Y., & Mishra, D. R. (2011). *Does corporate social responsibility affect the cost of capital?* http://ssrn.com/abstract=1546755Electroniccopyavailableat:https://ssrn.com/abstract=1546755Electroniccopyavailableat:http://ssrn.com/abstract=1546755

Goss, A., & Roberts, G. S. (2009). *The Impact of Corporate Social Responsibility on the Cost of Bank Loans*.

Hart, S. L. (1995). A Natural-Resource-Based View of the Firm. In *Source: The Academy of Management Review* (Vol. 20, Issue 4). https://www.jstor.org/stable/258963

Henisz, W., Koller, T., & Nuttall, R. (2019). *Five ways that ESG creates value Getting your environmental, social, and governance (ESG) proposition right links to higher value creation. Here's why*.

Hillman, A. J., & Keim, G. D. (2001). Shareholder Value, Stakeholder Management, and Social Issues: What's the Bottom Line? In *Management Journal* (Vol. 22, Issue 2). https://about.jstor.org/terms

Ioannou, I., & Serafeim, G. (2012). What drives corporate social performance? The role of nation-level institutions. In *Source: Journal of International Business Studies* (Vol. 43, Issue 9). https://www.jstor.org/stable/41674526

Jones, T. M. (1995). Instrumental Stakeholder Theory: A Synthesis of Ethics and Economics. In *Source: The Academy of Management Review* (Vol. 20, Issue 2). https://www.jstor.org/stable/258852

Moody's. (2024). *Country Risk Service*. Retrieved from Moody's: https://www.moodysanalytics.com/product-list/country-risk-service

Liang, H., & Renneboog, L. (2017). On the Foundations of Corporate Social Responsibility. *Journal of Finance*, *72*(2), 853–910. https://doi.org/10.1111/jofi.12487

Park, J. H., Park, H. Y., & Lee, H. Y. (2018). The effect of social ties between outside and inside directors on the association between corporate social responsibility and firm value. *Sustainability (Switzerland)*, *10*(11). https://doi.org/10.3390/su10113840

Porter, M. E., & Kramer, M. R. (2011). *HBR.ORG The Big idea Creating Shared Value how to reinvent capitalism-and unleash a wave of innovation and growth*.

Ramelli, S., Ossola, E., & Rancan, M. (2021). Stock price effects of climate activism: Evidence from the first Global Climate Strike. *Journal of Corporate Finance*, *69*, 102018. https://doi.org/10.1016/j.jcorpfin.2021.102018

Reboredo, J. C., Ugolini, A., & Ojea-Ferreiro, J. (2022). Do green bonds de-risk investment in low-carbon stocks? *Economic Modelling*, *108*. https://doi.org/10.1016/j.econmod.2022.105765

Ross. (1977). The Determination of Financial Structure: The Incentive-Signalling Approach. In *Source: The Bell Journal of Economics* (Vol. 8, Issue 1). https://www.jstor.org/stable/3003485

Ross, S. A., Westerfield, R. W., & Jordan, B. D. (2018). *Essentials of Corporate Finance*.

Santos, C., Coelho, A., & Marques, A. (2023). A systematic literature review on greenwashing and its relationship to stakeholders: state of art and future research agenda. *Management Review Quarterly*. https://doi.org/10.1007/s11301-023-00337-5

Scholtens, B., & Kang, F. C. (2013). Corporate Social Responsibility and Earnings Management: Evidence from Asian Economies. *Corporate Social Responsibility*

and Environmental Management, *20*(2), 95–112. https://doi.org/10.1002/csr.1286

Schumacher, K. (2022). *Environmental, Environmental, Social, and Social, and Governance (ESG) Governance (ESG) Factors and Factors and Green ProductivitY Green ProductivitY Productivity Insights The Impacts of The Impacts of Greenwashing Greenwashing and Competence and Competence Greenwashing on Greenwashing on Sustainable Finance Sustainable Finance and ESG Investing and ESG Investing*.

Soedjatmiko. (2021). Do Environmental Performance and Environmental Management Have a Direct Effect on Firm Value? *Journal of Asian Finance, Economics and Business*, *8*(1), 687–696. https://doi.org/10.13106/jafeb.2021.vol8.no1.687

Sridharan, S. A., Yan, Y., & Lombardi Yohn, T. (2023a). *ESG rating agency incentives * ESG rating agency incentives*.

Sridharan, S. A., Yan, Y., & Lombardi Yohn, T. (2023b). *ESG rating agency incentives * ESG rating agency incentives*.

Unctad. (2022). *World Investment Report 2022: International tax reforms and sustainable investment*.

Van Binsbergen, J. H., Graham, J. R., & Yang, J. (2010). The Cost of Debt. In *Source: The Journal of Finance* (Vol. 65, Issue 6).

Van Horne, J. C., & Wachowicz, J. M. (2005). *Instructor's Manual Fundamentals of Financial Management twelfth edition*. www.pearsoned.co.uk

Yaffee, R. A. (2003). *A Primer for Panel Data Analysis*.

Appendix